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.

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PREFACE

This document summarises the outcome of a training workshop, "Inter-active and dynamic approaches on forest and land-use planning", that was organised in Vietnam and Lao PDR during April 1999. The workshop was arranged by researchers from SLU, Umeå in co-operation with Sida and it's CCB Programme, the National Board of Forestry and concerned government institutions in Lao PDR – the National Programme for Shifting Cultivation Stabilisation, Ministry of Agriculture and Forestry and in Vietnam – the Forest Inventory and Planning Institute, Ministry of Agriculture and Rural Development.

The main purposes of this paper are

- To review and conclude the outcome of the workshop to all those who have participated or been concerned with it.
- To summarise an evaluation of the somewhat unique arrangement, with participants from different sectors, administrative levels, gender and countries.
- To present "the APM approach" on land use planning, which was put forward, tested and discussed during the workshop.

The input to the working paper originates from participants, resource persons and instructors who took part in the workshop. The editing has been made by Mats Sandewall.

Photo: The participants in the training workshop at Tam Dao National Park

HOW TO READ THE WORKING PAPER

- The first part of the Paper - *Section A* - provides a background to the workshop and it´s objectives.
- *Section B* consists of lecture notes from some significant parts of the joint Vietnamese-Lao session in Tam Dao National Park, Vietnam and the two concluding national seminars in Hanoi and Vientiane.
- In *Section C* there are two national case studies which have been prepared by some of the participants during and immediately after the Workshop.
- *Section D* covers the discussion during the two concluding national seminars.
- Some perspective papers on the workshop arrangement and the APM Approach are included in *Section E.* There is also a photographic part.
- *Section F* includes various practical details such as, terms of reference, time schedule, participants, reference documents and also an evaluation made by the participants.

ADDRESSES

Persons interested in the concepts of this document are welcome to contact the authors

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Part A

Introduction

The background and ideas of the training workshop

By Klaus Janz and Mats Sandewall

1. The background of the workshop:

The Lao-Vietnam training workshop "interactive and dynamic approaches on forest and land use planning" was carried out with support from a Sida-funded programme within the Swedish National Board of Forestry.

The Programme aims at strengthening the capacity of national institutions and organisations in developing sound national forest policies and collecting, organising and analysing the information needed for this. It consists of two major components:

- A series of annual training courses on the subject "Development of National Forest Policies and Strategies". So far, three (3) courses have been arranged. Some 25 participants from 10-15 different developing countries have taken part each year.

- A follow-up project named "Country Capacity Building for Planning, Assessment and Periodic Evaluations within the Forest Sector" (short "The Capacity Building Project").

The Lao-Vietnam workshop is an activity under the Capacity Building Project (see section 4). The Swedish part of the preparation and conduct of the workshop was contracted to the Swedish University of Agricultural Sciences (SLU), Department of Forest Resource Management and Geomatics.

The persons in the SLU team have been part of a research project in Lao PDR and Vietnam over the last 2-3 years - "People's Options on Forest Land Use" (section 3). The Project aims at developing new methods on forest and land use planning and strategy development. The approaches introduced in the workshop are very much related to the findings and experiences made in that research project.

One of the key concepts in the "People's Options on Forest Land Use" project is linked to the Area Production Model, APM (section 2). The APM is a computer based model aimed to be used as a strategic planning tool for elaborating scenarios on future land use, agriculture, forestry and socio-economic development. The originator of the APM is involved in the research project as supervisor and was a member of the SLU team during the training workshop in Laos and Vietnam.

The persons in the SLU team, and a number of the participants in the workshop, have been working with issues related to forest and land use planning in Lao PDR and Vietnam over the last 20 - 25 years (from time to time). That circumstance has facilitated the linkage of the introduced approaches and methods with the historical and current developments in the concerned countries, and the planning and policy issues of today.

2. The Area Production Model (APM):

The APM is a planning tool invented and developed by Prof. Nils-Erik Nilsson within the frames of an FAO Project in the early 1980s. Technically, it is a Windows-based computer program that can be used for developing scenarios on future land use, fuelwood balance, forest plantation development etc. However, the idea is that is to be used for broad purposes and as a help in analysing and understanding changes, identifying data requirements (what data are the most important) and strategic options.

The user of the APM could be anybody concerned with strategic considerations on the future land use and development within an area (government staff on central, provincial or district level dealing with the analysis of data for the purpose policy and strategy development or land use planning). It could also be researchers working with multi-disciplinary land use issues or e.g. persons related to national forest inventories)

The APM scenarios could be run for any defined geographical area (e.g. district or watershed). The required input data are of multi-disciplinary type and describing

- The current situation
- The rate of current and expected future changes

Some of the most important input variables are 1) Total Area divided into different land use types, 2) Population (urban and rural), 3) Economic growth, 4) Productivity in agriculture, 5) Production of different agriculture and forest crops 6) Demand and supply of timber and fuel wood.

The APM is to a large extent demand driven. It assumes that people's demand for subsistence food is of basic importance for their land use. If there is a surplus it will be used as marketable crop. Another assumption is that everybody - rich or poor - requires the same amount of subsistence food but the demand for market food depends on the income. So, subsistence food production depends on the number of people while the market food production is related to the income (expressed as GDP/capita). The available forest area is derived from the agriculture area. When people's need for agriculture land is satisfied, the remaining areas will be available for forest growth.

Over the last 2.5 years the APM has been used in several research and pilot studies in Lao PDR and Vietnam and previously in India, Thailand, Indonesia and other countries.

As a computer model the APM was recently upgraded into Windows. It still contains "bugs" and inconsistencies and should benefit from further refinement. Despite that, some major conceptual and practical advantages with the APM have been identified:

- It includes all land within a given area (village, commune, watershed etc. according to the wish of the user). It acknowledges the actual land use, therefore, is not recommendable for "planning data" but requires good estimates of the actual current land use. It is not a "black box" but a transparent model where any calculations could basically be done and checked on a paper. It is model for integrated, interdisciplinary planning and data analysis.

3. The People's Options on Forest Land Use research project:

"People's Options on Forest Land Use" is a PhD research co-operation project undertaken by a team of researchers of SLU, Department of Forest Resource Management and Geomatics in co-operation with concerned institutions in Vietnam and Lao PDR. The Project was started in 1996 and is funded by Sida/SAREC.

The Project is multi-disciplinary concerning it's scope and also with regard to the persons working with the project. A forester (Mats Sandewall), a sociologist (Bo Ohlsson) and an agronomist (Ruchatorn Kajsa Sandewall) jointly undertake the research together with national research staff in Vietnam (FIPI) and Lao PDR (Shifting Cultivation Stabilisation Research Project, National Office of Forest Inventory and Planning and the Lao-ADB Forest Plantation Project).

The objective of the Project is to develop approaches and methods that could improve the process of strategic planning in relation to a sustainable use of forest land, with special emphasis on mountainous areas in Southeast Asia with extensive shifting cultivation.

A focus of the Project is the actual decision making process at different levels and the role of different stakeholders. The Project suggests that both government and the villagers have and work along with their own land use strategies. It also emphasises the importance of applying a historical perspective in strategic planning and the need to involve all concerned stakeholders in the planning process.

The field research has been concentrated to two study areas – the Upper Nam Nan Water Catchment Area, Luang Prabang Province, Lao PDR and Ban Lau Commune, Lao Cai Province, Vietnam. In the Lao study five (5) sets of photos of different dates ranging from 1953 to 1996 are analysed, i.a. regarding the extent of cultivation, forest cover, population and (indirectly) agriculture yield. Reasons behind changes are sought through interviews in the seven (7) villages of the watershed. In the study in Vietnam the historical development, the actual current situation and the ongoing changes are studied and used as a base for analysing and comparing the government long term plan and the farmers expectations and ambitions.

The planning approaches include

- analysis of air photos and satellite imagery
- an independent point sampling inventory with local key informants for determining current and historic land use
- socio-economic studies including PRA methods
- use of existing data at village, district and province level and the analysis of the policy and strategy development over a certain period
- use and development of the Area Production Model as a strategic planning tool in order to analyse various scenarios and options.

Two Working Papers (SLU, Department of Forest Management and Geomatics) have been produced by the Project and a series of articles to be published in scientific journals are under preparation.

4. The Country Capacity Building (CCB) Project:

The Project and the Programme, of which it is a part, can be seen in the context of follow-up to UNCED and Agenda 21. In Chapter 11 of the latter it is stated:

"Assessment and systematic observations are essential components of long-term planning, for evaluating effects, quantitatively and qualitatively, and for rectifying inadequacies. This mechanism, however, is one of the often-neglected aspects of forest resources, management, conservation and development. In many cases, even the basic information related to the area and type of forests, existing potential and volume of harvest is lacking. In many developing countries, there is a lack of structures and mechanisms to carry out these functions. There is an urgent need to rectify this situation for a better understanding of the role and importance of forests and to realistically plan for their effective conservation, management, regeneration, and sustainable development."

The formulations above witness of awareness that both assessment techniques and the capacity to formulate and implement forest sector policies need to be strengthened. National forest inventories (NFI) are of little value unless there is a use of their results in a political process at national or province level. Where NFI:s are carried out their results are often poorly used or not used at all. At the same time, there is a request and need for appropriate information to support the formulation of adequate policies. Too often, data collection is done in a standard fashion and in isolation from the planning problems of real life. This is true at all levels, from national to local.

The programme of which the Capacity Building Project is a part addresses these inadequacies. Among others it aims at a better understanding of questions such as:

- what does a good policy process imply;
- how can national and local planning be better oriented towards real life problems;
- how should forest inventories and other information gathering in the forest sector be organised to better meet the needs of users.

The Capacity Building Project can provide a number of tools and activities such as

- seminars and workshops, preferably for groups of neighbouring countries;
- study tours and fellowships;
- computer hardware and software support;
- provision of "seed money" needed to start activities that fit the project objectives;
- visits from the Swedish side to promote follow-up activities in various countries;
- establishment and maintenance of a network of contact persons for exchange of experience and information;
- promotion of the underlying ideas of the programme in suitable ways;
- help in the development of tools for planning and data collection such as the Area Production Model (APM) and data collection guidelines;
- support related to capacity building activities of FAO.

Being a follow up to the annual training courses, the project seeks to support former course participants to apply the experience gained in their national environment. However, activities can be initiated from other contacts as well. The workshop

reported in this document had its origin largely in a visit made by the project leader (Mr Klaus Janz) to Vietnam and Lao PDR in March 1998 in order to discuss co-operation with the national authorities of the two countries.

5. The aim and ideas of the Lao-Vietnam training workshop:

The Lao-Vietnam training workshop originates from a set of related activities:

- The identification of key problems related to "planning" and strategy development and needs to improve "planning".
- A "planning" concept/tool (the Area Production Model)
- A research project aimed at developing new methods for "planning" and engaged in testing the applicability of the APM in combination with other tools and available experience (People's Options on Forest Land Use)
- A capacity building project aimed to promote and introduce new planning approaches based upon existing knowledge and experience (the CCB project)

The training workshop is justified by the current planning practices as described in Section 4 (the gaps in communication and understanding among different stakeholders and sectors, policy versus forest inventory and so on).

The main objective of the training workshop has been expressed as follows

- By exposing the participants to new approaches on commune level forest and land use planning and strategy development the workshop would provide an input to considerations of how the planning system could be improved.

Some significant ideas have influenced the design of the training workshop:

One of those ideas is a) presenting the new methods generated in the research project b) letting the participants apply and test those approaches in a case study and c) letting them present their findings to their countrymen in a concluding seminar.

The planning approaches tested during the workshop have been presented as one concept under a given name - "the APM approach". It is further explained and exemplified in other parts of this report.

A second idea of the workshop is to link the introduced planning approaches with the relevant planning issues in the concerned countries:

In Vietnam, the state planning system has a long tradition and involves hundreds of thousands of people on all administrative levels of the society. Over time, the system has been of help to the government while implementing policies and programs. However, the rapidly changing socio-economic and environmental conditions in Vietnam coupled with recently introduced policies and strategies on the use of the natural resources has generated new requirements on the planning system.

During the 1980s, in the Bai Bang Pulp and Paper Mill Project, it became obvious that "forestry problems" cannot always be solved by pure forestry solutions. Many lessons can be (and were) learnt through the experiences of that Project.

The ongoing and very ambitious "5 million hectares reforestation program" is an apparent example of recent policy efforts creating new requirements – how can planning support such a programme, which is to be based on the deliberate work and initiative of millions of villagers.

In Lao PDR, the Government has strongly increased it's policy efforts in forestry, agriculture and land use over the past ten years. The strong efforts to stabilise shifting cultivation, the setting aside of vast forest areas for bio-diversity conservation and the forest land allocation programme are some examples. However, it is concerned with similar limitations in the planning as the Vietnamese government.

A third significant idea of the workshop is the attempt to identify major stake-holders (those who need to be concerned with the planning or are influenced by the outcome of it) and to let them participate and be exposed to the new concept.

For that reason the workshop includes staff at provincial and commune level, central government staff concerned with planning, policy development, data analysis and data capture and researchers. It also includes both men and women. In the workshop the participants inter-act with another important group - the local villagers - during practical exercises.

Regarding the Terms of Reference for the training workshop, see Annex 1!

As a whole, the training workshop should not be seen as a training course or the introduction of a developed planning system. Instead, it is considered a purposive experiment and a way of introducing new ideas and new ways of thinking and working with planning and strategic issues. Hopefully, it has fulfilled it's objective.

Part B

Lecture notes from introductory course week and concluding seminars

OPENING SPEECH

Dr Nguyen Huy Phon

Deputy Director of Forest Inventory and Planning Institute (FIPI)
Ministry of Agriculture and Rural Development (MARD)

Note: This speech was made in the final seminar of the Vietnamese session of the workshop in Hanoi on April 26.

Distinguished participants, ladies and gentlemen,

At first, on behalf of seminar organizers, I would like to welcome all participants, international delegates, scientists, managers… for your coming and attention to one of the important issues in upland rural development that is forest and land use planning.

In Vietnam, planning has for years attached much importance by Government, Ministries, economic sectors and local authorities. Ministry for Agriculture & Rural Development (MARD) has prepared Master Plans at both sector and sub-sector levels as food production, forestry, husbandry, irrigation etc.

Most of the provinces or even districts have also integrated socio-economic development plans to direct operational project planning those, to some extent to both sector and local development.

However, weaknesses in basic survey, analysis and forecasting of resources, lack of well co-ordinate approaches for sectors and regions as well as pre-conditions for project implementation have made many projects unfeasible.

Not less projects prepared in previous time having no economic and technical elements now get backwards and unrealistic both in development targets and approaches. Technically, there were many shortcomings and lack of synchronization of methodology and tools used for planning.

To orient the agriculture and rural development in the coming 10-20 years, the Prime Minister has enacted a Decree No 32/1998/Ct-TTg for reviewing and completing all provincial development plans which are considered as important bases for subsequent micro development planning (at commune, village and sector levels).

Forest and land use planning gets more important, especially in upland and/or barren land areas where land use plans will be a well-founded base for land allocation one among important precedence for agriculture and rural development and environment protection.

To contribute to the development and completion methodology in land use planning in Vietnam, encouraged by MARD, since 1997 FIPI has co-operated with the Swedish University of Agricultural Sciences (SLU) to implement the Project "People's

Options on Forest Land Use" in some communes of Muong Khuong, an upland district of Lao Cai.

Data and information on land use, population, historical factors affected the land use, farming systems, cropping and live stock system, forest cover, land productivity, household economy… were collected and analyzed to develop commune land use plans on sustainable and ecological basis.

Dialogue, Participatory Rural Appraisal (PRA) and Area Production Model (APM) have been used as tools to support research and planning process.

To create opportunities for sharing experience in forest and land use planning, International Cooperation Department (ICD) of MARD and Country Capacity Building Program of Sida have supported FIPI and SLU to implement a training program basing mainly on lessons withdrawn from "People's Options on Forest Land Use".

This training workshop "Inter-active and dynamic approaches on forest and land use planning" is one of the activities in such training program.

The training part from 12 to 22 April has taken place in Tam Dao National Park for participants from institutions related to land use planning in Vietnam and Lao. There, participants were introduced concepts and technical tools and given opportunities to exercise themselves in community based forest and land use planning.

This seminar aims at resuming the training workshop. Issues and ideas in forest land use planning, some scenarios of land use in Tam Dao as results of training part will be introduced and subjected for comments and discussions.

We are sure to get valuable contributions from all of you in completing approaches in forest and land use planning which will be meaningful for the implementation of the National Project of 5 million hectares of plantation in Vietnam.

By the occasion I would like to express my great thanks to MARD, ICD, CCBP of Sida, SLU, FIPI, People's Committees and institutions of Lao Cai Province, Tam Dao National Park, scientists and managers of institutions and organizations concerned with Vietnam for their impartial and effective supports to us, both in research process and in organizing the workshop.

I am in honor to invite you to start the Seminar and do wish it will be successful.

Thank You !

Opening statement

By : Silavanh Sawathvong

Committee for Land Management and Forest Land Allocation,
Head of National Shifting Cultivation Stabilization Programme.

Note: The following speech was given in the final seminar of the Lao session of the workshop in Vientiane on April 30.

Distinguished Guests, the Lao Team and the SLU Team,

It is a great pleasure for me to have the good opportunity to attending this seminar on "a dynamic planning on agriculture and forestry land use" which is related to the socio-economic development of our country. – The national economic structure is based upon Agriculture and Forestry Production with close links to processing industries and the Service sector.

The Government is now implementing the 4th Socio-Economic Development Plan (1996-2000) and consolidating the Strategic Plan up to the year 2020. The main targets are:

- Uplift the Lao PDR from the level of "least developed country".
- Upgrade the living standard of the People
- Country capacity building
- Advance the social welfare with a good justice

Eight (8) National priority programmes were strongly implemented on the grass root level with its' achievements according to annual targets. Land use planning and forest land allocation process was widely spread through the Country. The macro-level land use planning concerned 7 plains for agriculture development, especially for rice production, 20 National bio-diversity conservation areas, 77 focal sites for integrated rural development and some watershed protection for hydro-power projects.

So far, forest land allocation has been carried out in about 4000 villages. – Actually, the forest land allocation process is the land use planning at village level, with participation of the local people. It includes consultation to identify the suitable and sustainable farming systems to generate incomes and food security in parallel to sustainable conservation of natural resources such as soil, water and forest for the coming generations.

Distinguished Guests,

In 1980, FAO designed a model for land use planning for agriculture and forestry development based upon a holistic and multi-disciplinary approach. – The most important components in the model are Population Growth, Economic Growth, Agriculture Land Use and Farming Systems, Forest Land Use and it's management systems. It was named the Area Production Model or simply "the APM".

Professor Nils-Erik Nilsson, who is with us in this room today, will tell us about the story of this program. Being a modern computer program, it has now also been developed into Windows software.

During this Pimai Lao, a Lao team has attended a training workshop in Vietnam. Afterwards, it conducted a field exercise with APM application in Houay Cheme focal site of Vientiane Municipality and Naxaithong District. They will present their case study. The presentation will be followed by an open discussion. Any comments and suggestions from the audience are welcome in order to improving and strengthening APM application in Lao PDR.

So, may I request all delegates to be active in contributing their views and ideas and sharing experiences together in a constructive way.

I hereby declare this seminar open and hope it will be successful.

Experiences of the Bai Bang Project – memories from the early days

By: Prof. Nils-Erik Nilsson

Note: This presentation was made on the first day of the joint session of the training workshop in Tam Dao National Park, April 12.

Respected Participants, Ladies and Gentlemen

I have been asked to present some personal memories from the early days of the Bai Bang project. Let me begin telling you that I have never been formally involved in the project. I have never visited Bai Bang either. As a matter of fact this is my first visit to Vietnam ever. I am happy to say since late is better than ever. Still I have been following the evolution of Bai Bang from a spectator's perspective.

The last few days only, I have had the opportunity to read two newly published evaluations reports on Bai Bang. These give a very detailed and mostly positive account of what has happened since the first ideas of building a pulp and paper mill in Vietnam came up. That was as early as in the middle of the 1960's.

The first Vietnamese negotiation delegation came to Sweden in 1969. Sweden had been among the first countries in the world to recognise the Government of Vietnam. In addition the Swedish Prime Minister Olof Palme had deeply annoyed the Americans by condemning the American aggression and not least their heavy bombing of Vietnam. On behalf of the Swedish Government he had also promised a substantial support to Vietnam.

At this time I was a professor at the Department of Forest Survey of the Forest College of Sweden. This meant that I was in charge of our national forest inventory and was also in charge of our wood supply and demand projections. I had also gained some experience of pre-investment survey of forest resources in India. For this reason I was invited to meet with the Vietnamese delegation. This is long ago, but I remember well, how decisive the delegation was with respect to their wishes for Swedish support. I remember a high-level delegation of 10 to 15 persons, out of which one or two were women. The men were clothed in dark suits and appeared to be very serious and dedicated. Most of them spook only French. This made my communication with them somewhat uncomfortable due to my very weak knowledge of that sophisticated language. By the way, if we Swedes are talking too fast or are using a too complicated Swedish English during the coming days, please, do tell us and we will try to adjust ourselves.

The wishing list of the delegation contained two items: They wanted support to one pulp and paper mill and to one hospital. As most of you know both projects got realised. In the case of the pulp and paper mill, however, it was to a considerable cost and there was a quite long time between the project started and the inauguration of the mill.

Some years later I was asked by Sida to look at the report of the wood supply study that had been undertaken. I must admit now, that I hesitated very much to give an OK to these forecasts. To a great deal the potential supply of raw material was based on the inventoried bamboo resources. Missing in the study was a realistic assessment of the actual utilisation of these resources. Ever since then, this has been one of my favourite themes: We need to have a good knowledge about actual use of land and trees. There is virtually no land that is not used in one way or another.

Other reasons for my hesitation was the complexity of large-scale logging and bamboo logging in particular. My advice therefore was to go along with the construction of a paper mill as a first stage and to feed that mill with market pulp. A pulp mill could be set up at a somewhat later stage when the wood supply had become better secured. I am afraid that Sida did not receive my proposal with much of enthusiasm. But this is long ago. Still I withhold that decisions on such large investments should not be taken until there is a sufficiently good knowledge base available. At the same time I have much admired the long-term decisiveness to make the Bai Bang project an eventual success, both of the Vietnamese Government and Sida and of all the people involved in the implementation.

On Friday last week, just by chance, I got the opportunity to take part of a briefing for the Swedish community in Hanoi on the immediate plans for extension of the Bai Bang. I will finish my presentation with a short summary of that briefing.

The mill was inaugurated on 26.November, 1982.

Today, 16 years later there is an annual production of 48 000 tonnes of sulphate pulp made from bamboo, acacia and eucalyptus. There is an annual production of 60 000 tonnes of fine cultural paper that is above the designed capacity of 55 000 tonnes. The mill is basically self-sufficient with energy. There are around 3000 people employed but with the qualification that a further big expansion of the mill can be done without creation of any more labour opportunities. The mill has been the basis for a very good development of infrastructure and social institutions.

Next millennium: Phase 1 of the proposed expansion of the mill includes an expansion of the sulphate mill from 48 000 tonnes to 60 000 tonnes and an expansion of the paper mill from 55 000 tonnes to 100 000 tonnes. The proposed start for the expansion work is set to later this year and the work should be completed during the first year of the next millennium, that is in the end of year 2001.

Let me finish this short presentation with an attempt to answer a question that may be in the air: Why has the Vietnamese Government taken a decision of expansion of Bai Bang? (Well, do not ask me, ask the Government.) My attempt for an answer is the following: The per-capita consumption of paper in Vietnam is less than 4 kg per year as against 400 in US, 300 in Sweden and around 12 kg in India. In connection with the rapid growth of the economy in Vietnam a drastic increase of paper consumption is forecasted. It is then natural to consider Bai Bang a backbone of future paper industry in Vietnam, thanks its well-developed competence both at the managerial level and the working level. Another reason of course is that Bai Bang now, with its capital costs written off, is a viable commercial undertaking.

Experiences of the Bai Bang Project - memories and observations from the 1980s

By: Mats Sandewall

Note: This presentation was made on the first day of joint session of the training workshop in Tam Dao National Park, April 12.

Respected Guests, Ladies and Gentlemen, Dear old Friends,

My family and I had the real pleasure of coming to Vietnam for the first time in April 1981. I was to work as "wood-supply planning adviser" for the Bai Bang Project and it was my first job in a developing country. The job description mentioned that I should assist the Vietnamese Forestry and Raw Material Organization in establishing "an even flow of wood" for the Bai Bang Pulp and Paper Mill. The Mill was just about to start operations. Those two years, added with a third year in 1986, became a (positive) experience of life that will always be on my mind.

The task was to develop a planning system and to train the staff of the six forest enterprises of "Ham Yen-Bac Quang Forest Company" to plan and implement road building, logging and wood transport (by buffalo, tractor, truck and raft) in such a way that the Mill received what it needed at the right time.

Mostly, I worked and travelled with my counterpart who was a forester and later on became the Head of a Design Enterprise. We worked with forest enterprise leaders and so called design brigades, some of them without vehicles and without road connection. Their living conditions were tough without electricity, TV or "Karaoke", with shortage of rice and the rest of their family living in their home provinces of Ha Nam Ninh, Ha Son Binh, Hai Phong and other places in the Red Rive Delta or along the Coast of N. Vietnam. When hard working enterprise staff travelled on duty, usually on foot or bicycle, they often brought only a note book, an extra shirt, a tooth brush and a bottle of home made "vodka". Sometimes they also had some money, but there where not too many opportunities to spend it in those days.

My stay in Ham Yen was rather much focussed on trees and bamboo, logging and pulp, roads and transports, plans and reality, chicken and rice wine, the Vietnamese way and the Swedish way. However, it also brought me in much closer contact with the people and their life than my work in Sweden has ever done. When I go back to those years in my mind from time to time I often make new discoveries.

Some early observations struck me when I came here the first time (maybe you disagree on some points but this is what I found):

- The local farmers living in the RMA were basically <u>not</u> involved in the Bai Bang Project in those years. They were somehow considered "part of the landscape". Instead, young mostly unmarried men and women from the Delta and the Coastal Areas moved up to work in the forest and build up a new life under sometimes great struggle.

- The relations between local people and foresters were not unfriendly but there was not very much mutual understanding and contacts. As expatriates, we stayed over night in the forest enterprises and brigades but never with the local farmers.

- Only a minor part of the wood and bamboo that was cut did arrive to be used in the Mill. More than 50% "disappeared" along the way from the forest stand to the Mill Site.

- When it came to forest plantations there was often tension between local people and those of the forest enterprises. Grazing was a land use that did not match very well with plantation establishment.

- Most of the local people in the Area and a major part of the people in the HBFC had never seen a Pulp Mill, nor had they had opportunity to experience what was the "end use" of the wood they produced.

- Project vehicles were constantly used for transporting people to the market, bringing wood to build private houses, excavating land for building fish ponds and other purposes that were "wrong" in our idea at that time.

- New roads constructed to open up new areas for bamboo harvesting etc. were often cleared by shifting cultivators before cutting could take place (but often after they were planned to be cut). Many people moved in and settled along the new roads.

- Official figures of forest plantation areas were greatly exaggerated. It seemed as if many foresters on the local level agreed that certain areas in the plantation records did not exist in reality. However, as they were official figures originating from official Plans they could not be changed. "According to the Plan" was an expression used with a sting of irony for data that were not to be trusted.

When I returned for my second assignment in 1986:

- Much of the plantation forests were gone, the RMA had been increased to cover many provinces. Almost everybody was concerned of the shortage of wood that limited the Mill production, and the landscape looked barren and not lush green as the first time. People's views on wood supply was more pessimistic also on the Vietnamese side.

- Huge investments were made to convert degraded lands near the Mill to Eucalyptus plantations. The first signs of private activities with people selling wood to the Mill could be seen.

Last year (1998), and another two times during the 1990s, we have had the opportunity to spend a few days travelling in our former working area, meeting old friends, talking about old times and the situation of today.

- Few people are now working in the forest enterprises in the North as compared to before. But.... many people who have had to quit forestry are still living around

the former brigades in the North and producing oranges and other crops. We got the impression that they now have a better life quality than in the past. We also met some friends who had not benefitted at all but were still very poor and looked back at the 1980s with remorse.

- The Bai Bang Mill is not in any raw material crisis any longer but producing above the designed capacity of 55 000 tonnes. Some of the former state forest enterprisis are still in operation and producing wood for Bai Bang, but a lot of the wood supply (some 30%) now originates from private farmers who grow and sell by themselves.

- The infra-structure around Bai Bang has grown in an astonishing way. A tiny village with a few shops and vegetable stands along the road some fifteen years ago is now a bustling town and market place.

- The urban areas have developed fast but the environmental and socio-economic change in the remote and hilly parts does not appear to be so significant.

To sum up with:

- The Vietnamese view upon the future raw material situation has changed drastically over time from the optimism of the mid 1970s through the negative perspective of the mid 1980s and onto the new optimism of the late 1990s

- Local people's need and use of land for agriculture and wood for their own use has over and over again influenced the development of the forests and the wood supply situation

- What seemed to be poor resource use by foresters in the 1980s turned out to benefit the life of many people in the Area in other ways

- Change of wood supply strategy from a centralised one to a more household and market based strategy has dramatically improved the wood supply situation.

- Limited contacts between "grassroots" (local people) and officials and limited understanding among officials of the life situation and driving forces of rural people has hampered development

- Strong reliance on plan figures has made it difficult to seriously face a problematic raw material situation with appropriate strategies

Experiences of the Bai Bang Project - summary of Sida evaluation

Summarised by Bo Ohlsson

Note: This presentation was made on the first day of the joint session of the training workshop in Tam Dao National Park on April 12.

1. Background

- Sweden the first western nation to recognise North Vietnam 1969
- Discussions of development co-operation started 1969
- Outcome: Integrated pulp and paper factory in Bai Bang
- Objective: improved living standard for the Vietnamese people through domestic production of paper (for the schools)
- The project met resistance from the Swedish forest industry
- Reluctantly approved by Sida board in 1974

- Budget and plan: 700 million SEK and a duration of four years. The total costs were eventually 2.7 billion SEK, some 6.5 billion SEK in 1996 prices.
- The first economic/aid co-operation with a western nation for Vietnam

2. The evaluation

- Two independent parts:

- How was the project idea initiated, implemented and finalised: "A Leap of Faith - a story of Swedish aid and paper production in Vietnam, the Bai Bang Project, 1969 - 1996" (CMI, Bergen, Norway)
- An evaluation of the development effects of the project: "Paper, Prices and Politics - an evaluation of the Swedish support to the Bai Bang Project in Vietnam, 1969 - 1996" (CIE, Canberra Australia)

- In addition, three more studies. The evaluation covered a period of 15 months

3. Project Phases and Development

- 1969 - 1970: Project concept
- 1970 - 1974: Planning and negotiations
- 1974 - 1982: Construction, overdrafts
- 1983 - 1985: Expansion, new supporting projects
- 1985 - 1990: Phasing out, searching for a new strategy for sustainability

4. Some conclusions

- During all stages of the project, the issues below were always present:

1. How to get raw material of satisfactory quality and quantity for the mill;
2. To develop a professional, skilled and motivated labour force
3. To make the mill complex financially sustainable

- The single most important factor/event to influence the project was the economic reforms in the late 1980´s, including land allocation. Without these reforms, it is not likely that the Mill had succeeded and that raw material supply been secured.

- Economic and financial sustainability are achieved. Under certain circumstances, the Mill has the potential to finance and expansion of up to 100,000 tons per year.

- Economic effects - the Bai Bang has had a substantial positive effect on the regional economy. In a national context limited influence except as a "management model" and in terms of paper production - 26 % of all paper produced in Vietnam comes from Bai Bang.

- Production - the Mill is well run and the forest production systems are sustainable

- Human resource development - the vocational training very positive. Some 25,000 gainfully employed, involving some 100,000+ persons.

- Living conditions and culture - increased welfare, smooth transition from farming to employment

- Value for the money?

5. Lessons learned

- Economic conditions and policies in the country very important. Without the economic reforms, the land allocation and the decollectivisation of forestry, the project would very likely not have succeeded.

- Local propriety of the project essential.

- Action to stimulate local institutional reforms more important than conditionalities

- For long-standing development co-operation to succeed, political visions and engagement at high level important for "survival". However, in the end, it was the Vietnamese economic reforms which saved the project

- Modern techniques and management must be adjusted to local social and cultural conditions and thus there is need for understanding those.

Development, Resource Management, Land Use Planning and Conservation in Lao P.D.R.

By : Silavanh Sawathvong

Committee for Land Management and Forest Land allocation,
Head of National Shifting Cultivation Stabilization Programme.

Note: This presentation was made during the joint session of the training workshop in Tam Dao National Park on April 15.

1. Natural Resource base :

Lao P.D.R. has a land area of 236,800 km2 and its comprised of predominantly rugged, mountainous terrain, the Western border of the country with Thailand and Myanmar is demarcated by the Mekong river. To the East, the high mountains of the Annamite Range and the northern highlands delimit the border with Vietnam. The borders with China in the North and Cambodia in the South are more physiographically contiguous, with less clearly defined physical barriers to diverse factors such as migratory wildlife, transnational infrastructure development, and cross-border trade.

The altitude varies from 300m to more than 2500m above the sea level. The permanent agriculture areas are on the forest land along the flat land along the Mekong river and its tributaries that mostly are located in the central and in the Southern part of the country.

The rural uplands of Lao P.D.R. concern, in most cases, areas with livelihood system predominated by the traditional practice of swidden-based farming system (or shifting cultivation system) especially in the Northern part of the country. Compared to its neighboring countries Lao P.D.R. is still rich in forest resources. The forest cover was estimated at 53% in the 1997 (FAO, 1997). However land use conflict, unsustainable natural resource management and forest fire are the main culprits for natural resources degradation.

2. Government Policy :

2.1. Economic liberalisation policy :

The general economic development policy of the GOL is based on the New Economic Mechanism (NEM) initiated in 1986. The NEM has two main goals : (i) stabilisation of the economy and (ii) transition from central planning to a market oriented growth.

Over the last decade the NEM has had a significant impact and success, including reducing infiltration, stabilisation of the exchange rate, increase in foreign investment, and a high growth rate in exports. The NEM was followed by a phase of structural transformation, which placed high priority on large scale infrastructure development,

such as National roads, hydropower plants, urban water supply systems, and Government sponsored large scale irrigation systems. The present public Investment Plan (1996 - 2000) places investment priority on communications and transport, health and education and gives higher priority to rural development.

2.2. Focal sites for rural development :

In 1994, the GOL adopted a resolution which highlighted the importance of rural development. It laid down the idea of establishing focal sites throughout the country as loci for rural development.
A National leading committee for rural development was established as well as provincial leading committees in every province. During 1995 - 1996, the provincial rural development committees identified focal sites and prepared development plans for each of these sites.

2.3. Land use planning, Forest- Land allocation, Land management Policy :

The Land has a long standing policy of heading over land and forests to the people for their protection, management and use. In part, this policy is limited to a clear recognition of the need to stabilise shifting cultivation by the development a more efficient system of agricultural production combined with adequate protection of natural resources. The programme is a thorough approach which covers allocation of land, development of agreed management rules and procedures at the village level, extension services to increase capacity for conservation management of ,and forest resources and conservation agricultural practices, and development of a process of review and revision.

The GOL has established a deadline of the year 2000 for the completion of Land – Forest allocation in protection areas, watersheds, and other areas affected by shifting cultivation

2.3.1. Formation of Land Management and Land - Forest allocation Committees

The formation of Land Management and Land Forest allocation at National, provincial, district and village level was initiated in 1996. At each administrative level the permanent offices of these committees are located in Prime Minister Office in case National level and in Provincial administration office in case provincial level and other level act as ad-hoc groups. These committee have the following responsibilities :

- to disseminate widely the land management and Land - Forest allocation policies so that all citizens clearly discern their obligations, interest and responsibilities in protecting, managing, using and maintaining land and Forest resources in a sustainable manner.
- to regulate National lands and forest in line with the National socio-economic development plan, contributing to the improvement of rural population's living conditions.
- to strengthen capacity building of Land -Forest allocation management Agencies from central to local level and to improve a better coordination mechanism.

2.3.2. Formation of National Programme for shifting cultivation stabilisation :

In recognition of the importance of an integrated approach to upland development the GOL formed and executive agency under MAF in 1998 named NPSCS. This is one of eight priority National Development Programme within this organisation are units for extension, LUP and LA and Monitoring and evaluation. The role of the NPSCS as indicated in Ministerial decision 1220/ AF / D.P 98 includes " Land use Planning in areas of high incidence of shifting cultivation and extension agriculture production in selected areas (focal site) and the identification of Forest-land use areas with village committees for management and protection of Natural resource such as soil, forest and wild life ".

3. Government Action :

The GOL has taken a number of steps to implement its policy frame work, particular in the areas of agriculture, Forestry, Conservation and energy development. GOL action has included :

Agriculture :

- Develop 7 plains for rice production to achieve a self sufficiency in rice .
- Strengthen irrigation system to support 2 season cropping.
- Expand and diversify a market - oriented agricultural system, with a move from a subsistence to a market - based production system in focal site.
- Promulgation of Agriculture Law

Forestry :

- Implementation of shifting cultivation stabilisation for environmental Protection Programme (commenced 1976, ongoing)
- Formulation and implementation of a National Forestry Action Plan with a number of operational programme components funded by various donors (1991, ongoing)
- Declaration of a number of Prime Ministerial decrees aimed at securing better forest management and implementation of a reforestation programme .The latest step, development of legal framework, was enacted the Land Law, Forest Law and Water Law.

Energy :

The country's first hydropower dam, the Nam Ngum, was commissioned in 1971 with an installed capacity of 150MW (70 % export to Thailand). Since then, as part of the work of the Mekong River commission, more than 60 " promising " sites have been identified on the tributaries of the Mekong within Lao P.D.R. (K. Phonekeo, 1994). It has been estimated that the country has a generating potential (including hydro-carbons) of over 18,000 MW, of which only one percent has been developed. In addition to the Nam Ngum dam, another dam was built on the Xeset River on the South in 1991 (45 MW-80% export to Thailand), and small dam at Selabam in the same year. A run of the river capacity has been installed at Nam Song-work is

currently under way on the Houay Ho at Attapeu, and on the Theun -Hinboun in Khammouane province. The largest capacity dam planned to be built in the short term is the 681 MW NamTheun II - currently the subject of protected financial negotiations.

As well as abundant water resources, Lao P.D.R. contains reserves of lignite and coal. The mining rights to a large deposit at Hongsa, in the North, has been sold to Thai Investors. A 600 MW power station is proposed to be built there by the year 2000.

Conservation :

- The Government 's major achievements has been the declaration of Prime minister's Decree 164 in 1993. This decree formally established the Protected Areas system, initially with 18 areas but now with 20. About 12,5% of the land area (almost 3000km2) is now legally protected.
- In 1993 the Science, Technology and Environment organisation prepared a National Environmental Action Plan with assistance from the World Bank.

Land use Planning and Forest land allocation :

- Forest -land allocation achievements were very modest until 1993- Decree 1993, on the management and use of Forest land, provided for allocation of Forest areas to communities and agricultural land to families.
- From 1995 a number of donor Projects became more active in programs related to forest and land allocation. Model and method development activity was undertaken in a diverse number of locations and contributed to improve forest - land allocation procedures for different agro-ecological situations including subsistence farming, commercial agro-forestry and village production forestry systems. This resulted in initiatives in joint forest management between provincial / district governments and rural communities, in which participatory approaches play a major role.

4. Problems :

The link between development, resource management, land use planning and conservation is considered as one of the major problems (and Lao P.D.R. is not alone in this) which is the lack of a coordinated, cross sectoral approach to develop planning.

Infrastructure (in particular roads and utilities), tourism, resettlement, energy, logging, mining and other development activities are implemented in an ad-hoc and uncoordinated way, even if at the policy level they appear separately to be complying with National development goals.

5. Remedies :

In order to overcome this situation there is an urgent need for coordinated and comprehensive regional and district approaches to land use and development planning, based on sound assessment of all relevant environmental and social parameters. The Government has official devolved responsibility for National policy implementation to provincial governments...and it is at this level that important economic development decisions are made and implemented. This is not to suggest that regional planning is a remedy which will be resolve all issue.

However, it can be an effective mechanism for establishing a development framework which involves all affected parties, presents the physical opportunities and constraints to be dealt with in the planning area, provides the basis for evaluating sustainable development options, and facilitates much – needed coordination between the National, provincial and district levels of Government, as well as the para - statal entreprises which are driving development in many parts of the country. But, there is a need to review national land use planning. This is a great challenge for APM to be tested in Lao PDR.

References:

1996, Resolution of the 6th Party Congress
1996, Socio-economic development plan 1996-2000
1996, The First National Review on land use planning and forest land allocation Conference.

On land use planning, forest land allocation and development of mountainous areas in Vietnam

By : Dr Hoang Sy Dong

Head, International co-operation section of FIPI

Note: This presentation was made during the joint session of the training workshop in Tam Dao National Park on April 16.

1. Difficulties met in the mountainous area:

- Forest loss, lack of water and soil degradation are main reasons leading to undesirable situation during the course of socio-economic development.
- Serious food deficit and starvation during between-crop periods, coupled with shortage of other necessities such as oil and salt.
- Insufficient knowledge of food production and livestock and lack of basic studies on ecology and biology for the sake of sustainable resource management.
- Limited market opportunities for agricultural prroducts, though available in small quantity (the market perception has not been fully understood in the present context of Vietnam).
- Lack of capital for production and education development and poor primary health care. This situation has caused difficulties for agriculture and forestry production.
- Underdeveloped transportation infrastructure disables food distribution for the mountainous areas which suffer from starvation while Vietnam as a whole has surplus food production.
- Lack of co-ordination between central and local authorities, between sectors working in the same area, between different projects and between micro and macro development activities.

2. Methodology approaches

2.1 Top-down approach

- when it was applied
- achievements made when using the approach
- difficulties faced during the economic development period after the reunification of the country

2.2 Bottom-up approach

- applied in the early 90s
- achievements made, especially the involvement of people in afforestation activities through the 327 Programme
- difficulties faced during the introduction of the approach (combination, management as well as denial of good results in socio-economic development

2.3 Combination and integrated solution for development issues

- reasons for changing approach
- when the above mentioned two approaches were combined in land use planning, forest land allocation and community development (since 1996)
- achievements made in community development, land use planning and forest land allocation
- difficulties in combining the two approaches in management and development activities

3. Tools employed in land use planning, forest land allocation and development of the mountainous areas

a. Semi-structured questionnaire
b. Sample plots
c. Map, land use diagrams and land use planning sketch map
d. Venn / organisational diagram
e. Tree and domestic animal appraisal method / diagram
f. Seasonal calendar
g. Landscape transect
h. Soil and site assessment method / diagram
i. Village development history
j. Erosion and hydrological model
k. Household economic analysis at different levels
l. Nursery management and / or nursery scheme
m. People´s book-keeping system or statistical method
n. APM
o. Development plans at different levels

4. Principles and guide-lines for land identification for the 5 million hectares reforestation programme

4.1 General principles

a. Harmonise central / local authorities' priorities with needs and aspirations of local people
b. Carry out within existing legal framework and with consideration of local traditions and customs
c. The 5 million hectares reforestation programme is to be implemented in harmony with land use planning and socio-economic development in Vietnam
d. Carry out with available local resources and collaborate with other co-operation programmes if possible
e. Assure sustainable development and sustainable resource mangement
f. It is a participatory process

4.2 Guidelines for land identification for the 5 million hectares reforestation programme

a. Prepare instruction / guidelines identify soil serving the implementation of the 5 million hectares reforestation programme, in particular

- Guidelines for land identification for production forest plantation
- Guidelines for land identification for protection forest plantation
- Guidelines for land identification for cash crops or fruit trees planting

b. The above guidelines should be simple, understandable and suitable for Vietnamese context

5. Conclusion

5.1 Achievements

a. Increased forest resources
b. Increased people´s income
c. Improved infrastructure and services
d. More productive use of land
e. Strengthened co-operation in socio-economic development and sustainable resource management within agriculture, forestry and fishery

5.2 Difficulties

a. Food deficit in remote and mountainous areas, especially when natural calamities such as drought or flood occur. Practical solutions for this situation is crucial for sustainable development and management of resources
b. Degraded community education leads to increased illiteracy rate among children. This problem should be tackled soonest.
c. Decreased socio-economic growth since 1998 has caused difficulties for the development in mountainous areas.
d. Difficulties related to infrastructure and farming techniques. Baseline studies should be gradually solved with consideration of conditions of specific area.
e. Improve policies to facilitate the socio-economic development of the mountainous area.

On "the 5 Million hectares reforestation programme"

By : Prof. Dr.Nguyen Ngoc Lung

Vice Chairman, Steering Committee Natural Forest Management Project
Director, Department of Forestry Development, MARD

Note: This text covers the lecture given by Dr Lung during the joint session of the training workshop in Tam Dao National Park on April 16. It is not a lecture manuscript, but based on an article published in Forest Magazine No 2. 1997.

On October 3, 1997 the Ministry of Agriculture and Rural Development (MARD) submitted to the government a project on forestry with a title named "gearing up afforestation, re-greening open lands and denuded hills, orienting towards closing natural forests". On October 30, 1999 MARD reported to the Standing Committee of the National Assembly "an important project" – 5 million ha to be planted in this project. How are the content and feasibility of the project (an abbreviation "closing natural forest" like?

In recent years, the speed of forest degeneration has been serious and fast, in Vietnam as well as all over the world, particularly in the tropical developing countries. It is noticed that forest could not well protect the living environment for human beings and reduce natural disasters, as forest loss is closely connected to annual droughts and floods, environmental pollution, erosion and washing away of soils, dirty water, dust, and noises. In particular, it is observed that the reduced capacity of CO2 absorption often leads to global warming due to "the green house effect".

Scientists claim that, if this process will go on for 20-30 years ahead, the surface temperature will increase by 1-3 degrees. Melting of the huge glaciers around both of the poles of the earth will make the sea level increase by 20-60 cm compared to the present level. If that happens the contemporary granaries at the elevation of 30-40 cm above sea level will disappear. This prediction is too close in time to be neglected. So far, two summit conferences were held in Rio de Janeiro 1992 and in New York 1997 to discuss and commit on the protection of the living environment and forests in which the mixed tropical rain forests are of great significance.

