TROPICAL ECOLOGY SUPPORT PROGRAM

Objectives, Concept and Eligibility Criteria

ESCHBORN 1997

FOREWORD

Since the 1992 UN Conference on Environment and Development (UNCED) in Rio de Janeiro, the joint concept of environment and development has taken on a new dimension. The Rio Declaration, Agenda 21, the Forest Principles and the Convention on Climate and Biological Diversity call for a new quality of global cooperation in this field. The resolutions themselves provide the basis on which to restructure national policies while striving for environmentally sound and sustainable development in industrialized and emerging economies alike.

The Tropenökologisches Begleitprogramm (TÖB - Tropical Ecology Support Program) is one of the German DC instruments developed in the follow-up to the Rio Conference. TOB operates on a supra regional basis and is implemented by the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ). Its aim is to design concepts for the conservation and sustainable use of tropical ecosystems and to develop and apply innovative tools and instruments in the process. Sustainable use of tropical forests poses a particular challenge in this context and is the focus of several projects.

TOB is currently coordinating four projects each with different instruments, target groups and thematic foci. Applied research forms the main thrust of activities under the projects "Ecological Research" and "Tropical Forest Research". Two other projects are supporting local non-governmental organisations in environmental education, conservation of natural resources and protected area management.

This brochure describes TÖB's objectives, concepts, eligibility criteria and thematic foci, while also providing detailed information on the application procedure. Further information can be obtained from TOB directly.

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CONTENTS

1. Tropical Ecology Support Program (TOB)  1
   1.1 Problem Context  1
   1.2 Objectives and Services  2
   1.3 The Concept  3

2. TÖB Projects  5
   2.1 Ecological Research  6
      2.1.1 Soil Fertility  6
      2.1.2 Ecology of Tropical Forest Systems  7
      2.1.3 Ecology and Plant Protection  8
      2.1.4 Biodiversity: Species and Biotope Protection  9
      2.1.5 Ecological Economics  10
      2.1.6 Individual Measures  11
      2.2 Tropical Forest Research  12
         2.2.1 Regeneration and Management of Forest Resources to Stabilise Buffer Zones  12
         2.2.2 Forest Rehabilitation and Management of Primary and Secondary Forests  13
         2.2.3 Identification, Use and Marketing of Forest Products (Wood and Non-wood Products)  15
         2.2.4 Institutional, Legal, Political and Socioeconomic Framework Conditions for Tropical Forest Conservation  16
      2.3 Protected Area Management  18
      2.4 Small-scale Environmental Projects  19

3. The Program's Further Development  21

4. Application Procedure for Research Projects  21
   4.1 Content-specific Aspects  21
   4.2 Formal Aspects  21
   4.3 Eligibility Criteria  22
   4.4 Decisions on Applications Submitted  23
   4.5 Selecting Junior Researchers  23

Annex: Structure of Applications  26
Projects in
Asia
Tropenökologisches Begleitprogramm (TÖB)
Tropical Ecology Support Program

Projects in Asia

Eschborn 1997
Preface

The link between the environment and development has acquired a new dimension since the 1992 United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro. The Rio Declaration, Agenda 21, the Forestry Declaration and the Conventions on Climate Change and Biological Diversity all call for a fresh approach to co-operation in this field worldwide. These resolutions are the basis for a process for reshaping national policies. They aim to foster environmentally compatible, sustainable development in industrial and developing countries.

In the wake of the Rio Conference, the Tropical Ecology Support Programme (TÖB) was set up as an instrument of German Development Cooperation. The TÖB works on a supra-regional basis and is being implemented by the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH on behalf of the Federal German Ministry for Economic Cooperation and Development (BMZ). It is endeavouring to further develop concepts for the protection and sustainable utilisation of tropical eco-systems and to devise and apply innovative instruments. In this context the sustainable utilisation of tropical forests constitutes a special challenge and is the subject of numerous project activities.

Under the umbrella of the TÖB, four projects with different instruments, target groups and focuses are currently being coordinated. The "Tropical Ecological Research" and "Tropical Forest Research" Projects concentrate on applied research. Two further projects are devoted to supporting local non-governmental organisations (NGOs) in the fields of environmental education, conservation of natural resources and safeguarding of protected areas.

The regional leaflets describe in brief the activities being carried out by the Tropical Ecology Support programme in the given area. They provide information both for organisations and institutions working in field of development cooperation and for members of the general public interested in environmental and development policy issues.

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Contents

Tropical Ecology Support Programme (TÖB) 1

Ecological research 5

Avian Diversity - An Indicator of Various Forms of Forest Usage in Fiji .......................................................................................................................... 6
Fish Otter as Bio-indicators in Wet Rice Cropping, Indonesia .............. 8
Giant Snail Populations (Achatinidae) in Indonesia ................................ 10
Resource Usage by the Dayak Benuaq: A Cultural-Ecological Study in East Kalimantan, Indonesia ................................................................. 12
Determining Drought-stress-sensitive and -resistant Trees in the Primary and Secondary Forests of Indonesia ......................................................... 14
Disturbances in the Nutrient Cycle as a Result of Timber Exploitation in the Tropical Forests of Indonesia ............................................................. 16
Significance of Light Conditions for Natural Regeneration in Indonesian Rain Forests ................................................................................................. 18
Morphological Changes in Natural Regeneration, Indonesia ............... 20
Contributions to the Establishment of a Biosphere Reserve in Central Tien -Shan in Kyrgyzstan ............................................................................ 22
Biological Pest Control Using Ants in Malaysia's Palm Plantations ...... 25
Significance of Ecotourism for the Conservation of Biodiversity and the Sustainable Development of Tropical Forests, Malaysia .................. 27
Ecological Assessment of Various Forms of Forest Usage on the Basis of Two Key Groups of Invertebrate Fauna (Leaf-litter Ants and Stingless Honey-bees) in Sabah, Malaysia ........................................... 30
Indicators for Environmentally sound Forest Management in Central Nepal ............................................................................................................. 32
Side-effects of Biological Weed Control, Philippines ................. 34
Significance of Fruit Bats (I) and Hawk-moths (II) for Ecologically and Economically Sustainable Agroforestry Systems on Leyte, Philippines ... 36
Forest Vegetation, Site Classification and Natural Regeneration Processes of Key Tree Species on Leyte, Philippines ................................. 38
Coconut Timber in the Philippines: Trends in Use Due to the Lack of Hardwoods...................................................................................................41
Developing Sustainable and Ecologically sound Agro-forestry Systems on Leyte, Philippines .................................................................44
Impact of Habitat Size on the Stability of Mammal Populations, Singapore........................................................................................................46

**Tropical Forest Research** 48

Traditional Village Management in Xishuangbanna, Southwest China ....49
Sustainable Land-use in Xishuangbanna, Southwest China......................51
Sustainable Management of State Wet Forests and Traditional Village Forests in Yunnan Province, Southwest China...........................................53
Local Know-how on the Preservation and Management of Trees and Forests in Rajasthan and Orissa, India...........................................................55
Regional Forest Usage, Environmental Awareness and Traditional Knowledge in the Wider Himalayan Context: Nepal, Bhutan, India .........57
Site-appropriate Planning of Forest Plantations, Indonesia .......................59
Structure and Stand Dynamics of *Pinus merkusii* in Their Natural State on Mt. Kerinci, Indonesia .................................................................61
Structure and Dynamics of Riverain Forest Formations in the Middle Reaches of the Mahakam, Taking Special Account of Human Influences, Indonesia.................................................................63
Computer Simulation of Development Dynamics in the Tropical Forests of Malaysia ..................................................................................65
Allelopathic Effects of Leguminous Trees on Associated Field Crops in Agro-forestry Systems, Sri Lanka...............................................................67
Participative Land-use Planning as a Means of Protecting and Managing Natural Resources in the Montane Forests of Northern Thailand...........69
Near-natural Silviculture in Degraded Dipterocarp Dry Forests, Thailand...........................................................................................................71
Floodland Forests in Northeast Thailand: Dissemination, Classification, Dynamics and Bio-diversity.................................................................73
The Role of Women from Ethnic Minorities in Forest Usage in Northwest Vietnam............................................................................................75
Generating an Ecological Basis for the Sustainable Management of Typical Forest Formations in Vietnam ................................................................. 78
Tao-Meo (Docynia indica, Mall) H'mong Plantations: A Potential Approach to the Sustainable Usage of Non-wood Products in Mountainous Areas, Vietnam ................................................................. 80

Small-scale Environmental Projects 82
Eco-farming on Loi-kaw Plateau, Burma ........................................... 83
Environmental Education and Rural Development in Sabah, Malaysia .... 85
Sustainable Agricultural and Forestry Systems in Nepal ................... 87
Sensitising the Population of Papua New Guinea to the Consequences of Forest Destruction Resulting from Timber Felling ....................... 89
Environmental Education and Reafforestation on Leyte and Palawan, Philippines ................................................................. 91
Environmental Education to Conserve Bio-diversity in West Visayas, Philippines ................................................................. 93
Reafforestation Programmes and Environmental Camps in the Chiang Mai Region, Thailand ................................................................. 95
Post-graduate Courses in Environmental Management and Nature Conservation at the University of Hanoi, Vietnam ..................................... 97
Planning and Designation of a Protected Zone in an Intact Rain Forest Area in Vietnam ................................................................. 100
Environmental Education and Awareness-Raising in "Cuc Phuong National Park", Vietnam ................................................................. 102
Tropical Ecology Support Programme (TÖB)

The Tropical Ecology Support Programme (TÖB) is a supra-regional service project applied in bilateral Development Cooperation (DC) by the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH on behalf of the Federal German Ministry for Economic Cooperation and Development (BMZ), with the aim of enhancing the ecological sustainability of DC projects in line with Agenda 21.

Context

The majority of the earth's human population relies on tropical eco-systems for their natural, life-sustaining habitat. And yet, human interventions are increasingly destroying the environment and degrading natural resources, thus sabotaging any efforts to attain sustainable development and effectively combat poverty.

Agenda 21 and other UNCED-inspired, international agreements, such as the Convention on Biological Diversity, are now challenging development cooperation's resourcefulness by assigning it key pilot functions in their implementation in the respective partner countries.

Tropical Ecology Support Programme - Its Objectives and Services

The Tropical Ecology Support Programme aims to enhance the ecological sustainability of DC projects by providing flexible research and advisory services which support DC projects in all ecologically relevant issues.

The programme is not bound to any one department or sector, but provides an „umbrella“ currently coordinating 4 projects, each with different instruments, target groups and specialist foci. Applied research forms the main thrust of activities under „Ecological Research“ and „Tropical Forest Research“ - „applied“ in the sense that every single measure is based on the research requirements identified in a given DC project and the solutions they help develop are geared to implementation in a DC project context.

In addition to the above activities, support is also provided to small-scale projects by local non-governmental organisations (NGOs) operating in the field of environmental education and natural resource conservation. These measures are financed, inter alia, by the proceeds from the special stamp collection on environmental protection by the German Federal Post Office and the Federal Ministry for the Environment (BMU). German consultative partners in this connection take the form of DC projects or even German NGOs.
Developing and implementing innovative protection strategies, likewise in close cooperation with NGOs, is the key activity area of the project „Protected Area Management“. The IUCN, or World Conservation Union, is a very important partner in this connection.

Figure: TÖB Programme Structure with its Ongoing Individual Projects

The following services are offered to German bilateral DC projects on a needs-oriented basis:

- identification, design and promotion of supportive short- and long-term research projects (on request)
- promotion of environmental education inputs in cooperation with local non-governmental organisations (NGOs)
- development and implementation of innovative protection strategies in cooperation with local NGOs in protected areas
- establishing contacts with specialists and universities
Projects in Asia

- evaluation and dissemination of findings via publications, workshops and other media (e.g. World Wide Web)
- processing sector-specific queries

These services are provided free of charge on request. In view of the limited funds available, research projects have to be applied for by a DC project with a concrete, application-oriented problem it needs help resolving.