In Vietnam, prior to 1943, there existed 14 million ha of natural forests or 43 % of the total territory. However, through 2 wars and the operation of slash and burn practice, wildfires, reclamation and over-logging only 8.25 million ha of forest remained in 1995, with a total growing stock of 584 million m3 or 71 m3 per ha on average. As regards afforestation, a significant area has been planted throughout the country in recent years. But both plantation and natural forest can only cover 28% of the whole territory.

The serious and fast natural forest degradation qualitatively and quantitatively leads to the reduction of the growing stock per ha and the biodiversity of the flora and fauna system. Natural forests cannot undertake the function of product supplying to national economy, protection of the environment, natural disasters, and natural forests cannot maintain a good environment for sustainable socio-economic development. The

natural forest closing project aims at 3 objectives: Restoring the safe cover of 43-45% to ensure the function of protection. Creating employment and contributing to the elimination of poverty, socio-economic development in the mountainous areas. Ensure wood and other non-wood product supply for national economy in the course of industrialisation and modernisation.

The contents of the project:

1. Closing Natural Forests.

This is a figurative term used by the public long time ago. The term implies the meaning of achieving a maximum reduction of logging rate and letting the poor forests (both productive and watershed forests) recover at least for 15-20 years. To avoid sudden transformation of the forest product market, this process will gradually reduce from 2 million m3/year during 1970-1980 down to 1 million m3/year during 1985-1990 and to 0.8-0.7 million m3/year during 1991-1995. The target for 1996 is 0.6 million m3, 1997 – 0.523 million m3 1998 – 0.444 million m3, 1999 – 0.369 m3 and 2000-2010 – 0.3 million m3/year. On the contrary, logging from plantation will gradually be improved to compensate the ratio of reduction of wood taken from natural forests.

2. Speeding up Afforestation and Natural Regeneration.

Paralleling to the natural forest closing project is the 5-million ha reforestation project in which 2 million ha (plantation and regenerated forest) of watershed forest, nature reserves to improve the capacity of protection, regressing the critical watershed areas funded by Program 327. Another 3 million ha of productive forest planted with industrial timber trees and commercial crop trees such as coffee, rubber, cashew, tea will be established to get raw material for pulpwood, particle board, construction wood, pit-post wood and non-wood products. The total investment is 31, 000 billion VND for the 1997-2010 period.

According to forecast, 3 million ha of productive forest can meet the demand for timber, non-wood products till the year 2005, say 9.35 million m3/year and from 2010 13.5 million m3/year, excluding 10-14 millions m3 of firewood. If the rotation of the fast growing species is 10 years, 1/10 or 0.3 million ha can be cut each year with an average stock of 70-100 m3/ha at the age of ten years, that gives 21-30 million m3 per year.

To carry out the program of rehabilitation of 5 million ha of forest, it is important to consider the potential of land, climate and ecological characteristics of species to be planted for each province and the whole country in order to work out a good plan. Besides, 400 millions of scattered trees to be continuously planted by people over the country to meet the demand of fuel wood and wood on the spot and for the salvage of land.

For the period prior to 2005, the circumstantial measure is employed to speed up import of timber in order to fill the gap as man-made forests do not yet timely yield their products.

3. Development of forest product processing.

Among the 759 enterprises dealing with small and medium scale forest product processing 16 units undertake production of super class articles, 37 units deal with afforestation and processing of timber from plantations, 53 units are in charge of joint venture and the rest undertake wood processing with simple technology. If 1200 small scale wood processing units such as co-operatives, handicraft families are included there will be 95000 workers involved in wood processing and 1.56 million m3 of timber is needed that is worth 2090 billion VND of equipment.

When the plantations supply with enough raw materials, no doubt, equipment must be replaced to process wood from plantations to ensure the supplying of super class articles domestically and for export made from pressed particle board.

Re-equipment and re-training to meet high technology is an essential requirement, at the same time establishing pulp factories, artificial board ones right in the concentrated plantation for raw material areas. On the other hand simple processing of traditional articles and processing non-wood products such as pine resin, shellac, rattan, bamboo, bamboo shoots, mushroom, cinnamon etc. should continuously be developed.

These three operations well show the contents of the project, which go beyond the title "closing natural forests" as figuratively mentioned, and the full title mentioned above used by prime minister Vo Van Kiet.

Dealing with measures for the implementation of the project will see the broader significance of the project as they touch big policies, renewing the managing organisations and forestry businesses.

Proposed solutions of the project:

a) settling agriculture and sedentary, limiting slash and burn practice, eliminating poverty, stabilising and developing socio-economy for the mountainous areas to protect and develop forests

These are policies, which have been applying to step-by-step transfer of those who formally earned their living by forest destruction to forest planters and protectors.

b) policies are principal solutions for state management:

In order to implement plans by means of administrative measures on the basis of laws and regulations under law. That is why policies should always be flexible, suitable and supplemented. To encourage afforestation activities, protection of rights for forest planters and processors of forest products, the Project proposes the following policies:

- Land allocation, contracting forest protection to ensure the right of objective land use, the right of ownership of forests of the investors whether it is money or labor or both. This policy is presented by the government and concerned bodies.

- Investment and fund, and policies on the question to encourage and mobilise material sources (money, materials, labor) of all economic components at home and international assistance in the investment for afforestation, forest protection, processing of forest products and developing community forestry.

- Policy on finding alternative for industrial use, for construction and partly for combustibles.

- Policy on science and technology with high efficiency in silviculture and processing, policy on socio-economy and management, on selection of species combination of planted species, afforestation, sloping cultivation approach on the basis of agro-forestry.

- Policy on tax, discount the revenue tax, tax on lease, on export of products made of wood from plantations. In general a good policy on the tax system will well encourage afforestation and forest protection, wood processing, socio-economic development of in the mountainous areas.

- Creating stable market for forest products by means of establishing factories to produce pulp, artificial board, process articles from rattan, bamboo etc right in the raw material areas in order to timely release products from plantation. Expanding markets for sophisticated articles in the world, particularly the traditional articles for the traditional markets. Stable market for products encourages afforestation and processing, which creates employment for a lot of people.

- Policy on foreign investment is under adjustment to get foreign investment in various forms, such as joint ventures or 100% of foreign investment or borrowing money with low interest for afforestation.

c) Renovation of organisation, state management on forestry.

- Strengthening the responsibility of the authority at all levels from commune to province, regarding the management and protection of forests by territory.

- Clearly identifying the responsibility of MARD – a specialised state management organisation of the government. Transforming the function of the Forest Protectors into Forest Police who will be responsible for supervision, checking the implementation of the Forest Laws and state management task within the sector

- Reconsidering the 412 forest enterprises when forces for logging in natural forests is reduced, most of them should be transformed into other forms of operations, such as afforestation, protection, forestry services and so on.

The Project "Gearing up afforestation, regressing open lands and denuded hills, orienting towards the close of natural forest" is a great movement toward a 15-year period 1996-2010. It involves many aspects, such as forest development, protection, management, processing, export and import of forest products, social forestry and rural development in the mountainous areas, formulating and adjusting policies, renewing methods for state management from the highest level – MARD to enterprise. By carrying out this project, the following results will be achieved:

- Creating a stable ecological environment, improving the capability of protection nationally and maintaining the biodiversity of a tropical zone, improving the forest coverage from 28 to 50 % by the year 2010, ensuring a stable environment of socio-economy and humanity.

- Establishing the raw material areas, fully meeting the demand for forest products for people's daily needs, for export, serving the industrialisation and modernisation of the forestry sector in particular and the whole nation in general.

- Creating employment for about one million laborers, a step of socio-economic development for the mountainous communities living in the deep and remote areas.

Perspective Forestry Planning within the Framework of Sustainable Use of Land

By: Prof. Nils-Erik Nilsson

Note: This speech was held in the final seminar in Hanoi on April 26. It was also held in the seminar in Vientiane, Lao PDR with some modifications and adapted to the Lao situation. Those parts that are different (Lao) have been marked with *Italics*

Distinguished Invited Guests, Respected Participants and Co-workers of our Workshop, Ladies and Gentlemen,

I have been asked to present some views on perspective forestry planning within the framework of sustainable use of land. Since I cannot speak Vietnamese I need to present my views in another language that also is foreign to me, that is in English. I will try to speak in short sentences to facilitate translation. But this means that my presentation will have to concentrate on but a few issues.

First a few words about my background. I have a forestry education complemented with economics and statistics. From 1958 to 1976 I was chief of the Swedish National Forest Inventory, became a professor in Forest Surveys in 1964.

From 1976 to my retirement in 1993 I was in charge of the Forecasting Department of the National Board of Forestry. The present name of that Department is "Analysis Unit". Its main task is to provide the Government with timely and relevant information on forest resources as well as on current and prospected use of the forests. Still we do not use the name of "planning department". How could we make real plans for the forestry sector in Sweden, when there are more than 350 000 forest owners? These owners decide themselves upon the use of their forests within a free market system.

Private people own about 60% of the total wood production capacity in Sweden. Companies, including a big state owned company, have around 30% and the state itself only around 10 per cent. The production capacity is then measured in terms of potential supply of timber to our forest industries.

In recent years there has been an increasing attention to the capacity of the forests to produce environmental services and to secure the maintenance of biodiversity. These benefits, however, are not so easy to assess or to forecast.

Production and Consumption Balances:

One of my main tasks during the period of service has been to carry out forest production and consumption studies and to develop methods for such studies. These studies are used for making optional scenarios with respect to development of the forest and forest industry sector. They are used as a basis for development of forest policies.

Forest policy reviews in Sweden are normally undertaken every five to ten years. Still the basic principles of sustainability have remained unchanged over the years since 1903. That year we got our first complete forest legislation. The most basic principle was, and still is, that all forestland has to be regenerated after cutting. Either by efficient natural regeneration or by planting.

Comment relating to Laos made when presenting the paper in the Seminar in Vientiane on April 30;

Sometimes these reviews are very important and decisive like the Forestry Conference that you held in Laos in 1989. Let me also mention in this connection that such State Commissions often present a proposal for change of legislation that relates to their task. When the Government has received the report it is published. All concerned authorities are asked to present their views on the findings and all other interested parties are invited to make their written comments. Not until then the Government decides whether to send a proposition for a new bill to the Parliament or not.

During my working time we have made major studies on wood supply and wood consumption in the years 1958, 1965, 1969, 1978, 1985 and 1992. Almost every time these studies have been carried out in connection with the work of major forestry Committees. These Committees have been commissioned by the Government to study certain specific issues relating to forestry and forest industry. Sometimes the question to answer has been the following. "Will there be enough supply of wood for the industry?" Sometimes "will there be enough industry to match the forest potential?"

The task of the 1992 Commission was to develop a proposal for a New Forest policy that would create a balance between the wood production goal and the goal to maintain a sufficient biological diversity. I cannot go into any details about these studies now or about the political processes they are supposed to serve for time reasons.

However, I should like to share with you two important experiences that I think is of a specific relevance also for Vietnam, not least in connection with the 5 million hectare plantation programme, that we have heard quite much about in recent time.

- Experience number one deals with the importance of a good knowledge about the current land use and specifically the current drain from the forests

In Sweden we have a stump inventory attached to the national forest inventory which gives us an unbiased estimate of the annual cut, from one spring season to the next spring. Since the national inventory covers the entire country every year we get annual estimates of the total cut, by species, dimensions and ownership. However, since the standard errors are quite big we have to complement this stump inventory with annual calculations of wood consumption based on data from the forest industries. Their data are quite good thanks a compulsory, standardised wood scaling system that is carried out by independent wood scaling organisations. These are organised by buyers and sellers of wood in co-operation.

Comment relating to Laos made when presenting the paper in the Seminar in Vientiane on April 30;

In Laos you are about to finish your first national forest inventory. I believe that you now need to make use of this information. This must be done within the framework of a problem-oriented production and consumption study that can establish a good knowledge of the current use of the forests and of land use in general.

So far there is plenty of forests in Laos and you do not have the same fuel deficit that we experienced during the Vietnam workshop in the last two weeks. Still it is important for Laos to monitor its present use of the forest for all purposes including for fuel. Of course, we all know that shifting cultivation is an important use of the forest as long as there are no other options.

Although the industrial use is dominating in Sweden we also use wood and wood residues for fuel. Since wood is a renewable resource and since sustainable use of wood does not contribute to global warming the use of wood fuel is increasing. In order to assess the rural use of wood for fuel and farming purposes we have to undertake fuel wood surveys similar to the one we carried out last week in Dao Tru Commune. We simply have to ask the farmers.

Our Central Statistics Authority in co-operation with the Analysis unit of the Nationals Board of Forestry undertakes these surveys.

It is a general feature of developing countries, including Vietnam and Laos, that knowledge of this kind is lacking. Hence, every planning for future development is usually based on insufficient and vague knowledge of the current situation. I believe that our training work within Dao Tru Commune last week has given us some typical examples of this. We saw for instance that there was an even flow of unrecorded wood coming out from Tam Dao National Park. Personally I saw freshly sawn wood of good quality that was brought out from the park in good order. I also think we all realised that Dao Tru Commune depends on fuel wood from the park area to a big extent.

Comment relating to Laos made when presenting the paper in the Seminar in Vientiane on April 30;

I believe that the training workshop here in Laos also has given some examples of this. In a centrally planned economy it is very common that planning data do not correspond to the factual use of land. The research work of Mats Sandewall and Bo Ohlsson has given some examples of this. Last week in Dao Tru commune of Vietnam we found that the current agriculture area was almost double that of the official planning data. My suspicion is that taxation rules make people eager to keep down the area estimates and then all planning data tend to be quite old for bureaucratic reasons.

- The next experience I will share with you is that policy development and policy implementation takes a long time.

In Sweden it takes about ten years to implement a New Forest policy. Take for instance the task to change people's attitudes with respect to the environmental functions of the forest and the adaptation of logging and silviculture to new

environmental standards. Possibly, such a process can be carried out more rapidly in a centrally planned economy like Vietnam, at least on paper. My experience is; however, that policy measures will not be well implemented until the concerned people understands and accepts the importance of the measure and agrees to the idea.

I mentioned about a timetable of ten years for such a process. When we wanted to establish a competence on ecology and environment among forest owners the first two years were used to prepare and organise basic knowledge about the issue and writing text books and learning material. This was done in co-operation with SLU, the Swedish University on Agricultural Sciences. The next three years were used to establish competence and engagement within our forestry staff, especially district forest officers who are responsible for extension work. Then there was a period of about five years in which time we arranged study circles and courses for forest owners and all other parties who are interested in forestry and land use.

Land use conflicts:

In connection with consultant work in India for FAO and later for the World Bank in support of a big pre-investment survey project I came to learn about land use conflicts. I realised for the first time the kind of conflicts that arise when governments plan industrial investments on land that is already used for marginal agriculture such as shifting cultivation. I realised that food production for subsistence always must be given a higher priority than the use of land for industrial forestry. I compared these conclusions with the historic development in Sweden. 150 years ago shifting cultivation was common in Sweden and this practice continued until the increasing productivity within the agriculture sector was bigger than the growth of population. Then there was a turning point when land was given back to forestry. Actually, I had learnt that this turning point occurred in South Sweden around year 1870 but in northernmost Sweden as late as in the 1940's.

This was how the Area Production Model came into existence in the beginning of the 1980's. Before that, in 1974, Dr K. D. Singh from India and myself had written a paper on "Evaluation of the environmental benefits of the forests". In that paper we make a definition of "area production" and lay a basis for the thinking that is laid down in the model. I am not going further into any description of the model. We will hear more about that later.

Comment relating to Laos made when presenting the paper in the Seminar in Vientiane on April 30;

In India I found a need for a simple model that could simulate such changes in land use as a result of changes in population, productivity within agriculture and a general change from subsistence economies to more market orientation. The model should also be able to simulate the use of rural energy and establish trends with respect to the energy balance. In addition my intention was to create a very simple wood balance for industrial wood and to simulate growth of plantations that aimed at improving the energy balance or the balance for industrial wood. This was how the Area Production Model came into existence in the beginning of the 1980's. My demonstration model was programmed in APL that is a programming language that is not so well known. Ola Lindgren then developed a Fortran version that is still in

use to some extent. What we have now is a new modern version under Windows that has been programmed by Magnus Grylle in FAO. We have tried the model during the workshop and we have found that the forest development part of the model is still very incomplete. It also contains some bugs. Transparent output tables are also missing. We hope that Magnus Grylle should be given opportunity to complete his working as soon as possible.

During my renewed acquaintance with the model during the last weeks in Vietnam I have also experienced that we could need some open land use classes that can be defined on the basis on local requirements. I think that the meat production activities that was identified in the Lao case study last week could have been handled if there had been some freedom to define production classes and steering indexes to drive these classes.

Before the construction of the APM model Dr K. D. Singh from India and myself had written a paper on "Evaluation of the environmental benefits of the forests". This was for an FAO/ECE meeting in 1974. In that paper we make a definition of "area production" and lay a basis for the thinking that is laid down in the model. I am not going further into any description of the model now. We will hear more about that later.

The section that follows was shortened when presenting the paper in the Seminar in Vientiane on April 30;

- Allow me now to say some words about the Sida Courses on Development of National Forest Policies and Strategies.

Such Courses have been held in 1996, 1997 and 1998. There is a new course scheduled for the autumn of this year. We had a good representation from Vietnam in 1996 and in 1998. The 1997 Course was mainly concentrated to African countries but we had one participant from Laos also that year on special request.

One of the ideas behind the SIDA Courses is to make the courses participatory. We want to avoid too much of teaching and instead promote contributions from the participants, not least in the form of discussions within participants from the same country and discussion between participants from different countries and regions.

One of the bottlenecks that we try to address is the lack of communication between forest inventory experts and policy makers. The experts are not used to problem-oriented approaches since they do not know the problems. The policymakers do not know how to formulate the problems in a way so that the experts can make use of the existing knowledge and the collect such new information that is needed for analysis of the problems. Sometimes the politicians make the decisions first and then ask the experts how these decisions can be implemented. Ideally, the courses thus should bring experts and decision-makers together and train them to talk with each other.

However, since we realise that it is difficult for high-level decision-makers to participate in courses that are as long as five weeks we are trying a next best solution. We have decided to invite one "decision-maker" from each of the major participant countries to take part in the first week only. During this week we arrange, among

other things, a panel discussion with the participation of high ranking Swedish politicians and other policy makers within the forestry sector. The main aim is to show how we get along with the ever on-going process of consensus building that is typical and necessary in a democratic country.

In this connection I cannot avoid mentioning with a big personal sorrow that courses in the future will not be quite the same as the first three courses. Börje Falk, who has been the Course Director and main teacher died in cancer 23. March. It will become very difficult for us, his co-workers, to maintain his spirit of human engagement and friendship. We certainly will try our best. I know that Börje Falk had a special liking of Vietnam. He has a number of friends here. His wife mentioned to me that he even had his own by-cycle, "xe dap", deposited somewhere in Hanoi to be used at his expected next visit here.

Let me also say in connection with this personal comment that we very much look forward to see a good representation from Vietnam in the 1999 Sida Course. Please, note that there will be no more course of that kind during this millennium.

Before I leave the subject I would like to make some comments on the substance of the courses. In view of the fact that I have been one of the driving forces behind the courses I have also influenced on the content.

The need for Country Capacity Building became clear for me during my participation in the negotiating process that resulted in the UNCED Conference in Rio in 1992. Chapter 11 of Agenda 21 and the UN Forest Principles were the main outcome of this conference as far as forestry is concerned. Before that I had also represented Sweden in negotiations for the International Tropical Timber Agreement in 1983 and in the work of ITTO that followed. However, I found frankly that the international forestry community was mostly interested in developing criteria and indicators for sustainable forest management to be used to measure good or bad behaviour of the countries. This seemed to be more important than finding means and methods to support the efforts of the countries towards sustainable development.

In my perspective this is the core of country capacity building. This is also the prime objective of the Sida courses. Country Capacity Building has a much broader meaning than only "transfer of knowledge". Why?

States have the sovereign right to exploit their own resources pursuant to their own policies. But they have also the responsibility to ensure that their activities do not cause damage to the environment of other States.

U N Forest Principles number 1 and 2 indicate a number of key-issues that describe the substance and nature of Country Capacity Building.

Recognising the national sovereignty these principles call for: measures to achieve:

- Sustainable development and socio-economic development
- Rational land-use policies
- Forest policies that can satisfy the needs of present and future generations
- Maintenance of the multiple values of the forests

- Provision of timely and accurate information on forests and forest ecosystems
- Participation of interested parties in the development, implementation and planning of national forest policies.

Hence, "Country Capacity Building" is everything that can contribute to the capacity of States to exercise its authorities and responsibilities with respect to sustainable land use within the boundaries of international accords and agreements. The following are some key issues:

- Democratic attitudes are important elements in developing sustained land use.
- All stakeholders need to understand the real issues and the inherent land use conflicts. The process of consensus building must be based on a sufficient knowledge of the current land use.
- Democracy and consensus building are slow processes and must be allowed to take time. The problems are difficult and there are no easy "technical fixes".
- The history and particularities of a given country have a bearing on its current situation and must be considered.

There are three areas of knowledge that is important for forestry planning in this respect.

Knowledge of the current status of forests and forest land, particularly with respect to actual and potential utilisation and with respect to the present status of conservation and protection.

Knowledge about the forest owners and/or users, particularly in the context of general land use.

Knowledge about the other sectors of society that influence on or are influenced by the forestry sector, especially the linkage between forestry and agriculture and between forestry and forest industries.

The organisation of existing knowledge and collection of new knowledge within these fields necessitates the setting up of fairly independent national **analytical units** that can provide a good basis for informed and participatory decision-making. It is well and good with forest inventories but they must be made use of in the context of solving problems related to the general use of land.

Allow me now, finally, to go back to the Bai Bang pulp and paper mill that was in focus for my presentation during the first day of the workshop. I mentioned that I was somewhat involved in the first discussions with the Vietnamese delegation that visited Sweden in 1969. I also mentioned that I was consulted when the first assessments of potential wood and bamboo supply to the mill had been carried out. I guess that it must have been around 1972 –73. I was quite critical to that report for the reason that it did not take into account the current use of the forest resources. I repeat my conclusion from the first day of the workshop:

- We need to have a good knowledge about the actual use of land and trees. There is virtually no land that is not used in one way or another.

Now, in the perspective of the 5 million ha planting programme I have the same type of considerations. I am fully convinced that there is a need for a big program like this. Vietnam is a rapid growing economy and the demand for paper and other forest products will rise rapidly. But I believe that there are much of preparations and communication with people needed. The people are the country's most valuable resource. The approach must be to mobilise and engage them. I thus believe that the program for land allocation will become an important means of implementation. But I am afraid of too big efforts for rapid implementation. One bottleneck is that the knowledge of suitable species for planting does not seem to be sufficient so far. The experiences from the growth of Eucalyptus for Bai Bang are not fully satisfactory.

During the first day I also mentioned that this is my first visit to Vietnam. Still I have followed with interest and admiration the struggle to make the Bai Bang project a success. I have admired the long-term decisiveness both of the Vietnamese Government and Sida and of all the people involved in the implementation. Now I can report to you that I have eventually visited the paper mill. The mill itself and not least its environment was above all expectations. What was most interesting was to hear about the logging and transport organisation. I am fully aware of all the logistic problems that exist in such a system. New problems need to be solved continuously.

It was also encouraging for me to visit the Silviculture and Tree Breeding Research Centre of Bai Bang. I found that people there were working hard to improve their knowledge of site/species relationships. May I also report that this was the first time for me to see in vitro propagation of seedlings in a productive scale. The centre is capable of producing not less than 1 million seedlings a year. Since I am very interested in growth and yield studies I will try to keep in touch with the centre. I believe that the Relative Production Function that is built in to the APM model could be of a big interest for the researchers at the centre.

Now, Ladies and Gentlemen forgive me for have been talking so long. But when your heart is full it is difficult to stop talking. Thank you very much!

The APM approach

By: Mats Sandewall

Note: The following presentation was made at the final seminar of the Lao part of the training workshop in Vientiane on April 30.

Respected Guests, Colleagues and Friends,

In this presentation, I will try to clarify

- what is behind the title of this workshop
- what do we mean by "the APM approach"
- what has been my ambition with the whole exercise.

As far as possible, I will use practical examples and my own experiences.

The Objective of this Workshop has been to promote new ideas and approaches on how to improve forest land use and the related planning process. In other words it is not a ready made planning package. I hope that you will all in your own way help to bring forward the ideas of this workshop, adapt them to Lao conditions and contribute to step-by-step improvements of the current planning system (OH 1).

Some concepts to be defined:

"Inter-active planning approaches" refers to the need to *narrowing the gaps* and improve communication in planning between inventory people and plan makers, between different sectors and between the government staff and the villagers.

"Dynamic planning approaches" high lights the *time-perspective*, the need to detect and *understand ongoing changes* (what is the basic reasons why forest disappears), the importance to be aware of the *historical perspective* when planning for the future and the way of analysing options for future development through *scenario techniques*.

The APM approach concerns methods for determining and analysing the historical and current situation and techniques for analysing future options and strategies using scenario techniques. Important tools for determining the current situation and changes are sampling methods and interview techniques. One of the tools used for developing scenarios is the Area Production Model, APM.

When talking about planning and land use planning in the APM context, we do not mean the operational defining of boundaries for this and production targets but the strategic issues. What are the problems and how to deal with them in general terms. I will try to illustrate this with an example form Vietnam.

The Tam Dao case – an illustration of the APM planning approach

Last week, I was involved in a groupwork / planning exercise in Dao Tru Commune, together with the 15 Vietnamese participants in the Workshop. The purpose was to apply methods introduced in the workshop in a practical case. We collected data using different methods and sources (OH 2-4).

- Commune data and complementary discussion with other concerned land users (forest brigade, national park HQ etc)
- Interviewing the village leadership in three selected (representative) villages
- Talking with three sampled households in each village
- An independent and systematic sampling inventory using local key-informants

Based on commune interviews we collected data on population, agriculture, socio-economic conditions and local government plans and policies and also land use data. The Commune is situated half inside half outside Tam Dao National Park, established in 1996 (only three years ago).

Based on household interviews (both men and women) we collected information on the use of fuelwood, food sufficiency, economic situation of the poor and the well-off, intentions and plans in forest land use, reasons for changes and so on.

From the sampling inventory we obtained an objective measure of the actual current land use and how it has changed over the last 20 years. This "point sampling technique" has turned out to be very powerful and well suited for the APM purpose.

The Commune explained that there were 454 ha of crop land, mostly paddy, and 101 ha of residential areas with homegardens, totally 555 ha. There were also 492 ha of forest plantations. The total Commune area was 8100 ha (the figure was later adjusted to 7400 ha. (In addition, Tam Dao National Park expressed concern that people used the Park for extensive collection of fuelwood and also illegal logging).

The sampling inventory revealed another "reality" (OH 3). - There were 1700 ha of cropland, residential areas and homegardens. The figures are sampling estimates and not precise figures, but the real agriculture area is far higher than the area of 555 ha given in the official statistics. Also the plantation area was double that of the official figure or about 1000 ha.

The reason why there is such a great "under-reporting" of figures is not quite clear but we have experienced similar tendencies in other areas, also in the Lao PDR. People´s worries for tax regulations and for intervention by the government seem to be one important reason.

However, the most interesting thing is maybe the historical trends. The plantation area in Dao Tru has increased almost as much as natural forest area has decreased. Area of paddy has not changed very much in the last 20 years although population has increased 3 times.

The image of three (3) main land use interests in the Commune was very clear

- People´s need for food sufficiency
- The Park´s need to protect the natural forest area and biodiversity
- The Government´s interest to implement the so called 5 Million hectare plantation program in order to satify the need to expand industrial production.

This is what we aim at in the first step of our "Planning" (OH 4) (data collection and analysis of indata) – defining what is the Issue (the Problem), quantifying it in terms of figures and change rates and explaining why changes take place and what do people and government want and intend to do in relation to this.

In the second step, we analyse the possible future development through "scenarios". (in our approach we have used the Area Production Model"). We use our data on

- Current situation (land use, population, agricultural yield, GDP/capita etc)
- Current and historical changes

in combination with our knowledge of

- Governments strategies and policies
- People´s expectations and intentions
- Other expected changes

to describe the future situation under different alternative assumptons and strategies. After that we analyse and discuss what is desirable.

After data analysis the Vietnamese Group prepared a couple of scenarios for another 20 years into the future. Among other things the increasing pressure on the natural forest because of fuelwood removal and logging could be illustrated and strategies to handle this issue were briefly discussed.

Research study in Nam Nan Water Catchment Area, Lao PDR:

In Nam Nan we have used similar techniques in a deep-research-study on shifting cultivation, land use and socio-economic changes. As a complement to point sampling and villages interviews we used five sets of air photos of different age (1953-96) and scrutinized the historical events and developments over a 100 year period.

Among many other things we found a close correlation between population changes, forest cover and agriculture (shifting cultivation) - (OH 5). The sometimes dramatic historical events in terms of war, new roads, improved agriculture techniques and government strategies could be analysed in details.

A seminar to discuss scenarios and strategies with villagers and local authorities is being planned for the conclusion of the Project next year.

The Area Production Model, APM:

The APM is a planning tool invented by Professor Nils-Erik Nilsson some years ago. Technically, it is a Windows-based computer program for developing scenarios on future land use, fuelwood balance, plantation development etc. but the idea is that is to be used for broader purposes and as a help to understand and analyse changes, identify data requirements (what data are the most important) and strategic options.

In Laos it has been used over the last 2.5 years in five (5) research and pilot studies and another three (3) studies in Vietnam (OH 6). It has previously also been used in India and in some case-studies in Thailand, Indonesia and some other countries.

I will not explain the technical details, as it would be heavy to listen to. Instead some Lao colleagues will demonstrate the use of it.

Anyway, some major advantages of the APM are that it includes all land within a given area (village, commune, watershed etc. according to the wish of the user). Another important thing is that it acknowledges the actual land use. It is not useful for "planning data" but requires good estimates of the actual current land use.

Thank you very much for your attention

OH 1

The training workshop "inter-active and dynamic approaches on forest and land use planning"

Workshop objective:

Promote new ideas and approaches on how to improve forest land use and the related planning process

Participants

- Province/District/Commune/National Park – Central level,
- Government Administration – University
- Policy – Planning – Programs – Inventory - Research
- Forestry – Agriculture - Environment
- Women - Men
- Vietnamese – Lao - (Swedish)

Major issues:

People's management of forest land and natural resources

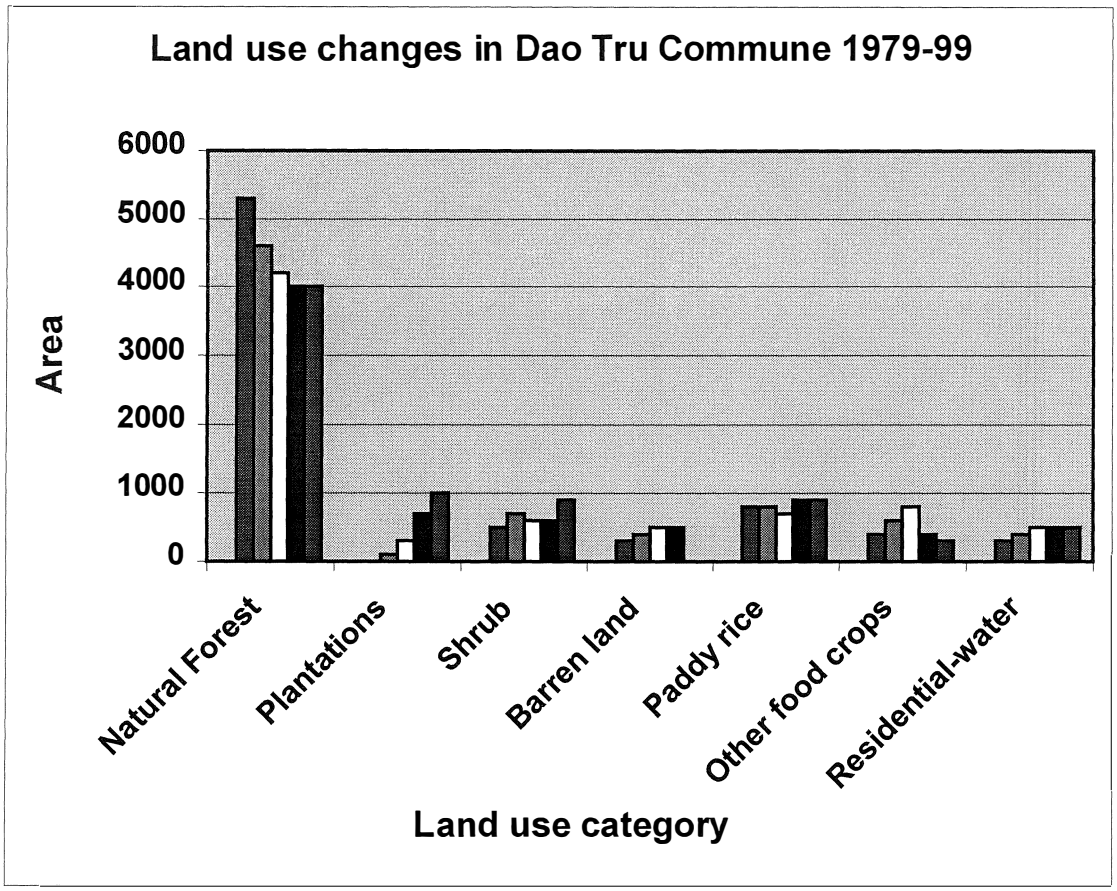
Dynamic planning
- The historical perspective
- The need to detect and understand changes
- Scenario techniques (e.g. APM)

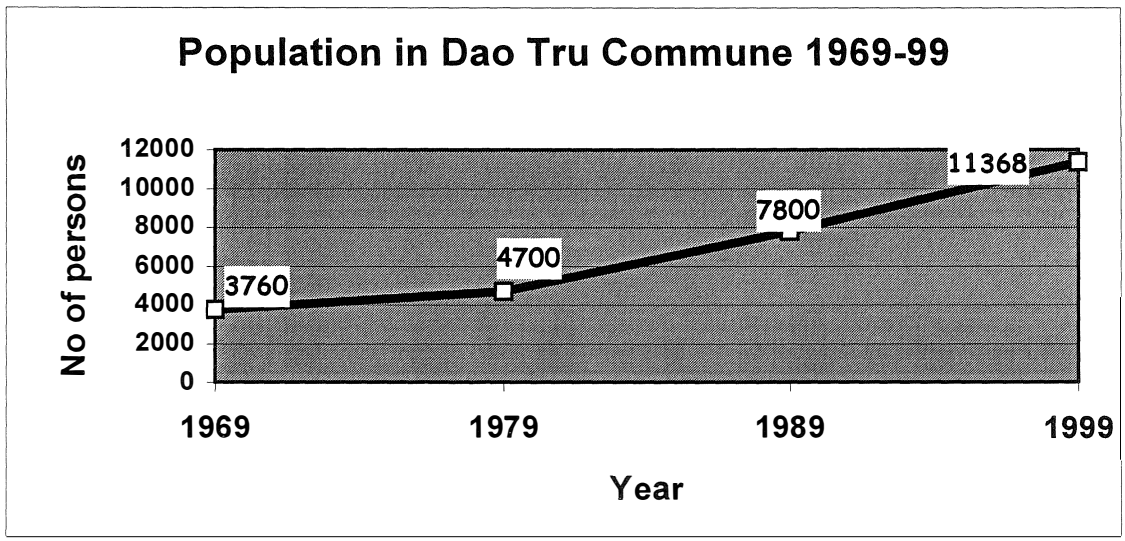
Inter-active planning
- The importance of involving all concerned sectors and all stake-holders e.g. both men and women, and in land use planning and policy work
- Interaction & communication between government staff and rural people
- The role and meeting point of planning from below and centralized government planning and policy making

The role of planning
- The need to acknowledge and describe the actual current situation and distinguish that from plan figures
- Closing the gap between "data capture" (inventory etc) and the development of policies and strategies
- How can planning and research promote development

OH 3

Land use	Year				
	1979	1984	1989	1994	1999
Natural Forest	5300	4600	4200	4000	4000
Plantations	0	100	300	700	1000
Shrub	500	700	600	600	900
Barren land	300	400	500	500	0
Paddy rice	800	800	700	900	900
Other food crops	400	600	800	400	300
Residential-water	300	400	500	500	500
TOTAL	7600	7600	7600	7600	7600





OH 4

The "APM approach"

Step 1

Data Collection and Analysis

Data collection

- Data/Information from Commune
- Data/Information from Village Leadership
- Information/Data from Sampled Households
- Independent Point Sampling (past and present land use)

Analysis of input data

- Inter-action with stakeholders and feed-back
- Possible complementary data collection

Consolidated data/infomation

- Current situation and land use
- Current and historical changes
- Current Government policies and strategies
- People's intentions and expectations
- Other expected changes (environmental, global economic influence etc.)

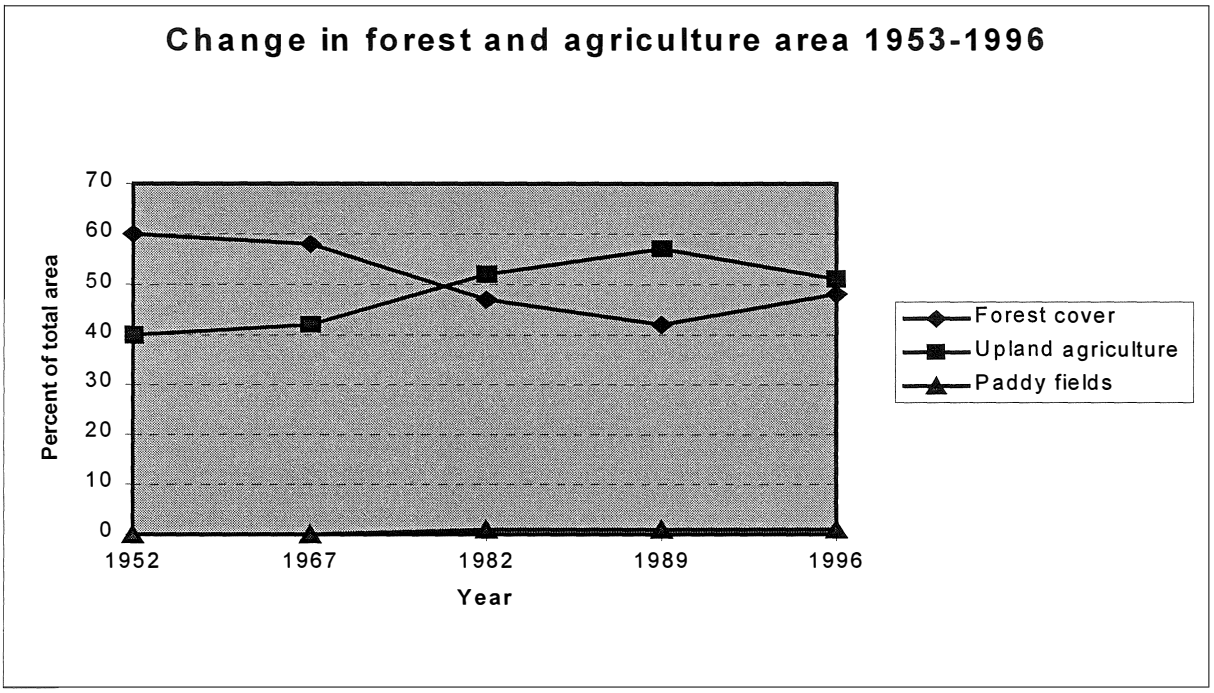
Step 2

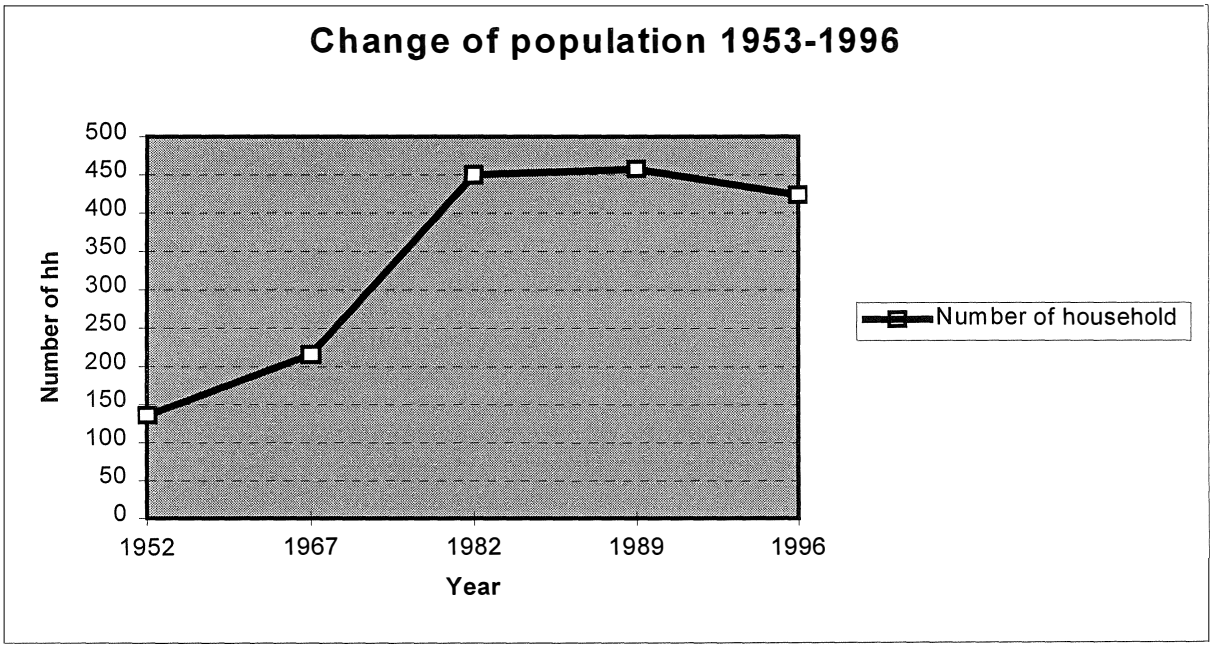
Scenarios and Evaluation

- Elaboration of optional APM Scenarios (based on consolidated data)
- Inter-action with stakeholders and feed-back
- Analysis of possible strategies

OH 5

The Study of the Upper Nam Nan WCA, Luang Prabang





OH 6

APM related exercises in Lao PDR and Vietnam:

Lao PDR:

Duration	Type of exercise	Area	Type of area
Dec-96	District-office study (SLU/SCRP)	Xieng Ngeun	District level
1997-99	Watershed study (field reserarch-SLU/SCRP/NOFIP)	Nam Nan WCA	Watershed (9 000 ha)
1999	Sayabouri (field research-Silavanh Savathvong)	Part of Nam Poui NBCA	Village level (2 villages)
1999	Pilot study (NOFIP-Data User Workshop)	Naxaithong	District level (90 000 ha)
1999	Pilot study (training workshop on "dynamic land use planning")	Ban PakXapMay	Village level

Vietnam:

Duration	Type of exercise	Area	Type of area
1997	Research study (SLU-FIPI)	Ban Lau Commune, Lao Cai	Commune
1998	Continuation research study (SLU-FIPI)	Lang Ha Village, Ban Lau Commune	Village
1999	Pilot study (training workshop on "dynamic land use planning")	Dau Tru Commune, Tam Dao National Park	Commune

An approach to the capture and analysis of planning data

By: Bo Ohlsson

Note: This lecture was given during the second day of the training workshop in Tam Dao National Park on April 13.

This afternoon, we will discuss some concepts, approaches and methods for capture and analysis of data. Part of this is also preparations for the forthcoming field work tomorrow. It is all based upon the experiences from the research project "People's option on use of forest land", financed by Sida/Sarec since 1997 and our own - Kajsa, Mats and Bo - experiences over a long period of time of working in developing countries.

The background is the problems with planning which we have observed. Often the data do not reflect reality; they are old; not relevant; too confined (forestry only for instance); normative and very often not even used (very often a blessing). This lecture will concern itself with different types of interviews and interaction with the clients including PRA and RRA techniques. In another lecture we will discuss a point sampling technique (which also involves an inter-active component) for determining and quantifying land use and land use history in a more systematic and objective way.

1. What do we need to know?

There are certain things we can define initially, "this is what I need to know". However, how to get information when you do not know what you need? Basically, we propose that three major issues should be considered (biological/environmental, economic and socio-economic considerations). The data requirements of the APM should of course also be considered. Different agencies, e.g. the government, might also ask for specific information, such as gender data.

In the workshop, we use the APM software requirements and define them in terms of identifiable variables and units. For instance, there is a need of knowing yield changes. This is defined as tonnes/per ha of unhusked rice. See Annex A. These items are then put into a checklist. In Annex B, there is a generic checklist, used in Lao PDR. It can be used at both village and family levels.

2. Different types of techniques for gaining information and ideas from the clients.

Item	**Tools**
Structured interviews Village leaders, officials, technicians	*Questionnaires.* Assumes you are quite certain about what you want to know. Limitations - not interactive
Informal, unstructured interviews Villager(s), groups, families, key informants, also officials, reference groups • professional dialogue	*Checklists plus ideas which come up during the discussions and are to be pursued.* Tea, cigarettes - a guest situation! Use your own professional skills and also recognise that the villagers are professionals in their own right.
Rapid Rural Appraisals RRA, Participatory Rural Appraisals PRA Villagers	*Methods and materials* Examples: • Map drawing by the clients: land use, stratification • Calendars: working, farming, important events, history • Village transect - draw a random line through the village, walk it with villagers, notify e.g. land use, trees etc. • Talk, walk, touch - when discussing a subject, walk to it, touch it!
Revisits - feed back, reconfirmation and verification All	*Preliminary analysis and report* You go back to the village with your information and analysis to discuss, verify and also to find new items of relevance

Revisits are included in the methodology – you go back and present your findings to your clients, e.g. the villagers, after you have collected and analysed your data. The interactive approach that we are suggesting includes that representatives of different disciplines are involved, work together and feed each other with information as it evolves. Thus the interactive and dynamic planning process!