TÖB is hoping that its service inputs will lead to a constructive discussion process between the various actors in the field of scientific research, environmental and nature-conservation organisations and development cooperation. Today's ecological challenges call for greater cooperation and coordination, the aim being to synergise positive environmental impacts and ultimately do everything possible to save the tropical eco-systems from extinction.
Ecological research
Avian Diversity - An Indicator of Various Forms of Forest Usage in Fiji

Study type: M.Sc., completed, publication available
Conducted by: Cand. rer. nat. Jörg Kretschmar
Scientific backing: Ruhr Universität, Fakultät für Biologie (Biology Faculty)
               Prof. Dr. E. Curio              Tel.: +49/234-700 28 58
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               44721 Bochum
Local partners: 1. Project: Forestry Promotion in Fiji
                Mr. Homola                     Fax: +6/79-301 758
                2. Environmental Consultant Programme Fiji
                   Dr. Watling
                3. Forestry Department Fiji
Funding period: 8 months (December 01, 1992 - July 31, 1993)

Problem Context:
Fiji has reforested approx. 44,500 ha with pine and about 42,000 ha with mahogany. However, it is far from clear what sort of impact these forest changes will have on the indigenous avifauna. Research in the field of tropical ecology has not looked into such ecological consequences, not even those of primary forest usage. An analysis of species diversity, however, could provide vital information on ecologically-acceptable changes in plantation and primary forest usage. It is expected that the composition of bird species will depend on the stratification and number of "internal border lines; i.e. homogeneity and heterogeneity of the forest stands and thus its flora.

Expected Results:
- A reproducible mapping method is developed for avifauna in tropical forests.
- The method's suitability as a monitoring component is investigated, including a calculation of costs.
- The status and diversity of selected bird species in the plantation/primary forest eco-systems in Fiji are compared.
- Data are collected on the breeding, feeding and territorial requirements of selected bird species.
• Human interventions such as plantations, timber harvesting in virgin forests etc. are assessed on the basis of the avifauna.

• Recommendations are put forward for forest usage in the region concerned.

• The method's degree of transferability is elucidated.

• Further research deficits in this field of activity are identified.

• Approaches are developed allowing the ecologically-compatible management of plantation forests.

**Relevance and Conclusion:**
The work will help simplify the procedures used to determine and monitor the environmental compatibility of various forms of forest usage. Furthermore, it will help make existing systems ecologically more sustainable. The possibility of using avifauna as a bio-indicator is, under certain circumstances, transferable to other areas. If used consistently, the method could become part of the EIA (environmental impact assessment) process.
Fish Otter as Bio-indicators in Wet Rice Cropping, Indonesia

Project type: M. Sc., completed, publication available
Conducted by: Cand. rer. nat. Roland Melisch
Scientific backing: Universität Hohenheim, Institut für Zoologie (220)
(Institute for Zoology)
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Local partners: 1. Asian Wetland Bureau (AWB)
   Dr. Marcel Silvius
   JL. Arzimar III No. 17, Bogor
   PO Box 254/BOO, Bogor 16001
   Jawa Barat, Indonesia
2. Indonesian Governmental Nature Conservation Authority
   (PHPA)
Funding period: 1 year (July 01, 1993 - June 31, 1994)

Problem Context:
The province of West Java is one of the most densely populated areas in the World and a showcase for the transformation of natural habitats into intensively farmed agricultural landscapes. Otter stocks, ideal indicators of intact wetlands (and therefore of their sustainable usage), are also potentially endangered by this development. Indeed, there is the risk that this valuable natural indicator species is at serious risk long before the potential dangers and their causes have been clearly defined.

Otters also play an important role as natural pest control operators in wet rice cropping (e.g. rats and crayfish). In view of the fact that rice is one of the staple foodstuffs in this area, conserving natural predators will in effect secure a key source of food for humans.

Expected Results and Pertinent Activities:
- Otter populations are surveyed in natural and agricultural habitats.
- Their suitability as indicator organisms for use in the assessment of water-extension processes is evaluated.
- Their suitability as indicator organisms in environmental monitoring and EIA processes is assessed.
- Their pest-control capacity in wet rice cropping is evaluated.
**Relevance and Conclusion:**

A better understanding of the role played by natural pest control operators in intensive agricultural systems can help reduce the amount of pesticides employed.

Ecological awareness-raising measures can increase the acceptance of biological pest control. The relevant indicators can be used to assess how natural the agricultural systems are and may also be applied in monitoring and EIA processes. Furthermore, the insights and knowledge gained in this way can be used within the scope of DC to rehabilitate intensively farmed areas.
Giant Snail Populations (Achatinidae) in Indonesia

Study type: Post-graduate course; completed and report submitted
Conducted by: Mr. Knud Schneider, qualified agricultural engineer

Local partner: LPPM — IPB
Jl. Raya Pajajaran Bogor University,
Dr. Ir. Syafri Mangkuprawira
Bogor 16002,
Indonesia

Funding period: 1 year (January 01 - December 31, 1995)

Problem Context:
Asian populations have known for a long time that snails provide a source of high-quality protein. To this day, the animals are still collected in the wild. However, the increasing demand for snail meat is causing the population to shrink in numbers. Moreover, collecting young animals that have not yet reached sexual maturity constitutes a very real threat to the entire species' existence.

This study aims to investigate the ecological and socio-economic significance of giant snails, its prime focus being on answering the following questions:

a) Is it possible under present circumstances to domesticate the snails and thus help conserve wild populations?

b) Can such measures tap any self-help initiatives?

c) Might any disadvantaged groups (traditional stock breeders, women and young people etc.) profit from snail domestication?

d) Is there an organisation (NGO) that has been involved in or is prepared to become involved in snail breeding and marketing?

Expected Results:
- Knowledge of giant snails' dissemination and ecology has been expanded.
- Marketing practices and the snails' economic importance are investigated, inter alia, by interviewing collectors, traders and exporters etc.
Breeding and housing conditions are researched.
Consumption habits are documented.

**Relevance and Conclusion:**
The Göttinger Institute has spent many years conducting laboratory trials on snail breeding and feeding and cooperates closely with Bogor University, which offers public services as well as training and upgrading inputs. The results are expected to tell whether, and if so, which population groups will profit from snail production. Depending on the outcome, the results can be translated into programmes, e.g. consultancy services.

Sustainable snail usage will help conserve species diversity and help improve the use of natural resources by allowing vegetable biomass that cannot be used directly by humans to be transformed into valuable animal protein. Furthermore, the project will supply key information in support of research into the management possibilities for wild animal species.
## Resource Usage by the Dayak Benuaq: A Cultural-Ecological Study in East Kalimantan, Indonesia

<table>
<thead>
<tr>
<th>Project type:</th>
<th>Ph.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conducted by:</td>
<td>Mr. Christian Gönner, qualified biologist</td>
</tr>
<tr>
<td>Scientific backing:</td>
<td>Albert-Ludwigs-Universität Freiburg</td>
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<tr>
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<td></td>
<td>Samarinda, East Kalimantan Indonesia</td>
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<tr>
<td>Funding period:</td>
<td>3 years (August 01, 1995 - July 31, 1998)</td>
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### Problem Context:

The rapid social and ecological transformation processes under way in most traditional societies in the tropics today are forcing them to either alter their tried-and-trusted methods of resource usage or to replace them with new ones. Such processes, which have formed the focus of numerous DC projects, are extremely complex and involve particularly unpredictable interactions that make it considerably difficult to plan activities and evaluate their impacts. The interrelationship between various specialist fields complicates problem analysis even further.

The above applies to resource usage by the Dayak Benuaq in East Kalimantan. Since such very different aspects as cultural outlook, social behaviour, soil fertility, market prices or progressive deforestation all play a part, surveys focusing on one particular sector alone cannot produce a holistic understanding of the given problem. The time factor involved in the various development processes is especially difficult to assess, since it requires detailed knowledge of critical parameters and interactions that only an interdisciplinary approach can deliver.

On the basis of preliminary studies conducted over a period of several months, this research project will take a closer look, from various angles, at resource usage amongst the Dayak Benuaq as well as their relationship to nature. The overall picture thus obtained will be a lot more complete than would be the case if a specific discipline were to conduct the study from its particular viewpoint.
Expected Results:

- The Benuaqs' resource basis is surveyed and mapped (forest, mammals, birds etc.).
- A qualitative survey of basic socio-economic, ethnological and ecological data is conducted and social groups identified.
- The Benuaqs' resource usage is described over a two-year period.
- Changes in local environmental conditions, in the Benuaqs' socio-economic status, their environmental awareness and approach to natural resources are described.
- Critical parameters affecting resource usage are identified and described.
- Bio-indicators are identified as SFMP monitoring instruments.
- A detailed cultural-ecological check list is drawn up.
- A multi-disciplinary approach is devised and tested.

Relevance and Conclusion:

Since the Benuaqs' situation in the sub-district of Jempang is, in many respects, representative of the situation throughout rural Southeast Asia, the research approach applied here is a sort of pilot approach for subsequent studies with a similar design. DC projects are all too seldomly accompanied by interdisciplinary studies focusing on the nature of resource usage. And yet, a broad understanding and the complementary planning and implementation of measures are the decisive factors behind a DC project's acceptance and success.

The results of the proposed inputs can be applied directly in several DC projects in East Kalimantan; this applies particularly to the new combination of field-study methods.
Determining Drought-stress-sensitive and -resistant Trees in the Primary and Secondary Forests of Indonesia

Study type: Ph.D., completed
Conducted by: Mr. Kurt Heberlein, qualified biologist
Scientific backing: Albert-Ludwigs-Universität, Freiburg, Institut für Biologie II (Institute for Biology II)
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Local partner: Indonesian-German Forestry Project
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Samarinda 75123  
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Funding period: 3 years (June 6, 1993 - May 31, 1996)

Problem Context:
Natural fluctuations in environmental conditions are increasingly being overshadowed by global changes in climate resulting from the greenhouse effect and the attendant consequences for the earth's atmosphere. Sufficiently foresighted planning in agriculture and forestry thus requires an in-depth study and exact understanding of how plants' and plant societies' react to the natural environment and how anthropogenic interventions are influencing the survival and growth of tree societies. It would seem that trees also have a coordinated system of stress response that can be stimulated by a large number of stressors. Studies of these stress systems call for an interdisciplinary approach that can harness the skills and technical capabilities of several working groups.

Expected Results and Pertinent Activities:
- Trial areas are determined in primary and secondary forests.
- Stands are characterised in cooperation with local geo-botanists and trees identified that are important for high-grade timber production.
- Measuring programmes are set up and tested.
- The water balance and nutrient dynamics in relation to the site-specific climate are monitored over a long period.
- Local university-level students are provided with themes for their final dissertation.
- The water-budget parameters of economically significant trees in the primary forest are monitored annually and, in selected cases, daily.
• Attempts are made to classify the drought-stress sensitivity of forest stands and natural regeneration in primary and secondary forests.

• Recommendations are put forward on the selection of tree species, specifying whether the given type is good, not so good or unsuitable for reforestation or tree plantations under drought-stress conditions.

**Relevance and Conclusion:**

Changes in forest ecosystems caused by human interventions call for far-sighted research inputs that will enable scheduled DC measures to be adjusted in line with the given needs. The results obtained can, on the one hand, be used directly in the project in the form of reforestation measures and monitoring procedures for the water budget in tropical forest ecosystems. On the other, they constitute an important scientific basis for other forest projects.

The comparison of tree plantations and primary forests has a direct bearing on the establishment of near-natural plantations. Thus, together with know-how from other disciplines, plantations can be planned, planted and managed in a more ecologically, economically and socially sustainable manner.
Disturbances in the Nutrient Cycle as a Result of Timber Exploitation in the Tropical Forests of Indonesia

Study type: Four local M.Sc.’s, completed and report submitted
Scientific backing: Georg-August-Universität, Institut für Bodenkunde und Waldernährung (Institute for Soil Science and Forest Nutrition)
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Local Partners:
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   Samarinda 75123 Fax:: +62/541-35 379
2. Prof. Dr. Daddy Ruhiyat
   Laboratorium Tanah
   Universitas Mulawarman
   East Kalimantan, Indonesia
Funding period: 3 years (June 01, 1993 - May 31, 1996)

Problem Context:
Interventions in tropical wet forests, i.e. exploitation in concession operations or within the scope of controlled, sustainable management, invariably upset the nutrient cycle. Particularly serious manipulations include the direct removal of wood, transferring live biomass into dead biomass (as a result of felling) and soil compaction with subsequent leaching. Long-term qualitative and quantitative investigations into the behaviour of key nutrients under different types of forest management plans are still lacking at present, but are to be prepared within the scope of planned studies.