It is important to notice that the use of the checklist requires that the user is familiar with the APM process. It is thus not possible to give the checklist to an interviewer in general. Rather, the checklist requires a professional with enough knowledge about the APM to be able to pursue information and ideas, not only to record answers.

Straightforward questionnaires for District level information can be constructed, using the generic checklist or if preferred, one could start at the APM software level and the Annex A "translation".

Initially, there is a tendency to collect too much information. However, as we go along, we learn what is important and relevant and can simplify the procedures and reduce the amount of information we collect. This is a dynamic part of it !

Please remember that when dealing with people, it is very important how they perceive you. A government official can be quite intimidating to a villager, even perceived as a threat!! Your personal behaviour is very important in this context. Another aspect concerns gender - they have different kind of experiences, information and skills and care should be taken to ensure that this is covered, for instance by having separate sessions with women.

The information gained from discussions with various actors at District, Commune (Vietnam) and village levels, is in the APM approach directly related to other methods such as the point sampling. The point sampling serves to provide accurate and statistically reliable data about land use - past and present. The different approaches such as the discussions and the point sampling are also mutually supportive. The point sampling gives accurate but more narrow information whilst the discussions covers broad subjects and also allows the clients to define the agenda but the information thus gained must be verified for its accuracy. The discussions also provide ideas and new concepts that can be checked with the use of the point sampling and aerial and satellite images. The discussion and analysis involved in using the APM software is presented in the case studies in the section C.

Annex B

Generic Checklist, APM. Basic data suggested

District.....

Village.....

Persons present.....

Date...../...../..... **Interviewer(s)**.....

1. Time perspective

Some 20 and 10 years are suggested for the APM. The actual situation will also decide the time perspective.

2. Demography

Item	Numbers	Comments
Number of households		
Number of population		
Number of men		
Number of women		
Number of kids below 15		
Number of labour		
Population growth		
Family planning in the village		
Ethnic groups		
Poor households, numbers or %		
Average households		
Well off households		

3. Land use

Category	Area, ha	Crops, for subsistence or market or cash	Comments Yields, Legal status, Land allocation etc.
Village gross area			
Stocked forest land			
Unstocked forest land			
Others			
Paddy fields, 2 crops +			
Paddy fields, 1 crop			
Shifting cultivation • Cycle/number of plots • Describe the system • Gross area			
• Potential paddy fields • Potential other agriculture land			
Plantations - spp, objectives			
APM market crops			
APM cash crops			
Land for grazing			
Use of forest land/other land outside village gross area			
Fuel(wood) consumption			

4. Economic activities

Activity	**No. / % for market**	**Comments**
Paddy 2		
Paddy 1		
Shifting cultivation		
NWFP		
Poles etc. from unstocked forest land		
Poles etc. from stocked forest land		
Vegetable gardens		
Pigs		
Cows		
Buffaloes		
Ruminants		
Fish ponds		
Orchards		
Other		
Non - farming activities		
Service/trade		
Weaving		
Home industry/rice mill, blacksmiths etc.		
Forest produce		
Non wood forest produce		
Employment		
Electricity		
Others		

How many months without rice/own produced rice		

Social services: school, clinic		

5. Communications and markets

6. Village and village forest land history

7. Time series

	Yield (tonnes/ha, Areas ha						
Time series	**20 years ago**		**10 years ago**		**present**		**Comments**
	t/ha	**ha**	**t/ha**	**ha**	**t/ha**	**ha**	
Crop/activity							
Paddy, 2 crops							
Paddy, 1 crop							
Upland rice							
- cycle/fallowing							
- others							
APM market crops							
APM cash crops							
1. Other land uses, e.g. cattle							
2.							
Demography, No. of households, population							

7. Village plans, visions, hopes for the future
Finally a section with your own comments!!

The People behind the planning data

By: Ms R. Kajsa Sandewall

Note: This is a summary of the lecture given at the final seminar in Vientiane on April 30 with some complementary additions from the lecture given in Hanoi on April 26.

The APM deals with topics such as land-use changes, demography, agricultural production, forest degradation, forest plantation, forest production, biomass energy balance and so on. It requires many types of data. The data are used for analysing why things have happened and what might happen in the future. It is, therefore, important that the data are accurate and relevant for the purpose. In order to obtain the most reliable data, various kinds of relevant information are needed.

Many of those involved in data capturing do not clearly distinguish the difference between the two terms "data" and "information". These two terms have often been interpreted as being synonymous, but, in fact, they are not. In our context, "data" means the figures that we use in our planning, and "information" is all the relevant details that lead to the most reliable data and make us understand our data. Generally, acquiring data is easy, but having access to information requires more consideration, attention, and time.

Two of our main sources of information are:

- related documents and
- interviews with concerned persons by applying the PRA (Participatory Rapid Appraisal) approach.

In many cases, specific information on land use given by those farmers, who are the direct land-users, is more accurate and more up to date than land use data collected from documents. By visiting the farmers and discussing with them at their homes and in their fields the interviewers can directly observe the current condition. At the same time, the accounts of the farmers' life in the past, which has influenced their current situation, can be obtained together with their future plan. Therefore, those who collect data need to have enough insight, concerns and empathy to be able to react to any contradictory information and follow-up interesting "leads".

At a session of the APM workshop in Vietnam, the data of fuel wood consumption showed that eight out of the nine sampled households consumed about 20 kg of fuel-wood per day and per household of approximately 6-7 members. But, the ninth household, of six members, consumed only 3 kg per day. Such a big difference seemed irrelevant and caused confusion among the participants at the session. It could have been more relevant if the data had shown e.g. "13 kg per day". However, the case had clearly been explained that the household was a poor and young couple with four small children at the respective ages of seven, six, four, and two years old. The wife had been ill for about two years and could not cope with either heavy household-chores or any work-load in the field. The husband alone had to manage with almost everything. Their relatives, living in the neighbourhood, assisted them in all needed matters, including occasionally ready-cooked meals. With regard to such

circumstances, the household had therefore low consumption of fuel wood. In this example, complementary socio-economic information could be used to verify the seemingly contradictory data.

Gender issues are not included in the components of the APM, but they influence the planning data. Often, the interviewers ignore conversations with the female members of the cases. Their ignorance might cause the loss of important information, which could influence the reliability of the data collected. From my experience, the women of communities and villages mostly have better memories than the men about historical matters (when, why and how it happened), because they usually trace back different events of the past stepwise through the birth-years and the ages of their children.

While carrying out a study on the history of land-use changes within the Upper Nam Nane water catchment area in Lao PDR, one of our sampled households had a long and interesting history about all its plots of shifting cultivation. We had conversations and interviews with the household-head in the field. His wife was at home. We followed him to all the plots he pleasantly told us about. After spending the whole day in the field with him, we had a good piece of information of all his plots, his agriculture practices and many other details, but the historical record was not yet completed in the way we wanted. The farmer could not remember the exact years related to the changes of his plots, which he tried to connect with the birth-years and the ages of his children. The problem was that he was not so sure whether he totally had had eight or nine children, because only four of them had survived and grown up.

After returning to the village that evening, we had an open "get-together" as we used to do while staying in the villages. The farmer, whom we interviewed that day, came laughingly to our "get-together" and immediately informed us that now he could completely fill the gaps of the missing parts, because his wife had given him the additional details we needed. And, above all, she had confirmed that they totally had had nine children, four alive and five dead. Three of them died at birth (which confused his counting), and the other two died before reaching the age of five years. This example has given us two indications; one is that we can achieve accurate information when the farmer is willing to co-operate, and another one is that the most accurate information needs the involvement of both male and female informants.

Considering the interviews, we have observed that female interviewers can "reach" all categories of people they approach, both men and women. The male interviewers, on the contrary, cannot really "reach" the female informants. Therefore, the information obtained from the women by the female interviewers is more accurate than that collected by the male ones.

The estimation of local population-changes in the planning data may easily be inaccurate or misunderstood if it is only based on the officially statistic reports without communication with the local people. The increase or decrease of local population depends on many factors and various circumstances, not only on the natural birth rate. Sometimes, it depends on in-migrations and out-migrations. When relating to the involvement of birth control programmes, the estimation of population changes, especially when estimating decrease of birth rate, cannot be based on the

reports of "the success" of the programme alone. It also needs additional information from the local people, particularly from the female part.

The information I received from the women's groups in the villages, where I have been working, suggests that in many cases the responsible persons did not follow up the consequences after distributing "materials and methods" to those couples who had agreed to practise birth control. Most of the women did not dare to continue practising the new methods due to their physical reaction, about which they had lack of knowledge. Such information can hardly be accessible for a male interviewer, because it is sensitive information and it mostly is initiated by an intimate conversation among the female actors. The birth rate, then, was still out of control, because the males had not yet accepted that it was also their commitment to practise the methods in one or other ways.

Quality of the information obtained depends on how relationship is established between the farmers and the interviewers (the outsiders). The more the farmers trust the outsiders, the more accurate information can be achieved. To be able to win the trust of the farmers and other local people, the outsiders need to behave respectfully, emphatically, and flexibly in accordance with the circumstances.

In addition to knowledge of local tradition and culture, the outsiders should bear in mind more additionally practical principles in order to achieve a good co-operation from the farmers. Here are some recommendations derived from my experiences:

- On arrival, it is, of course, necessary that the visitor presents oneself and explains the objectives of the work to be done. However, it is also important to remember to apologise for any interruption of on-going activities.

- During the stay in a household, any participation of the visitor in the locally on-going activities creates a positive atmosphere and more attention to the questions to be asked (any traditionally public performance of the village, small household-chores at the host family or even small activities in the fields).

- While interviewing, one should change the topics if the informant shows uncomfortable or irritable feelings and if possible bring it up from another angle.

- On departure, besides traditional thanks, apologies once again should be expressed in case some "unaware mistakes" have occurred during the stay and working period. (Being little too much concerned is better than the other way round).

Introduction to the Area Production Model-software (APM)

By: Karl Gustafsson.

Note: This introduction was prepared for the APM exercise at the training workshop in Tam Dao National Park on April 13

Requirements:

- Basic knowledge on computer usage by at least some member of the group.
- A computer with the APM-software properly installed.
- Users guide to the area production model, APM.

Goal and input data

This exercise aims to give the participants a brief introduction on how to operate the APM-software. The exercise is based on data from La Hang Village in Vietnam. The starting year of the APM-run will be 1990 and it will simulate development until 2010. Please follow the steps 1-3!

1. Starting the APM program

The APM program is generally found under the *Start-menu* | *program* | *APM* and is started by a single click on the left button of the mouse. The *Start* menu may look different on different computers depending on the installation.

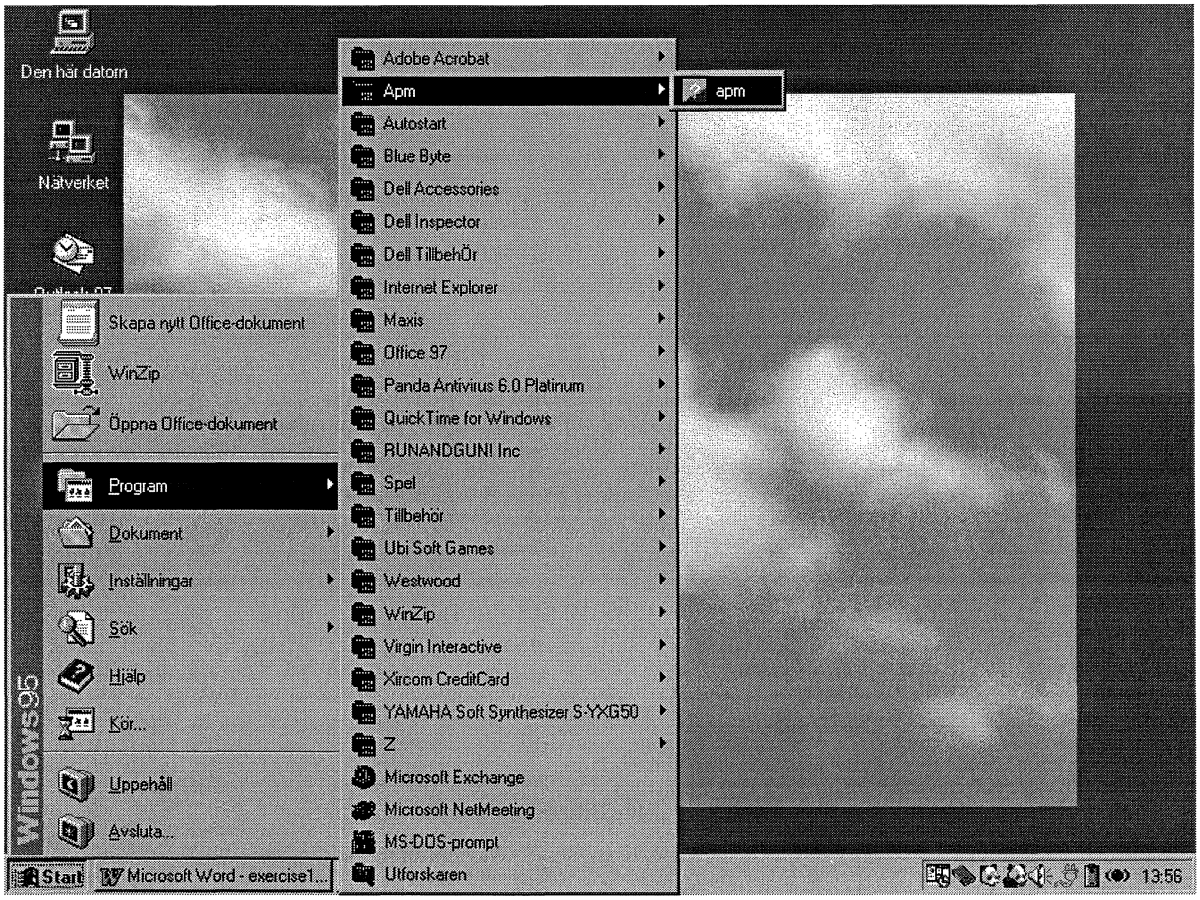


Fig. 1 Starting the APM program

2. Adding a new data set (Users guide, section 8.6)

As the APM is started you will be presented the main window of the program. Choose *Add data set* from the *Edit* menu. A window "*Adding data set*" will appear. The window consists of four sheets in which you will add the input data (the units of the input data can be found in the Users guide, section 8.6). The input data for the area is shown in the pictures following.. The growth factors are the driving forces, which will alter the land use, production and population of the area. The model is simply deterministic and will present to you the results of a possible development in these variables.

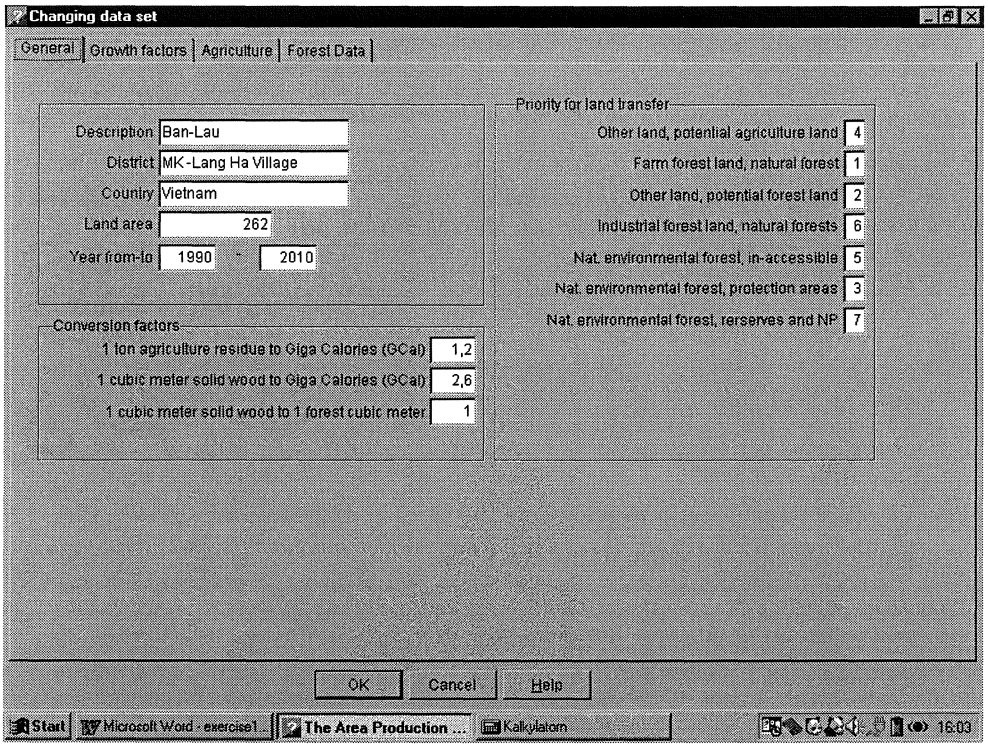


Fig. 2 General data input sheet (Users guide, section 8.6.1)

Please take the time to consider the priority for land use transfer. The current settings imply that if land needs to be transferred to any land-use class e.g. *subsistence food production it* will primarily be taken from the land use class *Farm forest land, natural forest.* Secondly, land will be transferred from the class *Other land, potential forest land.*

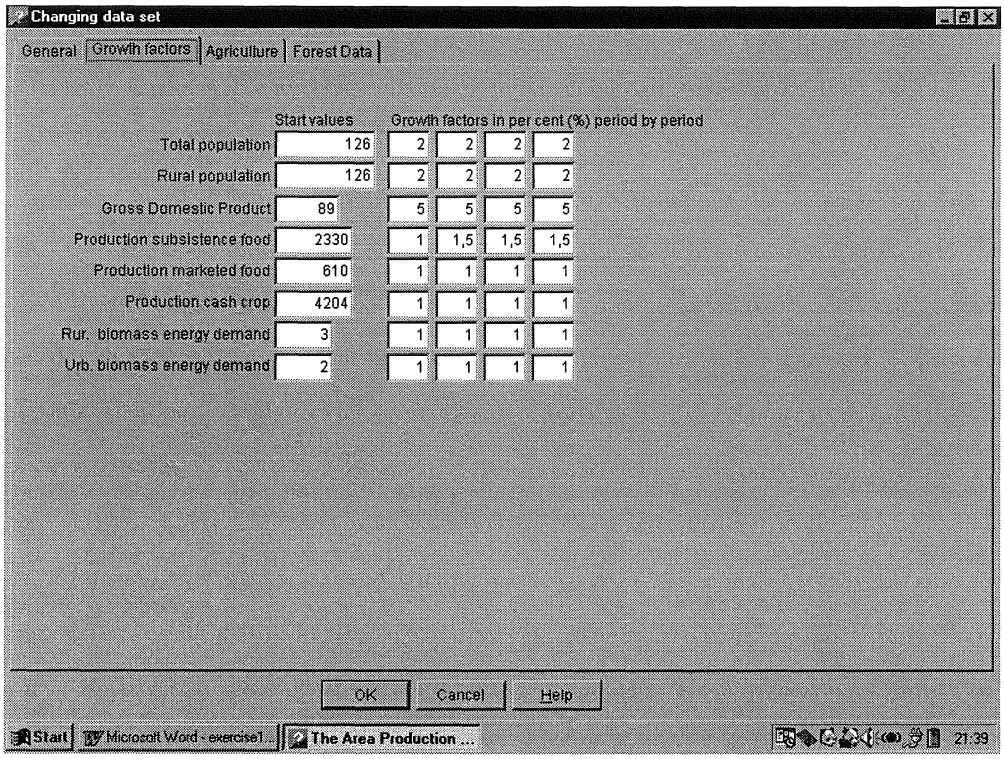


Fig. 3 Growth factors input sheet (Users guide section 8.6.2)

The starting values have been taken from available statistics and field studies from the area. Please add them as shown above. The growth rate has been estimated from experience of studies in the villages. Take time to discuss the growth rate of each element. It's the annual growth rate in percent that is to be entered for each of the four 5-year periods between 1990 and 2010.

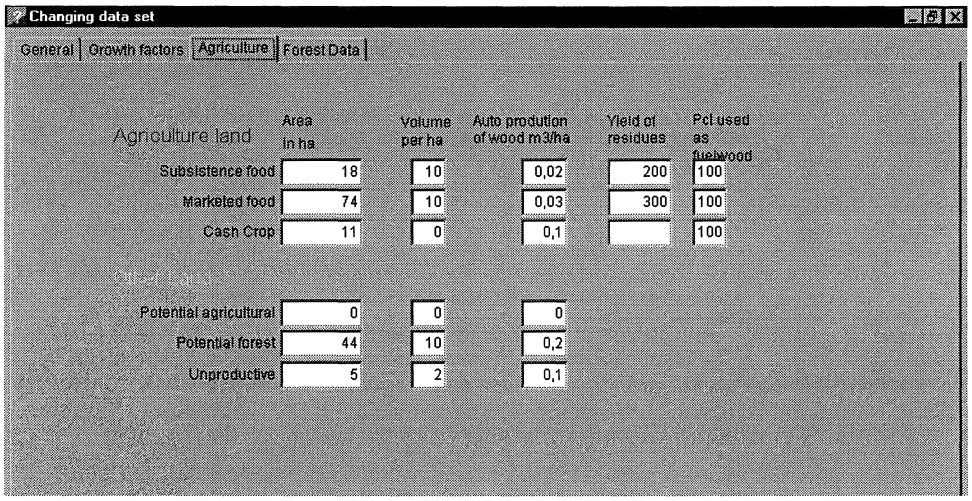


Fig. 4 Agriculture data input sheet. (Users guide section 8.6.3)

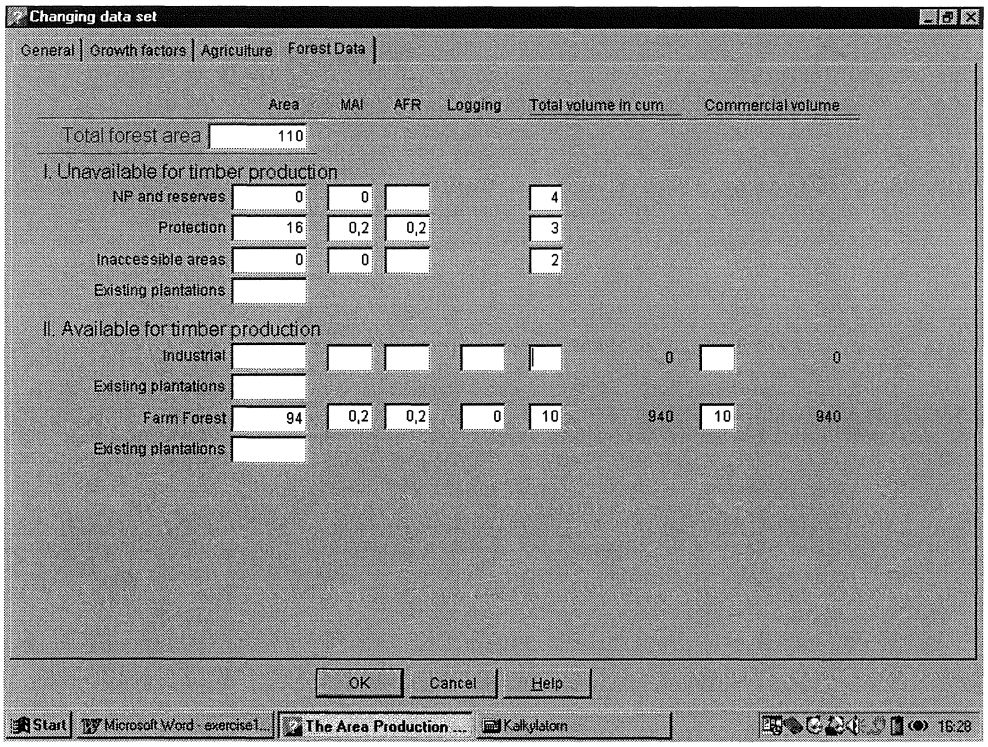


Fig 5 Forest data input sheet (Users guide, section 8.6.4)

Please fill in the agricultural and forest data as shown in fig 4 and 5. Note that the sum of areas of forest and agriculture land must match the total area as given under the general input data sheet. If this do not match the program will not run. When the input is completed as above press "OK" to close the *adding data set* window. Please try to anticipate the land use transfer and development of the population.

3. Running the model (Users guide, section 8.11)

To run the model, simply choose *run model* from the *file*-menu.
You will be presented a choice of report.

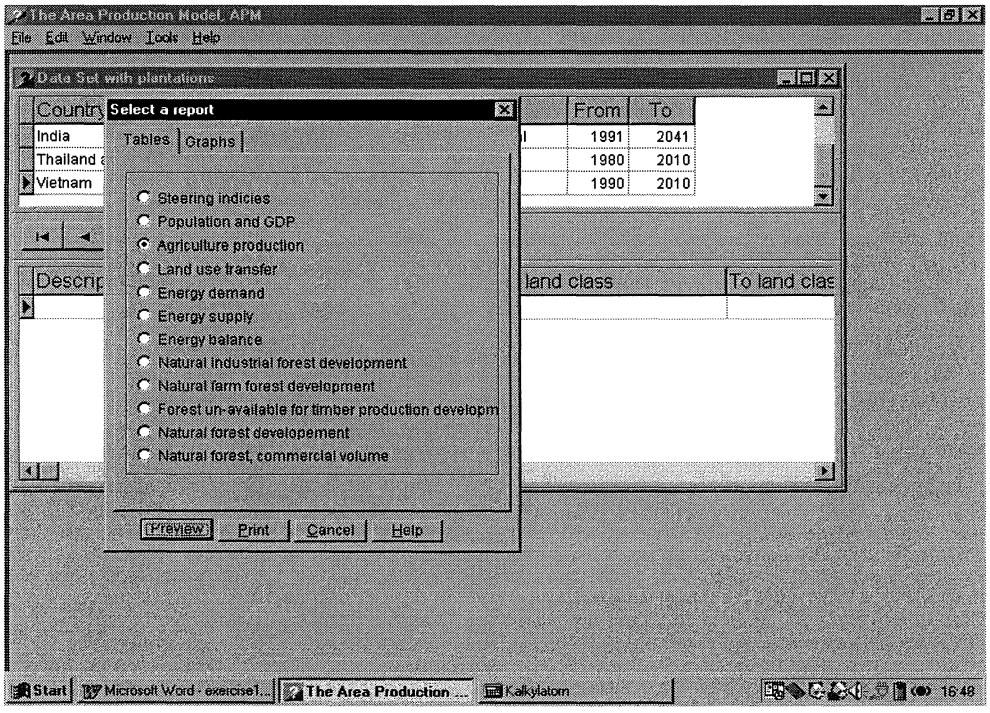


Fig. 2 The *select a report* window

Part C

Case studies

Inter-active and dynamic approaches on forest and land use planning – a profile from the training workshop

By Mr Phung Van Khoa
Lecturer, Xuan Mai Forestry College

Preface

In the context of an agriculture based economy with the rapidly changing socio-economic and environment conditions such as Viet Nam today, achieving sustainable development on the uses of natural resources must necessarily be based on insightful planning of all levels. Therefore, training and setting up the understanding of this aspect for the key-people who are involved in building and implementing a certain programme such as the "5 Million ha Reforestation Programme", "Hunger Eradication and Poverty Alleviation Programme" ... must be a crucial requirement.

Meeting a need of the requirement mentioned above with the Swedish support, the special training worshop named: "Inter-active and Dynamic Approaches on Forest and Land Use Planning" was organized in Tam Dao National Park on April 12th - 22nd, 1999 and the Final Seminar which held in Ha Noi on April 26th - 27th this year.

The aim of this report is not only to review the workshop's success and experiences, but it might also be used as a simple manual for those who are interested in this issue.

Acknowledgements

Being a participant I was voted for summing up systematically the main points and the general consensus during the training workshop. So I can say this report is a composite, indirectly made up by many people who were participating and sharing the workshop.

On behalf of all my colleagues and myself, I would like to express that we are deeply indebted to Mr Mats Sandewall and his wife Mme Kajsa Sandewall, Prof. Nils-Erik Nilsson and their colleagues for their support as well as teaching and traing us.

We should like to acknowledge the organizing staff of FIPI who tried their best for giving us the good conditions to study and practise during the workshop. Our deep appreciation to the staff and officials of Tam Dao National Park as well as the local people in Dao Tru Commune for giving their time in providing data and information and in being interviewed.

Last but most important, thanks are due to the participants for their help and encouragement in the setting up of my report preparation.

Forestry University of Viet Nam, May 1999

Phung Van Khoa

1. Background

From the sustainable development point of view, there is a necessary inter-play and inter-dependence of the environment, society and the economy of all programmes and projects or other development activities. So Inter-active and Dynamic Approaches on natural resources management process such as Forest and Land Use Planning are obviously required.

APM is a computer model which is aimed to be used as a tool in strategic planning for meeting the requirement mentioned above. It has been developed by Prof. Nils-Erik Nilsson, Swedish University of Agricultural Sciences. Mr Mats Sandewall has been adjusting and using the model in his research works in Laos and also in Viet Nam since 1997. The model deals with land use changes and their consequences. It is robust and easy to understand. It includes socio-economic data as well as agriculture and forest data. However, we can say that any land use manager should be able to use it, regardless profession.

By using the model it may take part in having the best answer for the big questions following: "How to use our natural resources effectively now as well as henceforth? Which areas of land should be under forestry and which should be allotted to other kinds of land use? Which agro-forestry management system will best meet the needs of each area, and what measures are necessary to implement this? etc".

The APM is an integrated programme so there are several different potential uses of it for achieving sustainable development such as various planning options can be considered by comparing of the result of simulation alternatives with different assumptions.

Dao Tru Commune - Tam Dao District - Vinh Phuc Province has been chosen as the pilot area of the workshop for selecting the input data required by the model. The best land use planning of the commune would be discussed and chosen after running the model.

2. Data gathering methodology

There is one way to really test the model. It is to use data on historical development. Thus, before running the APM, certain information and data both in the past as well as at the present on the area to be covered by the simulation should have to be selected and specified. It is necessary to base on this for having a predictability of what the future development will be. Gathering the information on previous development in the commune is not only statistics but also descriptive data on the reasons for changes is therefore required. So there are three categories of information that should be needed.

1. Data in the past
2. Data on the current situation
3. Estimates of expected future changes

In general speaking, all the required items are not available. So we had to find out and discuss to choose the effectively methods for collecting the information and data

mentioned above. We applied the "Integrated method" and three other specific methods following:

1. Inherited Method (i.e. using available documents discriminatingly).
2. Subjective Sampling Method (i.e. interviewing the local people).
3. Objective Sampling Method (i.e. setting up and survey systematically the sampling points on the field of the commune).

This is a systematic method and has been great success. By dividing the total area of the commune on the map into small squares for setting up the sampling point system (please see the map in the Annex A). Each point equals to 100 ha on the field. Then, we went to visit or view the selected points systematically and record the situation of land use at the present, in the past and the scenarios in the near future by asking the local guide supporting us. By using this method we could also understand the indigenous knowledge as well as the form or the procedures of traditional land use of the commune. In fact, we can get the survey results very fast by applying the sampling method.

However, the exactitude of the results depends on the number of the sampling points. How many sampling points would be convenient enough for us?. The good answer should be considered carefully in each specific context (should be according to the statistical analysis method). In this case, we divided the area into 76 sampling points. On the other hand, the interviewing and survey activities in three levels: commune, village and family are also seemed as the sampling points.

In the otherwise, in order to overcome the bureaucratic habit when collecting data and information we thought highly of the methods such as PRA, RRA, especially a general steering principle that so-called: "Talk - Walk - Touch". Using these methods can also narrow the gap between "Top - Down" and "Bottom - Up" oriented planning. By applying the methods mentioned above, the input data used in the pilot simulations on Dao Tru Commune are displayed in the General Information below and in the Annexes part at the end of this report.

3. General information of the Commune

3.1 Natural conditions

Dao Tru is a mountainous commune in the North-Eastern part of Lap Thach District - Vinh Phuc Province. It is located in the middle of the Latitude $23^0$79' N and the Longitude $105^0$60' E (please see the photo of Annexes B). Natural area in total is about 7600 ha, over 3/4 of this land are scattered hills or ranges of mountains with the mean sloping scope from 7^0 - 35^0. So we can say this land are more convenient to the ongoing development of shifting cultivation, farm forest and cattle or goat breeding. Rhodic Ferralsols Soils (Brown - Red Soils) and Xanthic Ferralsols Soils (Brown - Yellow Soils) are the most popular kinds of soil in the area. The data of forest and land use classifications are shown in the Annexes part C displayed at the end of the report.

The climate regime here is one of the tropical characteristic condition. There are two main seasons. The rainy season lasts from April to October and concentrated mainly to July and August every year. The dry season lasts from November to March. The mean annual rainfall is 1600 mm. The average of maximum temperature is 41.5^0C while the number of average of the minimum is only 0.4^0C. The mean annual humidity is about 84%.

There are some streams flowing pass the commune area. However, because of deforestation and degradation of soil, erosion process so only one main stream could supply water for paddy rice, crops and animals in the last 20 years up to now. The natural forests here is really of the rain tropical/sub-tropical closed evergreen type. It has been exploited illegally for many years, while the dominant man-made forests are monocultures of Eucalyptus or Acacia with the MAI accounted to about 6 m^3/ha/year. In general, mixed plots of native species will be dominant in the reforestation process in the coming years due to the sustainable development ecosystems point of view. Since 1996 most of the natural forests have belonged to the Tam Dao National Park. However, they have been allotted to the local people for protection who have been paid about 4.0 USD per ha and year.

3.2 Socio-economic conditions

Dao Tru Commune has 15 villages and 1, 850 households with about 11, 000 inhabitants. There are 144.7 inhabitants/km^2, of which 20% have certificate of primary education, 50% have certificate of secondary education, 25% have high school level, 0.1% upper high school level and about 4.9% are illiterate. There are only 3 different ethnic groups in the commune, in which the Kinh occupy 25%, the Dao 15% and the San Diu 60%. The Kinh have just lived here since 1960 as part of the government resettlement and the "reclaim waste lands" programme. The amount of paddy fields (both 1 and 2 crops) per person in the commune amounts to 0.1 ha. However, maybe it is not a very rare situation in the countryside of the nation, this is according to the official information which often only record those paddy field which formerly were part of the co-operatives and enventually distributed to the inhabitants of the villages. Tax is paid only for these recorded fields, not for the other ones. Actually, the amount of paddy field totally in Dao Tru today may amount to some

1500 ha as shown by the result of the sampling inventory process. Maybe this is seemed as a part that can explain why Dao Tru is not a poor commune in the District. Basing on the study we estimate that "GDP" at least equals to 120 USD per Capita. The main source of income comes from paddy fields, crops and other parts come from pigs, cattle breeding, shifting cultivation and other economic activities such as handicraft, pomiculture, horticulture, apiculture, etc. From a historical perspective on forest land use, the shifting cultivation was a crucial factor for destroying forest *for subsistence food.* However, shifting cultivation is much declined so far, and the new crucial factor for destroying forest that is occurring here is illegal exploitation *for making some owners richer.* This is very bad situation, and the local government as well as the National Park are trying to halt and decrease it.

From 1996 Tam Dao National Park was established so it influences for opening more opportunities for the commune's economic activities development such as forest protection, plantation, tourist services, etc. Following to the establishment of the National Park the commune also received some projects supporting for infrastructure building such as upgrading road, hospital station and health care and making an electric cable through the commune (it hasn't been finished yet). Two new schools are also built, in which one primary school comprising 1, 000 pupils and one secondary school comprising 800 pupils.

There are about 3, 400 labours (30%) in the commune. Most of them are grassroots (95%), and the rest are technocrats and upper educated people.

Most of interviewees say that they would like to be supported for cattle and goat breeding, upgrade the irrigation system, apply new techniques and new varieties. They also believe that the commune cannot develop well if there is lack of education system, health centre, etc.

Now, before finishing this part, we would like to show here an interesting and optimistic situation that all of interviewees here are afraid of over population. They would like to (or have already done) volunteer to accept the birth control methods applying in the commune. So from this, we can say the Family Planning Programme has been very successful here.

4. The simulations

In order to demonstrate the APM in a simple way, the data of the commune have been applied into two alternative simulations (scenario A and the reference scenario B). The simulations have been made for a period of 40 years (1979 – 2019). Both simulations are in the same data in the past because obviously we should not change what happened up to the current situation. So the node for assuming different scenarios should be best started from 1999.

Scenario A:

Assuming that in the coming 20 years the growth of population will gradually slow down as a result of the Family Planning Programme efforts, the influences of infrastructure development and economic realities. "GDP" will increase because of increasing market opportunities, and the development of economic activities as the

economic diversification. So, production of marketed food and cash crops are also increasing. Besides, the production of subsistence food should be kept in the same rate at the present (3%), and Rural biomass energy demand may decline (from 2.5% in 1999 to 1.0% in 2019) due to that other energy sources will also be used.

Reference scenario B:

Assuming that all the growth factors (except for Rural biomass energy demand in the same rate of scenario A) in the coming 20 years will be maintained at the same rate as it is today.

5. The simulation results and some comments

With references to the simulation results displayed in the Annexes part C and D, the following of the two scenarios could be made:

Firstly the two scenarios should be divided into two periods:

The first period (1979 – 1999):

In general, the result (both the two scenarios are the same) made up after running the model is very closed to the current situation at the present except for some small differences. However, these are not so very important. So we can reliable use the APM for predicting what will happen in the near future.

The second period (1999 – 2019):

Scenario A:

In the coming 20 years, the increase of population will gradually slow down from 3.5% in 1999 to 2% in 2019, meaning that the population in 2019 would increase about 1.6 times. The GDP per Capita would increase from 115 USD to 320 USD. The agriculture development table in the Annex part provides the information that the area of subsistence food would gradually decrease from 1598 ha (1999) to 1, 449 ha (2019) as long as the production of this must be increased about 1.8 times in the year 2019.

Besides, it also requires that the marketed food and cash crop will have to be increased both the area and production. The need of increasingly area to be used for producing agriculture products requires the land use transfers according to the priority order that determined at the beginning. The land use transfers Table in the Annex part shows that 900 ha potential land (both agriculture land and forest land) have been used up to the year 2011. Then, to the year 2019, about 31 ha of farm forest land will be also used.

The other important thing is maybe the energy balance. It can show that at the present the residue of fuelwood and wood is +11, 987 m^3 (this can explain why the local people are selling fuelwood for earning money as the source of income). In the year 2019 this balance will instead be negative, or -11, 357 m^3.

As a result, due to the MAI of industrial forest is bigger than the Annual fuelwood removal and Annual logging so the industrial forest will be developed. In this case, forest unavailable for timber production will neither increase nor decrease except for the decrease in the area of the protection forest due to the illegal cutting by the local people is bigger than the MAI, and conversely the in-accessible forest production will be increasingly.

- What is wrong with scenario A ?

The assumption that the average yield of agriculture will be increased is reasonable because the local people tend to struggle to survive and improve their living standard by various means (new advanced techniques, new varieties, high intensity cultivation, more investments in permanent agriculture, etc). However, degeneration of soil on shifting cultivation land and soil slide, erosion are also taking place so the yield will not increase at the same rate in everywhere. On the other hand, there are about 20% poor families who cannot invest fertilizer and/or pesticide, etc to their field. So their agriculture yield may be not increased as the same rate of the rich ones. This may lead to an accumulation of land to the rich people, therefore the gap between the rich and the poor is also being larger, even this is a crucially bad situation today that the government want to narrow it by applying various means as soon as possible.

Scenario B:

We assume that the rates of population growth as well as GDP, production of subsistence food, marketed food and cash crop will be the same as it is today. So the number of population in the year 2019 will be bigger than the number in scenario A (the approximation value is about 2000 people). This can show that the energy balance in the year 2019 is about –7000 m^3 smaller than this number in scenario A. Conversely, the number of GDP per Capita, production subsistence food and production marketed food or production cash crop will be smaller compared to scenario A. This explains why the agriculture area in scenario B will be required higher than in scenario A (about 500 ha). Therefore, the scope of land use transfers will be also bigger than in scenario A, i.e. all the area of the priority ordered from 1^{st} - 5^{th} will be finished by the end of the year 2015, and the extra land is about 150 ha of the priority 6^{th} (Nat. environmental forest reserves and NP) will be also used (please see the Land Use Transfers Table displayed in the Annexes part D of this report). Therefore, these lead to the decline of the forest production development. The other aspects are not different to scenario A.

What is wrong with scenario B ?

Compared with scenario A, the applied data or assumption on future changes are unrealistic or aren't responding to the needs of the development along with the desires and the orientation in the coming years of the community's planning. As an example, the assumptions in the scenario omitted the effectiveness of the Family Planning Programme, and the various means taking place for producing higher average yield of agriculture products, etc.

6. The Planning issue

After comparing and discussing the two scenarios, scenario A was selected as the best pilot steering orientation of the commune's agro-forestry land use planning in the coming 20 years. This decision was voted through the Final Seminar with 100% agreement without any protest. Then, based on the commune's general information and the current conditions combined with the outcome and some essential issues according to scenario A, the planning issue was made up and passed with the main following points:

The decline of the rate of population growth from 3.5% (1999) to 2.0% (2019) requires the effective efforts of the Family Planning Programme. So the campaign for this should be more promoted and motivated. This issue also needs the attention of men as well as women. Anyway, we have already an optimistic view of this event. Because the rate of population growth in 1979 was 5% and up to the present it is 3.5% (the decline is 1.5%). So the decline from 3.5% (1999) to 2.0% (2019) is perfectly possible. On the other hand, the perception (about the decline of population) which has been rising by the local people being a prerequisite success.

In order to reach the increment of GDP from 4.5% to 5 and to 5.5% in the coming years we should pay more attention and invest for developing infrastructure, market, promote economic activities and diversification such as cattle and goat as well as poultry breeding, pomiculture, apiculture, horticulture and orchard. These are seemed as the most strong points of the commune. We also need to care for education, production marketed food, cash crop. etc.

As we have already known that the decline of energy demand in the year 2019 will be -11, 357 m^3. This means that it needs at least about 100 ha plantation with the mean annual increment of about 6 m^3/ha/year. At the present there are only 50 ha existing plantation of Eucalyptus and Acacia in the area. So, if the existing plantation won't be changed we should plant about 50 ha more of new forest or an equal number of trees like that volume. However, we may have only about 20 ha land enough for new forest. So, we have to promote the local people to plant scattered trees, lines/groups of trees along the road, routes as well as on paddy field's banks and so on in order to reach the equal number volume of wood and fuelwood due to the lack of 50 ha mentioned above. Besides, we should motivate the local people use more residues of agriculture products as well as applying other energy sources in their lives.

As the result, the area of subsistence food is gradually declining and it will be decreased about 100 ha in the year 2019 compared to the current situation as long as the production/ha has to be increased from 4000 kg/ha to over 6000 kg/ha/year (2019). However, we should not use the residual land of this for other purposes because when running the APM the different quality of soil, different investment condition between the rich and the poor as well as the risk of crop, rice harvest, etc are not taken into account. On the other hand, for increasing the marketed food and cash crop, we should implement the renovation process of home gardens in the area. Most of the home gardens here are very poor because there are so many species in each garden. Thus, it is not enough products for marketing in one harvesting season. In fact, they are like the wastelands.

In order to respond to the increased production of subsistence food, we should have to develop and upgrade the irrigation canal system as well as applying new techniques, new seed varieties, high intensity cultivation, etc. It is also required to develop agricultural services, promote the extension of agro-forestry and open more essential short training course, which are compatible with the local people.

7. Some conclusions and proposals

In a manner of speaking, the planning issue mentioned above are the most essential points for the commune in the sustainable development point of view. However, according to the topic named: "dynamic" a concrete land use planning should not be built. Anyhow, in the marketing mechanism in Viet Nam and in the commune today, most of land has already been allotted to households. We accept that economic diversification is necessarily important for development process. However, diversification must be limited in a general planning frame, and obviously the general planning must support and make up opportunities for economic diversification development. Thus, it is not easy to implement a commune's development planning. Therefore, the planning issue should be discussed and passed through the community's meetings. It should also be seen as the special hints and frames for everyhousehold or organizations' land use planning in a sustainable manner.

Some proposals on the APM:

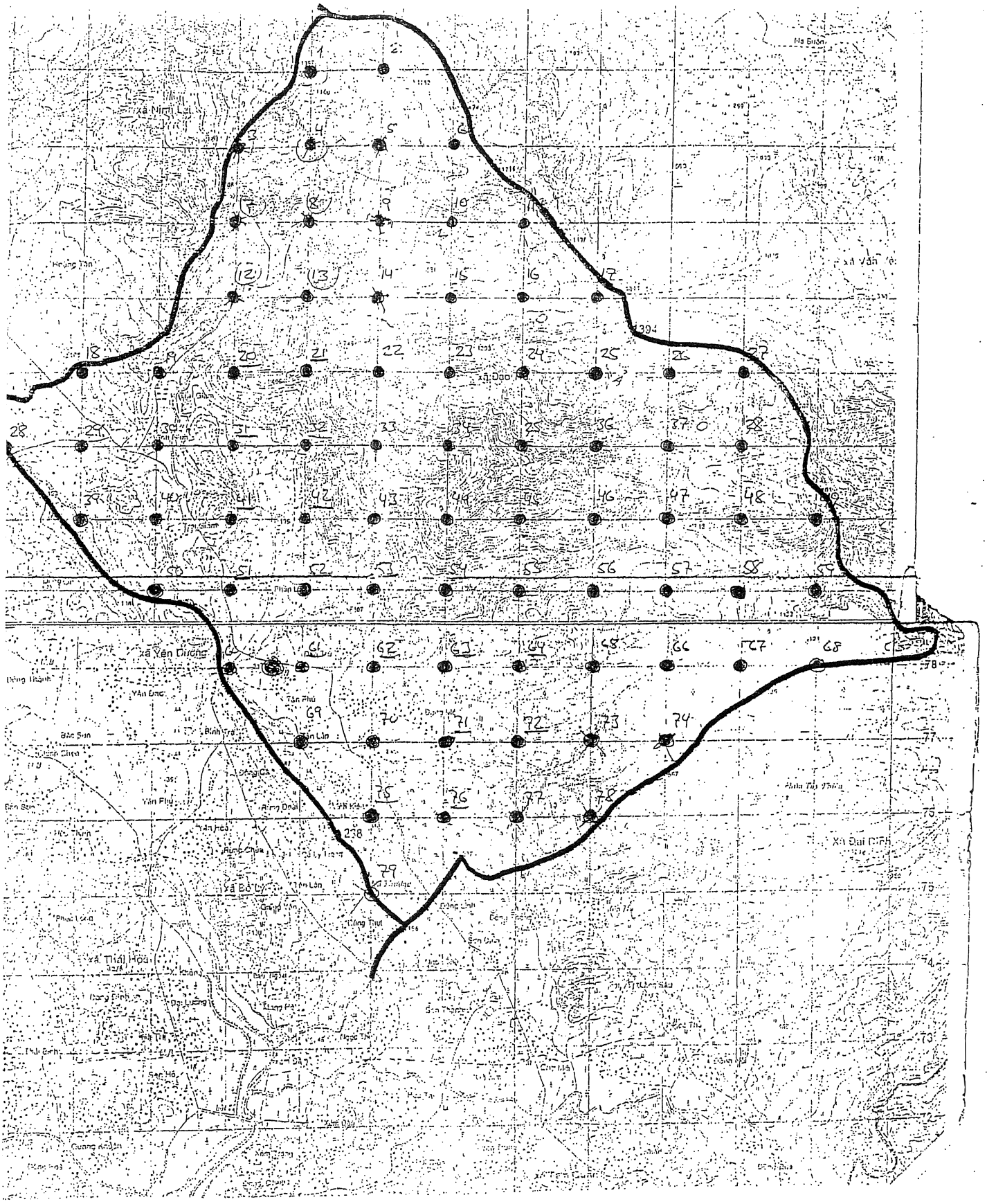
This is a useful programme for making land use planning in every level. So it should be introduced and trained to the whole of people who are doing their works as land use managers, to the students studying in forestry or agriculture university, institute. In Viet Nam, it should be written into Vietnamese for expanding its influences effectively.

However, maybe we cannot help saying that there some shortcomings of the APM such as when running the model the outcome of the development of man-made forest is omitted. In addition, the land use transfers are not so simple as the result after running the model, i.e. actually, the transfers from farm forest land into subsistence food land is impossible in some cases. In the other words, the APM should be added with a programme for selecting its the best scenario after attempting some assumptions. These can make it more easy and convenient to the users.

Annexes:

A. Distribution of sampling points in the land use inventory of the commune.
B. Photographic view of Dao Tru Commune.
C. Some results of the sampling inventory.
D. The input data and the Result of pilot simulation (scenario) A for analysing land use planning in Dao Tru Commune using the APM.
E. The input data and the Result of pilot simulation (scenario) B for analysing land use planning in Dao Tru Commune using the APM.

<u>Annex A:</u> Distribution of sampling points in the land use inventory of the commune.

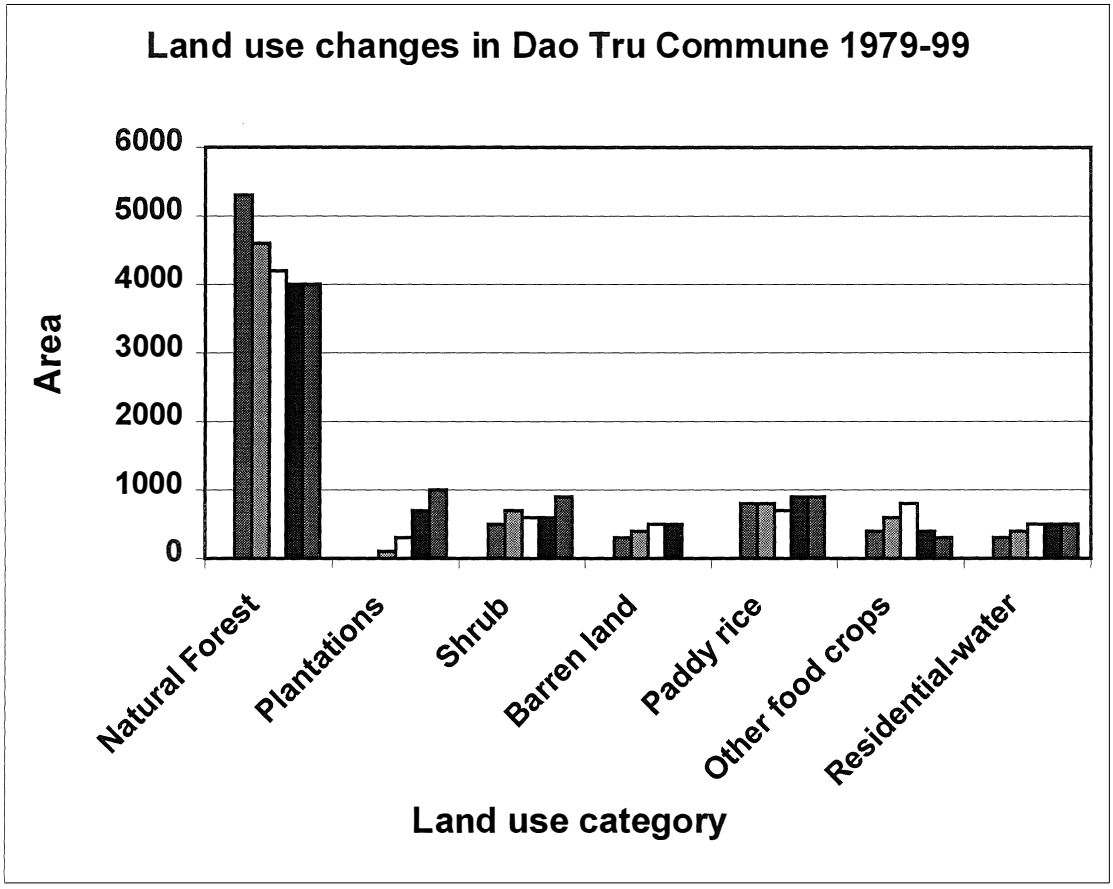


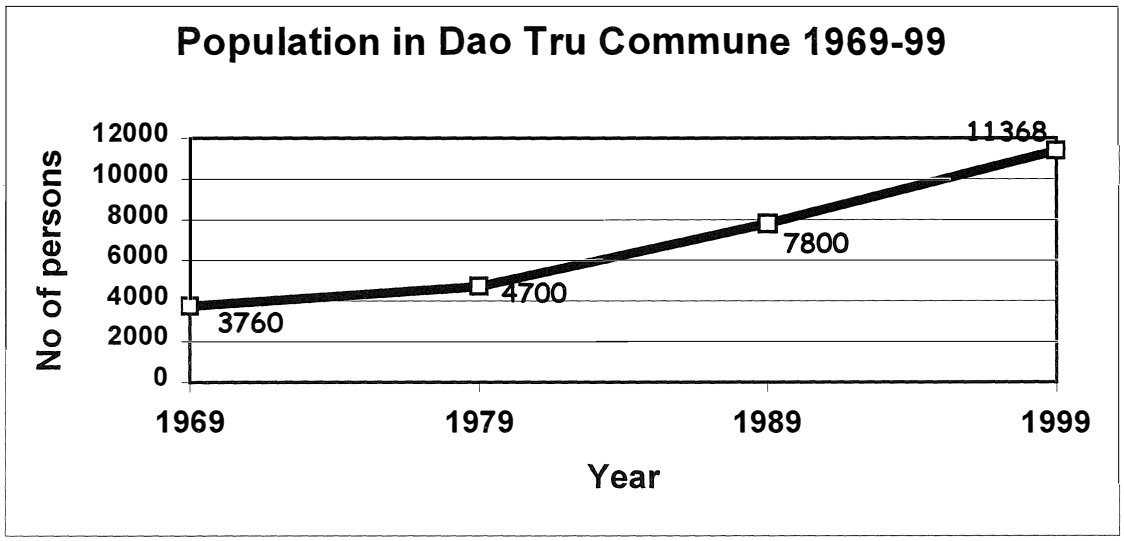
Annex B: Photographic view of Dao Tru Commune

(Photo: Bo Ohlsson)

Annex C: Some results of the sampling inventory

Land use	Year				
	1979	1984	1989	1994	1999
Natural Forest	5300	4600	4200	4000	4000
Plantations	0	100	300	700	1000
Shrub	500	700	600	600	900
Barren land	300	400	500	500	0
Paddy rice	800	800	700	900	900
Other food crops	400	600	800	400	300
Residential-water	300	400	500	500	500
TOTAL	7600	7600	7600	7600	7600





Annex D

THE INPUT DATA AND RESULT OF PILOT SIMULATION

SCENARIO A

FOR ANALYSING LAND USE PLANNING

IN DAO TRU COMMUNE

USING THE APM

Data set

Description: Dao Tru, Scenario A

District	Tam Dao	
Country	Vietnam	
Land area	7600	
Years	1979	2019

1 ton agriculture residue to Giga Calories (GCal)	4,0
1 cubic meter solid wood to Giga Calories (GCal)	2,6
1 cubic meter solid wood to 1 forest cubic meter	1,0

Land use transfer priorities

Other land, potential agriculture land	1
Farm forest land, natural forests	3
Other land, potential forest land	2
Industrial forest land, natural forests	4
Nat. environmental forest, in-accessible	7
Nat. environmental forest, protection areas	5
Nat. environmental forest, rerserves and NP	6

Growth factors, start value and period growth in %.

Total population	4 700	5,00	5,00	4,00	3,50	3,00	2,50	2,50	2,00
Rural population	4 700	5,00	5,00	4,00	3,50	3,00	2,50	2,50	2,00
Gross Domestic Product	50	4,00	4,00	4,50	4,50	5,00	5,00	5,50	5,50
Production subsistence food	2 500	1,00	1,50	2,00	2,50	3,00	3,00	3,00	3,00
Production marketed food	1 000	1,00	1,00	1,50	1,50	2,00	2,00	2,50	3,00
Production cash crop	600	1,00	1,50	1,50	2,00	2,50	2,50	3,00	3,50
Rur. biomass energy demand	3	1,00	1,50	2,00	2,50	2,50	2,00	1,50	1,00
Urb. biomass energy demand		0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

Agriculture data

Agriculture land	Area (hectares)	Volume wood per hectare	Autoproduction of wood m^3/ hectare and year	Yield of residues kg per hectare	Amount of residues used as fuelwood (%)
Subsistence food	960	3	0,3	1 500	30
Marketed food	120	4	0,3	2 500	50
Cash Crop	20	5	0,3	3 500	60
Other land					
Potential agricultural	400	8	0,5		
Potential forest	500	25	0,6		
Unproductive	600	5	0,2		

Forest data

I Unavailable for production	Area (hectares)	MAI m^3	Ann fuel wood removal m^3	Ann. Logging m^3/ hectare	Total volume in m^3 per ha	Total volume in m^3 altogether	Commercial volume in m^3 per ha	Commercial volume in m^3 altogether
NP and reserves	4 000	6	6		80			
Protection	250	6	7		80			
Inaccessible areas	232	6	5		90			
Existing plantations	300							
II Available for production								
Industrial	50	7	3	2	80	80	40	
Existing plantations								
Farm forest	90	7	5	1	60	60	10	
Existing plantations	78							

Steering indicies

Year	Population		GDP		Energy Demand		Productivity in agriculture		
	Total	Rural	Total	Per capita	Urban	Rural	Subsistence	Marketed	Cash Crop
1979	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
1980	1,05	1,05	1,09	1,04	1,00	1,01	1,01	1,01	1,01
1981	1,10	1,10	1,19	1,08	1,00	1,02	1,02	1,02	1,02
1982	1,16	1,16	1,30	1,12	1,00	1,03	1,03	1,03	1,03
1983	1,22	1,22	1,42	1,17	1,00	1,04	1,04	1,04	1,04
1984	1,28	1,28	1,55	1,22	1,00	1,05	1,05	1,05	1,05
1985	1,34	1,34	1,70	1,27	1,00	1,07	1,07	1,06	1,07
1986	1,41	1,41	1,85	1,32	1,00	1,08	1,08	1,07	1,08
1987	1,48	1,48	2,02	1,37	1,00	1,10	1,10	1,08	1,10
1988	1,55	1,55	2,21	1,42	1,00	1,12	1,12	1,09	1,12
1989	1,63	1,63	2,41	1,48	1,00	1,13	1,13	1,10	1,13
1990	1,69	1,69	2,62	1,55	1,00	1,15	1,15	1,12	1,15
1991	1,76	1,76	2,85	1,62	1,00	1,18	1,18	1,14	1,17
1992	1,83	1,83	3,10	1,69	1,00	1,20	1,20	1,16	1,18
1993	1,91	1,91	3,36	1,77	1,00	1,23	1,23	1,17	1,20
1994	1,98	1,98	3,66	1,84	1,00	1,25	1,25	1,19	1,22
1995	2,05	2,05	3,95	1,93	1,00	1,28	1,28	1,21	1,24
1996	2,12	2,12	4,28	2,01	1,00	1,31	1,31	1,23	1,27
1997	2,20	2,20	4,63	2,11	1,00	1,35	1,35	1,24	1,29
1998	2,27	2,27	5,00	2,20	1,00	1,38	1,38	1,26	1,32
1999	2,35	2,35	5,41	2,30	1,00	1,41	1,41	1,28	1,35
2000	2,42	2,42	5,85	2,41	1,00	1,45	1,46	1,31	1,38
2001	2,50	2,50	6,33	2,53	1,00	1,49	1,50	1,33	1,41
2002	2,57	2,57	6,84	2,66	1,00	1,52	1,55	1,36	1,45
2003	2,65	2,65	7,40	2,79	1,00	1,56	1,59	1,39	1,49
2004	2,73	2,73	8,01	2,93	1,00	1,60	1,64	1,42	1,52
2005	2,80	2,80	8,62	3,08	1,00	1,63	1,69	1,44	1,56
2006	2,87	2,87	9,27	3,23	1,00	1,66	1,74	1,47	1,60
2007	2,94	2,94	9,98	3,40	1,00	1,70	1,79	1,50	1,64
2008	3,01	3,01	10,74	3,57	1,00	1,73	1,85	1,53	1,68
2009	3,09	3,09	11,56	3,74	1,00	1,77	1,90	1,56	1,72
2010	3,16	3,16	12,50	3,95	1,00	1,79	1,96	1,60	1,78
2011	3,24	3,24	13,52	4,17	1,00	1,82	2,02	1,64	1,83
2012	3,32	3,32	14,62	4,40	1,00	1,85	2,08	1,68	1,88
2013	3,41	3,41	15,81	4,64	1,00	1,88	2,14	1,72	1,94
2014	3,49	3,49	17,09	4,89	1,00	1,90	2,20	1,77	2,00
2015	3,56	3,56	18,39	5,16	1,00	1,92	2,27	1,82	2,07
2016	3,63	3,63	19,79	5,45	1,00	1,94	2,34	1,88	2,14
2017	3,71	3,71	21,30	5,75	1,00	1,96	2,41	1,93	2,22
2018	3,78	3,78	22,92	6,06	1,00	1,98	2,48	1,99	2,29
2019	3,86	3,86	24,67	6,40	1,00	2,00	2,55	2,05	2,37

Population & GDP

Year	Population			Gross Domestic Product	
	Rural	Urban	Total	Total (in millions)	Per capita
1979	4 700		4 700	0	50
1980	4 935		4 935	0	52
1981	5 182		5 182	0	54
1982	5 441		5 441	0	56
1983	5 713		5 713	0	58
1984	5 999		5 999	0	61
1985	6 298		6 298	0	63
1986	6 613		6 613	0	66
1987	6 944		6 944	0	68
1988	7 291		7 291	1	71
1989	7 656		7 656	1	74
1990	7 962		7 962	1	77
1991	8 281		8 281	1	81
1992	8 612		8 612	1	84
1993	8 956		8 956	1	88
1994	9 314		9 314	1	92
1995	9 640		9 640	1	96
1996	9 978		9 978	1	101
1997	10 327		10 327	1	105
1998	10 689		10 689	1	110
1999	11 063		11 063	1	115
2000	11 395		11 395	1	121
2001	11 736		11 736	1	127
2002	12 088		12 088	2	133
2003	12 451		12 451	2	140
2004	12 825		12 825	2	147
2005	13 145		13 145	2	154
2006	13 474		13 474	2	162
2007	13 811		13 811	2	170
2008	14 156		14 156	3	178
2009	14 510		14 510	3	187
2010	14 873		14 873	3	198
2011	15 244		15 244	3	208
2012	15 626		15 626	3	220
2013	16 016		16 016	4	232
2014	16 417		16 417	4	245
2015	16 745		16 745	4	258
2016	17 080		17 080	5	272
2017	17 421		17 421	5	287
2018	17 770		17 770	5	303
2019	18 125		18 125	6	320

Agriculture development

Year	Subsistence food		Marketed Food		Cash Crop		Accumulated
	Area	Production/Ha	Area	Production/Ha	Area	Production/Ha	transfer
1979	960	2 500	120	1 000	20	600	0
1980	998	2 525	124	1 010	22	606	44
1981	1 038	2 550	127	1 020	23	612	88
1982	1 079	2 576	131	1 030	25	618	135
1983	1 121	2 602	135	1 041	27	624	183
1984	1 166	2 628	139	1 051	30	631	235
1985	1 206	2 667	143	1 062	32	640	281
1986	1 248	2 707	147	1 072	34	650	329
1987	1 291	2 748	152	1 083	37	659	380
1988	1 335	2 789	156	1 094	40	669	431
1989	1 381	2 831	161	1 105	43	679	485
1990	1 408	2 887	166	1 121	46	690	520
1991	1 436	2 945	170	1 138	49	700	555
1992	1 464	3 004	175	1 155	52	710	591
1993	1 493	3 064	181	1 172	56	721	630
1994	1 522	3 125	186	1 190	60	732	668
1995	1 537	3 203	192	1 208	64	746	693
1996	1 552	3 283	197	1 226	67	761	716
1997	1 567	3 365	203	1 244	71	777	741
1998	1 582	3 450	209	1 263	76	792	767
1999	1 598	3 536	215	1 282	80	808	793
2000	1 598	3 642	222	1 308	85	828	805
2001	1 598	3 751	228	1 334	89	849	815
2002	1 598	3 864	235	1 360	94	870	827
2003	1 598	3 980	242	1 388	100	892	840
2004	1 598	4 099	249	1 415	105	914	852
2005	1 590	4 222	256	1 444	110	937	856
2006	1 582	4 349	264	1 473	116	960	862
2007	1 574	4 479	271	1 502	122	984	867
2008	1 567	4 614	279	1 532	128	1 009	874
2009	1 559	4 752	288	1 563	134	1 034	881
2010	1 552	4 894	296	1 602	141	1 065	889
2011	1 544	5 041	305	1 642	148	1 097	897
2012	1 537	5 193	314	1 683	155	1 130	906
2013	1 529	5 348	323	1 725	163	1 164	915
2014	1 522	5 509	332	1 768	171	1 199	925
2015	1 507	5 674	340	1 821	178	1 241	925
2016	1 492	5 844	348	1 876	185	1 284	925
2017	1 478	6 020	357	1 932	192	1 329	927
2018	1 464	6 200	366	1 990	200	1 376	930
2019	1 449	6 386	374	2 050	208	1 424	931

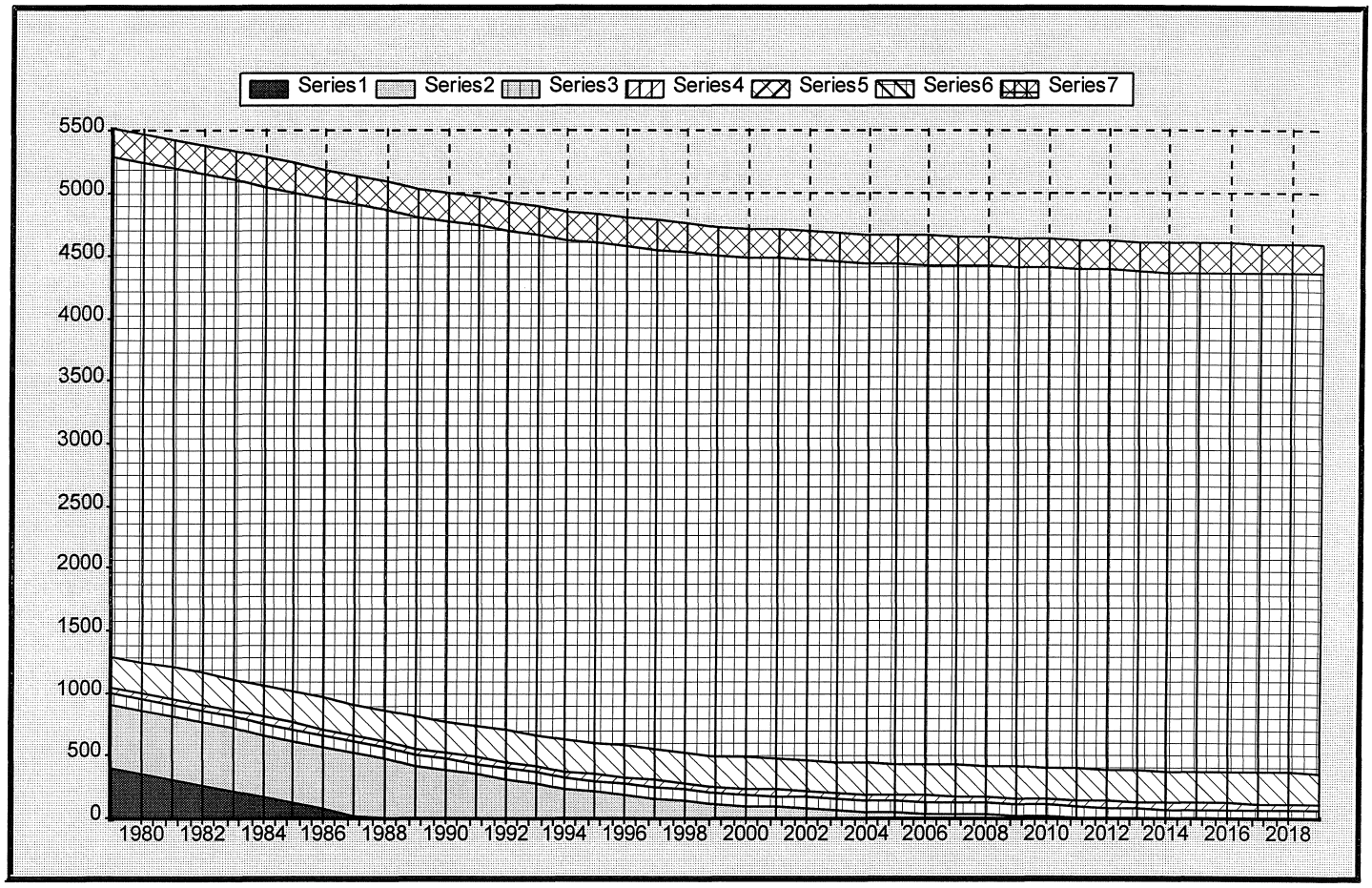
Land use transfers

1 = Other land, potential agriculture land
2 = Other land, potential forest land
3 = Farm forest land, natural forests
4 = Industrial forest land, natural forests
5 = Nat. environmental forest, protection areas
6 = Nat. environmental forest, rerserves and NP
7 = Nat. environmental forest, in-accessible

Year	Accumulated transfer	Remaining area after land transfer, classes as listed above. 1	2	3	4	5	6	7
1979	0	400	500	90	50	250	4 000	232
1980	44	356	500	90	50	250	4 000	232
1981	88	312	500	90	50	250	4 000	232
1982	135	265	500	90	50	250	4 000	232
1983	183	217	500	90	50	250	4 000	232
1984	235	165	500	90	50	250	4 000	232
1985	281	119	500	90	50	250	4 000	232
1986	329	71	500	90	50	250	4 000	232
1987	380	20	500	90	50	250	4 000	232
1988	431	0	469	90	50	250	4 000	232
1989	485	0	415	90	50	250	4 000	232
1990	520	0	380	90	50	250	4 000	232
1991	555	0	345	90	50	250	4 000	232
1992	591	0	309	90	50	250	4 000	232
1993	630	0	270	90	50	250	4 000	232
1994	668	0	232	90	50	250	4 000	232
1995	693	0	207	90	50	250	4 000	232
1996	716	0	184	90	50	250	4 000	232
1997	741	0	159	90	50	250	4 000	232
1998	767	0	133	90	50	250	4 000	232
1999	793	0	107	90	50	250	4 000	232
2000	805	0	95	90	50	250	4 000	232
2001	815	0	85	90	50	250	4 000	232
2002	827	0	73	90	50	250	4 000	232
2003	840	0	60	90	50	250	4 000	232
2004	852	0	48	90	50	250	4 000	232
2005	856	0	44	90	50	250	4 000	232
2006	862	0	38	90	50	250	4 000	232
2007	867	0	33	90	50	250	4 000	232
2008	874	0	26	90	50	250	4 000	232
2009	881	0	19	90	50	250	4 000	232
2010	889	0	11	90	50	250	4 000	232
2011	897	0	3	90	50	250	4 000	232
2012	906	0	0	84	50	250	4 000	232
2013	915	0	0	75	50	250	4 000	232
2014	925	0	0	65	50	250	4 000	232
2015	925	0	0	65	50	250	4 000	232
2016	925	0	0	65	50	250	4 000	232
2017	927	0	0	63	50	250	4 000	232
2018	930	0	0	60	50	250	4 000	232
2019	931	0	0	59	50	250	4 000	232

Land use transfers

Series 1 = Other land, potential agriculture land
Series 2 = Other land, potential forest land
Series 3 = Farm forest land, natural forests
Series 4 = Industrial forest land, natural forests
Series 5 = Nat. environmental forest, protection areas
Series 6 = Nat. environmental forest, rerserves and NP
Series 7 = Nat. environmental forest, in-accessible



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Energy balance

Year	Supply (giga calories)	Demand (giga calories)	Balance (giga calories)	Balance (cubic meters)
1979	76 492	14 100	62 392	23 997
1980	76 574	14 953	61 621	23 700
1981	76 647	15 858	60 789	23 380
1982	76 733	16 817	59 916	23 045
1983	76 820	17 835	58 986	22 687
1984	76 920	18 914	58 006	22 310
1985	77 004	20 157	56 847	21 864
1986	77 092	21 482	55 610	21 388
1987	77 193	22 895	54 298	20 884
1988	77 283	24 400	52 883	20 339
1989	77 374	26 005	51 369	19 757
1990	77 445	27 586	49 860	19 177
1991	77 514	29 263	48 251	18 558
1992	77 586	31 042	46 544	17 902
1993	77 671	32 929	44 742	17 208
1994	77 753	34 931	42 821	16 470
1995	77 824	37 058	40 766	15 679
1996	77 883	39 314	38 569	14 834
1997	77 954	41 707	36 247	13 941
1998	78 033	44 246	33 787	12 995
1999	78 105	46 939	31 165	11 987
2000	78 173	49 556	28 616	11 006
2001	78 228	52 319	25 909	9 965
2002	78 296	55 236	23 060	8 869
2003	78 371	58 315	20 056	7 714
2004	78 439	61 566	16 873	6 489
2005	78 498	64 368	14 131	5 435
2006	78 570	67 296	11 273	4 336
2007	78 637	70 358	8 278	3 184
2008	78 709	73 560	5 149	1 981
2009	78 785	76 907	1 878	722
2010	78 865	80 012	-1 147	-441
2011	78 948	83 242	-4 294	-1 652
2012	78 963	86 603	-7 640	-2 938
2013	78 951	90 100	-11 149	-4 288
2014	78 929	93 737	-14 809	-5 696
2015	79 000	96 568	-17 568	-6 757
2016	79 072	99 485	-20 413	-7 851
2017	79 126	102 489	-23 363	-8 986
2018	79 177	105 584	-26 408	-10 157
2019	79 245	108 773	-29 528	-11 357

Forest unavailable for timber production - development

Year	National parks and reserves			Protection			In-accessible areas		
	Area	m3 / ha	m3 total	Area	m3 / ha	m3 total	Area	m3 / ha	m3 total
1979	4 000	80	320 000	250	80	20 000	232	90	20 880
1980	4 000	80	320 000	250	79	19 750	232	91	21 112
1981	4 000	80	320 000	250	78	19 500	232	92	21 344
1982	4 000	80	320 000	250	77	19 250	232	93	21 576
1983	4 000	80	320 000	250	76	19 000	232	94	21 808
1984	4 000	80	320 000	250	75	18 750	232	95	22 040
1985	4 000	80	320 000	250	74	18 500	232	96	22 272
1986	4 000	80	320 000	250	73	18 250	232	97	22 504
1987	4 000	80	320 000	250	72	18 000	232	98	22 736
1988	4 000	80	320 000	250	71	17 750	232	99	22 968
1989	4 000	80	320 000	250	70	17 500	232	100	23 200
1990	4 000	80	320 000	250	69	17 250	232	101	23 432
1991	4 000	80	320 000	250	68	17 000	232	102	23 664
1992	4 000	80	320 000	250	67	16 750	232	103	23 896
1993	4 000	80	320 000	250	66	16 500	232	104	24 128
1994	4 000	80	320 000	250	65	16 250	232	105	24 360
1995	4 000	80	320 000	250	64	16 000	232	106	24 592
1996	4 000	80	320 000	250	63	15 750	232	107	24 824
1997	4 000	80	320 000	250	62	15 500	232	108	25 056
1998	4 000	80	320 000	250	61	15 250	232	109	25 288
1999	4 000	80	320 000	250	60	15 000	232	110	25 520
2000	4 000	80	320 000	250	59	14 750	232	111	25 752
2001	4 000	80	320 000	250	58	14 500	232	112	25 984
2002	4 000	80	320 000	250	57	14 250	232	113	26 216
2003	4 000	80	320 000	250	56	14 000	232	114	26 448
2004	4 000	80	320 000	250	55	13 750	232	115	26 680
2005	4 000	80	320 000	250	54	13 500	232	116	26 912
2006	4 000	80	320 000	250	53	13 250	232	117	27 144
2007	4 000	80	320 000	250	52	13 000	232	118	27 376
2008	4 000	80	320 000	250	51	12 750	232	119	27 608
2009	4 000	80	320 000	250	50	12 500	232	120	27 840
2010	4 000	80	320 000	250	49	12 250	232	121	28 072
2011	4 000	80	320 000	250	48	12 000	232	122	28 304
2012	4 000	80	320 000	250	47	11 750	232	123	28 536
2013	4 000	80	320 000	250	46	11 500	232	124	28 768
2014	4 000	80	320 000	250	45	11 250	232	125	29 000
2015	4 000	80	320 000	250	44	11 000	232	126	29 232
2016	4 000	80	320 000	250	43	10 750	232	127	29 464
2017	4 000	80	320 000	250	42	10 500	232	128	29 696
2018	4 000	80	320 000	250	41	10 250	232	129	29 928
2019	4 000	80	320 000	250	40	10 000	232	130	30 160

Natural forest development

Year	Un-available for production						Available for production			
	National parks, etc.		Protected forest		In-accessible areas		Industrial forest		Farm forest	
	Per ha	Total	Per ha	Total	Per ha	Total	Per ha	Total	Per ha	Total
1979	80,0	320 000	80,0	20 000	90,0	20 880	80,0	4 000	60,0	4 000
1980	80,0	320 000	79,0	19 750	91,0	21 112	82,0	4 100	62,8	4 100
1981	80,0	320 000	78,0	19 500	92,0	21 344	84,0	4 200	62,8	4 200
1982	80,0	320 000	77,0	19 250	93,0	21 576	86,0	4 300	62,8	4 300
1983	80,0	320 000	76,0	19 000	94,0	21 808	88,0	4 400	62,8	4 400
1984	80,0	320 000	75,0	18 750	95,0	22 040	90,0	4 500	62,8	4 500
1985	80,0	320 000	74,0	18 500	96,0	22 272	92,0	4 600	62,8	4 600
1986	80,0	320 000	73,0	18 250	97,0	22 504	94,0	4 700	62,8	4 700
1987	80,0	320 000	72,0	18 000	98,0	22 736	96,0	4 800	62,8	4 800
1988	80,0	320 000	71,0	17 750	99,0	22 968	98,0	4 900	62,8	4 900
1989	80,0	320 000	70,0	17 500	100,0	23 200	100,0	5 000	62,8	5 000
1990	80,0	320 000	69,0	17 250	101,0	23 432	102,0	5 100	62,8	5 100
1991	80,0	320 000	68,0	17 000	102,0	23 664	104,0	5 200	62,8	5 200
1992	80,0	320 000	67,0	16 750	103,0	23 896	106,0	5 300	62,8	5 300
1993	80,0	320 000	66,0	16 500	104,0	24 128	108,0	5 400	62,8	5 400
1994	80,0	320 000	65,0	16 250	105,0	24 360	110,0	5 500	62,8	5 500
1995	80,0	320 000	64,0	16 000	106,0	24 592	112,0	5 600	62,8	5 600
1996	80,0	320 000	63,0	15 750	107,0	24 824	114,0	5 700	62,8	5 700
1997	80,0	320 000	62,0	15 500	108,0	25 056	116,0	5 800	62,8	5 800
1998	80,0	320 000	61,0	15 250	109,0	25 288	118,0	5 900	62,8	5 900
1999	80,0	320 000	60,0	15 000	110,0	25 520	120,0	6 000	62,8	6 000
2000	80,0	320 000	59,0	14 750	111,0	25 752	122,0	6 100	62,8	6 100
2001	80,0	320 000	58,0	14 500	112,0	25 984	124,0	6 200	62,8	6 200
2002	80,0	320 000	57,0	14 250	113,0	26 216	126,0	6 300	62,8	6 300
2003	80,0	320 000	56,0	14 000	114,0	26 448	128,0	6 400	62,8	6 400
2004	80,0	320 000	55,0	13 750	115,0	26 680	130,0	6 500	62,8	6 500

Year	Un-available for production						Available for production			
	National parks, etc.		Protected forest		In-accessible areas		Industrial forest		Farm forest	
	Per ha	Total	Per ha	Total	Per ha	Total	Per ha	Total	Per ha	Total
2005	80,0	320 000	54,0	13 500	116,0	26 912	132,0	6 600	62,8	6 600
2006	80,0	320 000	53,0	13 250	117,0	27 144	134,0	6 700	62,8	6 700
2007	80,0	320 000	52,0	13 000	118,0	27 376	136,0	6 800	62,8	6 800
2008	80,0	320 000	51,0	12 750	119,0	27 608	138,0	6 900	62,8	6 900
2009	80,0	320 000	50,0	12 500	120,0	27 840	140,0	7 000	62,8	7 000
2010	80,0	320 000	49,0	12 250	121,0	28 072	142,0	7 100	62,8	7 100
2011	80,0	320 000	48,0	12 000	122,0	28 304	144,0	7 200	62,8	7 200
2012	80,0	320 000	47,0	11 750	123,0	28 536	146,0	7 300	62,8	7 300
2013	80,0	320 000	46,0	11 500	124,0	28 768	148,0	7 400	62,8	7 400
2014	80,0	320 000	45,0	11 250	125,0	29 000	150,0	7 500	62,8	7 500
2015	80,0	320 000	44,0	11 000	126,0	29 232	152,0	7 600	62,8	7 600
2016	80,0	320 000	43,0	10 750	127,0	29 464	154,0	7 700	62,8	7 700
2017	80,0	320 000	42,0	10 500	128,0	29 696	156,0	7 800	62,8	7 800
2018	80,0	320 000	41,0	10 250	129,0	29 928	158,0	7 900	62,8	7 900
2019	80,0	320 000	40,0	10 000	130,0	30 160	160,0	8 000	62,8	8 000

Annex E

THE INPUT DATA AND RESULT OF PILOT SIMULATION SCENARIO B FOR ANALYSING LAND USE PLANNING IN DAO TRU COMMUNE USING THE APM

Data set

Description: Dao Tru, Scenario B

District	Tam Dao	
Country	Vietnam	
Land area	7600	
Years	1979	2019

1 ton agriculture residue to Giga Calories (GCal)	4,0
1 cubic meter solid wood to Giga Calories (GCal)	2,6
1 cubic meter solid wood to 1 forest cubic meter	1,0

Land use transfer priorities

Other land, potential agriculture land	1
Farm forest land, natural forests	3
Other land, potential forest land	2
Industrial forest land, natural forests	4
Nat. environmental forest, in-accessible	7
Nat. environmental forest, protection areas	5
Nat. environmental forest, rerserves and NP	6

Growth factors, start value and period growth in %.

Total population	4 700	5,00	5,00	4,00	3,50	3,00	3,00	3,00	3,00
Rural population	4 700	5,00	5,00	4,00	3,50	3,00	3,00	3,00	3,00
Gross Domestic Product	50	4,00	4,00	4,50	4,50	4,50	4,50	4,50	4,50
Production subsistence food	2 500	1,00	1,50	2,00	2,50	2,00	2,00	2,00	2,00
Production marketed food	1 000	1,00	1,00	1,50	1,50	2,00	2,00	2,00	2,00
Production cash crop	600	1,00	1,50	1,50	2,00	2,00	2,00	2,00	2,00
Rur. biomass energy demand	3	1,00	1,50	2,00	2,50	2,50	2,00	1,50	1,00
Urb. biomass energy demand		0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

Agriculture data

Agriculture land	Area (hectares)	Volume wood per hectare	Autoproduction of wood m^3/ hectare and year	Yield of residues kg per hectare	Amount of residues used as fuelwood (%)
Subsistence food	960	3	0,3	1 500	30
Marketed food	120	4	0,3	2 500	50
Cash Crop	20	5	0,3	3 500	60
Other land					
Potential agricultural	400	8	0,5		
Potential forest	500	25	0,6		
Unproductive	600	5	0,2		

Forest data

I Unavailable for production	Area (hectares)	MAI m^3	Ann fuel wood removal m^3	Ann. Logging m^3/ hectare	Total volume in m^3 per ha	altogether	Commercial volume in m^3 per ha	altogether
NP and reserves	4 000	6	7		80			
Protection	250	6	7		80			
Inaccessible areas	232	6	5		90			
Existing plantations	300							
II Available for production								
Industrial	50	7	3	2	80	80	40	
Existing plantations								
Farm forest	90	7	5	1	60	60	10	
Existing plantations	78							

Steering indicies

Year	Population		GDP		Energy Demand		Productivity in agriculture		
	Total	Rural	Total	Per capita	Urban	Rural	Subsistence	Marketed	Cash Crop
1979	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
1980	1,05	1,05	1,09	1,04	1,00	1,01	1,01	1,01	1,01
1981	1,10	1,10	1,19	1,08	1,00	1,02	1,02	1,02	1,02
1982	1,16	1,16	1,30	1,12	1,00	1,03	1,03	1,03	1,03
1983	1,22	1,22	1,42	1,17	1,00	1,04	1,04	1,04	1,04
1984	1,28	1,28	1,55	1,22	1,00	1,05	1,05	1,05	1,05
1985	1,34	1,34	1,70	1,27	1,00	1,07	1,07	1,06	1,07
1986	1,41	1,41	1,85	1,32	1,00	1,08	1,08	1,07	1,08
1987	1,48	1,48	2,02	1,37	1,00	1,10	1,10	1,08	1,10
1988	1,55	1,55	2,21	1,42	1,00	1,12	1,12	1,09	1,12
1989	1,63	1,63	2,41	1,48	1,00	1,13	1,13	1,10	1,13
1990	1,69	1,69	2,62	1,55	1,00	1,15	1,15	1,12	1,15
1991	1,76	1,76	2,85	1,62	1,00	1,18	1,18	1,14	1,17
1992	1,83	1,83	3,10	1,69	1,00	1,20	1,20	1,16	1,18
1993	1,91	1,91	3,36	1,77	1,00	1,23	1,23	1,17	1,20
1994	1,98	1,98	3,66	1,84	1,00	1,25	1,25	1,19	1,22
1995	2,05	2,05	3,95	1,93	1,00	1,28	1,28	1,21	1,24
1996	2,12	2,12	4,28	2,01	1,00	1,31	1,31	1,23	1,27
1997	2,20	2,20	4,63	2,11	1,00	1,35	1,35	1,24	1,29
1998	2,27	2,27	5,00	2,20	1,00	1,38	1,38	1,26	1,32
1999	2,35	2,35	5,41	2,30	1,00	1,41	1,41	1,28	1,35
2000	2,42	2,42	5,82	2,40	1,00	1,45	1,44	1,31	1,37
2001	2,50	2,50	6,27	2,51	1,00	1,49	1,47	1,33	1,40
2002	2,57	2,57	6,75	2,62	1,00	1,52	1,50	1,36	1,43
2003	2,65	2,65	7,26	2,74	1,00	1,56	1,53	1,39	1,46
2004	2,73	2,73	7,82	2,86	1,00	1,60	1,56	1,42	1,49
2005	2,81	2,81	8,41	2,99	1,00	1,63	1,59	1,44	1,52
2006	2,89	2,89	9,06	3,13	1,00	1,66	1,62	1,47	1,55
2007	2,98	2,98	9,75	3,27	1,00	1,70	1,66	1,50	1,58
2008	3,07	3,07	10,49	3,42	1,00	1,73	1,69	1,53	1,61
2009	3,16	3,16	11,29	3,57	1,00	1,77	1,72	1,56	1,64
2010	3,26	3,26	12,15	3,73	1,00	1,79	1,76	1,59	1,67
2011	3,36	3,36	13,08	3,90	1,00	1,82	1,79	1,63	1,71
2012	3,46	3,46	14,08	4,07	1,00	1,85	1,83	1,66	1,74
2013	3,56	3,56	15,16	4,26	1,00	1,88	1,87	1,69	1,78
2014	3,67	3,67	16,31	4,45	1,00	1,90	1,90	1,73	1,81
2015	3,78	3,78	17,56	4,65	1,00	1,92	1,94	1,76	1,85
2016	3,89	3,89	18,90	4,86	1,00	1,94	1,98	1,80	1,89
2017	4,01	4,01	20,34	5,08	1,00	1,96	2,02	1,83	1,92
2018	4,13	4,13	21,90	5,31	1,00	1,98	2,06	1,87	1,96
2019	4,25	4,25	23,57	5,54	1,00	2,00	2,10	1,90	2,00

Population & GDP

Year	Population			Gross Domestic Product	
	Rural	Urban	Total	Total (in millions)	Per capita
1979	4 700		4 700	0	50
1980	4 935		4 935	0	52
1981	5 182		5 182	0	54
1982	5 441		5 441	0	56
1983	5 713		5 713	0	58
1984	5 999		5 999	0	61
1985	6 298		6 298	0	63
1986	6 613		6 613	0	66
1987	6 944		6 944	0	68
1988	7 291		7 291	1	71
1989	7 656		7 656	1	74
1990	7 962		7 962	1	77
1991	8 281		8 281	1	81
1992	8 612		8 612	1	84
1993	8 956		8 956	1	88
1994	9 314		9 314	1	92
1995	9 640		9 640	1	96
1996	9 978		9 978	1	101
1997	10 327		10 327	1	105
1998	10 689		10 689	1	110
1999	11 063		11 063	1	115
2000	11 395		11 395	1	120
2001	11 736		11 736	1	126
2002	12 088		12 088	2	131
2003	12 451		12 451	2	137
2004	12 825		12 825	2	143
2005	13 209		13 209	2	150
2006	13 606		13 606	2	156
2007	14 014		14 014	2	163
2008	14 434		14 434	2	171
2009	14 867		14 867	3	178
2010	15 313		15 313	3	187
2011	15 773		15 773	3	195
2012	16 246		16 246	3	204
2013	16 733		16 733	4	213
2014	17 235		17 235	4	222
2015	17 752		17 752	4	232
2016	18 285		18 285	4	243
2017	18 833		18 833	5	254
2018	19 398		19 398	5	265
2019	19 980		19 980	6	277

Agriculture development

Year	Subsistence food		Marketed Food		Cash Crop		Accumulated
	Area	Production/Ha	Area	Production/Ha	Area	Production/Ha	transfer
1979	960	2 500	120	1 000	20	600	0
1980	998	2 525	124	1 010	22	606	44
1981	1 038	2 550	127	1 020	23	612	88
1982	1 079	2 576	131	1 030	25	618	135
1983	1 121	2 602	135	1 041	27	624	183
1984	1 166	2 628	139	1 051	30	631	235
1985	1 206	2 667	143	1 062	32	640	281
1986	1 248	2 707	147	1 072	34	650	329
1987	1 291	2 748	152	1 083	37	659	380
1988	1 335	2 789	156	1 094	40	669	431
1989	1 381	2 831	161	1 105	43	679	485
1990	1 408	2 887	166	1 121	46	690	520
1991	1 436	2 945	170	1 138	49	700	555
1992	1 464	3 004	175	1 155	52	710	591
1993	1 493	3 064	181	1 172	56	721	630
1994	1 522	3 125	186	1 190	60	732	668
1995	1 537	3 203	192	1 208	64	746	693
1996	1 552	3 283	197	1 226	67	761	716
1997	1 567	3 365	203	1 244	71	777	741
1998	1 582	3 450	209	1 263	76	792	767
1999	1 598	3 536	215	1 282	80	808	793
2000	1 613	3 607	220	1 308	85	824	818
2001	1 629	3 679	226	1 334	89	841	844
2002	1 645	3 752	231	1 360	94	857	870
2003	1 661	3 827	237	1 388	100	875	898
2004	1 677	3 904	243	1 415	105	892	925
2005	1 694	3 982	249	1 444	111	910	954
2006	1 711	4 062	255	1 473	117	928	983
2007	1 727	4 143	261	1 502	124	947	1 012
2008	1 744	4 226	268	1 532	130	966	1 042
2009	1 761	4 310	274	1 563	138	985	1 073
2010	1 779	4 396	281	1 594	145	1 005	1 105
2011	1 796	4 484	288	1 626	153	1 025	1 137
2012	1 814	4 574	295	1 658	162	1 045	1 171
2013	1 831	4 666	302	1 692	171	1 066	1 204
2014	1 849	4 759	309	1 725	180	1 087	1 238
2015	1 868	4 854	317	1 760	190	1 109	1 275
2016	1 886	4 951	325	1 795	200	1 131	1 311
2017	1 904	5 050	333	1 831	212	1 154	1 349
2018	1 923	5 151	341	1 868	223	1 177	1 387
2019	1 942	5 254	349	1 905	236	1 201	1 427