Expected Results and Pertinent Activities:
• Chemical degradation of soil solutions in spatio-temporal terms is identified in differently farmed areas.
• Nutrient losses are estimated in the respective areas.
• The influence of mechanical stress on the soil's chemical and physical properties is evaluated.
• Regeneration and a comparison of development with inventories from the ecological region are documented.
Relevance and Conclusion:
Greater knowledge of the flow of nutrients in human-influenced and natural forest ecosystems will facilitate the design of more environmentally compatible inputs in the agricultural and forestry sector. The results obtained can be applied directly in the Indonesian-German Forestry Project and are also transferable to other forestry-related projects in ecologically similar regions.

The soil parameters will permit the development of indicators for use in monitoring and assist classification of the various management methods (sustainable usage).
Significance of Light Conditions for Natural Regeneration in Indonesian Rain Forests

Study type: M.Sc.; completed
Conducted by: Ulrich vor dem Esche
Scientific backing: Albert-Ludwigs-Universität Freiburg
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Funding period: 11 months (October 1994 - September 1995)

Problem Context:
Besides ongoing exploitive farming, unusually long dry periods have caused some serious damage in Kalimantan's rain forests. Climatic changes of this kind have to be seen in connection with the global warming resulting from increased emissions of CO₂ and other greenhouse gases. Thus, spontaneous climatic changes can occur that go far beyond any natural fluctuations experienced to date, overtaxing the extremely specialised primary vegetation in tropical rain forests that are unable to adapt quickly enough.

The short-wave solar irradiation (particularly UV-B) that has been proven as harmful to plants too, should be regarded as a limiting environmental factor in the tropics, because of the large-scale occurrence in this region. Nothing is known as yet about the UV tolerance of the very different, light-adapted rainforest plants. Situations such as longer cloud-free periods or the loss of individual shading trees (e.g. due to drought or felling) could lead to radiation damage in sensitive plant species or at certain stages in the development of plant regrowth. This aspect formed the key aspect of the study.

Expected Results:
- Throughout the entire period (5 months), the growth and development of planting stock of selected tree species are monitored in as clearly defined areas of primary and secondary forests as possible under different, natural
or experimental light conditions (use of diverse large-scale filters and shading devices that allow precipitation to pass).

- Following a two-month observation period or thereabouts, suitable plans should have been identified that can be transferred to a test field and submitted to more detailed photosensitivity testing.
- Collected plant material is analysed (especially pigmentation) and the data obtained processed and evaluated.

**Relevance and Conclusion:**
Tests on the UV sensitivity of trees are very important for the long-term planning of forestry inputs. Furthermore, the findings obtained will be incorporated directly into the forestry project to which the research project is attached. The findings, experience and methodology can be transferred to other areas.
Morphological Changes in Natural Regeneration, Indonesia

Study type: Ph.D.
Conducted by: Ms. Michaela Pauli - v. Gemmingen, qualified biologist
Scientific backing: Bundesforschungsanstalt für Forst- und Holzwirtschaft (BFH)
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Local partners: 1. Indonesian-German Forestry Project (till December 1995)
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Funding period: 3 years (December 01, 1994 - November 30, 1997)

Problem Context:

In the various phases of stand dynamics in tropical primary forests, the tree species adapt to the ecological conditions in line with their specific elasticity and the sequence of pioneer, secondary and climax forests. Depending on the intensity of the disturbance caused by uncontrolled forest cropping, the capacity of individual plants and plant communities to reproduce and develop is often taken up to and beyond their given limit, resulting in a shift in species composition and forest structure (degradation).

Forest cropping, forest clearance for plantations and population pressure are all responsible for the great increase in forest degradation in East Kalimantan. A development which is having serious impacts on the general economic, ecological and social functions the forest fulfils in this region.

Besides a political and a socio-economic approach, technical and scientific inputs are also required in order to develop rehabilitation concepts. Therefore, research into the impacts such borderline situations have on the regenerative morphology of indigenous tree species following forest cropping is highly significant.
What are the limits regulating the ability of plants and plant societies to react to various stress factors resulting from morphological changes and to adjust, to a lesser or greater degree of effectiveness or permanency, to the new site-specific conditions?

**Expected Results and Pertinent Activities:**

- An overview detailing the structure of the various forest stands is available.
- Micro- and macro-morphological features that indicate changes on the basis of ecological parameters are determined using timber tree species from an intact dipterocarp forest and, for purposes of comparison, in used stands. Extreme states are analysed under controlled conditions.
- Morphological changes in reaction to various stand structures (and/or light conditions) are demonstrated.
- Indicators and recommendations are developed for silvicultural measures in secondary forests.
- Indicators and recommendations are developed for the possible uses of the investigated tree species under extreme light conditions, e.g. plantations.

**Relevance and Conclusion:**

Research into the impacts of altered light conditions on the regenerative morphology of economically vital tree species following forest cropping is intended to help upgrade existing silvicultural guidelines on the regeneration and care of secondary forests.
Contributions to the Establishment of a Biosphere Reserve in Central Tien-Shan in Kyrgyzstan

| Study type: | Two German and two local Ph.D.s 2 German and 8 local M. Sc.’s |
| Conducted by: | Mr. Hagen Gottschling (1/95 - 12/97), qualified biologist and Mr. Thorsten Harder (1/95 - 12/96), qualified biologist Ms. Sabine Hoffmann Mr. Walter Jontofsohn NN |
| Scientific backing: | Universität Greifswald FB Biologie (Faculty of Biology) Prof. Dr. Michael Succow Tel.: +49/3834-75 555 Grimmer Str. 88 17489 Greifswald |
| Local partners: | 1. Ms. Jaenbaeva Project "Guidelines for environmentally-acceptable development in Tien-Shan" Ministry for Environmental Protection Bishkek, 720033 Fax.: +7/3312-621857 2. State University of Kyrgyzstan, Faculty of Geography Prof. Dr. Abdirai Osmonov Belinsky Str. 101 Bishkek 720024 Tel.: +7/3312-250 876 Kyrgyzstan |
| Funding period: | 3 years (January, 1995 - December 31, 1997) |

Problem Context:
The central Tien Shan mountain range is of great significance for the region's ecological integrity, especially its water budget. It also harbours an exceptionally vast diversity of species. The new, formerly Soviet republics are currently in the midst of an economic and political transformation process in which, as yet, environmental and socially-compatible development strategies have hardly played any role at all. Moreover, large areas of Kyrgyzstan still bear witness to the serious ecological damage they have suffered in the past. Establishing a biosphere reserve can therefore serve as a model for ecologically and socially meaningful development. To date, no basic studies or analyses have been conducted of land-use planning in this country. Therefore, this study will use an interdisciplinary approach to develop a operational plan with which to establish a biosphere reserve.
Expected Results:

- The area under investigation is classified both in general and environmentally-specific terms by analysing existing data, aerial and satellite pictures and by conducting own surveys.
- The target-groups and institutions are researched.
- The economic framework conditions are analysed.
- Future development prospects are evaluated.
- The environmental compatibility of the agricultural production systems is analysed.
- The problems facing existing protected zones are analysed and evaluated.
- The environmental compatibility of industry and mining practices is evaluated.
- The available infrastructure and its spatial distribution and quality are analysed, and the ecological, economic and social implications specified.
- The spatial distribution of traditional and modern settlements is determined and evaluated.
- The negative anthropogenic interventions in natural and cultural areas are analysed and evaluated.
- The results are presented in the form of large-scale maps.
- Environmentally-acceptable income-earning possibilities are identified.
- The various biosphere zones are planned in line with the principles of landscape ecology as well as socio-economic criteria.
- All results are summarised in the form of an annotated plan.
- An environmental monitoring procedure is developed for the biosphere reserve, inter alia, by specifying readily identifiable bio-indicators.

Relevance and Conclusion:

This study will go a long way towards helping the local institutions achieve their goal of setting up a biosphere "Central Tien Shan", since it not only provides the basic data needed for the decision-making authorities, but also gives the planners concrete recommendations. It is expected that the population's participation will ensure that the recommendations are appropriately geared to the socio-economic conditions, i.e. ready for implementation. The high level of participation and upgrading experienced by the countries' young scientists is designed to ensure sufficient on-site
know-how for the planning of environmentally-friendly and socially-acceptable inputs following the study's completion.

Since the project is of a model character for the former Soviet republics, it is expected that it will yield a great many results that can be transferred to other areas in the region.
Biological Pest Control Using Ants in Malaysia's Palm Plantations

Study type: Ph.D.
Two local and two German M.Sc.’s

Conducted by: Mr. H. Steiner, qualified biologist

Scientific backing: J.W. Goethe Universität, FB Biologie,
Zoologisches Institut (Biology Faculty, Zoological Institute)
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Local partner: University of Malaya
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Dr. Azarae Haji Idris
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Malaysia

Funding period: 3 years (June 1994 - May 1997)

Problem Context:
Palm trees are extremely important ecological components of tropical rain forest systems. Furthermore, they are also a significant economic factor throughout Southeast Asia. The climbing rotang palms, or rattan as they are known, are the most important non-wood product harvested from tropical rain forests. Other wild palms are also used for many purposes.

Given the palm tree's significance, present knowledge of its biology is definitely inadequate. Very little is known in particular about the relationship to insects, the most important herbivore predator group in tropical rain forests. Since the rattan industry is becoming increasingly dependent on plantations, both ecological changes and alterations in the pest situation have to be reckoned with. However, these developments can only be assessed if there is adequate knowledge of the natural conditions. This study therefore aims to set up a data base of insect fauna in selected rain-forest palms. These comparative investigations will be conducted on site and in plantations.

Expected Results and Pertinent Activities:
- Herbivore insect species found on palm trees are inventorised.
- Larvae are bred and their feeding habits investigated; a reference collection is established.
- "Life histories" are drawn up for key species.
- Existing parasitoids and potential diseases are determined.
- The herbivores' population dynamics are recorded.
• Species of ant fauna found on selected palms are inventorised; a reference collection is established.
• Ant-palm tree associations are investigated.
• The reproductive biology of selected palms is documented (observation of the flowering period and the role of insects in pollination).
• The damage caused by key species is assessed.
• (The growth parameters of infected and healthy plants are inventorised, as are the population dynamics of selected pests and the extent of damage caused).
• The ants' protective influence is assessed; those ant species that are potentially suitable for pest control are identified, their taxonomic and biological properties examined and their biotope requirements defined.
• The pest-reservoir potential that herbivorous fauna on wild palms hold for crop plants is assessed; palm-specific herbivorous fauna at natural locations and in plantations are compared.
• The crop-protective potential of wild-palm ant fauna is investigated; comparison of the ant fauna of rattan and oil palms at natural locations and in plantations.
• Management measures' impact on the ant and hemipteran fauna is evaluated.

Relevance and Conclusion:

The research project takes a preventive look at the various pests that could affect the economic cropping of different palm species and investigates possible biological control options. It therefore supplies key information for all institutions and projects working in this area, including DC agro-forestry activities.

The results obtained will facilitate the development of corresponding bio-indicators and monitoring procedures. Likewise, knowledge of the various interrelations will enable the more environmentally-compatible planning and development of projects involving palm trees. Furthermore, the possibility of increased pest problems can be dealt with in the EIA, allowing the early implementation of suitable preventive measures.
Significance of Ecotourism for the Conservation of Biodiversity and the Sustainable Development of Tropical Forests, Malaysia

Study type: Ph.D.; completed, publication available
Conducted by: Mr. Bernd Stecker, qualified forest management expert
Scientific backing: Bundesforschungsanstalt für Forst- und Holzwirtschaft (BFH) Institute for World Forestry
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   52109 Kuala Lumpur, Malaysia

Funding period: Field study Malaysia: 8 months (December 1993 - July 1994)
Total project 3 years

Problem Context:
Recent years have seen a great increase in the number of tourists visiting attractive forest areas, national parks and nature and wild-life reserves in numerous tropical countries. In view of the need to conserve and sustainably develop tropical forests, international organisations (such as the WWF, IUCN, IUFRO and the World Bank), Agenda 21 and the Federal German Government's tropical forest report are all in favour of promoting ecotourism, especially in protected forests, as an alternative form of usage.

In many cases, though, the forestry and nature-conservation authorities responsible for these zones are not at all, or only inadequately, prepared and equipped for the additional work this would bring (infrastructure, organisation and management). The question of whether tourism and nature conservation are indeed at all compatible and the impacts that tourism would have on flora, fauna, culture, lifestyle and the traditional rights of the local population bring up more negative than positive issues and developments. Key problems and deficits in this context include:

a) Over-taxing protected forest areas; i.e. neglecting their ecological and socio-cultural carrying capacity.
b) Lack of acceptance of certain fundamental requirements (i.e. the need to conserve nature and maintain cultural identity) on the part of the users, affected groups and planners.

c) Economic instability owing to tourism's seasonal character.

d) Most of the economic profit from „eco-tourism“ will not benefit the place visited or even the country, but will go to the foreign organisers and travel agents.

The reasons for these deficits can be traced back, inter alia, to the lack of suitable, in other words, socially and environmentally-compatible strategies and planning and management concepts for tourism in the given country's protected forest areas. The decision to go ahead with a certain tourist option should therefore only be taken on the basis of a systematic analysis of the people and problems concerned and one which documents and evaluates all potential influences and interactions. The case study in Malaysia (Endau-Rompin) is designed to make a key contribution to this overall objective.

**Expected Results and Pertinent Activities:**

- Needs and problems are evaluated systematically taking Endau-Rompin Park in West Malaysia as an example.

- Political, socio-economic and organisational framework conditions, plus the legal status of forestry and nature-conservation, are determined and evaluated. Interest groups, institutions (target groups) that exert influence or are affected by the problems are identified and their interests and motives described, analysed and evaluated.

- Interviews are conducted with visitors, park and forestry personnel and the local population.

- A catalogue of criteria is prepared specifying the environmentally and socially-compatible usage of protected forest areas (e.g. conservation of natural resources, participation of local population); corresponding indicators are described.

- A planning and management concept is developed for eco-tourism in tropical forest areas (strategies are developed for strengthening potential eco-project organisers). Proposals are put forward outlining ways of improving visitors' programmes and optimally combining conservation and exploitation needs. Recommendations are made describing how participation and benefit can be optimised for local population groups).
• A decision-making matrix is prepared as an instrument to be used by planners, forestry or park administrations when implementing various eco-tourist options.

**Relevance and Conclusions:**

The study is part of a research project at the Institute for World Forestry. The results will be incorporated into the Endau-Rompin park design. Furthermore, transferable principles, criteria and indicators for environmentally- and socially-acceptable tourism that can be used by other projects are to be identified. The indicators can be used for monitoring purposes during the implementation of eco-tourist activities.

The case study and the entire research project can provide key inputs for DC measures in this field. Within DC, eco-tourism can be integrated into forest management and land-use planning. This study will enhance the income and living conditions of the rural population and alleviate the pressure on the primary forests.
Ecological research

Ecological Assessment of Various Forms of Forest Usage on the Basis of Two Key Groups of Invertebrate Fauna (Leaf-litter Ants and Stingless Honey-bees) in Sabah, Malaysia.

Study type: Ph.D.
Conducted by: Mr. Thomas Eltz, qualified biologist
NN
Scientific backing: Julius-Maximilians-Universität Würzburg, Biozentrum Lehrstuhl für Tierökologie und Tropenbiologie (Faculty of Animal Ecology and Tropical Biology)
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Local partners: 1. Sustainable Forest Management Project (GMSFMP)
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                    Sabah, Malaysia  
                    Fax: +60/896-687 75
2. Sectoral Network Forest Management Southeast Asia

Funding period: 3 years (April 01,1997 - March 31, 2000)

Problem Context:
In recent years, it has become increasingly obvious that tropical forests have to be managed sustainably in order to conserve this ecosystem's basic functions as well as its products for the pleasure and benefit of future generations. The efficacy of the concepts developed to date is still uncertain owing to the long time it takes for the various timber species to reproduce and due to the considerable delays in general system reactions. The sustainability of forest cropping is currently evaluated on the basis of past regeneration phases of valuable timber. The models presently used to calculate future felling cycles are, for the most part, based on a few, simple plant species which do not do justice to the complexity of tropical forest eco-systems and the various interrelations, e.g. between plants and animal species. Therefore, it will most probably only be possible to achieve long-term economic sustainability, if a large part of the given forest's (currently) unused biodiversity is conserved at the same time. For this reason, any assessments of the various forms of forest usage must not only look at the floristic but also the faunistic parameters. This is particularly important because short-lived invertebrates provide a much more reliable overview of an ecosystems present status.
This research project is to investigate two different and ecologically-significant arthropod communities, leaf-litter ants (formicidae) and stingless honey-bees (Apidae: Meliponini), to ascertain their suitability as bio-indicators for the ecological integrity of low-land rain forests following timber harvest.

The project aims to develop an effective, rapidly applicable and favourably priced monitoring method to assess anthropogenic interventions in tropical forest eco-systems. It is to facilitate the quantification of the damage caused by the different felling techniques by analysing the impacts on diversity and abundance of the above groups of arthropods. As a result of these activities, it will be possible to formulate recommendations for forest users on the best means of developing sustainable forms of management.

**Expected Results:**

- The various, question-based methods for quantifying the two groups of arthropods are developed and standardised.
- The coenosis of the two groups of arthropods in various forest formations (primary and differently used forests) is described and evaluated.
- Those species or groups of species most suitable for assessing the extent of damage are identified.
- The relationship between group diversity and abundance and the overall status of the forest systems examined is determined and thus their fundamental suitability as indicators assessed.
- The forest-management methods used in the project area are evaluated to determine their impact on the ant and bee communities.
- By identifying the causal relationships behind the damage, it will be possible to recommend approaches facilitating the more sustainable usage of low-land rain forests.

**Relevance and Conclusions:**

As secondary forest systems become increasingly important in Southeast Asia, so too will assessments of the ecological sustainability of forest usage. Provided the bio-indicators developed in the course of the project are suitable, they can be used on a wide-scale owing to the broad, geographical distribution of the insect groups. The presumable ease with which the data can be collected, means that they are a highly relevant DC instrument and will help develop sustainable forms of forest use.
Indicators for Environmentally sound Forest Management in Central Nepal

Study type: M.Sc.; completed, publication available
Conducted by: Cand. rer. nat. Karsten Wesche
Scientific backing: Georg-August-Universität Göttingen, Institut für Anthropologie (Institute for Anthropology)
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Local partners:
1. Churia Forest Development Project
   Dr. W. Andler (forestry advisor)
2. Ramnagar Monkey Research Project
   Dr. Carola Borries
   P.O.B. Narayangadh/Chitwan
   both in Nepal

Funding period: 9 months (April 01, 1994 - January 31, 1995)

Problem Context:
In Nepal, human activities have had a great influence on deforestation. As a result, not only the diversity of species is under threat but the Nepalese population itself is facing far-reaching consequences. Since little is known about anthropogenic impacts on the forests in Nepal, this study aims to provide a clearer picture, inter alia, by describing the vegetation in a given region using classic floristic, climatological and soil-specific methods.

The study will complement activities being conducted within the framework of a long-term project on the eco-ethnology and socio-biology of langur monkeys (Presbytis entellus) under Prof. Dr. C. Vogel and Dr. Winkler that is being financed by the Deutsche Forschungsgemeinschaft (DFG) (German Research Society).

Long-term data already on hand are to be used to make proposals for environmentally-acceptable forest management. The area to be investigated lies to the south of Central Nepal, close to the village of Ramnagar, Chitwan District.

Expected Results and Pertinent Activities:
- Local vegetation is inventorised.
- The project area has been characterised in phytosociological terms.
- The area's vegetative status is evaluated.
• Prognoses are made for future forest development in this area.
• Measures facilitating controlled forest usage are catalogued, taking account of the villagers interests.

**Relevance and Conclusion:**

By describing the causal relations, it is possible to evaluate the impacts of human activities on the forest eco-system and then elaborate recommendations for sustainable usage. The results obtained can be used in environmental awareness-raising activities.

The bio-indicators identified permit the rapid classification of the type and quality of the given anthropogenic influence on the forest eco-system. Consequently, they can also be incorporated into the monitoring procedures.
**Side-effects of Biological Weed Control, Philippines**

**Study type**: Ph.D.; completed and report submitted

**Conducted by**: Mr. Uwe Ladenburger, qualified biologist

**Scientific backing**: Albert-Ludwigs-Universität Freiburg
Forstzoologisches Institut (Forest Zoology Institute)
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**Local partner**: Philippine-German Biological Plant Protection Project
Dr. H. Pag
Bureau of Plant Industry
Manila, Philippines

**Funding period**: 3 years (September 01, 1992 - August 31, 1995)

**Problem Context:**

Although native to South America, the plant *Chromolaena odorata* has spread rapidly across the entire tropical belt following its initial introduction to the region, causing great ecological damage in its wake, especially in the field of agriculture and forestry. International-level studies on its biological control have been stepped up, and it was suggested using the South-American tiger moth (*Pareuchaetes pseudoinsulata*). However, this approach has failed in various cases, only really scoring any success in Guam.

There is a general lack of basic knowledge of the ecologically potentially hazardous side-effects linked to the use of foreign organisms within the scope of noxious plant control. The tiger-moth's potential for controlling *Chromolaena* still has to be clarified and the „hidden side-effects“ of its targeted release and the long-term ecological consequences in particular require closer investigation.

**Expected Results:**

- The possible fields of application and effectiveness of *Pareuchaetes pseudoinsulata* in the control of *Chromolaena odorata* are determined.
- The potential impacts of Pareuchaetes' introduction on other plants (especially plants not related to Chromolaena but with similar contents) and other members of the eco-system (especially parasites and predators; vegetation dynamics) are investigated, i.e. Pareuchaetes' environmental compatibility is assessed.
- Different monitoring procedures relating to the controlled release of Pareuchaetes and the development of attractant traps are compared.
• Basic data are collected on the biology of Pareuchaetes under Southeast Asian conditions, especially host specificity and seasonality and the influence of predators, parasites and parasitoids,
• A monograph on literature pertaining to Chromolaena is elaborated and published.

**Application and Conclusion:**

Research into the potential side-effects of the South-American tiger-moth is vital if it is to be used against Chromolaena. Both this particular case and the methodology used are directly application oriented. The experience gained is very valuable to DC in the field of plant protection.
Significance of Fruit Bats (I) and Hawk-moths (II) for Ecologically and Economically Sustainable Agroforestry Systems on Leyte, Philippines

Study type: Two M.Sc.'s; completed, publications available
Conducted by: 1. Cand. rer. nat. Peter Schütz  
2. Cand. rer. nat. Peter Widmann
Scientific backing: Universität Hohenheim, Institut für Zoologie (Zoological Institute)  
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Local partner: Project: ViSCA- Ecology Program  
Dr. J. Margraf, Dr. Milan  
Baybay, Leyte 6521-A  
Philippines
Funding period: 9 months (December 01, 1993 - September 31, 1994)

Problem Context:
The Philippines' natural forest stands are continually receding, the main reason being the population's rapid and mostly non-sustainable usage of the forest and cleared areas.

In most cases, nothing or only very little is known about the biology and ecology of Philippine tree species that could be used for reforestation or for integrated cropping systems. Pollinating vertebrates include hornbills and fruit bats. In the case of invertebrates, key groups comprise the hymenopterans or dipterans and, even more importantly, the hawk-moths (Spingidae).