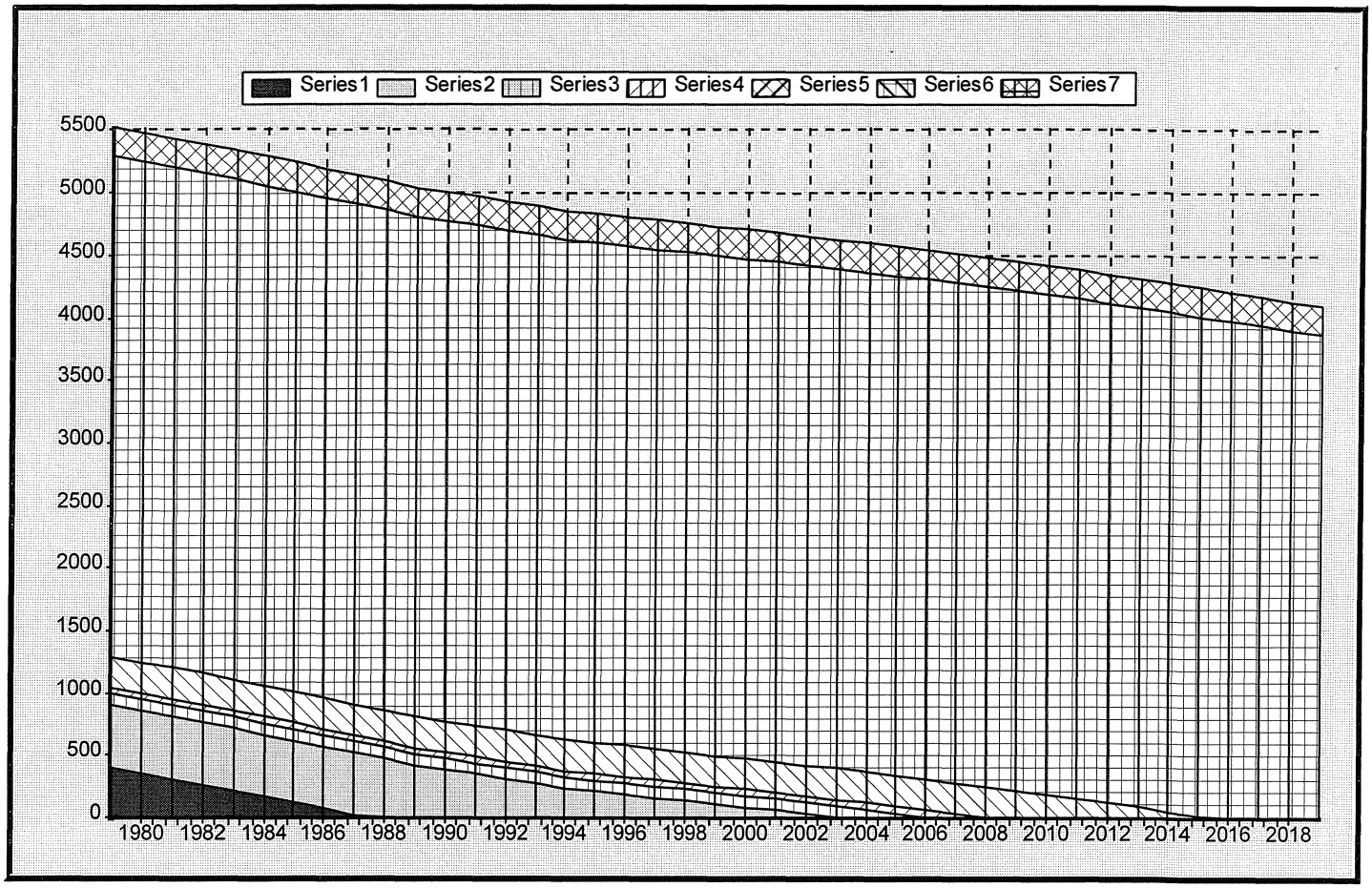
Land use transfers

1 = Other land, potential agriculture land
2 = Other land, potential forest land
3 = Farm forest land, natural forests
4 = Industrial forest land, natural forests
5 = Nat. environmental forest, protection areas
6 = Nat. environmental forest, rerserves and NP
7 = Nat. environmental forest, in-accessible

Year	Accumulated transfer	Remaining area after land transfer, classes as listed above. 1	2	3	4	5	6	7
1979	0	400	500	90	50	250	4 000	232
1980	44	356	500	90	50	250	4 000	232
1981	88	312	500	90	50	250	4 000	232
1982	135	265	500	90	50	250	4 000	232
1983	183	217	500	90	50	250	4 000	232
1984	235	165	500	90	50	250	4 000	232
1985	281	119	500	90	50	250	4 000	232
1986	329	71	500	90	50	250	4 000	232
1987	380	20	500	90	50	250	4 000	232
1988	431	0	469	90	50	250	4 000	232
1989	485	0	415	90	50	250	4 000	232
1990	520	0	380	90	50	250	4 000	232
1991	555	0	345	90	50	250	4 000	232
1992	591	0	309	90	50	250	4 000	232
1993	630	0	270	90	50	250	4 000	232
1994	668	0	232	90	50	250	4 000	232
1995	693	0	207	90	50	250	4 000	232
1996	716	0	184	90	50	250	4 000	232
1997	741	0	159	90	50	250	4 000	232
1998	767	0	133	90	50	250	4 000	232
1999	793	0	107	90	50	250	4 000	232
2000	818	0	82	90	50	250	4 000	232
2001	844	0	56	90	50	250	4 000	232
2002	870	0	30	90	50	250	4 000	232
2003	898	0	2	90	50	250	4 000	232
2004	925	0	0	65	50	250	4 000	232
2005	954	0	0	36	50	250	4 000	232
2006	983	0	0	7	50	250	4 000	232
2007	1 012	0	0	0	28	250	4 000	232
2008	1 042	0	0	0	0	248	4 000	232
2009	1 073	0	0	0	0	217	4 000	232
2010	1 105	0	0	0	0	185	4 000	232
2011	1 137	0	0	0	0	153	4 000	232
2012	1 171	0	0	0	0	119	4 000	232
2013	1 204	0	0	0	0	86	4 000	232
2014	1 238	0	0	0	0	52	4 000	232
2015	1 275	0	0	0	0	15	4 000	232
2016	1 311	0	0	0	0	0	3 979	232
2017	1 349	0	0	0	0	0	3 941	232
2018	1 387	0	0	0	0	0	3 903	232
2019	1 427	0	0	0	0	0	3 863	232

Land use transfers

Series 1 = Other land, potential agriculture land
Series 2 = Other land, potential forest land
Series 3 = Farm forest land, natural forests
Series 4 = Industrial forest land, natural forests
Series 5 = Nat. environmental forest, protection areas
Series 6 = Nat. environmental forest, rerserves and NP
Series 7 = Nat. environmental forest, in-accessible



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Energy balance

Year	Supply (giga calories)	Demand (giga calories)	Balance (giga calories)	Balance (cubic meters)
1979	86 892	14 100	72 792	27 997
1980	86 974	14 953	72 021	27 700
1981	87 047	15 858	71 189	27 380
1982	87 133	16 817	70 316	27 045
1983	87 220	17 835	69 386	26 687
1984	87 320	18 914	68 406	26 310
1985	87 404	20 157	67 247	25 864
1986	87 492	21 482	66 010	25 388
1987	87 593	22 895	64 698	24 884
1988	87 683	24 400	63 283	24 339
1989	87 774	26 005	61 769	23 757
1990	87 845	27 586	60 260	23 177
1991	87 914	29 263	58 651	22 558
1992	87 986	31 042	56 944	21 902
1993	88 071	32 929	55 142	21 208
1994	88 153	34 931	53 221	20 470
1995	88 224	37 058	51 166	19 679
1996	88 283	39 314	48 969	18 834
1997	88 354	41 707	46 647	17 941
1998	88 433	44 246	44 187	16 995
1999	88 505	46 939	41 565	15 987
2000	88 579	49 556	39 023	15 009
2001	88 651	52 319	36 332	13 974
2002	88 727	55 236	33 491	12 881
2003	88 814	58 315	30 499	11 730
2004	88 608	61 566	27 042	10 401
2005	88 365	64 682	23 683	9 109
2006	88 121	67 954	20 167	7 756
2007	87 999	71 393	16 606	6 387
2008	87 884	75 005	12 878	4 953
2009	87 471	78 801	8 671	3 335
2010	87 040	82 382	4 658	1 791
2011	86 615	86 126	489	188
2012	86 166	90 041	-3 875	-1 490
2013	85 733	94 133	-8 401	-3 231
2014	85 283	98 412	-13 128	-5 049
2015	84 797	102 378	-17 581	-6 762
2016	84 326	106 503	-22 177	-8 530
2017	83 837	110 796	-26 958	-10 369
2018	83 342	115 261	-31 919	-12 276
2019	82 829	119 906	-37 077	-14 260

Forest unavailable for timber production - development

Year	National parks and reserves			Protection			In-accessible areas		
	Area	m3 / ha	m3 total	Area	m3 / ha	m3 total	Area	m3 / ha	m3 total
1979	4 000	80	320 000	250	80	20 000	232	90	20 880
1980	4 000	79	316 000	250	79	19 750	232	91	21 112
1981	4 000	78	312 000	250	78	19 500	232	92	21 344
1982	4 000	77	308 000	250	77	19 250	232	93	21 576
1983	4 000	76	304 000	250	76	19 000	232	94	21 808
1984	4 000	75	300 000	250	75	18 750	232	95	22 040
1985	4 000	74	296 000	250	74	18 500	232	96	22 272
1986	4 000	73	292 000	250	73	18 250	232	97	22 504
1987	4 000	72	288 000	250	72	18 000	232	98	22 736
1988	4 000	71	284 000	250	71	17 750	232	99	22 968
1989	4 000	70	280 000	250	70	17 500	232	100	23 200
1990	4 000	69	276 000	250	69	17 250	232	101	23 432
1991	4 000	68	272 000	250	68	17 000	232	102	23 664
1992	4 000	67	268 000	250	67	16 750	232	103	23 896
1993	4 000	66	264 000	250	66	16 500	232	104	24 128
1994	4 000	65	260 000	250	65	16 250	232	105	24 360
1995	4 000	64	256 000	250	64	16 000	232	106	24 592
1996	4 000	63	252 000	250	63	15 750	232	107	24 824
1997	4 000	62	248 000	250	62	15 500	232	108	25 056
1998	4 000	61	244 000	250	61	15 250	232	109	25 288
1999	4 000	60	240 000	250	60	15 000	232	110	25 520
2000	4 000	59	236 000	250	59	14 750	232	111	25 752
2001	4 000	58	232 000	250	58	14 500	232	112	25 984
2002	4 000	57	228 000	250	57	14 250	232	113	26 216
2003	4 000	56	224 000	250	56	14 000	232	114	26 448
2004	4 000	55	220 000	250	55	13 750	232	115	26 680
2005	4 000	54	216 000	250	54	13 500	232	116	26 912
2006	4 000	53	212 000	250	53	13 250	232	117	27 144
2007	4 000	52	208 000	250	52	13 000	232	118	27 376
2008	4 000	51	204 000	248	51	12 648	232	119	27 608
2009	4 000	50	200 000	217	50	10 850	232	120	27 840
2010	4 000	49	196 000	185	49	9 065	232	121	28 072
2011	4 000	48	192 000	153	48	7 344	232	122	28 304
2012	4 000	47	188 000	119	47	5 593	232	123	28 536
2013	4 000	46	184 000	86	46	3 956	232	124	28 768
2014	4 000	45	180 000	52	45	2 340	232	125	29 000
2015	4 000	44	176 000	15	44	660	232	126	29 232
2016	3 979	43	171 097				232	127	29 464
2017	3 941	42	165 522				232	128	29 696
2018	3 903	41	160 023				232	129	29 928
2019	3 863	40	154 520				232	130	30 160

Natural forest development

Year	Un-available for production						Av
	National parks, etc.		Protected forest		In-accessible areas		Industrial forest
	Per ha	Total	Per ha	Total	Per ha	Total	Per ha
1979	80,0	320 000	80,0	20 000	90,0	20 880	80,0
1980	79,0	316 000	79,0	19 750	91,0	21 112	82,0
1981	78,0	312 000	78,0	19 500	92,0	21 344	84,0
1982	77,0	308 000	77,0	19 250	93,0	21 576	86,0
1983	76,0	304 000	76,0	19 000	94,0	21 808	88,0
1984	75,0	300 000	75,0	18 750	95,0	22 040	90,0
1985	74,0	296 000	74,0	18 500	96,0	22 272	92,0
1986	73,0	292 000	73,0	18 250	97,0	22 504	94,0
1987	72,0	288 000	72,0	18 000	98,0	22 736	96,0
1988	71,0	284 000	71,0	17 750	99,0	22 968	98,0
1989	70,0	280 000	70,0	17 500	100,0	23 200	100,0
1990	69,0	276 000	69,0	17 250	101,0	23 432	102,0
1991	68,0	272 000	68,0	17 000	102,0	23 664	104,0
1992	67,0	268 000	67,0	16 750	103,0	23 896	106,0
1993	66,0	264 000	66,0	16 500	104,0	24 128	108,0
1994	65,0	260 000	65,0	16 250	105,0	24 360	110,0
1995	64,0	256 000	64,0	16 000	106,0	24 592	112,0
1996	63,0	252 000	63,0	15 750	107,0	24 824	114,0
1997	62,0	248 000	62,0	15 500	108,0	25 056	116,0
1998	61,0	244 000	61,0	15 250	109,0	25 288	118,0
1999	60,0	240 000	60,0	15 000	110,0	25 520	120,0
2000	59,0	236 000	59,0	14 750	111,0	25 752	122,0
2001	58,0	232 000	58,0	14 500	112,0	25 984	124,0
2002	57,0	228 000	57,0	14 250	113,0	26 216	126,0
2003	56,0	224 000	56,0	14 000	114,0	26 448	128,0
2004	55,0	220 000	55,0	13 750	115,0	26 680	130,0
2005	54,0	216 000	54,0	13 500	116,0	26 912	132,0
2006	53,0	212 000	53,0	13 250	117,0	27 144	134,0
2007	52,0	208 000	52,0	13 000	118,0	27 376	136,0
2008	51,0	204 000	51,0	12 648	119,0	27 608	,0
2009	50,0	200 000	50,0	10 850	120,0	27 840	,0
2010	49,0	196 000	49,0	9 065	121,0	28 072	,0
2011	48,0	192 000	48,0	7 344	122,0	28 304	,0
2012	47,0	188 000	47,0	5 593	123,0	28 536	,0
2013	46,0	184 000	46,0	3 956	124,0	28 768	,0
2014	45,0	180 000	45,0	2 340	125,0	29 000	,0
2015	44,0	176 000	44,0	660	126,0	29 232	,0
2016	43,0	171 097	,0		127,0	29 464	,0
2017	42,0	165 522	,0		128,0	29 696	,0
2018	41,0	160 023	,0		129,0	29 928	,0
2019	40,0	154 520	,0		130,0	30 160	,0

Natural forest developmen

Year	Un-available for production						Available for production			
	National parks, etc.		Protected forest		In-accessible areas		Industrial forest		Farm forest	
	Per ha	Total	Per ha	Total	Per ha	Total	Per ha	Total	Per ha	Total
1979	80,0	320 000	80,0	20 000	90,0	20 880	80,0	4 000	60,0	4 000
1980	79,0	316 000	79,0	19 750	91,0	21 112	82,0	4 100	62,8	4 100
1981	78,0	312 000	78,0	19 500	92,0	21 344	84,0	4 200	62,8	4 200
1982	77,0	308 000	77,0	19 250	93,0	21 576	86,0	4 300	62,8	4 300
1983	76,0	304 000	76,0	19 000	94,0	21 808	88,0	4 400	62,8	4 400
1984	75,0	300 000	75,0	18 750	95,0	22 040	90,0	4 500	62,8	4 500
1985	74,0	296 000	74,0	18 500	96,0	22 272	92,0	4 600	62,8	4 600
1986	73,0	292 000	73,0	18 250	97,0	22 504	94,0	4 700	62,8	4 700
1987	72,0	288 000	72,0	18 000	98,0	22 736	96,0	4 800	62,8	4 800
1988	71,0	284 000	71,0	17 750	99,0	22 968	98,0	4 900	62,8	4 900
1989	70,0	280 000	70,0	17 500	100,0	23 200	100,0	5 000	62,8	5 000
1990	69,0	276 000	69,0	17 250	101,0	23 432	102,0	5 100	62,8	5 100
1991	68,0	272 000	68,0	17 000	102,0	23 664	104,0	5 200	62,8	5 200
1992	67,0	268 000	67,0	16 750	103,0	23 896	106,0	5 300	62,8	5 300
1993	66,0	264 000	66,0	16 500	104,0	24 128	108,0	5 400	62,8	5 400
1994	65,0	260 000	65,0	16 250	105,0	24 360	110,0	5 500	62,8	5 500
1995	64,0	256 000	64,0	16 000	106,0	24 592	112,0	5 600	62,8	5 600
1996	63,0	252 000	63,0	15 750	107,0	24 824	114,0	5 700	62,8	5 700
1997	62,0	248 000	62,0	15 500	108,0	25 056	116,0	5 800	62,8	5 800
1998	61,0	244 000	61,0	15 250	109,0	25 288	118,0	5 900	62,8	5 900
1999	60,0	240 000	60,0	15 000	110,0	25 520	120,0	6 000	62,8	6 000
2000	59,0	236 000	59,0	14 750	111,0	25 752	122,0	6 100	62,8	6 100
2001	58,0	232 000	58,0	14 500	112,0	25 984	124,0	6 200	62,8	6 200
2002	57,0	228 000	57,0	14 250	113,0	26 216	126,0	6 300	62,8	6 300
2003	56,0	224 000	56,0	14 000	114,0	26 448	128,0	6 400	62,8	6 400
2004	55,0	220 000	55,0	13 750	115,0	26 680	130,0	6 500	62,8	6 500

Year	Un-available for production						Available for production			
	National parks, etc.		Protected forest		In-accessible areas		Industrial forest		Farm forest	
	Per ha	Total	Per ha	Total	Per ha	Total	Per ha	Total	Per ha	Total
2005	54,0	216 000	54,0	13 500	116,0	26 912	132,0	6 600	62,8	6 600
2006	53,0	212 000	53,0	13 250	117,0	27 144	134,0	6 700	62,8	6 700
2007	52,0	208 000	52,0	13 000	118,0	27 376	136,0	3 808	,0	3 808
2008	51,0	204 000	51,0	12 648	119,0	27 608	,0		,0	
2009	50,0	200 000	50,0	10 850	120,0	27 840	,0		,0	
2010	49,0	196 000	49,0	9 065	121,0	28 072	,0		,0	
2011	48,0	192 000	48,0	7 344	122,0	28 304	,0		,0	
2012	47,0	188 000	47,0	5 593	123,0	28 536	,0		,0	
2013	46,0	184 000	46,0	3 956	124,0	28 768	,0		,0	
2014	45,0	180 000	45,0	2 340	125,0	29 000	,0		,0	
2015	44,0	176 000	44,0	660	126,0	29 232	,0		,0	
2016	43,0	171 097	,0		127,0	29 464	,0		,0	
2017	42,0	165 522	,0		128,0	29 696	,0		,0	
2018	41,0	160 023	,0		129,0	29 928	,0		,0	
2019	40,0	154 520	,0		130,0	30 160	,0		,0	

APM Case Study in Ban Pak Xap May, Vientiane Municipality, Lao P.D.R.

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National Shifting Cultivation Stabilisation Programme

1 Introduction

This paper explains a land use planning exercise done in Pakxapmay village. It describes how data were collected through interviews on district, village and household level and also in an independent sampling point inventory. The different methods for data collection are described in detail.

As a result of he data collection the land use of the village in the past until today could be described and also the future expected land use. The data were evaluated and used as an input to the APM, which was used as a tool to formulate scenarios on future agriculture, forest and socio-economic development.

In the beginning we planned to study another area in Sangthong District, belonging to the National University of Laos. Because of heavy rains at that time and poor road conditions we had to change our plans in the last minute and move to another area.

In this document we describe and analyse the history and land use of the village. We also describe the conditions for food security of the people and try to estimate the value of total forest and agriculture production of the villagers as a measure of their economic standard. This type of information is important input data in the APM scenarios.

The authors of this paper wish to particularly thank NPSCS, NOFIP and SLU and for arranging this programme to promote the APM. We also appreciate the financial input by Sida and it's CCB Programme.

Finally, we would like to encourage anybody taking interest in the APM and reading this paper to provide comments and ideas on how to develop the APM and it's use.

2 The village interviews

a) Method

Data for this part of the case study came from primary and secondary sources. Primary data were collected through interviews in different types of households, such as well-off, average and poor households. Secondary data were collected at the Xaythany District office and from village level.

The primary data on land use patterns and land tenure were collected in the village. Household interviews were conducted using semi-structured interviews. They contained the following items:

1) Background of the family
2) Situation of the house
3) Land use, land tenure and the production
- household income
- agriculture land and areas under shifting cultivation
- main crops cultivated
- the problems for the household and it's future plans

At the household level, information concerning the household, including land resource and land use, encompassing land holding, agricultural crops and animal production were collected. Information about the off-farm activities, including other employment, collection of forest products and management practices of forest resources was also collected. The interviews were mainly conducted with the Village Headman. At the village level, questions for interview were assigned to each team member and team meetings were organised in consultation with the Village Headman.

b) Description of the Village

Based on the outcome of the interview of the Village Headman, the former settlement area of the villagers was in Khamkhert District, Bolikhamxay Province from where they migrated to the current place in 1972.

- the population mainly comprises farmers although a substantial number of the villagers are employed. They depend upon climatic conditions, especially rain for paddy rice production. There is not much vegetable production in the village. Because of drought, the yield of paddy rice has decreased in the past years down to 1.2 tonnes per hectare compared with 2.5 tonnes per hectare before. The yield of ray (shifting cultivation rice) is 1.5 tonnes per hectare and crop.

- the total population in Ban Pak Xap May is 1072 people but there is currently no population growth (it equals 0). A number of them are employed near the village in the Agriculture College (Nabon), Burapha Company, a dairy farm, a sugar cane factory and so on.

- the villagers also use some land outside the village boundary for shifting cultivation. In the last 5 years about 75 families living in the village have practiced shifting cultivation outside the village boundaries.

- concerning livestock, the number of pigs has been reduced from 300 to 45 in recent years because of an increase of the price of rice husk and agriculture residues. There are 300 cattle, which represent the main cash income for many families.

- the village has some 20 well-off households and only 3 that are classified as very poor (having up to 6 months of rice deficit). Those poor households sell their labor as seasonal employees to earn their living.

- the village is waiting for a new irrigation scheme. In the middle of 1998 the area survey was completed. It is estimated that if the scheme is implemented it will increase the paddy area from 57 ha to 100 ha and it will be irrigated land.

- not only the rice production is expected to increase but also the area of other crops such as maize, sugar, vegetable and cash crops.

3) The land use sampling inventory

a) Method

As a complement to the subjective data collected in the village interviews, objective primary data on land use were collected in a systematic point sampling inventory.

The whole inventory with preparations included the following steps:

a) collection of the available data from an official organization, i.e. institution, province, district and aerial photos
b) Acquiring of a map and air photograph, scale 1:16.000
c) Pre-survey around the village settlement (observed by eye and walk around the village settlement)
d) Allocation of the sampling points in the village area
e) Visiting every point together with village headman and interviewing him about background of land use on the sampling points at the same time checking of the secondary data from the village

A systematic grid of about 70 sampling points were laid out on aerial photos and each point was visited in the field together with the village leader. On every sampling point the land use was observed by the inventory group and the village leader provided additional information about the past land use since 1979 and the present land use.

The field work was completed in two working days. One or two more days had really been needed but there was shortage of time as a result of the changed plans.

The following information was recorded on every sampling point:

- Ownership 1999
- Actual land use (in the years 1999, 1994, 1989, 1984 and 1979)
- Type of crop (1999, 1994, 1989, 1984 and 1979)
- Yield (1999, 1994, 1989, 1984 and 1979)
- Production years per crop rotation (1999, 1994, 1989, 1984 and 1979)
- Average annual yield (1999, 1994, 1989, 1984 and 1979)
- Volume of wood 1999

After the field work the land use data were processed, analysed and compared with the information from the village interviews (see table 1) in order to estimate the area of every land use category and the changes in land use over the last 20 years.

- the record of the sampling inventory is summarized in the table (Excel sheet). With these data we estimated the changes in the use of land in the past and until now. In the graphs (figure 2 and 3) is also presented the production of rice over time.

- the sampling data are compared with the village information in an input data analysis. The most reliable data are used as input to the APM. This analysis gave us a better idea of why the rice production decreased as a result of drought and other reasons.

b) Data processing

Primary data from sampling points:

Land use data were registered on 73 sampling points which we had been identified on the aerial photo and visited in the field. The points could be divided on 4 land owner groups as follows:

Villagers: 51 points, Company: 1 point, School: 11 points, Factory 10 points.

We calculated that every sampling point represents an area of 6.0176 ha.

Work data:

Because of time shortage there were some sampling points marked on the photo that could not be visited. Instead, every second point was visited in the field in some part of the area. Those plots were marked with "2" which indicates that they are to be counted twice. Totally, there were 19 plots that were counted twice. After duplicating the data of those plots the total number of plots was 92, as follows:

Villagers: 69 points, Company: 2 points, School: 11 points, Factory: 10 points

Village work data:

The actual number of sampling points belonging to the village was 51 points (visited) and 18 points (counted a second time), totally 69 points. The total area of the village is estimated at 6.02 ha x 69 = 415 ha (table 1).

The points were divided into 8 types of land (land use 1999) as follows:

- agriculture land
- garden area
- grazing area
- homestead land
- tree plantation
- fish pond

- forest area
- shifting cultivation land

Based on the land use on each plots in different years (1979, 1984, 1989, 1994 and 1999) those points were analysed for study of land use changes in the Pakxapmay Village during 1979-1999 (see section 3c).

c) Results

In this section the area of different land use is described in terms of sampling points. It is possible to estimate the area (in hectares) of each category by multiplying the number of points by the factor 6. Please, keep in mind that it will be estimates based on sampling and not exact figures!

Agriculture land used in the past 20 years (1979-1999): The result of the point sampling (table 1) shows that the total area of rice production is 168 ha. The area of rice paddy in 1999 can be estimated at about 42 ha (7 sampling points).

In 1979 that area (all seven points) was also used for rice production. The area was called paddy field ("paddy 1") but could only produce rice in the rainy season. In the dry season the area lay unproductive because of lack of water. The average production was 1.2 T/ha. In 1984 and in 1989 six plots were still used for rice production (1.25 T/ha) while sugarcane (10 T/ha) was produce on one plot. In 1994 and 1999 all the plots including the plot that had produced sugarcane was used for growing rice again (1.3 T/ha).

Forest land used in the past 20 years (1979-1999): The total forest area in 1999 is represented by 8 sampling points (table 1). In 1979 all that land was used for agriculture (4 points were paddy fields, two points were used for shifting cultivation and the remaining 2 points were used for grazing). The rice production was not so high and used for subsistence only. In 1984 the land use had not changed. In 1989 two plots had changed to forest area and 2 shifting cultivation points were unstocked forest. In 1994 all shifting cultivation and paddy points had changed to forest while the remaining two points were still used for grazing at that time but have now changed to forest.

Grazing land used in the past 20 years (1979-1999): In total 10 plots are currently used as grazing land. In 1979 eight of those plots were used to grow rice with an average production of 1.2 T/ha while two of the plots were used for grazing. The rice plots gradually changed to grazing land. In 1984 one plot changed (because of low rice production) and in 1989 two more plots changed. In 1994 two more plots changed, but two of the old grazing plots were used for rice in that year and until now all the ten plots have become grazing land.

Forest plantation area in the past 20 years: There are 4 plots of plantation (1999). In 1979-1994 those plots were used for agriculture (paddy rice), but the yield decreased every year from 1.0 T/ha to 0.6 T/ha so the villagers changed their land use.

Homestead land in the past 20 years: The land use on the 7 plots used as homestead has not changed much during 1979-99. The villagers have also used some of this area as home gardens most of the time.

Water reservoirs and ponds in the past 20 years: The 3 plots used as ponds (irrigation 1 plot, fish 2 plots) were developed some time before 1994. Until 1989 they were used for grazing and shifting cultivation, but the average yield was low.

Shifting cultivation area in the past 20 years : There were 24 plots of shifting cultivation from 1979 to1984. Until 1989 the villagers abandonned 2 plots, its became to stocked forest and in 1994 one plot was used to orchard (fruit tree plantation). So far, there are 21 plots still used for shifting cultivation inside the village boundaries.

General conclusions:

In 1979 some 45 plots (270 ha) produced rice inside the village (table 2). Of those rice plots 23 were paddy fields and 22 were shifting cultivation. By 1999 some 28 plots (168 ha) produce rice, but there are only 7 plots with paddy and 21 are still used for shifting cultivation. There are also about 35 ha outside the village boundaries now being used by the villagers for shifting cultivation.

The average yield has decreased quite much (table 2), but not so much because of declining yields in the paddy fields, but mainly because the share of rice paddy has decreased so much, but shifting cultivation has not.

Much of the paddy land that has been abandoned since 1979 is now being used for other production such as grazing and teak plantations, and some has become forest.

The main input for running the APM scenarios is the sampling inventory data. In the last 10 years the forest and the forest plantation area has increased quite much. Also the grazing area has increased but not so much.

4) The Scenarios

a) Analysis of input data from village interviews and land use sampling

To make the best use of data collection it is necessary to compare data from many different sources and to combine and use the most reasonable way according to the situation in the village. Precise area information does not exist at the moment. One way of aquiring area estimates is using point sampling. The person who conducts the survey should know how to interpret and analyse that data.

b) APM Scenarios

The APM is a computer model developed to be used as a tool for land use strategy development. It enables estimate of the future land use, e.g. the area used for agriculture and forest in the future (the number of years could be specified by the user).

The input data for the APM can be classified into four main groups, as follows:

1) General data
2) Growth factors
3) Data related to agriculture
4) Data related to the forest area

The APM run depends upon the input data estimate according to the village situation. The input data are very important because they will tell what conditions are required to achieve a certain output result. Sometimes it is necessary to adjust the input data to suit the APM format but in a correct and reasonable way so that it still describes the situation in the village. So, the persons who use the Model should know and give the idea how to protect and develop the area in the sustainable way for the future.

In the land use planning for food security the subsistence food (rice) production is balanced with the population. – If, as an example, the villagers do not produce enough rice in their village area they have to find other ways to solve their food supply, e.g. go outside their area to produce enough rice or buy rice from other areas. It also means that they will have to produce something else that they can sell and get cash income, for example livestock, which is often the main cash income for the villagers.

For understanding of the simulation process, the input data to the APM in the case study are specified in the following way:

<u>Area of the village:</u>

There were 92 sampling points inside the village boundary. As calculated based upon the size of the grid (average distance between the sampling points) each point represents 6.0176 ha. The 92 points inside the village boundary equal 554 ha (92 x 6.0176 ha). Out of that area 415 ha belong to the villagers and the other 139 ha is for settlement of the University (Agriculture School), factory and company.

Population:

According to the official data of the District the population of Ban Pakxapmay has not changed significantly in recent years and there are a few signs of other economic development. However, the population living in the village seems to decrease because of the drought and the rice yields decline and that people move to the town.

c) Analysis and comments on the Scenarios (Annex B)

According to the result of the village interview and the land use sampling inventory the development during the period 1979 - 99 has been as follows:

- The rice production area within the village has decreased (mainly the paddy area) but the area used for market crops and for grazing (beef production) has increased.

- The forest and forest plantation area has increased. The main reasons are that the soils are not so suitable for paddy rice and growing interest to invest in forest plantation, especially teak. As a result of active government policy efforts in relation to the implementation of the land and forest law people have become more aware of forest protection.

- Other areas, such as sugarcane, gardens and homesteads and fish ponds have not increased, mainly because of shortage of water during the dry season.

In the APM scenarios for the period 1999 - 2019 the following trends are noticed:

- The population in the village is fairly stable (does not increase or decrease). It is related to the decreasing area of agriculture as a result of lack of infrastructure, especially irrigation scheme. The villagers have made a request to the Government to improve irrigation system. However, they don't think of borrowing money from the Bank, because the construction cost is too high for them.

- However, the urban population increases from 125 to 180 because they have a very good communication to Vientiane with good road and daily bus from the village to the city. There are also good education opportunities. So, some farmers change their life to become small middlemen in business activity or become employees in town. On the contrary, the rural population decreases from 947 to 892 when people move to the town.

- For land transfer in the first 10 years the potential agriculture land will continue to decrease but after that it will increase again. It reflects that agriculture starts to become more intensive, which is reflected in the increased production per ha of subsistence, market and cash crops (subsistence food from 465 to 488 kg/ha, market food from 100 to 181 kg/ha).

- The APM could not tell about the grazing area but in some areas the cash income, mainly from cattle, is an important economic activity of the villagers. In order to calculate the GDP per capita in the village we add the income from beef production, which is not reflected in the Model in any other way.

- We still don't know if the government will approve the budget for irrigation construction. If so, it may increase the agriculture land and the population in the near future. This is a typical APM situation. We do not know what will happen, but we can prepare two scenarios to try to show what could happen in either case. The scenarios could then be used as a complementary base for the decision maker.

- The scenario presented in this study does not include implementation of any irrigation scheme. An "irrigation scenario" would include increased yield for subsistence crops, but also other changes in population growth, GDP growth, selling of some of the rice as market crop etc. There was not enough time to elaborate and analyse such a scenario within the frames of this study.

- The forest area increases. More land (initially identified as potential agriculture land in the APM) will be available when the agriculture area decreases.

The scenario gives an idea of the changes that could be expected until the year 2019 (within 20 years) as regards population, economic growth, agriculture and forest land in case there is no irrigation scheme or new technology for agriculture production.

The forest land is also expected to increase because of the land and forest policy that will encourage the villagers to protect and use the land in a suitable way. The commercial forest plantations (Teak and Eucalyptus) such as those supported by Burapha will also increase.

5) Conclusions

This is an exercise on using the APM as a tool to understand how to deal with future land use planning.

- We can not say that everything in the APM scenarios will come true. It may not be like that in the future.

- We are afraid that if the person (staff) who collect and analyse input data to be put into the APM will miss some important activities in the village, the output will describe an incorrect situation in the village.

- As far as possible, we would like that the information (in the past) should have been recorded consequently in the office, so that we could use the data for analysis instead of making estimations before the APM application. I mean that the input data are very important.

- During the village interview it seems that the village gave the first estimate and information (data) because they didn't have any record or they hid their own data.

- If we think that our input data are very close to the real situation of the village, we can say that the output is reasonable for future land use planning.

- Finally, there is a need for a good relationship between inventory people and villagers and also between different government sectors to solve the problem of the villagers in a good and sustainable way.

Appendix A

Figure 1: Changes of land use in Ban Pakxapmay during 1979 - 1999

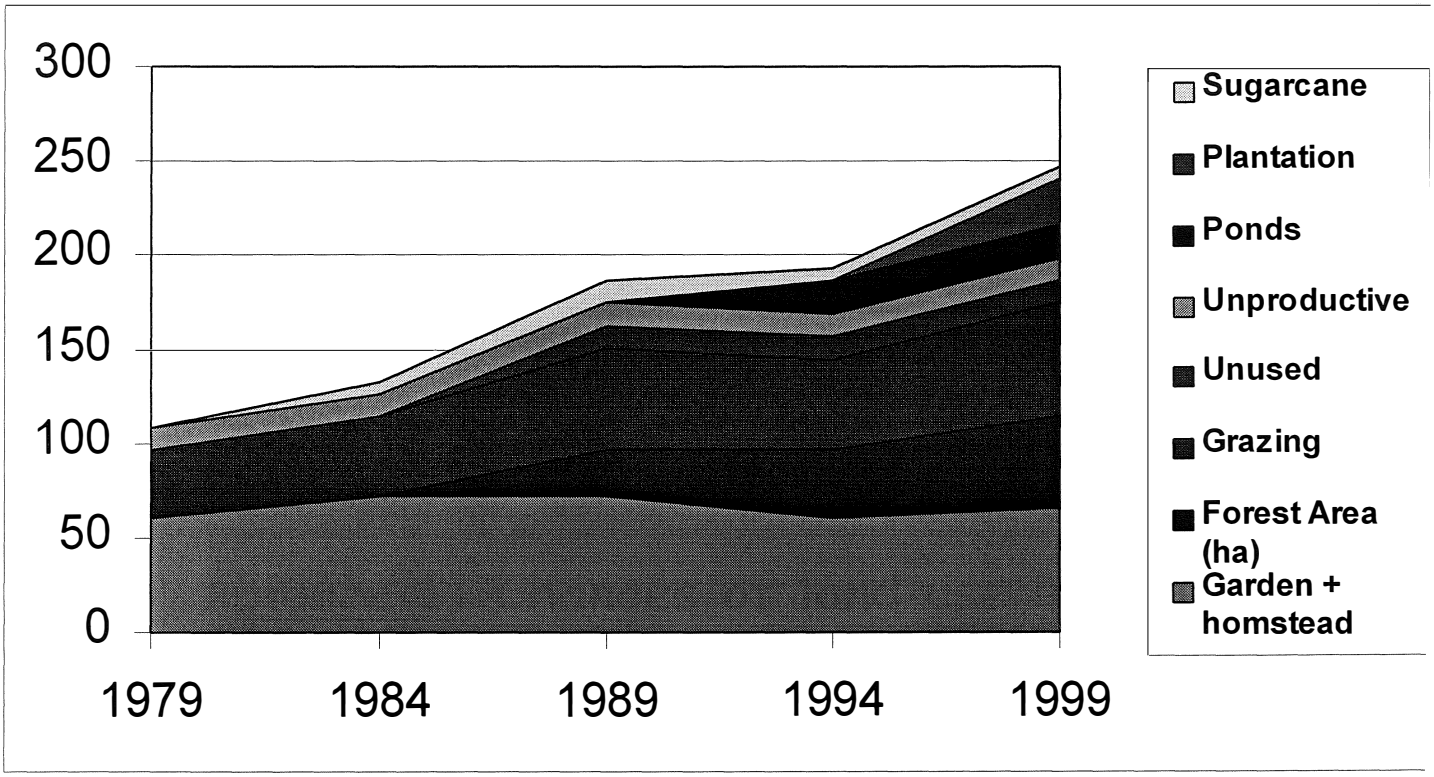
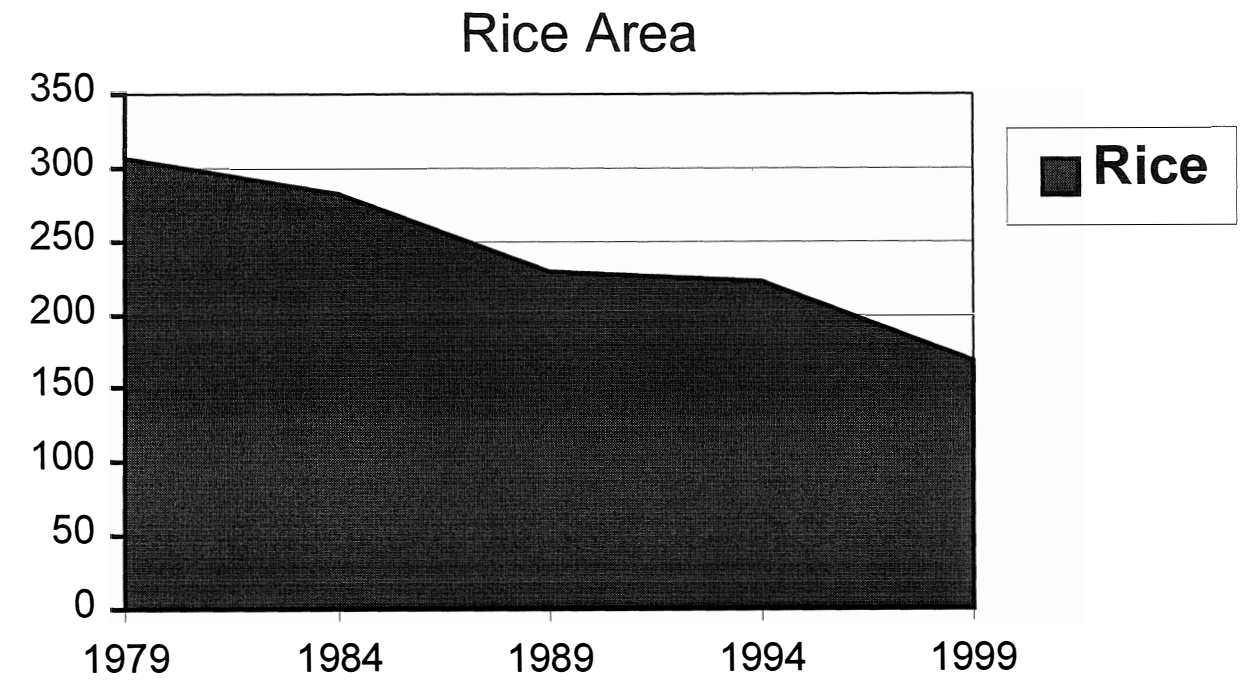


Table 1: Comparison of sampling data and village data for Ban Pakxapmay

Sampling point inventory		Village data	
Land use class	**Area (ha)**	**Land use class**	**Area (ha)**
Rice (paddy + s.c.)	168	Paddy 1	57
Garden + homestead	66	Shifting cultivation	35
Forest Area	48	Plantation	3
Grazing	60	Sugarcane	5
Unused	12	Residential	40
Unproductive	12	Grazing and potential	
Ponds	18	shifting cultivation	129
Plantation	24		
Sugarcane	6		
Village Land	**415**		**269**
University	66	University	70
Sugar factory	60	Sugar factory	32
Company	12		
Grand total	**553**		**371**

Figure 2: Area and yield of rice in Ban Pakxapmay during 1979 - 1999



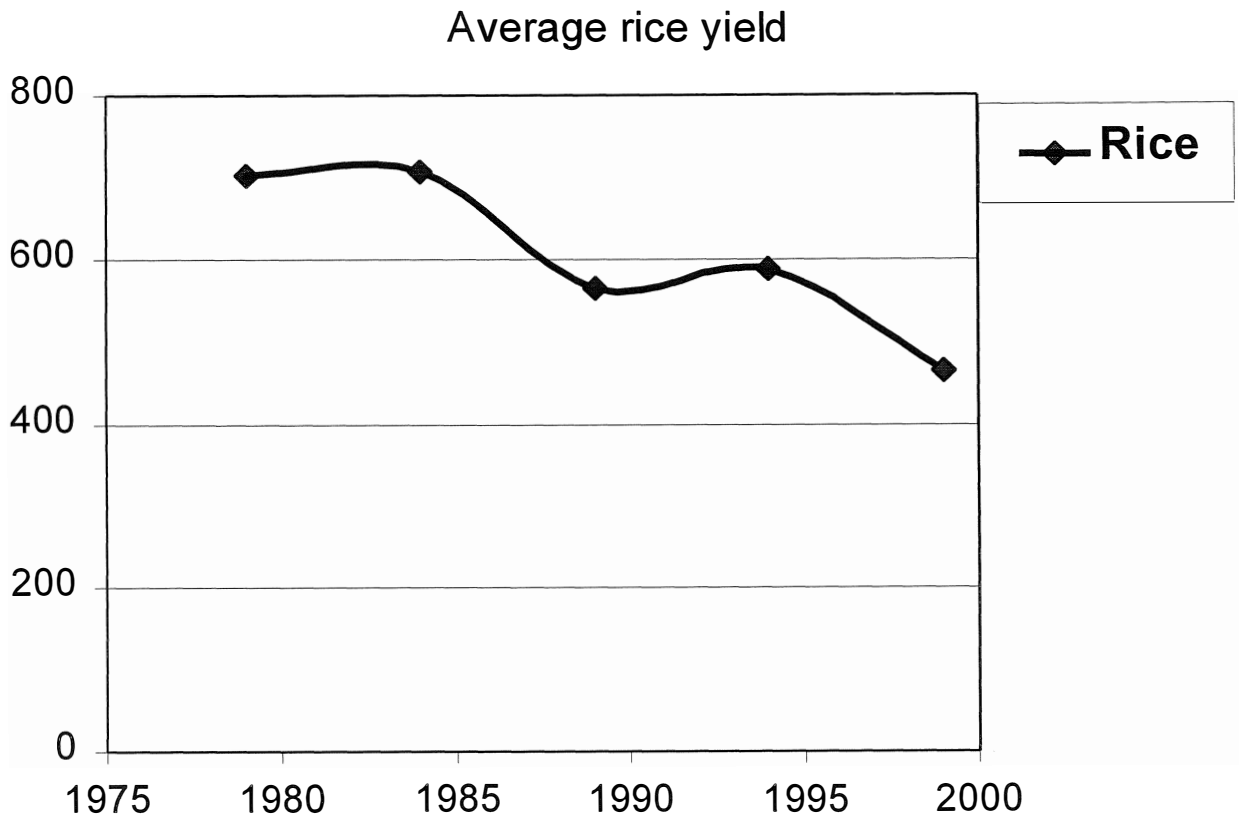
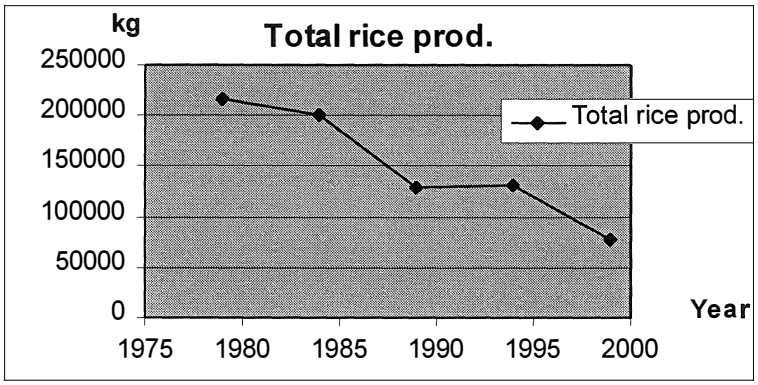
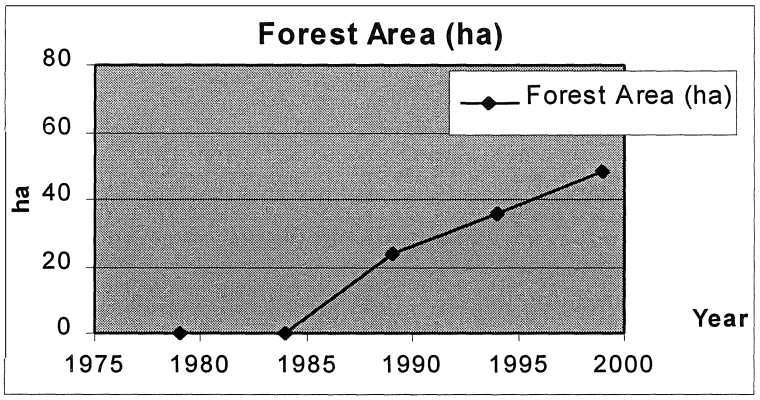
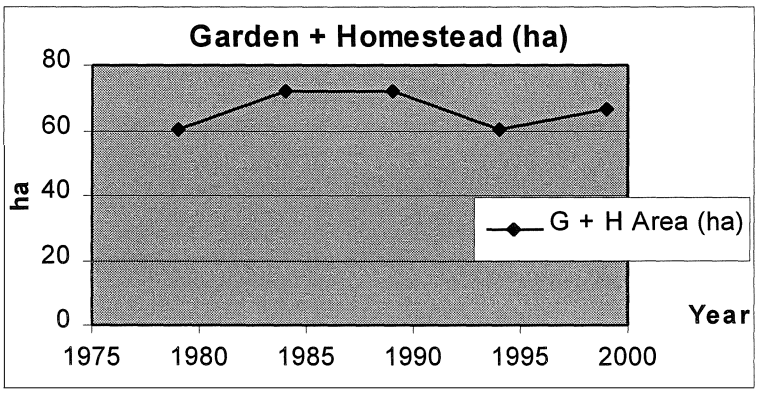
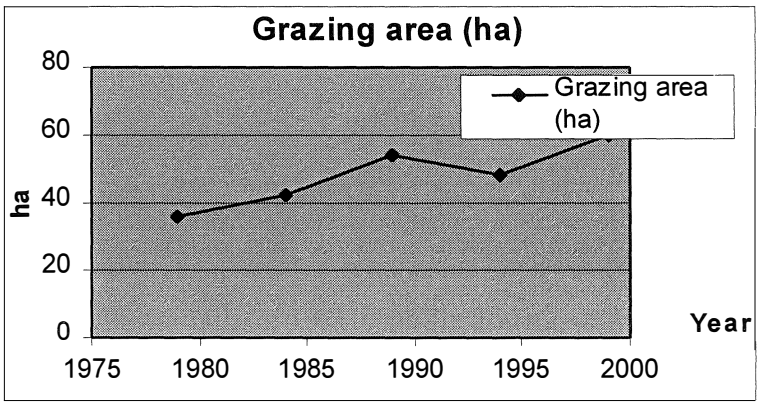