1st Master thesis: Significance of fruit bats (Pteropodidae) in the process of pollination
2nd Master thesis: Significance of hawk-moths (Spingidae) in the process of pollination

Expected Results and Pertinent Activities:
• The importance of fruit bats and hawk-moths for pollination and dissemination of fruit and forest-trees in natural and anthropogenically influenced forest eco-systems is clarified.
• The fruit bats and hawk-moths are inventorised.
• The respective habitat requirements are investigated.
• Proposals are put forward concerning the improvement of biotopes in agro-forestry and forest areas.

**Relevance and Conclusion:**

Poor pollination limits fruit formation and the spread of economically important tree species too. Elaborating proposals on how to improve existing agro-forestry and forest systems using the results obtained will help conserve bio-diversity on the one hand and secure economically sustainable production on the other.

Likewise, the findings and knowledge gained can be integrated into supportive environmental awareness-raising activities and thus help promote acceptance for the generation of as near-natural production systems as possible. The results are transferable to other Southeast Asian regions and possibly also to regions further afield. Further investigations could help develop bio-indicators that can be used to determine the extent of human influence on forest eco-systems.
Forest Vegetation, Site Classification and Natural Regeneration
Processes of Key Tree Species on Leyte, Philippines

Study type: Two Ph.D.s

Conducted by: 1. Mr. Peter Balzer, qualified agricultural engineer
2. Mr. G. Langenberger

Scientific backing: Albert-Ludwigs-Universität Freiburg, Waldbau-Institut
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Philippines

Funding period: 3 years (April 01,1995 - March 31,1998)

Problem Context:
Forest stands in the Philippines are essentially overexploited and the land
degraded. Direct consequences include timber imports and increased pressure
on the remaining forest areas which the national government has been trying
to counteract by planting foreign tree species. However, given the ecological,
economical and socio-political circumstances, success is very limited.

The ViSCA-Ecology Program is intending to halt this destruction, inter alia,
by means of a participative process involving reforestation with indigenous
tree species. As things currently stand, however, not enough is known about
the spectrum of native species, their appearance, site requirements and
ecology, or their suitability for generating new forests. This research project
therefore aims to fill in these considerable gaps in knowledge.

Expected Results
1st Dissertation: Characterisation of the autecology of selected tree species,
with a focus on regenerative ecology as a basis for
recommendations on reforestation

- A photo- and drawing-based aid for use in the determination of juvenile
  stages of key tree species on Leyte. This aid will be published jointly and
  in close cooperation with the ViSCA-GTZ Ecology Program in "Annals of
  Tropical Research: Special Issues on Ecology".
Projects in Asia

- Various strategies for forest regeneration on Leyte are characterised, taking account of micro-sites, light requirements, seed-dissemination and establishment mechanisms.

- Improved nursery techniques for local tree species are put forward, taking account of the results obtained in the research project "Reafforestation Techniques for Indigenous Tree Species on Leyte, Philippines (cf. below)".

- Analysis of the results permitting their usage in the ViSCA-GTZ Ecology Program's planning process (Project objective: Closed Canopy and High Diversity Forest Farm" on degraded areas) together with the project staff.

**2nd Dissertation:** Characterisation of the forest types as a reference for near-natural reafforestation. Investigations into the site requirements of the tree species and the natural regeneration processes in forests as a basis for reafforestation recommendations.

- The various tree species found are documented in the form of a herbarium for ViSCA, the "Philippine National Museum" in UP Los Banios and for DC projects.

- The relationship between the vegetation (forest type, ecological and phytosociological species groups) and the site conditions is described.

- Site conditions and forests types are mapped in a selected test area.

- The results are analysed, with a view to using them in the ViSCA-GTZ Ecology Program to attain its objective (of reafforestation as a "Closed Canopy and High Diversity Forest Farm" on degraded areas) in cooperation with the project staff and taking account of the results from the 1st dissertation.

**Relevance and Conclusion:**

In order to achieve the objective of near-natural, socially-compatible reafforestation, the given natural forest type serves as a site-appropriate "model" and point of reference. The project results thus go directly into project activities in the field of reafforestation. Studies of the various species is important both for the advisers and the local population and the pertinent results will therefore also be used in the project's environmental awareness-raising activities.
Investigations into the Ecology of Autochthonous Tree Species for Reafforestation Procedures on Leyte, Philippines

**Study type:** M.Sc.; completed and report submitted  
**Conducted by:** Cand. for. Horst-Dieter Fuhrmann  
**Scientific backing:** Albert-Ludwigs-Universität Freiburg, Lehrstuhl für Forstwissenschaft  
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**Funding period:** 9 months (November 01, 1994 - July 30, 1995)

**Problem Context:**
Filipino forests are heavily degraded. Reafforestation with non-indigenous tree species is not normally a suitable solution to the problem, since they often have undesired ecological and social consequences. However, reafforestation with local trees and with the active participation of the population is hampered by the lack of knowledge of the various reproductive possibilities, their germination and breeding conditions and growth characteristics. The research project therefore focuses on these deficits and aims to make breeding in the ViSCA/GTZ nurseries more effective.

**Expected Results:**
- Seeds, seedlings and cuttings of various tree species are collected.  
- Various possibilities of seed treatment and plant substrates as well as various light conditions and their impacts on the duration and rate of germination are tested.  
- Various plant diseases are determined.

**Relevance and Conclusion:**
The project will provide important information needed to breed local tree species. The results can be used directly in the ViSCA project, but, in many cases, are relevant to other regions in Southeast Asia and thus to other DC projects.
Coconut Timber in the Philippines: 
Trends in Use Due to the Lack of Hardwoods

Study type: M.Sc., completed and report submitted
Conducted by: Cand. rer. nat. Rainer Zaiss
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Eichstätt
2. ECO-Nature  
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Local partners: 1. Project: ViSCA-Ecology Program  
Dr. P. Milan, Dr. J. Margraf  
Baybay, Leyte 6521-A  Tel.: +63/2-818 92 43  
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2. Philippine-German Coconut Project  
PCA, Davao Research Center  
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Davao City, Philippines
Funding period: 8 months (April - December 1996)

Problem Context:
The Philippines are no longer able to meet the demand for timber resources from their own stocks and consequently have to import wood. At the same time, the wood from the coconut palm is becoming increasingly important, even though it was regarded as inferior in the past. Palm felling has been noticeable for some time now in the Philippines. Although this is quite normal when the stands are overmature or damaged by storms or disease and have receding yields, the fact that more and more young, highly productive palms are coming under the axe is giving cause for concern, especially since new palms are rarely planted in their place, thus ultimately changing the face of land usage. As a consequence, stands are declining and the price of coconuts on the local markets have shot up. It is not only the lack of timber resources, but also the new land reforms and the drop in prices of coconut products on the world market that are responsible for this development.

The dissertation aims to illustrate the current problems associated with the usage of coconut wood in the Philippines (age structure of the plantations, cropping areas, ownership issues, scale of felling, competition between
tropical and coconut timber, processing and marketing etc.), and the future consequences, by tackling the following issues:

a) What factors (land reform, lack of timber resources, drop in world prices for coconut products) are responsible for the large-scale felling of coconut palms in the Philippines for timber exploitation?

b) What effects does forest cropping have on existing stocks; are coconut palms only being felled at the moment or are new ones being planted too?

c) What plans exist in the Philippines at the present for re-planting coconut palms and replacing old stocks?

d) Has a conflict of use since arisen between the tree's fruit and timber potential?

e) What is the supply and demand situation with regard to coconut timber and the prices in comparison with tropical hardwoods?

f) What practical problems occur during felling, processing and usage of coconut timber?

g) Which social groups profit from the use being made of this wood?

**Expected Results**

- Research relevant to the information needed is conducted by visiting specific institutions such as the PCA, COIR, NEDA, Department for Agriculture, Ministry of Agrarian Reform etc.
- Case studies in selected and cooperative enterprises in Mindanao and Bohol, and possibly on other islands too, provide a closer and more detailed insight into the problem context.
- Stocks are mapped and measured and production processes documented.
- In cooperation with ViSCA, the profile of model coastal forests with coconut stands is analysed.

**Relevance and Conclusion**

This research project is an applied study on ecological economy and natural resource protection. Ecologically sustainable usage of coconut timber could help alleviate the increasing deficits in sawn timber on the Philippines.

Based on the potential natural vegetation, coconut palms form an integral component of the coastal forests. The ViSCA-GTZ Ecology Program would like the dissertation to take a look at the diversity of species in the coastal
forests; the Philippine-German Coconut Project in Davao is also interested in the study's work.

PROTRADE is implementing a variety of activities designed to promote coconut timber within the scope of the supraregional project „Coconut Timber Processing“. The study provides an insight into the coconut sector in the Philippines which could be useful for further PROTRADE activities. Corresponding contacts have been made with the company ECO, which works on PROTRADE's behalf.
Developing Sustainable and Environmentally sound Agro-forestry Systems on Leyte, Philippines

Study type: M.Sc.; completed, publication available
Conducted by: Cand. rer. nat. Christian Müller-Edzards
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79098 Freiburg Fax: +49/761-203 37 38
Local partner: Project: ViSCA- Ecology Program
Dr. J. Margraf, Dr. Milan
Baybay, Leyte 6521-A
Funding period: 9 months (October 1, 1993 - June 30, 1994)

Problem Context:
Forest stands in the Philippines are fast receding. Only about 22% of the country's total surface area still has forest cover (WCMC/IUCN1992). The reasons for this situation are non-sustainable forms of forest use and increasing population pressure; the latter is responsible for the continuing need for land on the island of Leyte. Indeed, the remaining forest areas must be considered as acutely endangered. At the same time, large areas of degraded land are lying idle.

On top of this problem, there are also fundamental deficits in knowledge concerning the composition of species in the remaining primary forests on Leyte. Thus, in order to build up agro-forestry systems, basic data has to be obtained on the given forest's floristic structure.

Expected Results and Pertinent Activities
- Two plots of land measuring 0.5 ha respectively are selected.
- Proof is collected; a herbarium is elaborated comprising as many (all) species possible; a list of flora is prepared.
- Frequency distribution, size classification and composition of selected tree populations are determined.
- Sub-areas are selected for quantitative surveys on natural regeneration.
- The number of individual tree species found on the selected test area is counted.
- Individual trees are measured to determine breast-height diameter and height
• Pollen is conserved and a pollen catalogue produced.
• Flowers are harvested from trees in bloom
• The vertical stand structure and stratification are analysed.
• Sub-plots are selected and bisects drawn.

Relevance and Conclusion
The study provides key data needed for project planning within the scope of the ViSCA-Ecology Program. The results facilitate the ecologically-compatible design of agro-forestry systems and provide a basis for the development of monitoring procedures.
Study type: M.Sc.; completed and report submitted
Conducted by: Cand. rer. nat. Carsten Hüttche
Scientific backing: Freie Universität Berlin, Institut für Humanbiologie (Institute for Human Biology)
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Fabecstr. 15
14195 Berlin
Local partner: National University Singapore
Prof. T. J. Lam, Dr. Peter K. L. Ng
Singapore
Funding period: 6 months (May 01, 1993 - December 31, 1993)

Problem Context:
Destruction and „forest island formation“ in previously connected primary forest areas are exerting an ever greater influence on the native flora and fauna. Together with the low-land rain forests, Singapore lost some 40% of its ground-based vertebrate fauna, including tigers, leopards and birds, and, according to present knowledge, 20% of its plant species. Probably the last large vertebrates existing in the wild in Singapore is the Binden-Langur (*Presbytis femoralis*). The Nee Soon area, at most north-eastern point of the central watershed, is home to what is probably the last dozen of this type of monkey in Singapore. The group's taxonomic status still has to be clarified.

Expected Results:
- Maps are made detailing the size and type of usage made of the area inhabited by the monkeys (minimum area)
- The group's size and composition are surveyed.
- The population's feeding habits and daily patterns are recorded.
- The animals' general behavioural biology is described.
- Human influence on the area is determined.
- Prognoses are made with regard to the impacts of anthropogenic disturbances.
- Proposals are put forward on how to conserve the natural surroundings and thus enable the population to remain in its natural habitat (Binden-Langurs as bio-indicators).
Relevance and Conclusion:

Sound knowledge of the behavioural patterns of animal populations along the lines of environmental monitoring is of decisive importance for preserving the diversity of species in the tropics. The project, not least because of its special geographical features, provides a significant scientific input by helping to identify the potential impacts of DC and other measures on species diversity.

Species that require large areas to live in are particularly in danger of decreasing in number once their habitat becomes smaller. They are therefore especially suitable as bio-indicators in EIA. The results obtained constitute an important contribution to the consistent implementation and improvement of EIAs within the scope of DC activities.
Tropical Forest Research
Traditional Village Management in Xishuangbanna, Southwest China

Study type: Ph.D.; completed, publication available
Conducted by: Mr. Ulrich Apel, qualified forestry management expert
Scientific backing: Universität Göttingen, Institut für Waldbau (Silvicultural Institute)
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Fax: +49/551-399629
Local partner: Southwest Forestry College, Kunming
Yunnan Province
China
Funding period: 9 months (August 1, 1993 - April 1, 1994)

Problem Context:

Forest science and forest policies in emerging nations have long neglected community forestry. Rural regions in the tropics and subtropics especially have received hardly any forest-management inputs at all that could help improve their economic status and the local population's standard of living. However, there has recently been a change for the better. Indeed, community forestry has tangibly increased in importance now that responsibility for state-owned forests is being handed over to village communities, most particularly in China and the Philippines.

The project area offers ideal conditions under which to examine the possibilities and problems facing community-level forestry, as well as the traditional forms of village-level forest management that are anchored in indigenous land-use systems and moulded by various socio-cultural influences. The main thrust of activities will be on sacred forests, a symbol in many villages of the symbiosis between humans and nature.

Fourteen ethnic minorities live in Xishuangbanna, the majority being Dai. A case study in a Dai village is to investigate the village's traditional forest-management practices and its land-use system, the focus being on the relationship between the forest and the people who inhabit and manage it. Historical, legal, economic, ecological, sociological and cultural aspects all have a role to play and must all be taken into account, if community forest is to help secure the socio-economic development and ecological stability of the rural area.
**Expected Results:**

- The village framework conditions relevant to traditional forest management are described.
- The floristic composition and structure of a typical village forest are investigated.
- The influences and impacts had by socio-cultural factors on the management and usage of village forests are analysed.
- An overview is provided of the Dai people's overall land-use system and the relationships between the various elements are elucidated.
- The community-forestry problems facing other villages and other minorities in this area are looked into.
- The significance of the village forests and their future development is discussed.

**Relevance and Conclusion:**

There are still near-natural village forests in Xishuangbanna with an abundant wealth of species that are more or less able to meet all of the given villages' wood requirements. In spite of a conservationist attitude towards the forest, as particularly apparent in the religiously motivated protection of sacred forest areas, a regulated management system has still not been developed. As a consequence, ineffective and unplanned exploitation is degrading the forests' status and there is a very real danger that degradation and the later transformation into farming areas will ultimately lead to the loss of considerable forest areas.

Seen in this light, village-level forest management constitutes a key area of promotion and one for which Xishuangbanna is particularly well equipped owing to its autochthonous village communities with their intact social structures. The project can pick up on the tradition of sacred forests and trees, since this is based on the people's deference and respect for nature. The insights into traditional forest management allowed by a study based on the local population's traditional system of values will constitute a major step towards a DC approach enabling people to use and manage their resources in line with their socio-cultural and economic needs.
Projects in Asia

Sustainable Land-use in Xishuangbanna, Southwest China

Study type: Upgrading for four Chinese scientists in sub-areas of tropical silviculture; activities completed and report submitted

Conducted by: Lu Yuanchang, Yang Yuming, Du Fang, Li Lijun

Scientific backing: Universität Göttingen, Institut für Waldbau (Institute for Silviculture)
Prof. Dr. H.-J. Weidelt
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37077 Göttingen   Fax: +49/551-399629

Local partner: Southwest Forestry College,
Kunming, Yunnan Province
China

Funding period: 4 years (August 1, 1991 - July 31, 1995)

Problem Context:
The Southwest Forestry College in Kunming was set up by the Forestry Ministry in Beijing in order to train forest officers for Yunnan Province. Intensive cooperation has developed since 1991 with Göttingen University's Institute for Silviculture, the aim being to enable Chinese teaching staff to engage in tropical forestry research. The overall goal in the long term is to achieve sustainable land use in Xishuangbanna.

The designation of large nature and also forestry reserves for timber production, as well as the increase in the number of rubber plantations, means that accessible forest stands are becoming fewer and far between for the shifting cultivators in Xishuangbanna. Consequently, the almost exclusively shifting-cultivator tribes such as the Hani, Yao, Lahu, Bulang etc. are encountering more and more difficulties in their search for land to clear.

What is more, the cropping areas available to the sedentary Dai for wet rice growing are not enough to feed all the inhabitants owing to the rapid population growth rate. A lot of people are therefore turning to the mountains, destroying important watersheds and protected forests in the process.

Xishuangbanna prefecture in the province of Yunnan is home to some of the most northern stands of tropical wet forests. Indeed, only Upper Burma and Assam have more northerly forests of this type. Xishuangbanna is particularly important from a botanical point of view, as more than 5000 species of macrophytes grow in this area, many of which are endemic.
**Expected Results:**

- Natural forest structure is quantified in terms of its species and diameter.
- Growth behaviour in terms of area, type and individual tree species are analysed.
- Regeneration of commercial tree species in natural forests is determined.
- Succession dynamics in various old secondary forests is investigated.
- Alley cropping systems are introduced as a more sustainable form of land use.

**Relevance and Conclusion:**

To sustainably manage the natural forests in Xishuangbanna, silvicultural information has to be obtained pertaining to the species composition, structure, growth patterns and regeneration of commercial tree species. To this end, 40 - 60-year-old secondary forest stands are to be examined that are rarely found elsewhere. At the same time, the introduction of alley cropping systems is designed to minimise the clearance of intact forest areas.

Permanent monitoring plots provide sources of data for the training and upgrading of Chinese scientists, especially, university-level dissertations or doctorate theses.
### Sustainable Management of State Wet Forests and Traditional Village Forests in Yunnan Province, Southwest China

- **Study type:** 2 Ph.D.s. (1 Chinese, 1 German)
- **Conducted by:** Mr. Michael Zickendraht, qualified forestry expert
  Lu Yuanchang
- **Scientific backing:** Universität Göttingen, Institut für Waldbau
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  Büsgenweg 1  
  37077 Göttingen  
  Tel.: +49/551-393652  
  Fax: +49/551-399629
- **Local partner:** Southwest Forestry College, Kunming, Yunnan Province, China
- **Funding period:** 4 years (September 01, 1995 - August 31, 1999)

#### Problem Context:

Xishuangbanna, in the south of Yunnan Province, has some 480,000 ha of state-owned, tropical wet forest that are divided according to their protected or productive status. Thus, the essentially effective protection of approx. 200,000 ha contrasts sharply with the destructive exploitation of the remaining areas. Unless a concept based on the principles of sustainable forest management is introduced in the productive areas, degradation will continue, ultimately making it impossible to preserve the protected zones on the current scale.

In village forests belonging to the Wa people in the southwest of Yunnan on the border with Burma, the forests are still managed traditionally. This offers the ideal opportunity to determine whether these age-old forms of management can be regarded as sustainable under present-day conditions. Furthermore, these traditional methods are to be examined with a view to deriving incentives for the management of state forests.

#### Expected Results:

- Sustainable management concepts are elaborated for state forests in Xishuangbanna, based on the data obtained from 20 test zones.
- The sustainability of traditional community forestry is assessed within the overall silvicultural, socio-economic and -cultural context.

#### Relevance and Conclusion:

The remaining wet forest areas in Southwest China are located almost exclusively in mountain areas inhabited by numerous ethnic minorities. The
project is to focus initially on preparing a natural forest management model for state forest stands, from which the mountain peoples were relocated more than 40 years ago.

In a second approach, a case study is to provide information on traditional community forestry as practised by the mountain peoples, in particular its sustainability.

In both cases, activities centre on the near-natural, sustainable management of tropical rain forests that are rich in species diversity. A particularly application-oriented aspect is the fact that responsibility for state forests in China is increasingly being handed over to village communities. Community forestry therefore commands special attention. Yet a further aspect is the fact that the current silvicultural concepts are poorly suited to conserving biological diversity in this region in the long term; the planned management strategies are therefore to provide assistance in this field.
Local Know-how on the Preservation and Management of Trees and Forests in Rajasthan and Orissa, India

**Study type:** Research project; completed and report available

**Conducted by:** Dr. Klaus Seeland

**Scientific backing:** Eidgenössische Technische Hochschule Zürich (Professorship for Forest Policy and Forest Economy)
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**Local partners:**
1. Council of Cultural Growth and Cultural Relations, Cuttack (Orissa), India
2. Seva Mandir, Udaipur (Rajasthan), India

**Funding period:** 3 years (February 01, 1992 - March 31, 1995)

**Problem Context:**
Reducing forests to their economic significance, above all as a source of timber, has led to their global downfall. Indeed, people who speak of forests, but actually mean timber, are endangering the forest as a whole. In view of the receding forest stands, the new types of forest damage and the increasingly vehement discussion on nature and environmental protection, it is vital that forest science focus on researching just what various cultures understand by „forest“. It is fair to say that society's cultural links with its forests are waning. Likewise, traditional social structures have long since started to break down, putting a serious strain on people's material and emotional relationship with the environment in general and the forests in particular.

For many forest regions, their future as a socially vibrant economic area depends to a great extent on their learning more about the attitudes of the people who live there, about the forests themselves and the different types of exploitation. Traditional communities in emerging nations have a wealth of forest-related knowledge, most of which is rooted in their religious beliefs and practices and can differ greatly depending on the given locality. Their techniques and emotional and cultural values are extremely commendable and deserve much greater attention in natural resource conservation activities than they have received to date.
**Expected Results:**

- A suitable theoretical basis is developed permitting the implementation and intercultural comparison of social-science projects.
- Connections between trees, forests, forest usage and the various people's environmentally-relevant knowledge are documented.
- Indigenous knowledge of nature and the environment is researched, in particular the forest inhabitants' approach to life in a forest environment.
- The various ways in which the locals in two regions in India perceive, use and conserve their forests are documented.

**Relevance and Conclusion:**

Research in Southeast Asia over the past 15 years has shown that a more holistic approach is needed to investigate the issue of "environment and natural resources in a variety of different cultural settings. The key objective of this kind of research is to understand and document the quintessential attitudes towards complex phenomena such as forest, landscape and nature by studying local know-how.

Typically westernised, exclusively or mainly technically-based problem diagnoses should become a thing of the past and make way for an unbiased and open approach to research. This research study therefore aims to find a common denominator allowing the comparison of the various cultures' perceptions and attitudes.
**Regional Forest Usage, Environmental Awareness and Traditional Knowledge in the Wider Himalayan Context: Nepal, Bhutan, India**

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<td>Conducted by:</td>
<td>Dr. K. Seeland, N. Ottiger</td>
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<td>Scientific backing:</td>
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<td>Bhubaneswar, Orissa, India</td>
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<td>Funding period:</td>
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**Problem Context:**

The Himalayas cover a large-scale geographical area in which many different cultures interface and various climatic and vegetative zones exist side by side. This cultural and biotic pluralism provides ideal conditions for comparing the various development problems affecting several countries in the region.

The network of local environmental knowledge means that the different cultures are able to face up to social transformation and alterations in their resource status. This study therefore has the mandate to research the myriad cultural values and the different forms of social organisation and know-how, with a view to determining whether they would be suitable for forest conservation and sustainable usage under different development-related conditions.

**Expected Results:**

- Research activities by selected, native NGOs in the field of „Local Management of Forests as Determined by Environmental Perception and Traditional Knowledge in the Wider Himalayan Context“ are encouraged and intensified.
• A regional research network with top performance capacity is maintained, steered and upgraded, both in terms of its theoretical approach and its methodology.
• Contacts by regional NGOs engaged in research activities with established research institutions in the wider Himalayan context and in Rajasthan are stepped up.
• NGO cooperation is promoted with DC project-executing agencies (GTZ) and national state research institutions such as CAZRI or SSDI.
• Supraregional research inputs are initiated and promoted via cooperation between the ETH in Zürich and local research-oriented NGOs and state research institutions.
• Ongoing field research is integrated into the research network and follow-up activities are conducted.