Figure 3-6: Total rice production and forest, garden/homestead and grazing area in Ban Pakxapmay during 1979-99









Steering indicies

Year	Population		GDP		Energy Demand		Productivity in agriculture		
	Total	Rural	Total	Per capita	Urban	Rural	Subsistence	Marketed	Cash Crop
1999	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2000	1.00	1.00	1.02	1.02	0.97	0.97	0.99	1.03	1.00
2001	1.00	0.99	1.04	1.04	0.94	0.94	0.98	1.06	1.00
2002	1.00	0.99	1.06	1.06	0.91	0.91	0.97	1.09	1.00
2003	1.00	0.99	1.08	1.08	0.89	0.89	0.96	1.13	1.00
2004	1.00	0.99	1.10	1.10	0.86	0.86	0.95	1.16	1.00
2005	1.00	0.98	1.13	1.13	0.83	0.83	0.94	1.19	1.00
2006	1.00	0.98	1.15	1.15	0.81	0.81	0.93	1.23	1.01
2007	1.00	0.98	1.17	1.17	0.78	0.78	0.92	1.27	1.02
2008	1.00	0.97	1.20	1.20	0.76	0.76	0.91	1.30	1.02
2009	1.00	0.97	1.22	1.22	0.74	0.74	0.90	1.34	1.03
2010	1.00	0.97	1.24	1.24	0.72	0.72	0.91	1.38	1.03
2011	1.00	0.96	1.27	1.27	0.69	0.69	0.92	1.43	1.04
2012	1.00	0.96	1.29	1.29	0.67	0.67	0.93	1.47	1.04
2013	1.00	0.96	1.32	1.32	0.65	0.65	0.94	1.51	1.05
2014	1.00	0.96	1.35	1.35	0.63	0.63	0.95	1.56	1.05
2015	1.00	0.95	1.37	1.37	0.61	0.61	0.97	1.60	1.06
2016	1.00	0.95	1.40	1.40	0.60	0.60	0.99	1.65	1.06
2017	1.00	0.95	1.43	1.43	0.58	0.58	1.01	1.70	1.07
2018	1.00	0.94	1.46	1.46	0.56	0.56	1.03	1.75	1.07
2019	1.00	0.94	1.49	1.49	0.54	0.54	1.05	1.81	1.08

Population & GDP

Year	Population			Gross Domestic Product	
	Rural	Urban	Total	Total (in millions)	Per capita
1999	947	125	1,072	0	230
2000	944	128	1,072	0	235
2001	941	131	1,072	0	239
2002	939	133	1,072	0	244
2003	936	136	1,072	0	249
2004	933	139	1,072	0	254
2005	930	142	1,072	0	259
2006	927	145	1,072	0	264
2007	925	147	1,072	0	269
2008	922	150	1,072	0	275
2009	919	153	1,072	0	280
2010	916	156	1,072	0	286
2011	913	159	1,072	0	292
2012	911	161	1,072	0	298
2013	908	164	1,072	0	303
2014	905	167	1,072	0	310
2015	903	169	1,072	0	316
2016	900	172	1,072	0	322
2017	897	175	1,072	0	328
2018	894	178	1,072	0	335
2019	892	180	1,072	0	342

Agriculture development

Year	Subsistence food		Marketed Food		Cash Crop		Accumulated
	Area	Production/Ha	Area	Production/Ha	Area	Production/Ha	transfer
1999	234	465	78	100	6	100	0
2000	236	460	77	103	6	100	1
2001	237	456	76	106	6	100	1
2002	239	451	76	109	6	100	3
2003	241	447	75	113	6	100	4
2004	242	442	74	116	7	100	5
2005	244	438	74	119	7	100	7
2006	246	433	73	123	7	101	8
2007	248	429	72	127	7	102	9
2008	249	425	71	130	7	102	9
2009	251	421	71	134	7	103	11
2010	248	425	70	138	7	103	7
2011	245	429	69	143	7	104	3
2012	242	433	69	147	7	104	0
2013	238	438	68	151	8	105	-4
2014	235	442	67	156	8	105	-8
2015	230	451	67	160	8	106	-13
2016	225	460	66	165	8	106	-19
2017	220	469	65	170	8	107	-25
2018	215	478	65	175	8	107	-30
2019	210	488	64	181	8	108	-36

Land use transfers

1 = Other land, potential agriculture land
2 = Other land, potential forest land
3 = Farm forest land, natural forests
4 = Industrial forest land, natural forests
5 = Nat. environmental forest, in-accessible
6 = Nat. environmental forest, protection areas
7 = Nat. environmental forest, rerserves and NP

Year	Accumulated	Remaining area after land transfer, classes as listed above.						
	transfer	1	2	3	4	5	6	7
1999	0	12	0	24	0	0	48	0
2000	1	11	0	24	0	0	48	0
2001	1	11	0	24	0	0	48	0
2002	3	9	0	24	0	0	48	0
2003	4	8	0	24	0	0	48	0
2004	5	7	0	24	0	0	48	0
2005	7	5	0	24	0	0	48	0
2006	8	4	0	24	0	0	48	0
2007	9	3	0	24	0	0	48	0
2008	9	3	0	24	0	0	48	0
2009	11	1	0	24	0	0	48	0
2010	7	5	0	24	0	0	48	0
2011	3	9	0	24	0	0	48	0
2012	0	12	0	24	0	0	48	0
2013	-4	16	0	24	0	0	48	0
2014	-8	20	0	24	0	0	48	0
2015	-13	25	0	24	0	0	48	0
2016	-19	31	0	24	0	0	48	0
2017	-25	37	0	24	0	0	48	0
2018	-30	42	0	24	0	0	48	0
2019	-36	48	0	24	0	0	48	0

Part D

Minutes from seminar discussions

Minutes from the Final Seminar of the Training Workshop "Inter-active and Dynamic Approaches on Forest and Land Use Planning" in Hanoi, Vietnam on April 26-27, 1999

Chairman:	Dr Nguyen Huy Phon
Participants:	According to Annex 2
Agenda:	According to Annex 3
Minutes prepared by:	Prof. Nils-Erik Nilsson

The Seminar was initiated with words of welcome by Dr Hoang Sy Dong

The opening speech was given by Dr Nguyen Huy Phon. He presented an overview of development planning in Vietnam based on Government Decision 32. He laid special emphasis on the planning situation in the uplands and refers to the Vietnam-Sweden Mountain Rural Development Programme 1996-2000. This programme supports provincial projects in Northern Vietnam while at the same time strengthening the capacity of the Ministry of Agriculture and Rural Development in Hanoi. Sustainable development in the uplands requires a process approach of continuous dialogue, top down – bottom up, with the view of developing communal land use plans. The Vietnam–Laos–Sida-SLU Research Co-operation Project "Peoples Options for Forest Land Use" should be seen in that context as well as Sida support to FIPI. The Area Production Model should be seen as a planning tool in this process. This workshop is one of the activities within this co-operation Project.

Mats Sandewall presented an overview of the objectives of the workshop as follows:

- Testing new approaches to integrated land use planning.
- Compare current governmental plans with how people actually use the land with specific attention to communication and co-operation between different stakeholders
- Special attention to the circumstance that the planning procedures in Vietnam have so far virtually not changed at all despite the fact that rapid development is taking place in the country.
- Use the "current situation" as a basis for planning instead of data according to current official plans.
- Describe land use conflicts, problems and opportunities in Dao Tru commune.
- Foster co-operation between participants who are purposefully different in profession and experience.

He posed the question whether current planning systems are adapted to the needs of the 21st century. Can planning solve land use problems. Planning implies collection and analysis of data. We need to find more efficient methods for collection of data.

He showed a map of Dao True commune and its different parts. A dominating part of the commune is situated within Tam Dao National Park. There are 15 villages in the Commune, out of which one is a Kinh village. There is also a brigade of a forest enterprise and there is a state prison area. Village people experience seasonal food shortages and continue to be dependent on the national park area for collection of fuel, minor forest produce and to some

extent for continued shifting cultivation. Around 1000 hectares of Eucalyptus forests are planted in the lower parts of the park. How can people feed themselves, protect the forests, improve the water balance and develop wood production?

During the fieldwork some new approaches have been tested:

- Point sampling, based on local key-informants, that establishes an estimate of current land use (in 1999) and corresponding land use in 1994, 1989, 1984 and 1979.
- Comparison of existing official data with data collected through systematic dialogues on village and household levels.
- Use of the Area Production Model for developing scenarios that depict both the historical land use and development problems and opportunities.

Professor Nils-Erik Nilsson presented a paper titled "Perspective Forestry planning within the Framework of Sustainable Use of Land" (see Section B6).

Mrs Kajsa Sandewall presented an overview of the interactive approach that has been developed in the project. She laid special emphasis on interview techniques and the specific importance of women views and competence. Below are some highlights of her presentation:

- This training workshop has been directed towards the linkage between forestry and the people who use the forests. We certainly need data but we also need information that can help us to understand and organise the data.
- We can obtain information from official documents and from interviews with the people concerned (officials and villagers). The most accurate information is obtained from the villagers who are the direct users of the natural resources.
- We need information about population changes and the historic background to these changes. Why has the population decreased, why has it increased?
- We certainly need to know about wood consumption, that of rich people and that of poor people.
- We need the good relations with those concerned at all levels; commune, villages and households in order to obtain the accurate information.
- Organised, structured sampling interviews are tools that can help us to achieve our aims.
- The background of people is very important. Sickness within a family, for instance, can make a big difference in its life and its consumption pattern.

- Let me tell you about my own background. My ancestors were farmers. After graduation, I worked as the government official at the Ministry level. This combination in my background helps me, in my present occupation as international rural development worker, to better understand what information we need to gather, why and how. Please, do not ignore the importance of knowledge of the background and understanding the historical trends!

Dr Dong presented and overview of land use planning in the uplands. The problem structure is characterised by loss of forests, starvation, poor infrastructure, lack of understanding of basic problem structure and lack of co-ordination between centre and local levels. The current planning approach follows the following lines:

- Problem identification

- Formulation of objectives
- Anticipate outputs
- Establish planning matrix

The approach is the same as in the 1980´s but there is a big difference in development. Better infrastructure and a good grass-root education system are major achievements.

In the 1990´s there was a change towards bottom up approach defined in programme 327. According to this programme the farmer is defined as the centre of concern. In line with the change towards a liberalised market a land allocation system is being introduced. At present we are aiming at a third solution of compromise between top down and bottom up approach. We are developing guidelines for land allocation and land use planning using this approach. A semi-structured questionnaire is used as a tool. We need to know about land quality, household production and consumption and nursery needs. Inventories and the area production model are tools in this process.

A basic problem is to identify land for the 5 million-hectare plantation programme. This calls for communication between central and local authorities with the farmer's needs as the centre for concern. Implementation of the programme is in accordance with present legislation and considering customary local rights. The programme is implemented in integration with land use planning in co-operation with the people, assuring sustainable management and a participatory approach.

The land identification process contains some important corner stones:

- Formulation of guidelines for identification of land for commercial forests
- Formulation of guidelines for identification of land for protection forests
- Formulation of guidelines for identification of land for commercial crops and fruit trees
- Formulation of guidelines for plantation of Eucalyptus trees that are easy to understand

In conclusion we aim at increased forest cover, improvement of farmer's income, more efficient use of land, better horizontal and vertical co-operation, improved use of fruit trees and improved communication in remote areas. However, we still lack base land studies on uplands, we lack forest protection and we must adapt forest protection policies.

The afternoon session started with a presentation of APM scenarios based on official data and on data gathered through interviews and point sampling. Mr Mr Vu Van Quyet, Tam Dao National Park, presented the current land use situation in Dao Tru Commune. Mr Phung Van Khoa, Xuan Mai Forestry College explained the methods used and made an introduction to the APM model making use of a big screen projector that was directly attached to a computer so that everyone could follow the steps of a model run and watch the resulting tables and graphs. Mr Du Van Huong, Forest Inventory and Planning Institute presented two APM scenarios for Dao Tru Commune covering the period until 2019 (see also section C1).

Mr Vu Long, former Director of Forest Science Institute and National Consultant of PROFOR Project made a statement on forest policy and land use planning. He referred to his present tasks in land use planning and forest policy formulation in connection with the 5 million ha programme and the programme for land allocation. Land use planning must now be

undertaken at the commune level. Accurate planning that integrates forestry and agriculture is a prerequisite. We are being criticised for a top down approach but we now try to combine the top down and bottom up approach. With respect to target groups the big difference now is that we now work with individuals rather than with co-operatives. The market liberalisation policy has opened new possibilities. So far, 2 million ha of land has been allocated but only 20% of this land has been put in use. The reason is lack of supportive measures. We need to more about the quality of land and its optional uses. Farmers do not know what land they have received. Thus a clear classification of allocated land is needed.

In the uplands we must recognise that people live on shifting cultivation. Thus on the basis of decree number 60 we must allocate land for shifting cultivation and the question arises whether this land should be allocated as forestry land or agriculture land. My personal opinion is that shifting cultivation land should be considered as agriculture land. Foresters may have another opinion. At commune land level we must identify protection land (strictly protection) and land used for wood production. There will be a lot of problems. If we allocate 5 – 10 ha to a family it is quite possible that all trees will be cut. People cannot become rich on shifting cultivation so we must accept that land use stabilisation is a slow process. There are many dynamic factors in addition to them that are included in the APM model. Decree 64 defines upland. Forest is defined as natural forests, plantations and bare land. What criteria to use in order to judge whether land is agriculture land or not?

The speech of Mr Long was followed by comments by Nils-Erik Nilsson, Mr Kinh, Mr Sandewall and Mr Tien.

Mr Kinh underlined the importance of balance between the sectors in the social-economic processes and the need for integrated approach. He stressed that students need to know more about calculation techniques and asked for translation into Vietnamese of APM manual and output tables. He also raised the question whether APM could be used at the district levels.

Mr Sandewall in response to Mr. Long noted that their research had concentrated on shifting cultivation but that shifting cultivation could mean many things. For most shifting cultivators no other options exist in the short perspective. When people start stabilise the land use this means that they start to start to trust that the land can feed them and their families. Ownership is therefore important for them. But we also come across shifting cultivation done by people who are not so poor. In one of the villages under study we found that one third of the shifting cultivation was performed outside the village. With respect to APM we have tested the model on all levels but for different purposes. It fits well to the commune level as we have seen during our work in Dao Tru.

Mr Do Dinh Tien, Chief of Tam Dao National Park referred to his earlier experiences of land use planning not least in connection with the Bai Bang plantation project. We introduced Eucalyptus camaldulensis to farmers. After one cycle of acceptable growth the production went down. During the period 1986-1990 the Bai Bang mill was in trouble due to insufficient wood supply. A bad land use planning was a major reason for this. We must consider soil conditions and fertility better. I believe in planning at the commune level but we must go down to the farmer's level as was done during the workshop.

The first day of the seminar was concluded by Dr Phon

The second day of the seminar was opened by Dr. Dong and Mr Sandewall. Three working groups had been formed with the following tasks related to different aspects of the planning:

- Group 1. The strategic issues. What are the overriding objectives ?
- Group 2. The data issues. What data are needed?
- Group 3. The planning issues.

The reporter of these minutes followed the discussions in group 1.

Mr Can identified sustainable development as the overriding strategic objective. This is in line with international accords and national policies. Sustainable development puts man in the centre for concern.

Nils-Erik Nilsson agreed and cited paragraph one of the declaration of the Rio conference. "Man is at the centre of concern for sustainable development. He is entitled to a healthy and productive life in harmony with nature.

Mr Bao stressed the need for putting the commune in its provincial framework. In addition to knowledge of the local administrative level of population, labour force etc. it is necessary to establish and identify the relations with other communes and with the province. Hence planning is needed in the context of communes, districts and province. There are some overriding needs for developing of economy, stabilisation of agriculture and improving protection. Since there is need for central investments the commune plan must be an integrated part of the regional plan. There are some major problems that relate to the fact that planning must be interactive, especially in remote areas. There will be demands that cannot be responded to by the central level. Cost of protection must be adjustable and different plans are needed for remote areas. APM appears to be a good tool but the time-table is a difficult issue. How much of time and money will be needed? How much can be spent on one commune out of 69 in the province? One month?

Mr Suong (young officer from Dao Tru Commune) The overriding needs of the commune are the following:

- Improved irrigation system for more efficient use of water. This will allow for increasing the area of three crops a year (two crops of paddy and one crop of maize)
- Improved supply of tree seedlings adapted to sites and purposes.
- Clarification of borderlines between forest and home gardens.
- Stabilisation of shifting cultivation. People are settled but still continue shifting cultivation outside the village.
- Implementation of land allocation (red book) and means for investment in allocated land such as money, seed and seedlings. There is a need to understand that farmers are poor, some are very poor. They cannot by themselves manage such as investments as purchase of fruit trees.

Under Dr Dong as chairman there was a presentation of the group works based on some summary conclusions:

Group 1 (Mr Suong):

- Forestry and agriculture should be integrated in land use planning
- Planning on the commune level should be related to other communes and the district
- There is a need for support from the centre
- Improved irrigation is a priority objective
- Attention should be paid to site/species relationships in planting. There is a need for developing a high economic value.

Group 2. (Ms Cuc):

- Cadastral data to be used in planning
- There is a need for accurate data and a legal basis.
- Use data from region and commune
- Make use of field studies for control of data.
- Compare data from commune and from field.
- Go to villages for checking of commune data.
- Communicate data to villagers for checking
- Add and check. Perform interviews with the households

Group 3. (Mr Khoa):

- Name of the planning? What are the planning objectives?
- Planning perspectives? 1999-2019? In the Dao Tru scenario population would increase from 11 116 to 19978. What does that mean? Necessity to increase agriculture production. Family planning. Yes, but families want to have at least one son.
- GDP increase from 580 000 dong to 1 130 000. How to achieve? Increase production of cash crops, grow fruit trees on a bigger area, perhaps 400 ha. Increased value production in home gardens.
- Increased food production. Can average be increased from 5893 kg/ha to 11 613 kg? Increase of agriculture area but total area is limited. Abandon shifting cultivation and promote increased productivity per ha.
- Planning considerations leads to the conclusion that the irrigation system needs to be improved
- Energy requirements. Our energy balance changed from – 11463 m3 to –17760 m3. We know of course that that scenario needs to show an initial balance why input data needs to be modified. The scenario still shows that the energy balance will become still more negative unless there are no measures for improvement. We conclude that the commune needs to get wood from the national park, that there is a need for at least 300 ha of fuel wood plantations, that there is supply of forest land but no means and insufficient knowledge for creation of efficient plantations. Hence there is a need for research and extension.

Statement by Mr Dao Can, National Institute of Agriculture Planning and Projection, who was a full participant of the workshop. Mr. Can referred to his long experience in land use planning and expressed thanks for his participation in the workshop. In his view food security was an overriding necessity. We need to know the ultimate targets of the farmers. First priority for them is economic benefits but how much do they care or can they care for the environment? There are some lessons to learn from the past. We cannot move a plan from one area to another. We must avoid sector competition by integrated planning. We cannot have several users of the same piece of land. We cannot have different policies for the same piece of land.

I have taken a big interest in the Area Production Model. But we must recognise that we get an output that is determined by the input. Thus we need accurate physical data and we need relevant socio-economic data. We must take different ecozones into account. Dao Tru is divided into upland and lowland. This means erosion in upland and irrigation in lowland. On that basis we need to develop an integrated comprehensive plan, considering financial viability. Poverty alleviation is an overriding objective. What other opportunities exist for Dao Tru commune? Development of tourism? Finally with respect to APM. A good input will give a good output but we need to adapt the model for Vietnamese use.

Statement of Mr Nguyen Van Bao, Deputy Director, Department of Agriculture and Rural Development, Vinh Phuc Province. I have been working for 30 years within the forestry sector and have seen big changes take place. Forests still continue to have both productive and protective functions. This makes forestry planning very complicated.

Planning from commune level is adequate but we need input from many sources from the commune level up to the national level. We must recognise the competing claims between local people and the government. There are demands for the benefit of the people that can be met by mobilising internal sources on one side and on the other side there are Government requirements for forest protection and supply of forest products to meet current and future needs.

We need to start training of people since local people is the key asset. The more people that get involved the better will the plans be. Cross-sectoral approach is essential. However, planning will cost a lot. We have 69 communes within our province. Fifteen days of data collection will mean a full year to complete the plan.

A Master Plan would take a very long time to implement. The allocation process needs to be pushed up. Out of 30 000 ha of forest land 16 000 ha may be set aside for central organisations including Tam Dao. Protected areas need to be managed by Government. Our duty is to protect land with the participation of the people. The objective of protection is to secure that:

- Water supply does not dry up
- Soil erosion be stopped
- Recreation centres maintained

With respect to Dao Tru commune our objectives are to:

- Build another big dam
- Improve schools
- bring in electrical power
- Improve forest protection
- Support plantation by mobilising people in planting forests and fruit trees

The forest inventory of the commune is completed and the experiences from this workshop will contribute to our work.

After the statement of Mr Bao, the floor was free for further statements and comments. Mr Chung from FIPI commented on Nils-Erik Nilsson's paper and stressed the importance of poverty alleviation as well as the need for international support.

Mrs Binh stressed the importance of making use of the experiences of the households. She stressed the need for understanding the history of the past. She also presented her experiences of the need for separate talks with the women, not least in connection with the family planning issues.

Mr. Sandewall made some remarks on conclusions that had been made in various statements. He noted a general consensus with respect to the need for:

- Cross-sector approaches
- Good quality of input data
- Collating information in case of differences between different sources
- Balancing between official data and actual data needs to be clarified
- Planning on the commune level seems to be relevant
- Developing and adapting the APM model for use in Vietnam

He finally expressed his deep satisfaction over the workshop as a whole. - It has been very nice to work with you all during the last two weeks. Many thanks to everybody!

Dr Phon closed the seminar after a very solemn distribution of certificates to all participants.

Minutes from the Final Seminar of the Training Workshop "Inter-active and Dynamic Approaches on Forest and Land Use Planning" in Vientiane, Lao PDR on April 30, 1999

Chairman:	Mr Silavanh Sawathvong
Participants:	According to Annex 2
Agenda:	According to Annex 3
Minutes prepared by:	Mats Sandewall (in consultation with Silavanh Sawathvong, Vayaphat Thattamanivong and Thongphath Leuangkhamma).

In his opening speech (B9) Mr Silavanh introduced and made comments upon the Area Production Model (APM). He mentioned that so far the Government has implemented land allocation in 4000 villages (out of 12000). It has also identified 7 plains for agriculture development, esp. rice production, 20 National Biodiversity Conservation Areas, 77 "focal sites" for integrated rural development and several watersheds with potential for hydro power projects. He emphasised that land use planning must be made in such a way that it fulfils the villagers´ basic needs and still maintains sustainability of the natural resources. Further on, Mr Silavanh clarified that the APM has three (3) main and important components relating to Population, Agriculture System and Ecosystem and therefore seems to be well suited for the Lao situation.

Professor Nils-Erik Nilsson made a personal and international sweep on the topic "forest planning in the perspective of sustainable land use" (B7) and Mats Sandewall explained the concepts introduced in the workshop including "the APM approach" (B6).

After that, the outcome of the Case Study (C2), that had been carried out in Ban Pakxapmay during the previous week as part of the workshop, was demonstrated by Mr Vayaphath and Mr Khamphut (using an enlarged computer screen). Afterwards, some concluding remarks were made by Karl Gustafsson.

Lunch was conveniently arranged in the same building as the Seminar (the Guesthouse of the Ministry of Education nearby the Department of Forestry).

In the afternoon another case study on District level was presented by Mr Linthong.
The Study was prepared by NOFIP in Naxaithong District, Vientiane Municipality as part of the forthcoming "NFI Data User Workshop".

Mrs Kajsa Sandewall focused on the need to pay full attention to working methods, enough time and good behaviour when visiting villages for collecting data and information in her speech "the people behind the planning data" (B9).

After each of the presentations Mr Silavanh further emphasised what had been said by adding some clarifications and examples.

Following the presentation session there was a two hours concluding discussion. Many of the participants were very active and raised relevant questions and comments on the APM Model

and the APM approach. A summary of those questions and comments raised is listed hereafter. Replies were usually given by Mr Silavanh,
Mats Sandewall and Nils-Erik Nilsson and are not referred in this Minutes.

Questions and comments brought up in the final discussion:

Mr Khamphay Manivong (National Agriculture and Forest Research Institute)

- Several of the categories, e.g. land use types used in the APM have complicated definitions and some of them may not be so well suited for Lao conditions. Some work to specify and maybe redefine classes is needed.
- The "border" between Urban and Rural Areas is unclear. A special category might be needed for people living in such transition areas.
- There is no exact information available on Mean Annual Increment (MAI) in natural forest.
- The projection of future energy consumption in Urban Areas is disputable.

Mr Silavanh Sawathvong (National Programme for Shifting Cultivation Stabilisation):

- In areas with shifting cultivation the land use often goes outside what is considered as village boundaries. People could live in one village and practice shifting cultivation in another.

Mr Houmphanh Salamani (Forest Conservation and Afforestation Project – JICA):

- How can APM respond to irrigation and new crops in agriculture?
- How to deal with land use planning in shifting cultivation areas?
- Is the APM suitable for the planning at Village level?

Mr Chanthaviphone Inthavong (AIT scholar):

- How can GDP/capita be identified on district and village level?
- One should also include other components in the APM if used for decision making, such as existing land use plans, land capability surveys and availability of land per head.
- It seems to me that APM is too heavily dependent on the supply side. How to emphasise the demand?

Mr Sengmani (National Statistics Center):

- The use of APM seems to be dependent on person
- The distinction between Rural and Urban Areas is formally well defined on national level
- It is not so appropriate to use the term GDP on e.g. village level as it is a well defined term on national level. Another term should be needed.
- Calculation of population growth…

Ms Khamphone Daravong (Lao Womens Union):

- It is important that both men and women participate in and influence the planning process, data projection etc. Otherwise, some information will be missing. I want to encourage everyone to employ and engage female staff in this work !

Mr Nouandaeng Rasporn (Irrigation Department):

- What has been the criteria for selecting certain villages or districts?
- Is there any process for feed-back from the concerned villages or districts on the scenarios that have been developed?

Part E

Concluding papers

The APM Approach in perspective

By Bo Ohlsson and Mats Sandewall

Over the past 40 years, there have been a large number of activities to estimate the forest land resource base - both in terms of physical assets and the conditions thereof - and human resources related. Forest inventories have been the hallmark of the efforts to capture data for planning and implementation purposes. The technology has evolved into very sophisticated levels, using aerial photos, satellite imagery, GPS and sampling procedures with land based inventory teams. The results being produced have been impressive but the use of the results have been less impressive. For planning purposes, the output has frequently been difficult to use and sometimes not used at all, but rather remained within the realms of the inventory offices. This is particularly valid for strategic planning in developing countries.

The efforts to deal with the human aspects - why do people do what they do? (e.g. practice shifting cultivation), what do they do? (e.g. how does the shifting cultivation system work?) and how to address these issues? (e.g. land allocation?) - have gone through different phases.

Initially, huge surveys were conducted, involving thousands of farmers/actors and advanced sampling methods. It was often "a cheat" as, for instance, in the study covering 5000 farmers in Bangladesh in the early 1980's where it was not possible, for a start, to define and number the population supposed to be sampled. Pre-set questionnaires were used, rather reflecting the researchers often biased and preconceived views on the issues at hand. To this should be added the exaggerated belief in the farmers' capability to recall for instance how much fuel wood the family used over a year. Another problem was the necessary translations through which much of the precision in the questions was lost.

The interviewers were usually not experts in the sense of having professional knowledge about the issues at hand. Rather they were asked to put - i.e. read - the questions and record or tick the answers. The numbers were processed by computers and it was learnt that small farmers are worse off than big farmers, that they consume X tonnes of fuel wood per annum and so on. The initial approach was also characterised by defining the "farmers" as the problem and defining them mainly as consumers, not as producers in their own right. The agenda was set by the authorities or the researchers, not by the clients/farmers. The knowledge useful for planning purposes that was gained in these rural surveys was very limited.

Simultaneously, an old tradition of using anthropologists was revived. They produced very knowledgeable insights into usually small communities or restricted areas, often in lengthy and for non-professionals very difficult form to understand and, most important of all, very difficult to translate into planning or action - what to do with the result?

The above methods were costly, time-consuming and did not really yield much operational information or realistic planning data. As a response, there was a development towards other methods, such as the Rapid Rural Appraisals, RRA. It was a method, which allowed more participation of the local people, had a number of rules which were intended to ensure a more comprehensive of the issues at hand and it was comparatively fast. At best, it did yield more operational results and better reflected the reality than the traditional rural surveys. In a way, it was a better method to exploit the knowledge of the clients, the farmers.

Eventually, with the emergence of the view that "empowerment" was an essential component in any development work, the Participatory Rural Appraisal, PRA was developed. The PRA entailed a very active participation of the clients with rather open agendas, transects through villages and fields, working calendars, historic events, map drawing and other activities, all aimed at generating relevant information.

There are a number of problems associated with both the RRA and the PRA. They generally lack the possibilities of verifying the information in an objective way. Even the clients/farmers are biased and have a substantial number of issues they want to pursue, all of which might not necessarily contribute to a correct description of their reality. Land areas are estimated, based upon either anecdotal or old information, there are a number of normative statements and the process is politicised. In addition, there are biases such as a desire to guide the information, which might be related to tax issues on land. It is also difficult and time consuming to ascertain that, for instance, all strata and interest groups of the village are represented.

There are also biases related to who conducts the PRA - when from the forest department, there is a tendency to be biased towards forestry for all actors involved. Even if the main problem of the village is lack of potable water, they might very well define their main problem as related to forestry - lack of fuel wood because the PRA group is using a forest department car e.g.

The research work with the "People's Options on Forest Land Use" project in Lao PDR and Vietnam has shown that there is often a huge discrepancy between reported figures and the real situation. It is particularly obvious when it comes to quantifying the current land use situation and areas of direct concern to the interviewed part (officials or villagers).

For example, the paddy area in one village in Vietnam turned out to be 20 ha in comparison with the officially reported and agreed figure of about 6 ha. On Commune level some 20 % of the area was reported to be agriculture land while 70 % of the commune area was considered "not yet used land". Based on sampling estimates it was concluded that some 66 % of the entire commune area was used for food production in that specific year. Shifting cultivation was not officially recognised, although it represented more than 1/3 of the total income in one of the villages that was studied.

In the Vietnamese commune studied during the workshop, the area of paddy turned out to be more than double that of the official figure, putting in question the statement of negative rice balance in the Commune. In the village of the Lao case study the area of paddy was also much higher than that reported. In the research study of a water catchment area with extensive shifting cultivation in Northern Lao PDR, 22% was allocated for agriculture use according to official sources. The research (based on point sampling and aerial photography) estimated the area under cultivation to be about 42 %, suggesting that the area used by each household, including fallow land, was about 10 ha.

There could be many reasons why the area claimed to be used by the village and the Commune is so much different from the real situation. Often the areas have never been measured. When they are measured some areas tend to be forgotten or the figures be adjusted depending on the preference of planners who wish to present performance in line with optimistic planning targets or local people who worry about taxation. For a policy maker, the result could be that strategies are based upon wrong assumptions about the current situation, ongoing changes or the reasons for those changes. For the local people it often means that real problems can not be discussed, as they officially do not exist.

The point sampling technique linked to the APM Approach offers a powerful tool for rapid assessment of the current land use, it's changes, trends and underlying causes. The point sampling can be applied with or without such tools as air photos and computers, but a decent topographic map and some basic understanding of sampling is required.

The APM Approach, as discussed and used during the workshop, aims at combining the PRA approaches, using local knowledge, with scientific, statistical correct methods in order to not only verify the information gained but also to further the agenda. The gained village and family based information is by and large verified (or not verified) by the sampling point work which in turn provides new inputs to the village/family based discussion and vice versa. The APM Approach provides the actors – the villagers, the planners – with an opportunity to carry out strategic planning based upon realistic data and information.

The Area Production Model, APM still has many technical inconsistencies as a computer model, which requires further development work. However, several advantages have also been observed. It brings inventory people closer to strategic issues as it requires them to collect and analyse interdisciplinary data. At the same time it can provide policy and decision-makers with a better insight in matters of data quality and data requirements. A closer inter-action between those two groups is promoted. It also directs attention in planning towards data variables of special importance and the value of studying, analysing and understanding ongoing changes as a base for strategic decisions.

We have observed that the APM has instantly generated serious interest both in Vietnam and Lao PDR. It seems as if people dealing with planning find that the APM concerns issues (population, land use and forest cover, socio-economics, agriculture production) which are closely interrelated but have so far not been treated in same planning context. Making use of that interest and the potential of the APM Approach is a challenge.

Approaches on Forest and Land Use Planning - Reflections on the Lao-Vietnam Workshop in the Perspective of Sustainable Development

By Nils-Erik Nilsson

1. Background

The technical and institutional background to the workshop has been explained in an introductory paper by Klaus Janz and Mats Sandewall. It was part of a Sida-funded programme within the Swedish National Board of Forestry. That programme aims at strengthening the capacity of national institutions and organisations in developing sound national forest policies and collecting, organising and analysing the information needed for this. The programme consists of a series of courses on "Development of National Forest Policies and Strategies" [1] and a follow-up project named "Country Capacity Building for Planning, Assessment and Periodic Evaluations within the Forest Sector". The Lao-Vietnam workshop was an activity within the follow-up project.

So far three (3) courses on "Development of National Forest Policies and Strategies" have been arranged. The fourth course is due in August- September 1999. Some 25 participants from 10 –15 different developing countries have taken part each year. The courses are participatory and directed towards fostering democratic attitudes. They are based on the idea that sustainable development requires consensus building within and across all sectors of society. Such development must be allowed to take time. We therefore hope for a long-term continuation of the courses and of the follow-up actions with the aim of creating co-operation networks with and within the countries involved.

Sweden in co-operation with Uganda organised in 1996 a workshop of experts on sustainable forestry and land use that was focused on the process of consensus building. The workshop was arranged within the programme of the Intergovernmental Panel on Forestry under the Commission for Sustainable Development. The workshop aimed at creating a better understanding of the challenges encountered as nations and communities seek to formulate plans and practices in forestry and land use based on participation and consensus. The formal IPF sessions had drawn attention to the needs for more participatory, integrated, and cross-sectoral approaches to forestry planning and implementation. These needs are articulated in principle 2 d of UN's Forestry Principles:

(2d) Governments should provide and promote opportunities for the participation of interested parties, including local communities and indigenous people, industries, labour, non-governmental organisations and individuals, forest dwellers and women in the development, implementation and planning of national forest policies .

I was among those negotiating the Forest Principles before and during the UN Conference on Environment and Development in Rio de Janeiro in 1992. In my mind

Principle 2 b summarises some basic guidelines for development and implementation of national forest policies and strategies. It reads like this:

(2b) Forest resources and forest land should be sustainably managed to meet the social, economic, ecological, cultural and spiritual human needs for present and future generations. These needs are for forest products and services, such as wood and wood products, water, food, fodder, medicine, fuel, shelter, employment, recreation, habitats for wildlife, landscape diversity, carbon fixation, sinks and reservoirs and for other forest products and services. Appropriate measures should be taken to protect forests against harmful effects of pollution, including airborne pollution, fires, pests and diseases in order to maintain their full multiple value.

FAO Council had made a more complete definition of "sustainable development" in 1988. It reads as follows:

"Sustainable development is the management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development (in the agriculture, forestry and fisheries' sectors) conserves land, water, plant, and animal genetic resources, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable."

However, paragraph 2 b of the Forest Principles could stand for a forest sector contribution to sustainable development that will be the core issue of this paper. Paragraph 2 of the Forest principles is also compatible with the first paragraph of the Rio Declaration that puts man in the centre of concern for sustainable development. It declares *that man is entitled to a productive and healthy life in harmony with nature.*

2. Aim of this paper

This paper aims at putting the activities of the Lao-Vietnam workshop in the context of the broader scope of sustainable development. It is an effort to present views on problems and opportunities encountered in forest policy development and implementation based on my on-line experiences in Sweden in combination with experiences from developing countries, mainly in Southeast Asia and Africa. The paper will contain direct references to the present stage of policy development in Vietnam and Laos in my subjective interpretation.

In an appendix I present a summary of substance from a paper called "Industrial Forestry and its Integration with Social and Rural Development". This paper was written for a workshop on industrial forestry that was organised by FAO in Bangkok in September 1986 as part of the regional project "Special Study on Forest Management, Afforestation and Utilisation of Forest Resources in Developing Regions" [GCG/RAS/106/JPN]. The paper also contains references to a "special paper" I wrote for the IX. World Forestry Congress held in Mexico. The theme of the Mexico Congress was "Forestry Resources in

the Integral Development of the Society". The title of my paper was "National and Subnational Forest Inventories" and it is contained in the Proceedings of the Congress

Both these papers are relevant for the present situation of forest policy development in Vietnam and Laos and they are referred to in the literature list.

3. Summary views on the workshop

My first impression is that the workshop was very much in line with the recommendations of the UN Forest Principles. Although I have been advocating the need for cross-sectoral co-operation in land use planning and the need for participatory approaches since long ago, this was the first time for myself to take part in an activity that was directed precisely towards that. And that was a very great experience.

Participants represented all levels, nation, province, commune, villages and individuals. There were certainly some problems related to the fact that the participants were different in profession and experience. However, all participants had something to say and there were a great deal of consensus in discussions on basic objectives, problems and opportunities as well as with respect to visions of future sustainable development.

The aims of the training workshop were the following:

- Testing of new approaches to integrated land use planning
- Compare current governmental plans with how people actually uses the land with specific attention to communication and co-operation between different stakeholders
- Special attention to the current unchanged planning procedures in Vietnam in view of the rapid development that takes place in Vietnam.
- Attention to planning in relation to the ongoing land use policy efforts in Vietnam and Lao PDR.
- Use "current situation" as a basis for planning instead of data according to current official plans.
- Describe land use conflicts, problems and opportunities in Dao Tru commune.
- Foster co-operation between participants who are purposefully different in profession and experience.

In his opening speech Dr Nguyen Huy Phon presented an overview of development planning in Vietnam based on Government Decision 32. He put special emphasis on the planning situation in the uplands and referred to the Vietnam Sweden Mountain Rural Development Programme 1996-2000.

The specific aspects of planning in upland areas were further analysed in a paper by Dr Hoang Sy Dong that is included in the proceedings. He presented the following list of difficulties met in upland areas:

- Forest loss, lack of water and soil degradation
- Food deficits and starvation during between crop periods, coupled with shortage of other necessities

- Insufficient knowledge of sustainable resource management
- Limited access to markets
- Lack of capital for infrastructure development (education, health care, transportation and communication)

Lack of co-ordination between central and local authorities, between sectors working in the same area, between different projects and between micro and macro development activities.

He concluded that sustainable development in the uplands requires a process approach of continuous dialogue, top down – bottom up, with the view of developing communal land use plans.

If we compare Dr Dong's list with experiences from other parts of the world we will find that many of the problems are quite universal. We might guess that the possible solutions also would be quite similar. These may involve empowerment and mobilisation of people, a combination of top-down and bottom-up approaches based on vertical and horizontal consensus building and improved international and regional co-operation on means and methods for improved land use technology.

Let me in this context refer to paragraph c) of the preamble to the Forest Principles:

(*c) Forestry issues and opportunities should be examined in a holistic and balanced manner within the overall context of environment and development, taking into consideration the multiple uses of forests, including traditional uses, and the likely economic and social stresses when these uses are constrained or restricted, as well as the potential for development that sustainable forest management can offer.*

The specific importance of Forest principle 2d on people's participation and the role of women was analysed in a presentation by Mrs Kajsa Sandewall. Her presentation is also included in the proceedings.

Dao Tru commune in Vinh Phuc Province had been selected as the subject for the training activities during the first week of the workshop in which both the Lao team and the Vietnamese team took part. The Vietnamese team continued the work on an APM case study for Dao Tru commune during the second week. Mr Phung Van Khoa has documented this case study. The Laotian team carried trough a similar study in Ban Pak Xap May in Vientiane Municipality that has been documented by Mr Vayaphat Thattamanivong and Mr Khamphout Phandanouvong.

A dominating part of the Dao Tru commune is within Tam Dao National Park that was created just a few years ago. There are 15 villages, out of which one is a Kinh (the dominating ethnic group in Vietnam) village. There is a much-reduced part of a forest enterprise and there is a prison area. Village people experience seasonal food shortages and continue to be dependent on the national park area for collection of fuel, minor forest produce and to some extent for continued shifting cultivation. Around 1000 hectares of

Eucalyptus forests are planted in the lower parts of the park. The question posed was the following: "How can people feed themselves, protect the forests, improve the water balance and develop wood production?"

The two study areas were quite different with respect to major factors influencing on land utilisation and options for future development but still it was possible to use the same approach for the study. Since I myself took part in the continued work in Dao Tru commune there will be more references to Vietnam than to Laos in this paper. My general impression, however, is that the present trends in land use policy development are quite similar. This is especially true with respect to the on-going activities for land allocation to farmers. It seems that the land allocation schemes offer good opportunities for empowerment of people but there are also a number of obvious risks involved. There is a need for improvements of the legal framework and strengthening of institutions related to ownership and tenureship of land.

It is important to realise that the workshop did not deal with more than one segment of forestry resources planning, namely "subsistence forestry". Industrial forestry and environmental forestry were only touched on. Some specific issues dealt with in the workshop are contained under these headings:

- A Master Plan for Vinh Phuc Province
- The Area Production Model
- The Field Sampling
- The need for national analytical units

Aspects on industrial forestry and on primary forest production are contained in the appendix.

4. A Master Plan for Vinh Phuc Province

During the workshop a question was raised on how long time and how big resources can be used for each commune in a planning activity based on a bottom-up approach. Mr Nguyen Van Bao, representing Vinh Phuc Province raised this question with the following background:

The commune needs to be put in its provincial framework. In addition to knowledge of the local administrative level of population, labour force etc. it is necessary to establish and identify the relations with other communes and with the province. Hence planning is needed in the context of communes, districts and province. There are some overriding needs for developing of economy, stabilisation of agriculture and improving protection. Since there is need for central investments the commune plan must be an integrated part of the regional plan. There are some major problems that relate to the fact that planning must be interactive, especially in remote areas. There will be demands that cannot be responded to by the central level. Cost of protection must be adjustable and different plans are needed for remote areas. APM appears to be a good tool but the timetable is a difficult issue. How much of time and money will be needed? How much can be spent on one commune out of 69 in the province? One month?

In the final seminar in Hanoi Mr Bao stated the following:

"Planning from commune level is adequate but we need input from many sources from the commune level up to the national level. We must recognise the competing claims between local people and the government. There are demands for the benefit of the people that can be met by mobilising internal sources on one side and on the other side there are Government requirements for forest protection and supply of forest products to meet current and future needs.