**Relevance and Conclusion:**

The aim is to research the network of cultural values and the various forms of social organisation and know-how, with a view to determining their capability for ensuring sustainable usage under development-oriented, forest-conservation conditions. It is also aimed to provide comprehensive methodological inputs enabling the generation of a new scientific approach with which to guide and coordinate research by local experts into traditional sources of knowledge and risk-management strategies in the various regions. Furthermore, the results will be analysed to determine their feasibility and applicability in the context of self-help projects in the field of social and community forestry. Only once the activities are firmly rooted in a regional context, will third-party support and promotion inputs be able to help resolve the problem or achieve the desired success.
Site-appropriate Planning of Forest Plantations, Indonesia

Study type: Ph.D.
Conducted by: Mr. Jens Mackensen, qualified forestry management expert
Scientific backing
Universität Göttingen
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2. Institut für Tropische Forst- und Holzwirtschaft, Tharandt
   (Institute for Tropical Forestry and Forest Industry)
   Prof. Dr. J. Pretzsch

Local partners:
1. Universitas Mulawarman, Laboratorium Tanah, Fakultas
   Kehutana, Prof. Dr. Dadddy Ruhiyat
   Samarinda, Indonesia

2. Indonesian-German Forestry Project
   Samarinda, Indonesia

Funding period: 3 years (September 1, 1994 - August 30, 1997)

Problem Context:
Now that the coastal forests in East Kalimantan are more or less exhausted, exploitation of the dipterocarp forests has spread to the mountains. The result is decreasing forest stands and increasing harvest costs. The option of transferring part of the timber production to coastal wood plantations therefore presents itself as particularly expedient and has appealed to the Indonesian forestry authorities for quite some time. However, transforming natural forests into large-scale forest plantations is not without considerable risks owing to the limited carrying capacity of tropical soils.

One of the most serious problems facing timber plantations in the wet tropics consists in the extreme loss of nutrients caused by the export of the entire wood substance (short rotation) as well as fire, washing- and leaching-out. This loss of nutrients contrasts with the very different levels of soil stocks. Site-appropriate selection of tree species with a correspondingly long cycle of usage or the preservation of near-natural forest management would facilitate a sustainable, soil-preserving type of usage - a feat which can only be accomplished, however, with precise knowledge of the conditions on site and correspondingly site-appropriate planning.

In general terms, the greatest management deficit in tropical forest plantations is the lack of any kind of long-term, ecological or economic plan.
However, this objective cannot be achieved without precise knowledge of the ecological production processes and their site-dependency. Furthermore, possible changes in the future have to be assessed and the findings incorporated into an economic planning process. Given the fact that very little is known about the forests' ecology, and, in particular, any potential changes, projections of this kind require a model approach that can be corrected constantly whilst also allowing alternative calculations. Such an approach would enable the success of alternative forms of forest usage to be evaluated; i.e. adaptation to site-specific differences.

Expected Results:
- Simplified site type maps from a concession area in East Kalimantan are available.
- All of the mapping units on the site type maps include profiles of expected yields for the various forms of usage.
- Alternative plans are available for the area under investigation which include evaluations of the silvicultural and ecological perspectives, as well as measures and risks.
- The cost-benefit ratio of various types of usage are investigated and assessed both from a short- and long-term perspective.
- The given cost-benefit ratios are investigated and evaluated from a private-sector and state point of view.

Relevance and Conclusion:
Forest plantations in the tropics are usually established without due respect for the variances and potential of the given sites or any site-specific changes that may occur. Therefore, this research project aims to simulate the ecological and economic impacts of site potential and variance on alternative forms of forest usage.

The Forest Faculty of Samarinda cooperates closely with a concession company that has volunteered to help develop a planning basis of this kind. The resultant model for alternative, long-term planning will, however, be of great interest to many other plantation companies in the tropics.

To this end, site type maps are to be produced and the types characterised according to their usage. The result is alternative models, which take account, to varying degrees, of the ecological principles of sustainability. Research into plantations' impacts is intended to reveal which site-appropriate forms of usage can be taken as alternatives to the present, large-scale, homogenous exploitation.
**Structure and Stand Dynamics of *Pinus merkusii* in Their Natural State on Mt. Kerinci, Indonesia**

**Study type:** 2 M.Sc.’s (tandem project); completed and report submitted  
**Conducted by:** Cand. forest Pascal Lopez (University Göttingen)  
Cand. forest Armizon Tamid (IPB)  
**Scientific backing:** Universität Göttingen, Institut für Waldbau  
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**Local partner:** Bogor Agricultural University  
Faculty of Forestry - Institute Pertanian Bogor (IPB)  
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Bogor, Indonesia  
Tel.: +62/251-21677  
Fax: +62/251-311868  
**Funding period:** 9 months (August 1, 1994 - April 30, 1995)  

**Problem Context:**  
Characterised by widely spread, disjunctive areas, *Pinus merkusii*'s natural range extends from eastern Burma via Laos, Thailand, Vietnam and the Philippines through to Sumatra. This tree species is not found on the Malaysian peninsula. *Pinus merkusii* is the only one of its genus to cross the equator in a southwards direction. The *Pinus* stands on Mt. Kerinci (Central Sumatra) constitute the most southerly location at which this genus is found. On Sumatra there are three isolated cases, which clearly differ from the 'mainland' forms, especially in terms of their growth patterns and appearance.  
*Pinus merkusii* is a shade-intolerant tree species, which can be damaged both in the seedling and young-plant stage by any kind of ground cover, even defoliation, including its own needle litter. Not enough research has been conducted into the ecology of *Pinus merkusii* to provide a basis for its appropriate protection - in particular its behaviour towards fire and competition with species in the neighbouring wet forests. Thus, long-term conservation of these tree stands is a task that requires more knowledge of this particular tree species' demands and stand dynamics.

**Expected Results:**  
- A contribution is made towards the better understanding of the syn- and autecology of *Pinus merkusii*.  
- Impacts of fire on *Pinus merkusii* on Mt. Kerinci are investigated.
• The competition between *Pinus merkusii* and the deciduous tree species in the adjacent humid forests is described.

• The execution of two graduate-level dissertations in a tandem procedure has intensified cooperation between the forestry faculties in Bogor and Göttingen.

**Relevance and Conclusion:**

The particular value of these research activities is that they are the first, in-depth, ecological study of the most southerly, natural occurrence of *Pinus*. These work inputs will provide valuable information that will help to protect and conserve *Pinus merkusii* in its natural habitat.

This particular species is found on Mt. Kerinci on Sumatra, both as individual trees or group-wise in broad-leaved and conifer mixed forest. This is a direct contrast to the open, single-species, aceh-provenance stands that are mainly used for reafforestation on Java.


**Structure and Dynamics of Riverain Forest Formations in the Middle Reaches of the Mahakam, Taking Special Account of Human Influences, Indonesia**

**Study type:** Ph.D. + 1 German and 2 local M.Sc.’s

**Conducted by:** Mr. Frank Richter, qualified forestry management expert

**Scientific backing:** Universität Göttingen, Institut für Waldbau (Silvicultural Institute)
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**Local partners:**
1. Mularwarman University, Samarinda, Faculty of Forestry, Indonesia
2. Promotion of Sustainable Forest Management Project, East Kalimantan, Indonesia

**Funding period:** 30 months (July 01, 1995 - December 31, 1997)

**Problem Context:**
From its upper reaches right down to its estuary, Mahakam, one of the largest rivers in Borneo, is bordered by a succession of riverain forest formations that are typical of rivers in this region and comparable with the riverside-forests found in Central Europe. In the mid-level, flat, basin landscape, the meandering river dynamics, combined with the oligotrophic swamp forests, produce an extremely alternating mosaic of vegetation, whose structure, dynamics and reaction to human influence is still largely unknown.

**Expected Results:**
- Various forest communities in the middle reaches of the Mahakam river are described.
- The structure and dynamics of the riverain vegetation in the area under investigation are elucidated.
- Impacts of human interventions on species composition are investigated.
- Appropriate strategies are developed for forestry usage.

**Relevance and Conclusion:**
Affected by both floods and ground water, the project areas harbour an unmistakable wealth of different locations and vegetative formations brought about by the river’s meandering course and the different levels of water. Vegetational dynamics in such amphibian and terrestrial landscapes are
extraordinarily intensive. Aggradation and erosion, siltation and rain-wash generate widely varying, progressive and regressive successions characterised by continually changing, small-scale mosaics.

Knowledge of the structure and dynamics of these riverain forest societies, as well as their dependencies and interrelations can provide vital information along the lines of an EIA on the potential impacts of large-scale projects on the Mahakam system (e.g. transmigration, forest plantation management). Furthermore, the data will serve as a basis for strategies facilitating the appropriate use of forests in the Mahakam basin.
**Computer Simulation of Development Dynamics in the Tropical Forests of Malaysia**

**Study type:** Research project; completed, publication available  
**Conducted by:** Prof. Dr. H. Bossel, Dr. A. Huth, Prof. Dr. L. Kappen,  
**Scientific backing:**  
1. Universität Kassel  
   Prof. Dr. H. Bossel, Dr. A. Huth  
   Forschungsgruppe Umweltanalyse, WZ III & FB 17  
   (Research group: Environmental Analysis)  
   Mönchebergstr. 11  
   34109 Kassel  
   Tel.: +49/0561-804-2519  
   Fax: +49/561-804-3176  
2. Universität Kiel  
   Prof. Dr. L. Kappen  
   Ecosystem Research Center  
   24089 Kiel  
**Local partner:** Forest Research Institute Malaysia FRIM  
Kepong 52109  
Kuala Lumpur  
Malaysia  
**Funding period:** 3 years (July 20, 1993 - June 31, 1996)  

**Problem Context:**  
The conservationist approach in which yield tables are employed in the usage of forest stands cannot be implemented at the present time in tropical rain forests. On the one hand, not enough reliable, long-term growth measurements have been conducted on what often amounts to more than 200 different species of tree per hectare, and, on the other, surveys are hardly feasible owing to the considerable pressure on the already partly degraded forest areas. However, without reliable growth-specific data, there can be no sustainable forest management.  
An alternative option is to simulate the eco-physiological processes in tropical forest stands (light, photosynthesis, exhalation and consumption of assimilates). Indeed, mathematical models of this kind can be used to obtain concrete approaches suited to the conditions on site, thus enabling appropriate stand usage which avoids excessive felling. The usage of such alternative forest data for forestry inventories constitutes an important step forward in the protection of tropical forests.  

**Expected Results:**  
- An eco-physiological, crown-layer process model is developed to determine forest gap dynamics.
• Data are collected on typical forest trees in Malaysia.
• Forest dynamics are determined on the basis of the simultaneous calculation of a large number of stand types and their mutual influences.
• The simulation results obtained using the permanent monitoring plots are checked for accuracy.
• The simulation model is expanded to include a larger number of tree species.
• Site-specific models are developed and linked up to the simulation model.
• Micro-climatic models are developed to evaluate forest gaps and their impacts on seedlings and young trees; these are then networked with the simulation model.
• The horizontal and vertical forest mosaic, including non-forest areas (fire cultivation, timber storage place, skid tracks and roads) is mapped.
• A silvicultural model is designed and expanded.

Relevance and Conclusion:
The project aims to develop a programme system capable of providing reliable data on the long-term development dynamics of naturally regenerated tropical forests, with and without silvicultural inputs. Thanks to such mathematically-based prognoses, it is possible to determine the long-term impacts of various usage scenarios. Once fully developed, the programme system is to be put at the disposal of the forest administration in West Malaysia and Sarawak.
Allelopathic Effects of Leguminous Trees on Associated Field Crops in Agro-forestry Systems, Sri Lanka

Study type: 2 M.Sc.'s (tandem procedure), completed and report submitted

Conducted by: Cand. Ing. Jörg Linde, N.N.