We need to start training of people since local people are the key asset. The more people that get involved the better will the plans be. Cross-sectoral approach is essential. However, planning will cost a lot. We have 69 communes within our province. Fifteen days of data collection will mean a full year to complete the plan. A Master Plan would take a very long time to implement. The allocation process needs to be pushed up. Out of 30 000 ha of forest land 16 000 ha may be set aside for central organisations including Tam Dao. Protected areas need to be managed by Government. Our duty is to protect land with the participation of the people. The objective of protection is to secure that water supply does not dry up, soil erosion is stopped and recreation centres maintained

With respect to Dao Tru commune our objectives are to:

- *Build another big dam*
- *Improve schools*
- *Bring in electrical power*
- *Improve forest protection*
- *Support plantation by mobilising people in planting forests and fruit trees*

The forest inventory of the commune is completed and the experiences from this workshop will contribute to our work.

Mr Bao's presentation is very much to the point. It provokes a number of questions: What detailed, local information is needed for a "Provincial Master Plan"? Is it that the present planning system goes too much into details as a result of central efforts to have full control over the use of land? Is it that the present policy of land allocation implies that all detailed planning of land use within given restrictions should be entirely up to the users of land? Is it that central planning mainly should concentrate on measures to ensure that the local use of land is in line with overriding national policies and priorities?

5. The Area Production Model

The APM was at the centre of concern during the workshop. I am not going to any details with respect to the case studies. Participants, as part of their training, have documented these. Please observe that scenarios that have been worked out do not represent any kind of solutions to the planning problem in the study areas. The APM is a simulation tool for planning but not a complete planning model. Its strength is that the historical interplay between the basic parameters that influence on the use of land can be studied. APM puts

the finger on what parameters influence on the use of land. Knowledge of historical trends and the current use of land, including trends of production and consumption are basic prerequisites for formulating scenarios on future development. A danger with the model, in its present modern shape under Windows, is that it is very easy to handle but at the same time there are few options for adapting the model to locally preferred systems for land classification. Further more, the second phase of the model dealing with plantation programmes is not transparent enough why it is difficult to see how the model works.

A description of the origin of the model is contained in my presentation at the concluding seminars in Hanoi and Vientiane: "Perspective Forestry Planning within the Framework of Sustainable Use of Land". That paper is part of the documentation of the workshop [3]. I would also like to refer to a paper by Bo Ohlsson and Mats Sandewall that is called "The APM Approach in Perspective" and that is part of the workshop proceedings [4].

The model was much discussed during the workshop. It is a concern of mine that there has been virtually no development of the basic structure of the model since its construction in the early 1980's. In my view it was a demonstration model only that needed to be developed over time on the basis of experiences gained. It is encouraging that efforts now are being made to open up possibilities for further development of the model. I look forward to opportunities to contribute to such work.

6. The Field Sampling

Mats Sandewall has introduced a very simple and efficient method of monitoring the current land use and at the same time creating a record for the last twenty years or so with respect to the historic use of land. He uses a systematic net of sample points. In the case of Dao Tru Commune he applied a density of one point per 100 ha that gave 76 sample points within the commune. The approach gives a reasonably acceptable standard error that can be lowered by visiting more points. A person who well knows the current and previous land use accompanies the field team and tells about the use of land at the points visited 5, 10, 15 and 20 years ago. This gives a good picture of the stability or the dynamics of the land use and can thus provide input data for historic runs of the APM as a means for formulating scenarios for the development of future land use. The field sampling provides a method of controlling and monitoring the current land use. The field work showed, as so many times before, that there might be very big differences between factual land use and land use according to current statistics or plans. This method can be well applied when used in combination with satellite images or aerial photos.

Since years ago, I have recommended this approach myself but mostly in vain, probably because the approach is simple and "unsophisticated". Let me present a conclusive statement from my Mexico paper. The conclusion follow a presentation of the Area Production Model that is the first published account of the model and that refers to the 1986 paper of Ola Lindgren that was under preparation. This is the citation:

"There are at least three basic conclusions to be drawn, that are of importance in the pre-planning stages of national and sub-national forest inventories:

- *The inventory design should cover all land classes.*
- *Sub-national are units should be small enough in order to allow for strategic planning of subsistence forestry.*
- *It should be possible to provide forestry data for the same area units for which socio-economic data and data on population are available.*

One more important observation could also be added. It may be more difficult to get data on actual cut and drain than to collect data on volume and growth. Rough data on actual drain of subsistence wood can probably be obtained by a problem-oriented classification of the area into classes of different utilisation intensity. Since it is probably necessary to generalise the data on subsistence utilisation on an area basis for a long period to come, an area inventory is much more urgent initially than a volume inventory. To some extent it would contradict what was said above about remote sensing inventories (need for ground truth), since these inventories might give us area estimates in a cheap way. The trouble is, however, that we need area estimates classified in a way that makes it possible to approximate the auto-production/consumption of subsistence wood/biomass from various kinds of land. It is not likely that a classification of land that can be obtained from a satellite imagery can serve that purpose. On the other hand it may be possible to construct two stage sampling models that can efficiently serve the purpose. A relevant classification into different land classes or land use classes is needed under any condition. Such a classification is very difficult and there is not much of experience.

(Compare the present situation in Vietnam and Laos where such classification is needed as part of the land allocation process. How to identify land that must be kept under central management for environmental reasons and how to identify land that can be leased out for industrial forestry use without causing to much of pressure on subsistence uses?)

The author suggests that trials with "deskarea inventories" are carried out in the initial stages of building up a survey organisation. Such inventories should aim at controlling the relevance of existing land use statistics. A systematic net of sampling points related to geographical co-ordinates should be established and the sampling points should be marked on existing maps of suitable scale. A simple and robust area sample plot form or list is then established. Local forestry staff then collects all data. Depending on the strength of the forestry organisation, density of road net and population, availability of modern maps and aerial photographs, the desk inventory could be based more and less entirely on existing knowledge or be combined with or entirely carried out by field work. It may also be feasible to collect an objective sub-sample for which trained surveyors can be used. Such a study could also give a test on the efficiency of the forest administration and in addition many people would get involved."

7. The need for national analytical units

In the introduction reference was made to the Sida-funded project on Country Capacity Building for Planning, Assessment and Periodic Evaluations within the Forest Sector". In my view "Country Capacity Building" is everything that can contribute to the capacity of States to exercise its authorities and responsibilities with respect to sustainable land use

and within the boundaries of international accords and agreements. The organisation of existing knowledge and collection of new knowledge within fields related to the forestry sector would necessitate the setting up of fairly independent national *analytical units* that can provide the government and all interested parties with a good basis for informed and participatory decision-making.

The basic terms of reference for a national analytical unit for the forest and forest industry sector would be to collect, organise and publish knowledge that is needed for policy development and implementation. The unit would have to place the forestry sector in its national and cross-sectoral perspective. It should work in a transparent way and be guided by agreed national objectives and priorities. In the Swedish example the analytical unit at the National Board of Forestry is guided by an advisory group, consisting of members who are selected on their individual merits and who are representing all major interests within forest resource management and conservation.

Forest policy development and implementation must be allowed to take time. The problems are difficult and there are no easy "technical fixes". International follow up of the UNCED accords should concentrate on promoting CCB rather than developing criteria and indicators for sustainable forest management that mainly aim at measuring progress and comparing countries on a global scale. It is important to realise that society at large may have priorities that are different from those of foresters and forest administrations. Professionals, foresters and others, need to understand the diverse needs and priorities of society and reflect on them in their work in order to achieve a mutual understanding. Solutions to many forestry problems lie outside the forestry sector. Consensus has to be sought in areas like agricultural policymaking and in sustainable use of energy and water. Conflicts over land use are increasingly common. Therefore conflict resolution mechanisms are at the centre of consensus building processes for sustainable land use. The history and particularities of a given country have a bearing on its current situation and must be taken into account.

There are three major knowledge areas that are relevant for the forestry sector:

- Knowledge of the current status of forests and forest land, particularly with respect to actual and potential utilisation and with respect to the present status of conservation and protection.

- Knowledge about the forest owners and/or users, particularly in the context of general land use; with respect to the prospects of sustained management and with respect of measures which may be needed for maintenance of biodiversity and stabilisation of land use and climate.

- Knowledge about the other sectors of society that influence on or are influenced by the forestry sector, especially the linkage between forestry and agriculture and between forestry and forest industries.

When reading through my comments above on the need for national analytic units, I feel, that I am repeating over and over again thoughts that I put on paper many years ago. Is it that my thinking and reflections has got into a standstill or is it that the problems I tried to analyse 20 years ago still have not been solved and that my own conceptions of possible strategies have remained relevant over time? As noted above I am a little embarrassed by the fact the APM- model has not been developed further since the first version in the 1980's. Rather we have found it relevant to develop a modern but mostly unchanged version adapted for use under Windows. Below is an appendix that is drawn from the paper on industrial forestry that I referred to above and that may serve as a complement to issues on subsistence forestry that was dealt with during the workshop.

APPENDIX

Industrial Forestry and Its Integration with Social and Rural Development (extract)

1. An approach to Forestry Planning

Lately I took on a job to rewrite a paper of mine that was written for a workshop on industrial forestry to be organised by FAO in Bangkok in September 1986. This was just in order to have the paper in my personal computer. This workshop was part of a regional project "Special study on Forest Management, Afforestation and Utilisation of Forest Resources in Developing Regions" [GCB/RAS/106/JPN]". The title of my paper was "Industrial Forestry and its Integration with Social and Rural Development" [4]. This is a subject that is very acute now both in Vietnam and in Laos. I now take the liberty to borrow some substance from that paper without noting whether it is a citation or not. On the subject of analytical units I wrote the following:

"Of course, I am aware of a number of serious knowledge gaps with respect to the existing forest resources and with respect to the production capacity of land within the seminar countries. It is certainly a need for development of technical competence but it is still more urgent to create fairly independent planning units with a permanent staff which is allowed to stay on their jobs and where people can do that without loosing reasonable prospects for promotion. The main responsibility for such units would be to organise the existing knowledge to serve as a basis for forest policy development and to acquire new knowledge for that purpose when needed. This is a job that requires time, continuity and patience.

The responsibility lies with the governments. It is their responsibility to formulate operative forest polices which are in accordance with widely accepted national objectives. This does not mean that the governments should dictate the forest policy - rather the opposite. A good forest policy must be backed up by the people and be developed with the participation of the people. The ideal decision process can be described as a "steered evolution towards consensus.

The main theme of the IX World Forestry Congress in Mexico was "Forest Resources in the Integral Development of Society". For this congress I wrote a special paper with the heading "National and Subnational Forest Inventories". The paper presented an approach to forestry planning which included the following sequence of activities:

1. Analysis of broad national objectives

2. Analysis of (or formulation of) broad forestry objectives.

3. Formulation of provisional production objectives for forestry sub-sectors (Subsistence forestry; industrial forestry, environmental forestry)

4. Implementation of provisional production objectives for sub-sectors

5. Analysis of main options with respect to:
- utilisation of existing forest resources
- creation of new resources
- land utilisation.

6. Definition of knowledge gaps. Formulation of inventory and survey projects and of programmes for research and education

In the sequence of activities listed above I have made use of the concept "subsistence forestry". This term may be self-explanatory but since subsistence forestry is of major importance I would introduce the following definition: *Subsistence forestry is defined as the production and consumption of un-marketed and unrecorded wood / biomass products and other minor forest products for fuel, food, fodder or other subsistence purposes.*

The definition of subsistence forestry leads to a very important conclusion, namely that forestry planning must include all land. A substantial part of subsistence fuel is produced on agricultural land or on other land that can not now be considered as forest land.

The "Area Production Model", which is referred to in the World Congress paper (see also the literature list) presents an approach to production and consumption studies in the subsistence forestry sector.

This paper concentrates on industrial forestry. When doing this I am still going to follow, as close as possible, the sequence of planning activities that were listed above.

"Subsistence forestry" thus is defined as a sub-sector of forestry, which reminds us that forestry planning and land use planning are much broader activities than what was contained in our training workshop in Dao Tru commune.

2. Analysis of broad national objectives

According to Gunnar Myrdal, a known Swedish national economist; the most important social objectives can be summarised under the concept of "the modernisation ideal". Economic growth would be a necessary means for realisation of "the modernisation ideal". Myrdal was of the opinion that the social objectives vary very little from country to country and from time to time. He was, however, very critical towards measuring the development and the saturation level by using macro-economical parameters such as per capita income and gross domestic product. (Workshop participants may remember that we had a similar discussion during the workshop and that we agreed that it was perfectly allowable to modify the GDP parameter in the APM model to better suit the local economic development that we aimed at simulating.)

Let me now list some of the most important national objectives according to a priority, that I believe, is fairly relevant for Swedish conditions. The reader may wish to rearrange

the order of priority according to what he thinks is most relevant for his own country. The reader may also want to delete some of the objectives.

At least in Sweden it is possible to connect one or more of the national objectives with one or more of the national policies. A practical conclusion that can be drawn from such a classification is that the development of national policies is a very complex problem where usually more than one state department is involved. Everyone may realise that such integrated work is difficult. Departmentalisation is a serious problem of its own, not only in Governments but in all institutions.

A reason for special mentioning of this problem is my reading of the progress reports of a meeting with the Asia Pacific Forestry Commission some years ago. I then observed that in many countries of the region many different state departments were responsible for various aspects of land utilisation and that this must lead to many problems of overlapping.

Below is a list where national objectives are grouped in the first column and national policies in the second column. I have tried to arrange the objectives in groups corresponding towards certain "policies". Some of the more important objectives may appear in more than one group:

National Objectives	**National policies**
Economic growth Balance of payment Full employment Price stability Self-sufficiency on energy	Economic policy Commerce policy Industry policy Finance policy Energy policy Tax policy Education policy
Economic growth Full employment Regional balance Income distribution	Regional policy Employment policy Rural policy Tax policy
Economic growth Environmental balance	Economic policy Environmental policy
Economic growth International solidarity	Foreign policy Assistance policy
Economic growth Cultural development	Cultural policy

I have repeated economic growth a number of times in order to indicate that some of the objectives at the end of the list may only be satisfied under favourable economic conditions. Long term investments such as for environmental amelioration, folk education, cultural development and similar often tend to get a too low priority compared with investments that yield immediate profit.

Investments in forest primary production are also long term investments. The investment period is, however, considerably shorter in Southeast Asia than in Northern Europe. Say that we can count on rotation periods of 10-50 years as compared with 60-140 years in Sweden.

3. Industrial forestry strategies in Asia and the Pacific

In the sequence of activities proposed above, number three was formulated as follows:

Formulation of provisional production objectives for forestry sub-sectors (Subsistence forestry; industrial forestry, environmental forestry) Subsistence forestry was our main target during the workshop. Industrial forestry and environmental forestry were lightly touched upon in connection with the presentation of the 5 million-hectare programme and in the presentation of Tam Dao National Park. This appendix deals with industrial forestry. My intention is to formulate quite concrete advice for the planning work. The text also points to the fact that there is a need for close co-operation between technical people and policy-makers.

Could it be a reasonable task for a forestry expert from another part of the world to write a chapter with a heading as the one above? Probably not, but if we delete the last five words of the heading, the task might be slightly more reasonable. Above I was suggesting that forest policy development must be based on analysis of national objectives. I was also supporting the opinion that national or social objectives are the same or almost the same in all countries and that they remain rather unchanged over time. A good general strategy for industrial forestry thus could be defined as a strategy that gives maximal aggregate contribution to a number of important national objectives without hazarding a number of other equally important objectives. It was also hinted above that national objectives often compete against each other.

Let now assume that the list of general objectives that I was presenting for Sweden also has a high relevance for Laos and Vietnam. A general approach for a certain country then could be to construct a matrix, where different forestry strategies are listed along one axis and the relevant national objectives along the other axis. By putting estimates of the contribution of a certain strategy to a certain objective, at least in the form of plus, minus or zero, one could arrive at a provisional analysis of the pros and cons.

One could also try to find out which strategies are likely to be most robust in the meaning that they can give a bigger future flexibility. It would for instance be a more robust strategy to go for species that could be used both for sawlogs and pulpwood rather than planting just sawlog species or just pulpwood species. Species that are apt for self-regeneration would be a more flexible choice than species that need to be replanted under all conditions.

Before making an effort to construct a matrix of strategies and objectives as suggested above I would like to make a list that could indicate different levels of ambitions with

respect to development of industrial forestry. As was obvious from the Swedish mini-report in chapter 2, we must work with a very long planning and realisation period. However, in Asia and the Pacific the planning period must not be so long as in Sweden. Say that teak could be grown with rotations less than 50 years, that new fine hardwood species to be identified, could be grown with around 30 years rotation and that reclamation and enrichment of logged-over natural forests would require a fifty years logging cycle. This would suggest that a planning and realisation period of 50 years could be reasonable.

Let us now have a look at the list of long term ambitions, which are contained in table 1. Primary products are put in one group and the corresponding processed products in a second group. There are three ambition levels: domestic sufficiency, regional sufficiency and export on the world market. Regional sufficiency could indicate an ambition to export to countries within the region possibly as a consequence of regional agreements or bilateral agreements.

Table 1. Indication of long-term ambitions with respect to industrial forestry

Product	Domestic sufficiency	Regional sufficiency	World market export
Unprocessed products			
Fine hardwoods			
Hardwood logs			
Softwood logs			
Hardwood pulpwood			
Coniferous pulpwood			
Processed products			
Plywood and veneer			
Hardwood sawnwood			
Softwood sawnwood			
Paper and paperboard			
Newsprint			
Particle board			
Fibre board			

The suggested use of the table is to put a yes, a no or a question mark for each option. This would be fairly easy. What is more difficult is to evaluate whether the judgements are relevant or not. It is very important that the planning of industrial forestry can be done in close co-operation with the existing forest industries. Of course one must realise that the industry is an interested party and that its attitude can be influenced by tactical considerations. Industrialists usually are even more short term minded than politicians are. My experience from Sweden is, however, that the bigger and more integrated the forest industry is, the more long term oriented and prudent is its forest policy. If we take the Swedish forest companies as a group, we find that their long term ambitions and their actual investments in increased primary production on their own forest land is on a far

higher level than what is demanded by the society. It should be mentioned that forest companies own around 25 per cent of the total forest area in Sweden. The high ambition level depends on an outspoken policy to achieve a maximum supply of raw material from own forests by increasing its long term potential. Much of company forest land in Sweden belonged in early days to the State and was given away to the companies subject to the condition that they should open up mines and process iron ore. The arrangement was some kind of a long term leasing which later on was converted to full ownership. I mention this in this connection since the ownership question and the question: "Who is likely to be most efficient in producing industrial wood?" must be posed in connection with the development of a long-term policy for industrial forestry.

❖ **Fine hardwoods**.

What are the prospects for export of tropical fine hardwoods for the world market? In 1986, when the cited paper was written, the forest resources of the Southeast Asia region were dwindling. Little was known about "lesser-known-lesser-used species" but the expectations were big. But what are really the prospects for these species to penetrate the market? It is a good guess that the future world market will require safe and sustained deliveries of specific wood species with known properties and of homogeneous quality. In the long-term prospect this can be achieved only from fine hardwood plantations. A global strategy for tropical forestry countries would therefore be to search for and develop a small number of reasonably rapid growing species (say maximum ten species) which could be grown in all three tropical regions.

Then comes the question whether or not one should aim at exporting unprocessed wood. The producing countries, during the process of negotiating the ITTO in the early 1980's gave a general answer to this question. *Increased further processing in the producing countries* should be a central objective of the organisation. This would not necessarily mean that further processing must be an exclusive strategy. It is no doubt that integrated production is most efficient in the case of such bulk products as newsprint, paper and paperboard. It is far more difficult to draw a general conclusion in the case of fine hardwoods. What makes the judgement so difficult is that further processing leads directly into such uses as furniture making and similar. This means a production that is very sensible to market and taste fluctuations and processing should therefore be very close to the market. A flexible strategy in this question is probably the best.

❖ **Hardwood and softwood logs**.

Hardwood and softwood logs could be dealt with simultaneously. These assortments are mostly destined for construction purposes. Generally speaking it does not seem to be a good idea to export unprocessed wood of this kind. To the extent that export is possible one should probably aim at selling sawnwood rather than logs. What is worthwhile to consider is whether the present domestic consumption pattern is satisfactory in the long term or not.

I believe that there is a big scope for production of coniferous softwood to be used for various construction purposes. The low density of softwood is a big advantage from the

point of view that smaller dimensions and less wood is required for many construction purposes. The potential for increased use of wood for construction is, by the way, one of the aspects that need to be dealt with as part of the consumption studies. Feasible methods for constructing low cost houses are needed throughout the tropical region. Since the transport costs are decisive local raw material must be found. Wood must be the obvious solution to this problem in many cases. Keeping in mind the short rotations that are needed, it is possible for families to plant trees destined for building houses for the children as a celebration of the birth of the children. Small portable or mobile sawmills are a prerequisite for this strategy. The present technical development may well lead to a change towards "do-it-yourself-solutions" even in the industrial countries. For further consideration of the problems that were indicated above I would refer to work which has been carried out within UNIDO. See for instance the documentation from the "First Consultation on the Wood and Woodworking Industry", which was held in Helsinki on 19-23 September 1983.

❖ **Hardwood and coniferous pulpwood**

During the last ten years there has been a rapid development towards the use of low quality wood for pulping. Mixed hardwood is now widely used, although at the cost of a relatively low out-turn. Wood chips with a fairly high admixture of bark can now be accepted to a certain degree. To some extent the industry adapts itself to the raw material it can get. If the supply is insufficient, less good qualities may be accepted. As a general rule, however, the industry prefers as homogeneous wood as possible. That means one species at a time and trees of equal size and density. In other words wood from plantations. Hardwood pulp from eucalyptus species has now penetrated the world market. In Sweden we have found that birch pulp of good quality now is sought for by the market to be used for mixing with pulp from mixed tropical hardwood with less good properties.

Would that then suggest a strategy of raising plantations exclusively destined for the pulp- and paper industry? I am not so sure. In Sweden, we find that the profitability of forestry almost solely is dependent on the higher wood prices that can be fetched for sawlogs. It would not pay to grow wood only for pulping. In spite of what I might have said above, even the pulp and paper companies aim at producing sawlogs of high quality, although not with the same emphasis as a wood farmer. Forestry mostly is a special profit centre in the companies, although its objective may be to furnish the mills with the required wood at lowest possible cost. It mostly pays for them to sell the sawlogs according to market prices or to exchange sawlogs against pulpwood according to market prices. What we consider to be most efficient, consequently, is to produce pulpwood and sawlogs from the same stands. Around thirty per cent of the total production comes from thinnings, which mostly yield pulpwood. The final fellings should mostly give sawlogs, although the upper part of the trees would go for pulping.

Even if pulpwood plantations now are popular in many countries I believe that in the long term there will be a development towards an integrated production of sawlogs and pulpwood as explained above. So this merits serious consideration.

There is one more aspect that needs to be mentioned under the heading above. And that is the importance of producing long fibre pulpwood in order to be able to produce long fibre pulp. In spite of all efforts to use other raw material, high quality newsprint requires coniferous wood. Similarly craft liner has to be produced from coniferous wood. In combination with what was suggested above about the scope for softwood sawlogs for construction purposes, it is concluded that a long-term strategy for industrial forestry most likely should include an element of tropical pine plantations. Depending on site conditions we might think in terms of 25-35 years rotation, 2-3 thinnings and a fairly dense spacing and/or pruning.

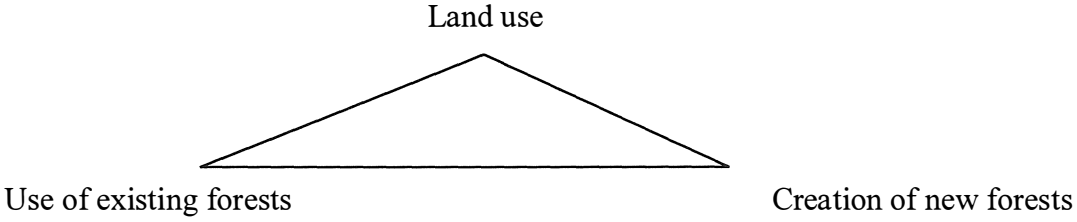
❖ **Processed products.**

I believe that the discussion above also has covered some aspects of further processing. What is also important in this connection is that there is an important relationship between the industrial end products and the applicable levels of planning. As indicated in the table below this relationship is mainly connected with the market structure - whether export or not - and with the structure of the industry -what is a realistic supply area for a certain kind of forest industry?

Table 2. Planning levels (study levels) in connection with forest production and consumption studies. Glo = global, Reg = regional, Nat = national, Sub = subnational, Dist = district- village

Industrial product	**Wood product**	**Level of planning (study)**				
		Glo	Reg	Nat	Subnat	Dist
(Fine) hardwoods	Tropical timber	x	x	x	x	x
Craftliner, newsprint	Long fibre wood	x	x	x	x	x
Pulp and paper	Pulp wood		x	x	x	x
Particle board	Wood chips		x	x	x	x
Sawn wood	Saw logs		x	x	x	x
Construction poles	Poles			x	x	x
Fuelwood (marketed)	Fuelwood			x	x	x
Fuelwood subsistence	Wood/biomass			x	x	x

On the basis of the discussion above it is possible to formulate some main strategies for industrial forestry. Initially the strategies can be formulated verbally only and not in quantitative terms. The strategies should express intentions and ambitions with respect to the main strategic problem areas that must become integrated in a national forest policy, namely the triangular problems depicted below:



In most tropical countries a long-term strategy for forestry could follow the following lines:

Subsistence forestry and the production of cash wood crops should be supported within integrated programmes for rural development. Subsistence forestry should be carried out on all lands and become well integrated with agriculture.

Existing natural forests should be retained to the largest possible extent. Selective cutting of natural forests should therefore successively be substituted by man made forest production. Reforestation of degraded land should serve subsistence as well as environmental and industrial uses.

The options listed below could indicate various stages in the development of a national policy for industrial forestry. Such a development process would, however, require a number of difficult decisions or agreements on land use and land ownership.

Option A. Intensified management of natural forest based on selective cutting. Sparse establishment of industrial plantations destined for certain industries. Increased further processing.

Option B. Successive transition from selective cutting of natural forests to plantation forestry, that is industrial plantations destined for certain industries. Increased further processing.

Option C. Decisive but phased change from selective cutting to plantation forestry. Multipurpose industrial plantations are introduced. Increased further processing.

Option D. Primary forest production for subsistence, environmental and industrial uses is well integrated. A successive phased expansion of the forest industry guarantees a steady demand for all kinds of industrial wood.

I have tried, very subjectively, to match these options against national objectives as is shown in table 7. I believe that it is a key-problem to link industrial forestry development with social and rural development and it would not be too difficult. In the long-term perspective it is possible to achieve positive contributions to all national objectives from the forest and forest industries sector.

Table 3. Contribution to national objectives by different strategies for industrial forestry

Option A. Continued and intensified application of selective cutting. Sparse establishment of industrial plantations destined for certain industries. Increased further processing.				
Option B. Successive transition from selective cutting to plantations forestry. Industrial plantations are destined for certain industries. Increased further processing.				
Option C. Decisive but phased changes from selective cutting to plantation forestry. Multipurpose industrial plantations are introduced. Increased further processing.				
Option D. Primary forestry production for subsistence, environmental and industrial forestry uses is well integrated. Increasing use of degraded land. A successive and phased expansion of forest industry.				
National objectives	Option			
	A	B	C	D
Economic growth	+	+	+	+
Increased standard of living	?	?	?	+
Balance of payment	+	+	+	+
Employment	+	+	+	+
Rural development	-	(+)	(+)	+
Regional balance	-	(+)	(+)	+
Ecological balance	-	(+)	(+)	+
Energy self sufficiency	?	?	?	+

It might be possible to quantify at least some of the objectives. The total cost for primary and secondary forest production and the cost for further processing could be a measure of the total activities within the forest and forest industry sector. The input of labour for primary and secondary forest production would measure the employment effect and the importance of forestry in the rural areas. Estimates of labour input have high relevance if they can be presented on the level of civil districts. The total export value finally measures the relevance for the balance of payment. Other objectives are more difficult to analyse. The evaluation of environmental benefits, for instance, is a much more difficult task which, however, is worth much effort. Reference is made to a paper on that problem which was written by Dr K. D. Singh and myself in 1974.

❖ **Planning of primary forest production**

It seems that this heading would be more important than ever both for Vietnam and Laos. I noted during my visit to Vietnam and Laos for the workshop that there is almost no organised knowledge on growth and yield of Eucalyptus species available, although both countries are about to launch very extensive plantation programmes. Nor is knowledge available on Acacia species that might have a bigger relevance for an integrated subsistence and industrial production. Let us see what my thinking was in 1986.

The conventional way of organising the existing knowledge of primary forest production is by compilation of yield tables for various species and site conditions. This is a very tedious work that requires that complete growth cycles of representative stands can be

followed up by means of permanent sample plots. The introduction of computers and regression analysis techniques has facilitated the work. At the same time the work has became more hazardous. It is now too easy to present nicely fitting curves produced by computers. In order to gain time one has also started to make use of data from temporary sample plots, which introduces a lot of new estimation problems.

In old forestry countries like Sweden we have the advantage of having robust site classification systems since long ago. This has made it possible to relate the yield studies to known site conditions. It has therefore been fairly easy to generalise the studies and to draw conclusions for practical application.

Of course we have always had the problem that the research workers chose too favourable conditions for the sample plots, so that one normally has to reduce the yield level at least 30 per cent to come to a realistic practical levels. In Sweden we have a national forest inventory covering the whole of the country every year with systematic sample plots and that has also given us excellent possibilities to link data from research plots with average growth conditions.

What is the state of knowledge now with respect to growth and yield of tropical plantations? A good summary of existing reports on growth and yield of tropical species was recently published by FAO as a result of a fellowship work carried out by Devendra Pandey (1984). [9].

From that report it is obvious that almost all studies lack sufficient information on the climatic and biotic conditions of the sample plots. It makes it impossible for the time being to classify these studies according to a site classification system, even if such a system already existed. It is therefore not possible to generalise the existing knowledge within a certain region, nor is it possible to transfer the existing knowledge to other regions. The existing information is therefore next to valueless for planning purposes. It is therefore an urgent task to develop a robust general system for site classification that should serve the purpose of facilitating transfer of knowledge within and between the tropical regions of the world.

Almost all knowledge that is needed for the creation of such a system is already available or could be made available without too much delay and cost. Basic climatic data for instance, are often easily available on magnetic tape.

A general system for site classification should consist of three main elements.

1. A site quality index based primarily on climatic data but with a possibility to differentiate on the basis of soil and water regimes. The index should make it possible to indicate the production potential expressed in average production in cubic metre per year and hectare.

2. A classification pattern for annual climatic profiles that could be used for site-species considerations and for planning of optimal plantation periods.

3. A " dryness" index which could be used for describing the pattern of climatic fluctuations over the years This index should be used in connection with the two other elements for instance for estimation of survival expectations and far normalisation of growth and yield estimates. Development of dryness indices demands much more data than the other indices, since daily data on temperature and precipitation would be needed:

By assistance from the Swedish Meteorological and Hydrological Institute we have recently developed dryness indices for two small regions in Sweden, where we have had drought damage in recent years. The same institution has also been engaged in similar studies in Ethiopia. Most likely a lot of development work is needed in order to find methods which would serve our forestry purposes as well as possible. The present method anyhow, is a good start. (See table in literature reference 8).

The need for some kind of dryness index should perhaps be explained a little more in detail. Tree growth is much influenced by climatic fluctuations. The problem is less difficult under temperate conditions. If the rotation period is reasonably long, one can expect that the average weather conditions during the growth period have been evened out reasonably well. Still we should not consider it prudent in Sweden to publish studies on growth and yield without calibrating the growth estimates to correspond with normal weather conditions.

The method that is used for that purpose is to apply so called year-ring indices. We measure the width of the year-rings and relate the average year-ring width for a certain calendar year to the average on the same trees for a long period, say 60 years periods. This gives us so called year-ring indices that indicate whether a certain year has been above or below the average.

The annual variation of growth can be very large. In Sweden we have found that the index can go down from 130 to 60 from one *year* to the next *year* and that the difference in index between two adjoining five-year periods can be as much as 20 per cent. Analysis from a fir stand in the Himalayas and from Pine trees in Portugal show that the climatic variation is of at least the same magnitude also in other parts of the world. From what is said above we can draw the conclusion that growth studies on tropical forests can contain very big uncertainties due to the fact that correction for climatic variations has not been contemplated so far. That adds to the uncertainty that was commented on above when I discussed the Panned-report.

During the recent years FAO has laid down considerable effort to initiate work on these problems that have so far resulted in two fellowship reports by Pandey [9] and Lal [10]. I would also like to refer to a paper by Dr. K. D. Singh "Quantified land evaluating procedure in forestry" where he presents some of the results based on data from India. The study by Lal makes use of a climatic index that was developed by Weck in 1958 [10]. Although I believe that this index can be improved considerably now, I am convinced that the approach opens a way for a universal system applicable on regional, national and local level.

My own contribution to the planning of primary production under tropical conditions is to offer the application of the relative yield function, which has been built in the area production model. A broad introduction of this function can be found in a short report: "An Alley Model for Forest Resources planning" [12]. The report is included in an anthology: "Statistics in Theory and Practice. Essays in the Honour of Bertil Matern" which has been published by the Swedish University of Agriculture Sciences, Section of Forest Biometry, Umeå, Sweden.

The **relative yield function** is based on the finding that the development of total yield over age in a forest stand, which is managed in order to give maximum or almost maximum volume yield, follows a very robust curve;

if the yield is expressed in per cent of total yield at the end of the optimal rotation (when mean annual increment = current annual increment) , that is **"relative yield"**

if the age is expressed in per cent of the rotation age, that is **"Relative age":**

The relative yield function has proved to be very robust and reliable. So far I have not found any respectable yield study which does not fit reasonably well with the relative curve. As a standard I am using constants in the function which gives a development of the total yield, where 38% of the total yield has been produced at the relative age of 50%. Yield tables that I have studied show a variation "yield50" which goes from 36 to 41%. Mostly they show values around 38 %. I have compared stand developments that cover rotations from 10 to 140 years without finding any systematic deviations.

I have plotted some of the yield tables in Pandey's report against the relative curve. Mostly they fit fairly well, but there are deviations that obviously are due to a less careful use of regression analysis. The site class in the middle may be OK in some cases whilst the other site classes show unlikely developments,

I would conclude this discussion by stating that there is a big scope for practical yield research in the tropical forests. As a basis for such research we urgently need a general system for site classification as explained above.

In order to add some substance to my discussion, I have made two tables on the basis of the relative curve that can be of practical use when making guestimates on mean annual production and optimal rotation in specific cases.

The first two columns of table 8 show relative age at 10 % intervals and corresponding relative yield, respectively. Then there are seven double columns showing absolute age and the corresponding volume in cubic metre per hectare for rotations from 10 years to 40 years. The table is based on a mean annual production of ten cubic metres per hectare and year. It can be transferred to any other yield level by applying a suitable multiplier.

Table 4. Total Yield according to the Relative Yield Function (Y50 = 38%), at various absolute ages (A) and for various optimal rotation periods (R). Mean annual production (yield) = 10 cubic metre per ha per year.

Rela-	Rela-	Rotation age for maximal volume yield													
tive	tive	R = 10		R = 15		R = 20		R = 25		R = 30		R = 35		R = 40	
age %	yield %	Age	Y	Age	Y	Age	Y	Age	Y	Age	Y	Age	Y	Age	Y
10	1.0	1	1	1.5	1	2	2	2.5	2	3	3	3.5	3	4	4
20	5.5	2	6	3	8	4	11	5	14	6	16	7	19	8	22
30	13.8	3	14	4.5	21	6	28	7.5	34	9	41	10.5	48	12	55
40	25.1	4	25	6	38	8	50	10	63	12	75	14	88	16	100
50	38.0	5	38	7.5	57	10	76	12.5	95	15	114	17.5	133	20	152
60	51.5	6	52	9	77	12	103	15	129	18	154	21	180	24	206
70	64.9	7	65	10.5	97	14	130	17.5	162	21	195	24.5	227	28	260
80	77.7	8	78	12	117	16	155	20	194	24	233	28	272	32	311
90	89.4	9	89	13.5	134	18	179	22.5	224	27	268	31.5	313	36	358
100	100.0	10	100	15	150	20	200	25	250	30	300	35	350	40	400
110	109.4	11	109	16.5	164	22	219	27.5	274	33	328	38.5	383	44	438
120	117.6	12	118	18	176	24	235	30	294	36	353	42	412	48	470

Reference to "An Alley Model for Forest Resources planning". See Literature list.

A better understanding of the development of yield can be achieved if the derivative of the yield curve is calculated in order to show the current increment. Also the current increment can be expressed in relative terms if we set the mean annual increment to 1.0

Table 5 presents the current relative increment for rotations between 10 and 30 years at every second year of age. The table can be used in the following way just as an example: Say that we want to know at what age a stand with a rotation of 20 or 40 years, respectively, has its maximal current increment. We can see that in both cases the maximal current increment is around 36 % above the mean annual increment and that the maximum current increment occurs at the age of 12 and 24 years respectively.

With access to volume estimates from a specific stand at certain known ages it is fairly easy to extrapolate the likely mean production per hectare and the likely optimal rotation, provided that the climatic fluctuations have not been to big. Very often, however, we have to count with quite considerable fluctuations. This means that we cannot get a good basis for future planning unless we solve the general problems that were discussed above.

The picture I have been presenting now on the present level of knowledge, as a basis for planning of primary forest production is not very bright. Still, the plantations must go on and the plantation intensity must be increased. My permanent advice is that any practical plantation handled by competent people should also become a research area. Set aside enough money for quality control of the plantations and establish representative permanent sample plots amongst the plantations for every calendar year or planting season. Establish data on temperature and precipitation and make as good use as possible of existing meteorological information. Keep records on the origin of the seed. Sales of seed and seed import may need to be controlled by a special legislation. We can probably not avoid making mistakes also in the future. But we cannot afford to make big mistakes

and we cannot afford to neglect to learn by the mistakes. If we pool all knowledge and try to co-operate on the global level it is certainly possible to break the present viscous trends. I think no one of us can think of living without forests."

Table 5. Relative current increment at various ages for rotation period's (R) between 10 and 40 years.

	Current stand age years																			
R	**2**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**	**36**	**38**	**40**
10	.66	1.23	1.36	1.23	1.00	0.77														
11	.58	1.16	1.36	1.29	1.11	0.89														
12	.52	1.09	1.34	1.33	1.19	1.00	0.81													
13	.47	1.02	1.31	1.35	1.26	1.09	0.91													
14	.42	.96	1.27	1.36	1.30	1.17	1.00	0.83												
15	.38	.90	1.23	1.35	1.33	1.23	1.08	0.92	0.77											
16	.35	.84	1.18	1.34	1.35	1.27	1.15	1.00	0.85											
17	.32	.79	1.14	1.32	1.36	1.31	1.20	1.07	.93	.79										
18	.29	.74	1.09	1.29	1.36	1.33	1.25	1.13	1.00	.87										
19	.27	.70	1.04	1.26	1.35	1.35	1.28	1.18	1.06	.94	.82									
20	.25	.66	1.00	1.23	1.34	1.36	1.31	1.23	1.12	1.00	.88	.77								
21	.23	.62	.96	1.19	1.32	1.36	1.33	1.26	1.17	1.06	.94	.83								
22	.22	.58	.92	1.16	1.30	1.36	1.35	1.29	1.21	1.11	1.00	.89	.79							
23	.20	.55	.88	1.12	1.28	1.35	1.36	1.32	1.24	1.15	1.05	.95	.85							
24	.19	.52	.84	1.09	1.25	1.34	1.36	1.33	1.27	1.19	1.10	1.00	.90	.81						
25	.18	.49	.81	1.06	1.23	1.32	1.36	1.35	1.30	1.23	1.14	1.05	.95	.86	.77					
26	.17	.47	.77	1.02	1.20	1.31	1.36	1.35	1.32	1.26	1.18	1.09	1.00	.91	.82					
27	.16	.45	.74	.99	1.17	1.29	1.35	1.36	1.33	1.28	1.21	1.13	1.04	.96	.87	.78				
28	.15	.42	.71	.96	1.14	1.27	1.34	1.36	1.35	1.30	1.24	1.17	1.08	1.00	.92	.83				
29	.14	.40	.68	.93	1.12	1.25	1.33	1.36	1.35	1.32	1.27	1.20	1.12	1.04	.96	.88	.80			
30	.13	.38	.66	.90	1.09	1.23	1.31	1.35	1.36	1.33	1.29	1.23	1.16	1.08	1.00	.92	.84	.77		
31	.12	.37	.63	.87	1.06	1.20	1.30	1.35	1.36	1.34	1.31	1.25	1.19	1.11	1.04	.96	.89	.81		
32	.12	.35	.61	.84	1.04	1.18	1.28	1.34	1.36	1.35	1.32	1.27	1.21	1.15	1.07	1.00	.93	.85	.78	
33	.11	.33	.58	.81	1.01	1.16	1.26	1.33	1.36	1.36	1.33	1.29	1.24	1.18	1.11	1.04	.96	.89	.82	
34	.11	.32	.56	.79	.98	1.14	1.25	1.32	1.35	1.36	1.34	1.31	1.26	1.20	1.14	1.07	1.00	.93	.86	.79
35	.10	.31	.54	.76	.96	1.11	1.23	1.30	1.35	1.36	1.35	1.32	1.28	1.23	1.17	1.10	1.03	.97	.90	.83
36	.10	.29	.52	.74	.93	1.09	1.21	1.29	1.34	1.36	1.36	1.33	1.30	1.25	1.19	1.13	1.07	1.00	.93	.87
37	.09	.28	.50	.72	.91	1.07	1.19	1.27	1.33	1.36	1.36	1.34	1.31	1.27	1.22	1.16	1.10	1.03	.97	.91
38	.09	.27	.49	.70	.89	1.04	1.17	1.26	1.32	1.35	1.36	1.35	1.32	1.28	1.24	1.18	1.12	1.06	1.00	.94
39	.08	.26	.47	.68	.86	1.02	1.15	1.24	1.31	1.35	1.36	1.35	1.33	1.30	1.26	1.21	1.15	1.09	1.01	.97
40	.08	.25	.45	.66	.84	1.00	1.13	1.23	1.30	1.34	1.36	1.36	1.34	1.31	1.27	1.23	1.17	1.12	1.06	1.0

The last part of this presentation that refers to the relative production function could have been deleted for the reason that it is reasonably well described in the APM manual. However I consider that the relative function also is a very robust and important tool in organising knowledge of growth and yield of tropical plantations. Table 5 can be used to consider the presently applied rotations for Eucalyptus in Vietnam. Let us for instance assume that the optimal rotation rather should be 15 years than 7 years. According to table 5 a stand with an optimal rotation of 15 years would be around its maximum volume growth at the age of 7- 8 years. It is perfectly clear for me that 7 years of rotation is much too short. Table 5 indicates that a too short rotation would cause considerable loss of production. I understand that cutting too early is attractive when there are shortages of supply and scarcity of capital. However the consequences should be known and efforts made to prolong the rotations. Then, as a component of all plantation activities, permanent sample plots should be established to monitor the production year

by year. In addition by felling and sectioning representative sample trees one should develop reliable volume functions.

A summary conclusion of mine with respect to this chapter is that the picture with respect to knowledge of growth and yield is still not very bright. It is rather quite sad. I cannot understand how it is possible that so few efforts have been undertaken for optimising plantation activities. Or is it that such information exists but is hidden in the files of the researchers? I was told during the workshop that such information exists but if it exists it needs do be documented in a transparent way. In the perspective of the time needed for organising and collecting knowledge within this field, I feel very much uneasy with respect to the timetable of the 5 million-hectare programme. Still, I am fully convinced on its relevance from the point of view of wood demand. Reference is made to my paper presented at the final seminar in Hanoi and Vientiane, respectively [13].

Literature References

[1] Nils-Erik Nilsson, 1992: Development of National Forest Policies and Strategies. The National Board of Forestry, Sweden, printed in Stockholm
[2] The National Board o Forestry: Report of the Intergovernmental Workshop of Experts on Sustainable Forestry and Land Use. The Process of Consensus Building, Jönköping, Sweden 1997
[3] Nils-Erik Nilsson, 1999: Perspective Forestry Planning within the Framework of Sustainable Use of Land (Included in these proceedings)
[4] Bo Ohlsson and Mats Sandewall, 1999: The APM Approach in Perspective (Included in these proceedings)
[5] Nils-Erik Nilsson, 1986: Industrial Forestry and Its Integration with Social and Rural Development. Extract from FAO Field document 16 GCP/RAS/106/JPN
[6] Nilsson Nils-Erik, 1978: "National Forest Inventories as a Basis for Long Term Planning of the Forest Resource Base." Special Paper for the 8th World Forestry Congress
[7] Singh K. D. and Nilsson Nils-Erik, 1974: "On the Problem of Identification of the Environmental Benefits of the Forests." FAO/ECE expert meeting paper
[8] Nilsson Nils-Erik, 1997: Estimating Productivity of Tropical Natural Forests and Plantations and by Climatic Factors (available and presented at the seminar)
[9] Pandey Devendra, 1983: "Growth and Yield of Plantation Species in the Tropics." FAO-fellowship report.
[10] Lal R.B., 1986: "Land Evaluation for Afforestation Planning. FAO-fellowship report
[11] Week J. 1961: "Ueberpruefung der Tauglichkeit eines Klimaindex zur Bestimmung forstwirtschaftlichen Produktionspotentials." Paper presented at lUFRO-meeting, Vienna.
[12] Pandey Devendra, 1996: Estimating Productivity of Tropical Forest Plantations by Climatic Factors. Doctor thesis at SLU in Umeå, Sweden
[13] Nilsson Nils-Erik, 1983: "An Alley Model for Forest Resources planning." Published in an anthology: "Statistics in Theory and Practice. Essays in the Honour of Bertil Matern." Swedish University of Agricultural Sciences Section of Forest Biometry S-90183 Umeå Sweden.
[14] Nils-Erik Nilsson, 1999: Perspective Planning within the Framework of Sustainable Use of Land (presented at the seminar)

Images of the Vietnam – Lao Workshop

Presentation of Tam Dao National Park

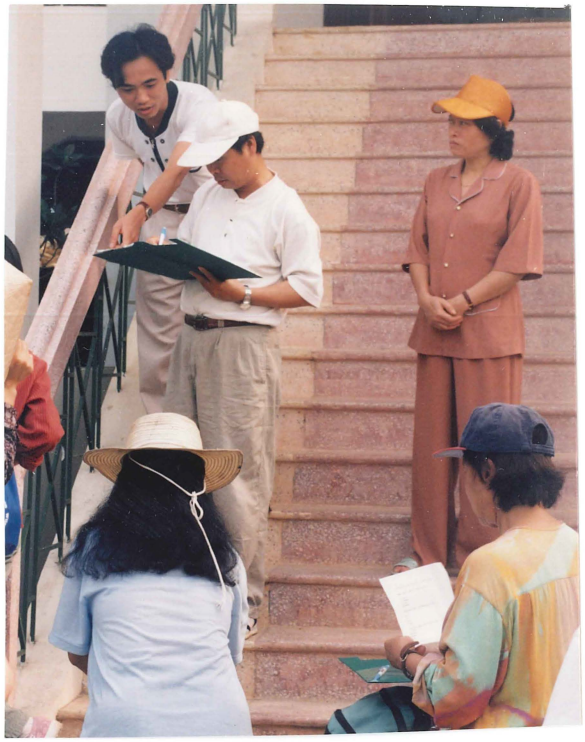
by Mr Do Dinh Tien, the Director (left)

Conservation, land use and development in Lao PDR

lecture by Mr Silavanh (right)

APM activity

in Vientiane (above)
in Tam Dao (left)



Morning preparations (above)

At Dao Tru Commune Office (above)

Project work in Dao Tru Commune, Vietnam

Point sampling (left and above)

Talk, walk, and touch

Inter-action with
villagers in
Dao Tru Commune

Tracing the history (left)

Final Seminar in Hanoi, Vietnam

On planning and people (upper right)

Group discussions (middle right)

Certificate ceremony (lower right)

Final Seminar in Vientiane, Lao PDR (left)

Part F

Annexes

1999-02-25 Annex 1

Inter-active and dynamic approaches on forest and land use planning – tentative terms of reference for training workshop

Background:

The state planning system in Vietnam has a long tradition and involves hundreds of thousands of people on all administrative levels of the society. Over time, the system has been of help to the government while implementing policies and programs.

However, the rapidly changing socio-economic and environmental conditions in Vietnam coupled with recently introduced policies and strategies on the use of the natural resources has generated new requirements on the planning system.

Many components of the system are not fully adapted to the needs of the 21st century. Some examples are the skills and methods for identification of information needs and capture and analysis of data, the inter-action between government staff and the local people in the planning process, and also between technical and policy related staff, and the preparedness of the system to respond to ongoing and future changes.

In Lao PDR, the Government has strongly increased it's policy efforts in forestry, agriculture and land use over the last ten years. However, it is concerned with similar limitations in the planning as the Vietnamese government.

In an ongoing research co-operation project in Vietnam and Lao PDR alternative planning approaches have been tested. Those approaches include sampling inventory methods, interaction among government and villagers in data capture and strategy development and also the use of scenario techniques linked to the concept of the "Area Production Model" (APM).

With Swedish support a training workshop is now being launched in order to let a broader group of concerned people experience and discuss those methods and ideas.

Time and place (dates modified compared with the original proposal of January 99):

The training workshop would take place in Vietnam during 12/4-16/4 (part 1-2, all).
In Vietnam during 17/4-22/4 and 26-27/4 (part 3-4, Vietnamese participants).
In Lao PDR during 19/4–24/4 and 30/4 (part 3-4, Lao participants).

Objective of the training workshop:

By exposing the participants to new approaches on commune based forest and land use planning and strategy development it is hoped that the workshop would provide an input to considerations of how the planning system could be improved.

Some issues to be covered in the training workshop:

- What kinds of data are needed in planning and decision making? Planning data, descriptive data and objective data. Complete and incomplete data. Importance of correctly describing the current situation and estimating ongoing changes. Analysis of data. What to do when plans do not match reality?

- How could a simulation model, such as the APM, be helpful as a planning and decision making tool in a Vietnamese or Lao context? Scenarios on forest land use and forest plantation development.

- How to narrow the gap between "top-down" and "bottom-up" oriented planning? Inter-action and communication between government staff and rural people. Roles of men and women in the land use planning process.

- The role of planning – how could "planning" stimulate local people to plant trees and carry out other activities? How to deal with a "5 Million ha reforestation programme" from a planning perspective?

Expected outputs of the workshop:

In addition to general consensus and competence building, two (2) documents would be produced during and after the training workshop:

- A case study to be used as an input to the "Vietnam-Sweden workshop" tentatively set for September 1999.

- A summary of the discussions and conclusions drawn by the end of the workshop

Target group (participants):

Three main categories could be identified

- Persons concerned with forest and land use planning at provincial, district and commune level

- Central government staff concerned with planning, policy development, data analysis and data capture in relation to the use of forest land

- Researchers (institutes and universities)

For practical reasons the total number of Vietnamese participants (excl. facilitators and resource persons) should not exceed about 20. Additional persons would join the final seminar (part 4). In addition, a group of 5-6 Lao participants would be invited to attend the first week of the training workshop in Vietnam (part 1-2). After that, they would return home and carry out the remaining parts of the workshop (part 3-4) in Lao PDR. Additional Lao participants would have the opportunity to join those parts.

Knowledge/ familiarity with use of computers and English language will be needed for at least some of the participants. It is suggested (and important for the outcome) that there should be at least two female professionals (one from the province and one central government staff) among the Vietnamese participants and one female professional among the Lao participants. It is also desirable that some of the participants have technical background (forestry, agriculture), others have policy background and some have socio-economic background.

Outline and general content:

The training workshop could be divided into four (4) parts

1. Opening of the training workshop and initial presentations (1 day)
2. Lectures and demonstration exercises (4 days)
3. Capture of planning data in the field with subsequent analysis of data and scenario modelling (6 days)
4. Seminar - presentation of course works and discussion (2 days)

Part 1 and 2 will cover policies, strategies and planning issues, methods for data capture, the APM concept and applications, presentation of some previous case studies, assignment and introduction to course works.

Part 3 should be carried out in small groups through interviews, inventory work, capture of statistics, photo interpretation, analysis of data and scenario modelling by hands-on use of the APM.

Part 4 covers seminar presentations by each group and joint discussions of findings.

Organisation:

On request by the Swedish CCB Program (Sida funding) and assigned by the International Co-operation Department (ICD) of MARD, the Forest Inventory and Planning Institute (FIPI) and the Department of Forest Resource Management and Geomatics, Swedish University of Agricultural Sciences (SLU) will jointly arrange the training workshop in Vietnam. The part of the training workshop carried out in Lao PDR will be arranged in co-operation with the Ministry of Agriculture and Forestry, Lao PDR.

From the Swedish side, a multi-disciplinary team of five persons would come to Vietnam and Lao PDR during the time of the workshop and work jointly with the

national facilitators and resource persons. The workshop in Vietnam should be conducted in Vietnamese and English language.

Preparatory training of facilitators:

Vietnamese and Lao officials were invited to participate in a two weeks specific course in Umeå, Sweden during November 30 – December 11, 1998. The course, named "Forest and land use planning - an international outlook", was focused on scenario modelling incl. APM. The participants from Vietnam and Lao PDR will function as facilitators and resource persons in the training workshop later on.

Location:

The training workshop (Vietnamese part) will take place within 100 km from Hanoi. The location of the part in Lao PDR will be decided upon later. The final seminars will take place in Hanoi and Vientiane respectively.

Case study:

Based on the findings of the workshop a research study (case study) will be prepared for the Sweden - Vietnam workshop set for September 1999. The Study will be prepared by FIPI in co-operation with some other institution and with the advisory support of SLU. Although the data to be gathered during the training workshop will be used as a base for the study, some complementary data collection might be required afterwards. The exact topic of the Study is still under discussion.

Annex 2

List of participants in the training workshop on interactive and dynamic land use planning in Tam Dao and Hanoi, April 12-27, 1999:

Participants from Vinh Phuc Province (taking part in the entire training workshop 12-27/4):

1. Ms Nguyen Thi Quang, Senior Officer, Province Dept of Agriculture and Rural Development
2. Mr Vu Van Quyet, Officer, Tam Dao National Park
3. Mr Le Thanh Cuong, Officer, Tam Dao National Park
4. Ms Luu Thi Thanh, Officer, Womens Union Representative, Dao Tru Commune
5. Mr Truong Duc Suong, Officer, Dao Tru Commune

Participants from Hanoi (taking part in the entire training workshop 12-27/4):

1. Mr Dao Can, Soil Scientist, National Institute of Agricultural Planning and Projection
2. Mr Phung Van Khoa, Forestry Teacher, Xuan Mai Forestry College
3. Ms Nguyen Kim Cuc, Natural Resources Environment Center, Hanoi Agriculture University
4. Ms Nguyen Thuy Hai, Agronomist, Forest Inventory and Planning Institute
5. Mr Tran Van Kinh, Computer Specialist, Forest Inventory and Planning Institute
6. Mr Du Van Huong, Forester, Forest Inventory and Planning Institute
7. Dr Hoang Sy Dong, Forest Inventory and Planning Institute (rp, course co-ordinator)
8. Mr Pham Duc Lan, Forest Inventory and Planning Institute (rp, inventory&mgment)
9. Ms Pham Thi Binh, Forest Inventory and Planning Institute (rp, PRA specialist)
10. Mr Tran Van Hung, Forest Inventory and Planning Institute (rp, remote sensing)

Participants from Lao PDR (in Tam Dao 12-16/4, conducting the remaining parts in Lao PDR):

1. Mr Vayapath Thattamanivong, Dpty Head, National Program for Shifting Cultivation Stabilisation
2. Mr Khambane Chanthavong, Official, Committee for Land Mgmt and Land Allocation, PM Office
3. Mr Thongphath Leuangkhamma, Dpty Director, National Office of Forest Inventory and Planning
4. Ms Davonh Phalamixay, Mapping Specialist, National Office of Forest Inventory and Planning
5. Mr Khamla Phanvilay, Head Teacher, National University of Laos, Dept of Agriculture & Forestry
6. Mr Silavanh Sawathvong, Director, National Program for Shifting Cultivation Stabilisation (rp)

(rp) = resource person or facilitator

Instructors and facilitators from Sweden:

1. Mr Mats Sandewall, forester, team leader, Swedish University of Agricultural Sciences (SLU)
2. Mr Karl Gustafsson, forester, officer, Swedish National Board of Forestry (*)
3. Professor Nils-Erik Nilsson, senior forester (formerly National Board of Forestry and SLU)
4. Mr Bo Ohlsson, sociologist, researcher, SLU (*)
5. Ms R. Kajsa Sandewall, agronomist, researcher, SLU

(*) = joined the Lao Group to Vientiane after the first week in Tam Dao

External persons* taking part on the opening day in Tam Dao (12/4):

1. Mr Do Dinh Tien, Tam Dao National Park
2. Mr Hoang Van Khai, Tam Dao National Park
3. Mr Hoang Xuan Ty, Forest Science Institute, MARD
4. Mr Nguyen Duy Chuyen, Vietnam-Sweden Mountain Rural Development Programme
5. Dr Nguyen Huy Phon, Forest Inventory and Planning Institute (chairman)
6. Mr Lang Minh Tien, Bai Bang Raw Material Company
7. Mr Le Hien Phong, Forest Inventory and Planning Institute (interpreter)

* In addition to 6 Lao and 15 Vietnamese workshop participants and 5 expatriate instructors

External persons** taking part in the final seminar in Hanoi (26-27/4)

1. Mr Vu Huu Tuynh, Deputy Director, Policy Department, MARD
2. Mr Vu Long, Former Director, Forest Science Institute
3. Mr Nguyen Duc Minh, Director, Land Investigation and Planning Institute
4. Mr Nguyen Van Bao, Dpty Director, Dept of Agriculture and Rural Dev., Vinh Phuc Province
5. Mr Do Dinh Tien, Director, Tam Dao National Park
6. Mr Hoang Van Khai, Deputy Director, Tam Dao National Park
7. Dr Nguyen Huy Phon, Forest Inventory and Planning Institute (chairman)
8. Mr Vo Tri Chung, Senior Officer, Forest Inventory and Planning Institute
9. Mr Pham Quoc Hung, Forest Officer, Forest Inventory and Planning Institute
10. Mr Le Huy Thai, Officer, Forest Inventory and Planning Institute
11. Mr Le Hien Phong, Forest Inventory and Planning Institute (interpreter)
12. Mr Pham Trong Hien, MARD (interpreter)

** in addition to the Vietnamese workshop participants and 3 expatriate instructors

List of participants in the final seminar of the training workshop on interactive and dynamic land use planning, Vientiane, April 30, 1999:

1. Mr Silavanh Sawathvong, Director, National Programme for Shifting Cultivation Stabilisation (Chairman)

2. Mr Somchay Ounprachanh, Official, Cabinet Office, Ministry of Agriculture and Forestry (MAF)
3. Mr Sisavang Vonghachack, Deputy Head, Soil Survey and Land Classification Center, MAF
4. Mr Nondeng Rasphon, Official, Department of Irrigation, MAF
5. Mr Sangvan Bouavong, Official, Department of Forestry
6. Mr Pheng Souvanthong Head of Extension and Training, Department of Forestry

7. Mr Khambane Chanthavong, Official, Committee for Land Mgmt and Land Allocation, PM Office
8. Mr Chanhom, Official, Committee for Land Management and Land Allocation, PM Office
9. Mr Sengmany, Section Head, National Statistics Center

10. Mr Vayaphat Thattamanivong, Dpty Head, National Program for Shifting Cultivation Stabilisation
11. Mr Khamphout Phandanouvong, Officer, National Program for Shifting Cultivation Stabilisation
12. Mr Phoui Siksidao, Officer, National Program for Shifting Cultivation Stabilisation
13. Mr Boualy Phamoung, Officer, National Program for Shifting Cultivation Stabilisation
14. Mr Kheophithoon Boonnak, Officer, National Program for Shifting Cultivation Stabilisation
15. Mr Outhong Phonesavath, Officer, National Program for Shifting Cultivation Stabilisation
16. Mr Kongkeo Phanvilay, Officer, National Program for Shifting Cultivation Stabilisation
17. Ms Vongsone, Administrator, National Program for Shifting Cultivation Stabilisation

18. Mr Thongphath Leuangkhamma, Dpty Director, National Office of Forest Inventory and Planning
19. Mr Soonthorn, Officer, National Office of Forest Inventory and Planning
20. Ms Davonh Phalamixay, Mapping Specialist, National Office of Forest Inventory and Planning
21. Mr Linthong Khamdy, NFI Data Analyst, National Office of Forest Inventory and Planning
22. Mr Peter Jones, Land Use Planning Adviser, Lao-Swedish Forestry Programme

23. Mr Khamphay Manivong, Head, National Forest Research Center
24. Ms Thongsouk Xayaphantanouvong, Head of Information Technique Unit, Forest Research Center

25. Ms Khamphon Daravong, Section Head, Lao Women's Union

26. Mr Somesy, Head of Forestry Unit, National University of Laos
27. Mr Phayboon. Teacher, National University of Laos

28. Mr Boonthavy, Deputy Director, Municipality Committee for Land Mgmt and Land Allocation
29. Mr Sourin, Deputy Chief of Cabinet, Saythany District Agriculture and Forestry Office

30. Mr Phouvong Keopaseut, Head of Unit, Lao-ADB Forest Plantation Project
31. Mr Houmphanh Saramany, Forest Conservation and Afforestation Project
32. Mr Chanthaviphone Inthavong, Forestry Official, AIT scholarship fellow
33. Mr Sisovath Phandanouvong, Officer, Lao-Swedish Forestry Cooperation Programme
34. Mr Somephanth, Officer, Lao-Vietnam Rural Development Co-operation Project
35. Mr Phantong, Officer, Head, Sustainable Management and Natural Resource Project
36. Mr Sonke Birk, GIS and Land Use Planning Adviser, GTZ

37. Mr Mats Sandewall, Team leader, Swedish University of Agricultural Sciences (SLU)
38. Professor Nils-Erik Nilsson, Senior Forester, SLU Team
39. Ms R Kajsa Sandewall, Agronomist, SLU Team
40. Mr Karl Gustafsson, Forester, National Board of Forestry / SLU Team

Annex 3

Interactive and dynamic approaches on forest and land use planning - program for the Tam Dao exercise, 1st week (12-16/4, 1999):

Monday 12.4 a.m.	Opening of workshop (Dr Phon) Tam Dao National Park , a short introduction (Mr Tien) The Program and some practical matters (MS, Dr Dong)
Monday 12.4 p.m.	Land use, development and planning - Bai Bang over 25 years Personal experiences, evaluation, analysis (NEN, MS, BO, Mr Tien) Discussion (NEN, VN)
Tuesday 13.4 a.m.	The Area Production Model: The APM concept. On conditions of agricultural growth (NEN) Scenario techniques, APM exercise (KG, MS)
Tuesday 13.4 p.m.	An approach to the capture and analysis of planning data: What sorts of data do we need, objective data - official figures, sampling, interviews and other methods, sources etc. (MS, BO) PRA approaches and other village based methods, the historical perspective, the Nam Nan research study in Laos (BO, KS) The contacs between officials and rural people, reaching the village men and women (KS) The Ban Lau case study in Vietnam (MS)
Wednes 14.4	Field demonstrations (rotational station system): Point sampling inventory and air photos (MS, KG) PRA approaches, household inteviews (KS) PRA approaches, talk-walk-touch, village officials (BO) Official plan data, what they do and may not show (NEN, VN)
Thursd 15.4 a.m.	Land use, conservation and socio-economic development: Land use, conservation and development in the Lao environment (SS) Discussion (MS, VN)
Thursd 15.4 p.m.	Forest plantation development with APM, exercise (NEN, KG)
Friday 16.4 a.m.	The 5 million hectares plantation programme in Vietnam (Dr Lung) Conclusive discussions (BO, VN)
Friday 16.4 p.m.	Land use, conservation and development in the Vietnamese environment (Mr Tien, Dr Dong) Conditions for the group works to be done in week 2 (MS) Closing of part 1 (the Lao Group leave on Saturday morning while the Vietnamese participants continue in Tam Dao)

(VN=Vietnamese repr., MS=Mats Sandewall, NEN=Nils-Erik Nilsson, BO=Bo Ohlsson, KS=Kajsa Sandewall, KG=Karl Gustafsson, SS=Silavanh Sawathvong,)

Interactive and dynamic approaches on forest and land use planning - program for the Tam Dao exercise, 2nd week (17-22/4, 1999):

The second week is used for Project work. All the participants work together to develop a land use plan for Dao Tru Commune (situated in the border region of the National Park). The work will be based upon inter-active and dynamic principles. The main objective is to give the participants an opportunity to experience and discuss new techniques, concepts and ideas.

The Plan will cover the historical changes in land use and socio-economic situation over the last 20 years (1980-2000) and include two (2) scenarios for the period 2000 – 2030. The Plan should address various issues, such as

- local people's supply of food for subsistence
- protection of the forest of Tam Dao National Park
- reforestation of barren lands
- how the implementation of such a Plan affects various groups of the society such as men and women, marginal and well-off households etc.

All the 15 participants will co-operate and jointly produce the final outputs. They should preferably organize themselves in smaller working groups conducting village and household interviews, photo interpretation, land use sampling, analysis of already existing and new collected data, modeling of scenarios (using APM), report writing and other works.

Every day at 8.00 – 9.00 a.m. there will be a session for briefing and discussion. All participants and resource persons must participate in the briefing sessions. Throughout the exercise there will be Vietnamese and Swedish resource persons supporting the participant group in their work when needed.

All participants will check out and depart from Tam Dao by 4 p.m. on Thursday (22/4). They will meet again in the Final Seminar (26/4) to perform the presentation.

The Final Seminar in Hanoi on April 26-27:

Monday a.m.

Opening speech (Dr Phon)
The Issues and Ideas of the Training Workshop and the Program carried out so far (Mats Sandewall)

COFFEE

Planning of future land use, what can a Government do ? (Nils Erik Nilsson)
Inter-active approaches (Kajsa Sandewall)
Land-use planning in Vietnam (Dr Dong)

LUNCH

Monday p.m.

Land use in the border area of a National Park – two scenarios for Dao Tru Commune:

- **Background, the Commune area, Tam Dao NP, major land use issues in the Commune (conservation, food supply, 5 Million ha reforestation program).**
- **The process of the APM scenarios (data collection incl. inventory and interviews, analysis of input data, scenarios, output analysis).**
- **Input data (a brief overview)**
- **Historical development (1980-2000) and future scenarios (2000-2030) incl. assumptions on change.**
- **Comments on food supply, fuel wood, 5 Mill ha, situation of weak groups etc. in the two scenarios.**

Statement by Forest Science Institute of Vietnam (Dr Long)

Tuesday a.m.

Discussion of the scenarios in groups (8.00-8.55):

1) The strategic issue: Conservation vs tree plantation vs food sufficiency
2) The data issue: Planning data vs "Current data"
3) The planning issue: Could "dynamic and interactive approaches" be a useful input to the Vietnamese planning system?

Statements by LIPI (Mr Minh), NIAPP (Mr Can) and DARD, Vinh Phuc Province (Mr Bao) (9.00-10.00)

COFFEE

Presentation of group findings (10.00-10.30)
Joint discussion and conclusion (10.30–12.00)

LUNCH

AGENDA FOR THE FINAL SEMINAR IN VIENTIANE ON APRIL 30:

ລາຍການດຳເນີນກອງປະຊຸມ

8:30	ລົງທະບຽນ.
8:40	ສະເໜີຈຸດປະສົງກອງປະຊຸມ.
8:45	ກ່າວເປີດການສຳມະນາ(SS).
9:00	ການວາງແຜນການນຳໃຊ້ທີ່ດິນປ່າໄມ້ແບບຍືນຍົງ (NEN).
9:30	ການນຳໃຊ້ APM ເຂົ້າໃນການວາງແຜນນຳໃຊ້ທີ່ດິນ, ເກັບກຳຂໍ້ມູນ ແລະ ວິເຄາະ (TP,MS).
10:15	ພັກຜ່ອນ.
10:30	ສະເໜີຜົນການທົດສອບໃນການນຳໃຊ້ APM ໃນເຂດຫ້ວຍຈຽມເມືອງໄຊທານີ (VT,KG,KP,KL).
12:00	ພັກທ່ຽງ.
13:30	ການນຳໃຊ້ APM ໃນເຂດເມືອງນາຊາຍທອງ (LT).
14:00	ການເກັບກຳຂໍ້ມູນເພື່ອວາງແຜນ (KS).
14:30	ພັກຜ່ອນ.
14:45	ສົນທະນາ (SS).
16:00	ກ່າວປິດກອງປະຊຸມ (SS).

AGENDA

8:30	Registration
8:40	Introduction
8:45	Opening session (SS)
9:00	Forest planning in the perspective of sustainable land use (NEN)
9:30	The APM approach on Land use planning,collection of data and analysis (TP,MS)
10:15	Break
10:30	Result and Use of APM exercise in Houay Chiem region Xaythany district (VT,KG,KP,KL)
12:00	Lunch break
13:30	The APM exercise in Naxaythong district (LT)
14:00	The People behind the planning data (KS)
14:30	Break
14:45	Discussion (SS)
16:00	Closing (SS)

Remark :

SS : Silavanh SAWATHVONG (NPSCS)
NEN : Nils Erik Nilsson (SLU)
TP : Thongphat LEUANGKHAMMA (NOFIP)
MS : Mats Sandewall (SLU)
KP : Khamphout PHANDANOUVONG (NPSCS)
KL : Khamla PHANHVILAY (NU)
LT : Linthong KHAMDY (NOFIP)
KS : Kajsa Sandewall (SLU)
VT : Vayaphat THATTAMANIVONG (NPSCS)
KG : Karl Gustafsson (SLU)

NPSCS: ໂຄງການຍຸດຕິການຖາງປ່າເຮັດໄຮ່ . (National Program for Shifting Cult Stabilisation

SLU: ມະຫາວິຍາໄລກະເສດແຫ່ງປະເທດສະວີເດັນ. (Swedish University of Agricultural Sciences)

NOFIP: ກອງສຳຫຼວດ ແລະວາງແຜນປ່າໄມ້.(National Office of Forest Inventory and Planning)

NU: ມະຫາວິທະຍາໄລແຫ່ງຊາດ. (National University of Laos)

Annex 4

Evaluation of the Training Workshop on Interactive and Dynamic Land use Planning in Tam Dao and Hanoi or Lao PDR during April 1999:

1. To which one of the following categories do you belong ?

Vietnamese (province, commune, national park)
Vietnamese (FIPI)
Vietnamese (other)
Lao, took part in Tam Dao and Lao PDR
Lao, took part in Lao PDR only

2. Was the workshop relevant for you from a professional point of view? (mark the alternative that is most applicable)

a) Very relevant
b) Not so relevant, but stll interesting and useful
c) Something was useful but most of it was not
d) It was a waste of time

Comment: _____
_____
_

3. Give each of the following parts a grade between 1 and 10 with respect to usefulness (1 is useless and boring, 10 is very useful)

Part of the Training workshop	Grade (1-10)
Lectures on the Bai Bang Project (12/4)	
Lecture/exercise on APM (13/4)	
Lecture on data capture methods (13/4)	
Demonstration exercises in Dao Tru (14/4)	
Land use and development in Lao PDR (15/4)	
APM plantation exercise (15/4)	
5 million ha Programme (16/4)	
Land use, conservation and development in Vietnam (16/4)	
Group exercise in Vietnam or Lao PDR (17-24/4)	
Final seminar	

Additional comments:

4) Do you have any suggestions on how to follow-up the workshop ?

5) Do you have other suggestions and comments ?

Thank you for your contribution to the workshop and this evaluation!

Hanoi in April 1999

Mats Sandewall

The performance of the evaluation:

The evaluation form was distributed to the Vietnamese during the final seminar in Hanoi and to the Lao participants after the final seminar in Vientiane. By misunderstanding, the form was distributed during the final group work in Hanoi and the questions discussed among the participants. This was not entirely negative, but some streamlining of comments might possibly be expected because of that.

The evaluation form had been translated into Vietnamese language and the written comments were translated back into English by the resource persons. For the Lao evaluation no translation was made before its distribution. Those two persons in the Lao Group who did not speak full fledged English were assisted with the translation by their colleagues.

The evaluation form was filled up by five Lao and ten Vietnamese participants. One Lao and one Vietnamese participant were absent in the final seminar because of other duty/sickness and did not fill up any form, nor did the Vietnamese resource persons.

The result of the evaluation:

On the question about the relevancy of the workshop:

- 12 participants considered it "very relevant" and 3 participants considered it "not so relevant, but still interesting and useful".

Concerning the usefulness of the different parts of the workshop the following "scores" were given by the participants:

Part of the training workshop	Mean score		Range
	Lao	VN	
Lectures on the Bai Bang project	7.2	7.4	5 –10
Lectures/exercises on the APM	8.0	8.0	6 –10
Lecture on data capture methods	8.0	8.2	6 –10
Demonstration exercises in Dao Tru	7.8	8.5	5 –10
Land use, conservation and development in Lao PDR	8.4	7.3	6 –10
APM plantation exercise	7.0	7.8	5 –10
5 million ha programme	7.2	8.2	5 –10
Land use, conservation and development in Vietnam	7.0	8.1	5 –10
Group exercise in Vietnam or Lao PDR	7.8	8.1	6 –10
Final seminar	8.4	8.2	6 –10

Other comments incl. follow-up activities (questions 4 and 5 in the evaluation form) made and proposed by the Lao participants:

- Extend the APM in the National University (2 persons)
- The person who uses APM should have a good experience on socio-economics and natural resources, esp. when analysing the input data to be used in the APM.
- The guidelines should be translated into Lao language and modified to suit the Lao conditions, many participants and people are limited in English (4 persons)
- The result of APM give some ideas of the development in the region, but it is very difficult to know about the exact situation in the future, because we don't know exactly what will happen.
- Develop a real test case for district APM application
- Conduct special training in the usage of the APM manual
- We have not much experience in this field but we can understand a lot more of this programme after finishing the workshop
- Follow-up activities would be vital, especially after the APM could be improved

Other comments incl. follow-up activities (questions 4 and 5 in the evaluation form) made and proposed by the Vietnamese participants:

- The training course was very useful for me in logical brainstorming in order to overcome problems in land use planning. For the input data, we should take some additional natural factors such as water soil condition, slope.. because they are main criteria in crop cultivation. Please pay attention to theory background and data processing when organising this type of training.

- This training course will be more successful if the theory part was more deeply explained and concentrated on APM objectives. APM program-this sample model should be demonstrated in the other institutes and organisations concerned with land use planning. The APM is highly applicable for Vietnam. If the fund will be available, we would like to apply the APM to land use planning for Dao Tru commune in suitable time. I would like to put some additional data for the input to the APM such as soil, site, rain fall and tree species.

- The theory part was too short and the practice part was not concentrated. For the input data it is necessary to gather some input data such as socio-economic and natural factors incl. water, soil, net income. The APM should be improved by reprogramming with some additional factors. Other training courses should be organised in order to apply APM to practice.

- The training course is very useful for me but quite short. It had been interesting if we had been equipped with some more computers so everybody could have a chance to practice directly with computer. I think it is needed to translate "Users guide to the Area Production Model, APM" into Vietnamese and print like a textbook. It would make it easier to understand APM more deeply while demonstrating it countrywide.

- The course is very useful for me. There should be a change to apply this APM technique to reality. The lecture notes should be prepared and delivered out to trainees before lecturing due to use of different languages. The contents and objectives of the course are relevant to the political and socio-economic situation in Vietnam. It means other similar training courses are required for applying APM techniques to practice. There should be a chance for participants to apply learnt APM to practice and to demonstrate this technique countrywide.

- Generally speaking, the training course was interesting but we have spent quite much time for data collection. It is more reasonable if we spend more time for data analysis before input them into computers getting realistic output results. Please translate the Manual of Users Guide to the APM" into Vietnamese and print like a textbook.

- The training course was very interesting but sampling approach applied for commune level will provide imprecise results (data) of present land use. It is needed to translate Manual into Vietnamese language. Some additional

information, such as soil, site condition, water should be added because they are important data in land use planning.

- We wish to participate in continuation of project and research on APM. What we have learnt here is just the first step in land use planning using APM. After the training course it is necessary to conduct some activities to ensure APM results. The current APM version should be improved by reprogramming with some additional factors and let them in an open-flexible form, meaning that for land use planning of a particular area, all variables could be adjusted to be relevant for the chosen area. For the next training course it is necessary to pay much attention to the growth rate of forest (or plantation) stands to growing stock, to annual increment…

- We wish to continue research and demonstrate APM achievement in agriculture and forestry sectors. The APM is a valuable and applicable program. It is recommended to lecture APM technique for students studying in Vietnam College of Forestry and in the other universities of agriculture in Vietnam. It is reasonable to consider APM to district level, accepting as top-down approach and to create harmony between top-down and bottom-up approaches. For the mentioned problem there should be an additional seminar. Important to translate the Users guide to the APM into Vietnamese.

- There is no model similar to APM in Vietnam. That is why the APM is needed for us. The time used for theory explanation and data processing was very short. We need to demonstrate and apply APM countrywide and to translate all items, titles and output tables into Vietnamese. It is right to consider applicability of APM to district level, because land use on district level is quite diverse, so there is more changes for us to transform types of land use.

Annex 5

Reference documents and computer software presented, referred to or distributed (D) during the training workshop.

Boserup, Ester, 1965. The Conditions of Agriculture Growth. The economics of agrarian change under population pressure.

FAO. Users Guide to the Area Production Model, APM, version 2.0 for Windows 95 and Windows NT. Preliminary proposal for a new version proposed by Nils-Erik Nilsson 1999-02-14 (revision of former version prepared by Magnus Grylle 1997).(D)

FAO, 1997. Software the APM Model (4 computer diskettes)..(D)

Nilsson N-E, 1999. Excel-sheet (software) for simple modeling of plantation growth.

Sandewall M., Ohlsson B. & Sandewall R.K., 1998. People's Options on Forest Land Use – a research study of land use dynamics and socio-economic conditions in a historical perspective in the Upper Nam Nan Water Catchment Area, Lao PDR. SLU, Dept of Forest Resource Management and Geomatics. Working Paper No 39.

Sandewall M., Ohlsson B., Sandewall R.K., Chung V.T., Binh T.T. & Hung P.Q., 1998. People's Options on Forest Land Use – Government plans and farmers intentions – a strategic dilemma. SLU, Dept of Forest Resource Management and Geomatics. Working Paper No 44.(D)

Sida, 1999. Evaluation report on the Bai Bang project. Part 1. A Leap of Faith. A story of the Swedish aid and paper production in Vietnam - the Bai Bang Project, 1969-1996. By Chris Michelsen Institute. Part 2. Paper, prices and politics. An evaluation of the Swedish support to the Bai Bang Project in Vietnam. By Centre for International Economics.

Serien Arbetsrapporter utges i första hand för institutionens eget behov av viss dokumentation. Rapporterna är indelade i följande grupper: Riksskogstaxeringen, Planering och inventering, Biometri, Fjärranalys, Kompendier och undervisningsmaterial, Examensarbeten samt internationellt. Författarna svarar själva för rapporternas vetenskapliga innehåll.

This series of Working Papers reflects the activity of this Department of Forest Resource Management and Geomatics. The sole responsibility for the scientific content of each Working Paper relies on the respective author.

Riksskogstaxeringen: (*The Swedish National Forest Inventory*)

1995 1 Kempe, G. Hjälpmedel för bestämning av slutenhet i plant- och ungskog. ISRN SLU-SRG-AR--1--SE

2 Riksskogstaxeringen och Ståndortskarteringen vid regional miljöövervakning. - metoder för att förbättra upplösningen vid inventering i skogliga avrinningsområden. ISRN SLU-SRG-AR--2--SE.

1997 23 Lundström, A., Nilsson, P. & Ståhl, G. Certifieringens konsekvenser för möjliga uttag av industri- och energived. - En pilotstudie. ISRN SLU-SRG-AR--23--SE.

24 Fridman, J. & Walheim, M. Död ved i Sverige. - Statistik från Riksskogstaxeringen. ISRN SLU-SRG-AR--24--SE.

1998 30 Fridman, J. & Kihlblom, D. & Söderberg, U. Förslag till miljöindexsystem för naturtypen skog. ISRN SLU-SRG-AR--30--SE.

34 Löfgren, P. Skogsmark, samt träd- och buskmark inom fjällområdet. En skattning av arealer enligt internationella ägoslagsdefinitioner. ISRN SLU-SRG-AR--34--SE.

37 Odell, G. & Ståhl, G. Vegetationsförändringar i svensk skogsmark mellan 1980- och 90-talet. -En studie grundad på Ståndortskarteringen. ISRN SLU-SRG-AR--37--SE.

38 Lind, T. Quantifying the area of edge zones in Swedish forest to assess the impact of nature conservation on timber yields. ISRN SLU-SRG-AR--38--SE.

1999 50 Ståhl, G., Walheim, M. & Löfgren, P. Fjällinventering. - En utredning av innehåll och design. ISRN SLU-SRG--AR--50--SE.

52 Riksskogstaxeringen inför 2000-talet. - Utredningar avseende innehåll och omfattning i en framtida Riksskogstaxering. Redaktörer: Jonas Fridman & Göran Ståhl. ISRN SLU-SRG-AR--52--SE.

54 Fridman, J. m.fl. Sveriges skogsmarksarealer enligt internationella ägoslagsdefinitioner. ISRN SLU-SRG-AR--54--SE.

56 Nilsson, P. & Gustafsson, K. Skogsskötseln vid 90-talets mitt - läge och trender. ISRN SLU-SRG-AR--56--SE.

57 Nilsson, P. & Söderberg, U. Trender i svensk skogsskötsel - en intervjuundersökning. ISRN SLU-SRG-AR--57--SE.

Planering och inventering: ***(Forest inventory and planning)***

1995 3 Holmgren, P. & Thuresson, T. Skoglig planering på amerikanska västkusten - intryck från en studieresa till Oregon, Washington och British Columbia 1-14 augusti 1995. ISRN SLU-SRG-AR--3--SE.

4 Ståhl, G. The Transect Relascope - An Instrument for the Quantification of Coarse Woody Debris. ISRN SLU-SRG-AR--4--SE

1996 15 van Kerkvoorde, M. A sequential approach in mathematical programming to include spatial aspects of biodiversity in long range forest management planning. ISRN SLU-SRG-AR--15--SE.

1997 18 Christoffersson, P. & Jonsson, P. Avdelningsfri inventering - tillvägagångssätt och tidsåtgång. ISRN SLU-SRG-AR--18--SE.

19 Ståhl, G., Ringvall, A. & Lämås, T. Guided transect sampling - An outline of the principle. ISRN SLU-SRGL-AR--19--SE.

25 Lämås, T. & Ståhl, G. Skattning av tillstånd och förändringar genom inventerings-simulering - En handledning till programpaketet "NVSIM". ISRN SLU-SRG-AR--25--SE.

26 Lämås, T. & Ståhl, G. Om dektering av förändringar av populationer i begränsade områden. ISRN SLU-SRG-AR--26--SE.

1999 59 Petersson, H. Biomassafunktioner för trädfraktioner av tall, gran och björk i Sverige. ISRN SLU-SRG-AR--59--SE.

Biometri: ***(Biometrics)***

19967 22 Ali, Abdul Aziz. Describing Tree Size Diversity. ISRN SLU-SEG-AR--22--SE.

Fjärranalys: ***(Remote Sensing)***

1997 28 Hagner, O. Satellitfjärranalys för skogsföretag. ISRN SLU-SRG-AR--28--SE.

29 Hagner, O. Textur till flygbilder för skattning av beståndsegenskaper. ISRN SLU-SRG-AR--29--SE.

1998 32 Dahlberg, U., Bergstedt, J. & Pettersson, A. Fältinstruktion för och erfarenheter från vegetationsinventering i Abisko, sommaren 1997. ISRN SLU-SRG-AR--32--SE.

43 Wallerman, J. Brattåkerinventeringen. ISRN SLU-SRG-AR--28--SE.

1999 51 Holmgren, J., Wallerman, J. & Olsson, H. Plot - Level Stem Volume Estimation and Tree Species Discrimination with Casi Remote Sensing. ISRN SLU-SRG-AR--51--SE.

53 Reese, H. & Nilsson, M. Using Landsat TM and NFI data to estimate wood volume, tree biomass and stand age in Dalarna. ISRN SLU-SRG-AR--53--SE.

Kompendier och undervisningsmaterial: ***(Compendia and educational papers)***

1996 14 Holm, S. & Thuresson, T. samt jägm.studenter kurs 92/96. En analys av skogstillståndet samt några alternativa avverkningsberäkningar för en del av Östads säteri. ISRN SLU-SRG-AR--14--SE.

21 Holm, S. & Thuresson, T. samt jägm.studenter kurs 93/97. En analys av skogsstillståndet samt några alternativa avverkningsberäkningar för en stor del av Östads säteri. ISRN SLU-SRG-AR--21--SE.

1998 42 Holm, S. & Lämås, T. samt jägm.studenter kurs 93/97. An analysis of the state of the forest and of some management alternatives for the Östad estate. ISRN SLU-SRG-AR--42--SE.

1999 58 Holm, S. samt studenter vid Sveriges lantbruksuniversitet i samband med kurs i strategisk och taktisk skoglig planering år 1998. En analys av skogsstillståndet samt några alternativa avverknings beräkningar för Östads säteri. ISRN SLU-SRG-AR--58--SE.

Examensarbeten: ***(Theses by Swedish forestry students)***

1995 5 Törnquist, K. Ekologisk landskapsplanering i svenskt skogsbruk - hur började det?. Examensarbete i ämnet skogsuppskattning och skogsindelning. ISRN SLU-SRG-AR--5--SE.

1996 6 Persson, S. & Segner, U. Aspekter kring datakvaliténs betydelse för den kortsiktiga planeringen. Examensarbete i ämnet skogsuppskattning och skogsindelning. ISRN SLU-SRG-AR--6--SE.

7 Henriksson, L. The thinning quotient - a relevant description of a thinning? Gallringskvot - en tillförlitlig beskrivning av en gallring? Examensarbete i ämnet skogsuppskattning och skogsindelning. ISRN SLU-SRG-AR--7--SE.

8 Ranvald, C. Sortimentsinriktad avverkning. Examensarbete i ämnet skogsuppskattning och skogsindelning. ISRN SLU-SRG-AR--8--SE.

9 Olofsson, C. Mångbruk i ett landskapsperspektiv - En fallstudie på MoDo Skog AB, Örnsköldsviks förvaltning. Examensarbete i ämnet skogsuppskattning och skogsindelning. ISRN SLU-SRG-AR--9--SE.

10 Andersson, H. Taper curve functions and quality estimation for Common Oak (Quercus Robur L.) in Sweden. Examensarbete i ämnet skogsuppskattning och skogsindelning. ISRN SLU-SRG-AR--10--SE.

11 Djurberg, H. Den skogliga informationens roll i ett kundanpassat virkesflöde. - En bakgrundsstudie samt simulering av inventeringsmetoders inverkan på noggrannhet i leveransprognoser till sågverk. Examensarbete i ämnet skogsuppskattning och skogsindelning. ISRN SLU-SRG-AR--11--SE.

12 Bredberg, J. Skattning av ålder och andra beståndsvariabler - en fallstudie baserad på MoDo:s indelningsrutiner. Examensarbete i ämnet skogsuppskattning och skogsindelning. ISRN SLU-SRG-AR--14--SE.

13 Gunnarsson, F. On the potential of Kriging for forest management planning. Examensarbete i ämnet skogsuppskattning och skogsindelning. ISRN SLU-SRG-AR--13--SE.

16 Tormalm, K. Implementering av FSC-certifiering av mindre enskilda markägares skogsbruk. Examensarbete i ämnet skogsuppskattning och skogsindelning. ISRN SLU-SRG-AR--16--SE.

1997 17 Engberg, M. Naturvärden i skog lämnad vid slutavverkning. - En inventering av upp till 35 år gamla föryngringsytor på Sundsvalls arbetsområde, SCA. Examensarbete i ämnet skogsuppskattning och skogsindelning. ISRN-SLU-SRG-AR--17--SE.

20 Cedervind, J. GPS under krontak i skog. Examensarbete i ämnet skogsuppskattning och skogsindelning. ISRN SLU-SRG-AR--20--SE.

27 Karlsson, A. En studie av tre inventeringsmetoder i slutavverkningsbestånd. Examensarbete. ISRN SLU-SRG-AR--27--SE.

1998 31 Bendz, J. SÖDRAs gröna skogsbruksplaner. En uppföljning relaterad till SÖDRAs miljömål, FSC's kriterier och svensk skogspolitik. Examensarbete. ISRN SLU-SRG-AR--31--SE.

33 Jonsson, Ö. Trädskikt och ståndortsförhållanden i strandskog. - En studie av tre bäckar i Västerbotten. Examensarbete. ISRN SLU-SRG-AR--33--SE.

35 Claesson, S. Thinning response functions for single trees of Common oak (Quercus Robur L.) Examensarbete. ISRN SLU-SEG-AR--35--SE.

36 Lindskog, M. New legal minimum ages for final felling. Consequences and forest owner attitudes in the county of Västerbotten. Examensarbete. ISRN SLU-SRG-AR--36--SE.

40 Persson, M. Skogsmarksindelningen i gröna och blå kartan - en utvärdering med hjälp av riksskogstaxeringens provytor. Examensarbete. ISRN SLU-SRG-AR--40--SE.

41 Eriksson, F. Markbaserade sensorer för insamling av skogliga data - en förstudie. Examensarbete. ISRN SLU-SRG-AR--41--SE.

45 Gessler, C. Impedimentens potientiella betydelse för biologisk mångfald. - En studie av myr- och bergimpediment i ett skogslandskap i Västerbotten. Examensarbete. ISRN SLU-SRG-AR--45--SE.

46 Gustafsson, K. Långsiktsplanering med geografiska hänsyn - en studie på Bräcke arbetsområde, SCA Forest and Timber. Examensarbete. ISRN SLU-SRG-AR--46--SE.

47 Holmgren, J. Estimating Wood Volume and Basal Area in Forest Compartments by Combining Satellite Image Data with Field Data. Examensarbete i ämnet Fjärranalys. ISRN SLU-SRG-AR--47--SE.

49 Härdelin, S. Framtida förekomst och rumslig fördelning av gammal skog. - En fallstudie på ett landskap i Bräcke arbetsområde. Examensarbete SCA. ISRN SLU-SRG-AR--49--SE.

1999 55 Imamovic, D. Simuleringsstudie av produktionskonsekvenser med olika miljömål. Examensarbete för Skogsstyrelsen. ISRN SLU-SRG-AR--55--SE

Internationellt: ***(International issues)***

1998 39 Sandewall, Ohlsson, B & Sandewall, R.K. People´s options on forest land use - a research study of land use dynamics and socio-economic conditions in a historical perspective in the Upper Nam Nan Water Catchment Area, Lao PDR. ISRN SLU-SRG-AR--39--SE.

44 Sandewall, M., Ohlsson, B., Sandewall, R.K., Vo Chi Chung, Tran Thi Binh & Pham Quoc Hung. People´s options on forest land use. Government plans and farmers intentions - a strategic dilemma. ISRN SLU-SRG-AR--44--SE.

48 Sengthong, B. Estimating Growing Stock and Allowable Cut in Lao PDR using Data from Land Use Maps and the National Forest Inventory (NFI). Master thesis. ISRN SLU-SRG-AR--48--SE.

1999 60 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. Edited by Mats Sandewall ISRN SLU-SRG-AR--60--SE.