Scientific backing
Universität-Gesamthochschule, Institut für Nutzpflanzenkunde gemäßiger tropischer und subtropischer Regionen
(Institute for Crop Science of Moderate Tropical and Sub-tropical Regions)
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37213 Witzenhausen Fax: +49/5542-981-309/230

Local partner: University of Peradeniya
Dr. A. N. Jayakody
Faculty of Agriculture, Peradeniya, Department of Soil Science, Sri Lanka

Funding period: 1 year (July 01, 1995 - July 31, 1996)

Problem Context:
The various plant components that make up an integrated agro-forestry system interact in a great many ways. In addition to competition for light, nutrients and water, allelochemical antagonisms also have a key role to play. It is, however, very difficult to prove the existence of such allelopathic effects, inter alia, because they are closely interrelated with competition for growth-promoting resources.

Investigations into the allelopathic potential of „multi-purpose trees“ (including leguminous trees) can go a long way towards minimising the risks associated with mixed, agro-forestry cropping. This project therefore focuses on research into the allelopathic effects of leguminous trees on field crops (maize) in Sri Lanka.

Expected Results:
• The allelopathic effects of key leguminous trees on the growth of maize are identified and proven.
• The allelopathic effects of local multi-purpose trees (MPTs) are compared with those tested under greenhouse conditions and evaluated.
• The nitrogen content and quantities in maize are determined.
• Allelopathic effects on the field crops' nutrient content are determined.
Relevance and Conclusion:

No systematic analysis has yet been conducted on the allelopathic potential of MPTs in an agro-forestry context. However, results from greenhouse and laboratory trials can be calibrated using material from tropical locations with a known ecology.

The anticipated results could, under certain circumstances, be transferred to other regions in which these tree species are found. What is more, they are of use to a whole range of agro-forestry projects.
Participative Land-use Planning as a Means of Protecting and Managing Natural Resources in the Montane Forests of Northern Thailand

Study type: Ph.D.
Conducted by: Mr. Oliver Puginier, qualified agricultural engineer
Scientific backing: Humbold-Universität zu Berlin
Landwirtschaftlich-Gärtnersiche Fakultät
(Landscape Gardening Faculty)
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Fax: +49/30-2802 3650
Local partners:
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Hagen Dirksen
P.O. Box 67
Chiang Mai 5000, Thailand
2. Maejo University
Department of Agricultural Extension
Prof. Dr. Numchai Thanupon
Sansai, Chiang Mai 50290
Thailand
Funding period: 36 months (September 01, 1996 - August 31, 1999)

Problem Context:
Thailand's montane forests constitute some of the country's largest remaining forest resources and serve as a water reservoir for the Chao Phaya Basin which is the most fertile and valuable stretch of land in Thailand. To protect the endemic flora and fauna and to conserve this area's function as a watershed, large areas of these forests have been declared national parks or game reserves. Every type of land-usage is heavily restricted in protected zones or even totally prohibited (since 1989 there has been a general freeze on logging), and yet, in spite of this, Thailand's forests have continued to recede at a dramatic pace.

The traditional management systems (shifting cultivation) practised by the local population are not enough to secure the people's survival. Consequently, the inhabitants are forced to become sedentary and to farm land on a permanent basis, if necessary with illegal opium crops. Population growth and the migration of farmers from neighbouring areas are making it increasingly hard to find any arable land. The local population with its
traditional management methods is largely responsible for conserving the country's montane forest resources.

This doctoral thesis aims to develop a method combining the „top-down-approach“ to land-use planning involving satellite imagery with a „bottom-up-approach“ that makes use of the local institutions' and the local populations' know-how. This approach can be regarded as a blueprint for the conservation of natural resources and sustainable, ecologically-compatible agricultural production. Indeed, it is intended to find out what local know-how there is on land- and forest usage and how this can be harnessed in order to improve the overall management of natural resources. In this connection, it is also planned to investigate the positive aspects of new management methods from the perspective of the village population.

**Expected Results:**

- Traditional and local rules and knowledge relating to forest management are inventorised in various ethnic groups.
- Existing land-use forms and their changes over the last 10 years are documented in six, ethnically different villages.
- A technique is developed allowing the meaningful combination of land-use data obtained with satellite imagery and terrestrial methods with the know-how and experience of the local population and institutions.
- A land-use plan and a land-use map indicating local differences and peculiarities is prepared.
- A land-use monitoring system is developed.
- A practical approach to participative land-use planning is elaborated.

**Relevance and Conclusion:**

The main focus of the Thai German Development Programmes (TG-HDP) and indeed other mountain forest development programmes is to improve the living conditions of Thailand's mountain people, restrict opium cropping and conserve the montane forest ecosystem. The project under review focuses on participation by the local population and responsible, local institutions, with a view to developing an improved natural resource management plan that takes account both of the population's needs as well as government interests.
Near-natural Silviculture in Degraded Dipterocarp Dry Forests, Thailand

Study type: Ph.D. and 3 M.Sc.’s (1 German and 2 local)
Conducted by: Mr. Horst Weyerhäuser, M.Sc.
N.N.
Scientific backing: Universität Freiburg, Institut für Waldbau (Silvicultural Institute)
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Local partner: Chulalongkorn University, Biology Department
Dr. Jiragorn Gajaseni Tel.: +66/2-2185360
Bangkok 10330 Fax : +66/2-2185000
Thailand
Funding period: 36 months (February 15, 1996 - February 14, 1999)

Problem Context:
For one reason and another, many valuable forest resources have been lost over recent years in Southeast Asia and, unless they enjoy special protection, those that are left are in various stages of decline.

Poor species diversity and insufficient natural regeneration coupled with a high level of fires are increasingly menacing these forests' general status. Illegal felling, increased pressure for land from the local population and inadequate forest management policies on the part of the government and the forest authorities only serve to aggravate the situation even more and to deplete the country's supply of high-grade timber. Moreover, this development has a negative impact on the entire ecological infrastructure, the water budget, soil and the region's climate. There is a way out of this dilemma though: namely, to resume forest production. To this end, the forests' composition, structure and autecology have to be investigated, initially on a model basis in dipterocarp dry forests in a protected area in Thailand.

Expected Results:
- Literature is collected on dipterocarp dry forests and the management of natural forests.
- Various types of forest have been classified in the area under investigation.
• The existing forest types are mapped using a geographical information system.
• Once forest elimination has been determined, maps of the area are finalised.
• Silvicultural inputs are implemented in model stands of the various forest types and the results put at the disposal of the responsible institutions.

Relevance and Conclusion:
Deforestation in Southeast Asia, and in Thailand especially, has taken on extreme proportions in the recent years, without eliciting any significant reactions or counter-measures on the part of the Forest Ministry in Bangkok. The Silviculture Institute at the University of Freiburg, Germany, is involved in an EU project geared to the classification of forests according to forest type. In line with the application for this interdisciplinary project, it is aimed to achieve cooperation between the universities concerned and the pertinent government bodies. The joint research project is to generate new findings and insights into natural forest usage. The forests are to be classified using satellite images and subsequent ground-based, land surveys. Practice-oriented, near-natural management methods are to be used to investigate different silvicultural methods and recommendations put forward for the various forest types.

Interventions are to be conducted in test areas together with local organisations and the findings and results made available to the Forest Ministry. Forest excursions to the areas under investigation, as well as seminars and workshop both for governmental and non-governmental organisations, are planned throughout the entire project duration. The study results will be published and made accessible to all interested parties.
### Floodland Forests in Northeast Thailand: Dissemination, Classification, Dynamics and Bio-diversity

<table>
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<tr>
<th>Project type:</th>
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<tr>
<td>Conducted by:</td>
<td>Supranee Sreetumbon, Ms. Wungworn Sungkamethawee</td>
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<td>Albert-Ludwigs-Universität Freiburg</td>
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<td>Prof. Dr. Th. Krings</td>
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<td>Prof. Dr. G. Oesten</td>
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<td>Scientific backing:</td>
<td>DFG-Graduierten-Kolleg „Sozio-Ökonomie der Waldnutzung in den Tropen und Subtropen“ (German Research Society's Graduate College „Socio-economy of Forest Usage in the Tropics and Subtropics“) 79085 Freiburg</td>
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<td>Local partners:</td>
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<td>Dr. Swattana Thadaniti</td>
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<td>Social Research Institute (CUSRI)</td>
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<td>Project „Waldinventur des Unteren Mekongbecken“ (Forest Inventory in the Lower Mekong Basin)</td>
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<td>P.O. Box 3802</td>
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<td>Vientiane, Laos</td>
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<td>Funding period:</td>
<td>24 months (September 1996 - September 1998)</td>
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### Problem Context:

The reasons for large-scale forest loss in Southeast Asia over recent years are many and varied. Deforestation is, however, especially worrying in Thailand - so much so, that a general ban on logging was issued in 1989 which has managed to slow down the rate of forest depletion, but has not managed to halt it. Within the framework of international cooperation, the remaining forest areas in the lower Mekong basin are to be inventorised and their status, functions and uses documented, so as to support and improve sustainable development via the conservation of natural resources.

Small, specialised forest types, such as the forests in the wetlands bordering the Thai rivers in the lower Mekong catchment area, are also threatened by degradation and destruction. Seasonally flooded, these wetlands have a
variety of ecological and economical functions for the area, and for the population too, most of whom earn their living from agriculture and fishing. To control flooding and provide irrigation and energy, most of the Mekong tributaries in Thailand are regulated by weirs and dams. Assessments of the environmental impacts of such infrastructural inputs have, to date, not taken adequate account of these seasonally flooded areas, in particular their functions or potential uses.

Expected Results:

• The floodlands along the Mekong tributaries are documented as spatial units using aerial and satellite pictures and the historical and seasonal variabilities are recorded.

• The terrestrial and amphibian surface characteristics, land usage and the vegetative cover in the floodlands are identified, typified and classified in structural terms.

• The vegetation that is found in the floodlands, the typical plant societies and indicator plants are identified and classified in reference areas according to their occurrence, botanical features, ecological and economical functions and uses.

• The results of the geomorphological, hydrological and phyto-sociological classification process are evaluated to determine their comparability with and applicability in other floodland areas in Northeast Thailand.

Relevance and Conclusion:

The results of the research project are to be made accessible to the member states of the Mekong River Commission via the project „Forest Inventory in the Lower Mekong Basin“ and through scientific publications in Thailand. The research inputs provide a scientific basis enabling the adequate assessment of the region's floodland forests, a basis which can also be used when drafting conservation concepts and appraising the environmental impacts of infrastructural inputs on riverain wetlands.
The Role of Women from Ethnic Minorities in Forest Usage in Northwest Vietnam

Study type: Ph.D.; completed, report submitted
Conducted by: Ms. Dang Tung Hoa
Scientific backing:
1. Technische Universität Dresden, Institut für Internationale Forst- und Holzwirtschaft (Institute for International Forest and Timber Management)
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   Institut für Agrarpolitik, Marktlehre und Agrarentwicklung
   Ergänzendes Fachgebiet Frauenforschung (Institute for Agricultural Policy, Marketing and Agricultural Development, and Women in Development)
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Local partner: "Black River Forestry Programme", SR Vietnam
Social Forestry Development Project (SFDP)
No 123 Lo duc Str.
Hanoi, Vietnam
Funding period: 28 months (August 01, 1993 - November 30, 1995)

Problem Context:

Vietnam is one of the poorest emerging nations on earth. Approx. two thirds of its forest areas (c. 13 million ha) have been cleared to date and are mostly now unproductive. An estimated further 150,000 to 200,000 ha natural forest are destroyed annually. Besides shifting cultivation, population growth and uncontrolled commercial felling, this situation is due to the type of forest and agricultural policy pursued over the last ten years which forced the clearing of forest areas.

Destruction of the forest vegetation followed by activities such as arable farming and intensive grazing have led to massive erosion. Consequently, the land can only support the local population for a very short space of time before being completely exhausted. Humankind's pressure on the remaining forest areas is constantly increasing; indeed, some 90% of the timber felled is used as household fuel. Urgent national tasks therefore include the protection and controlled usage of the remaining areas. To this end, low-grade stocks
have to be upgraded into highly productive forests and unused forest areas have to undergo reafforestation.

A lot of work is needed to achieve this objective, most of which will fall to women who traditionally play a very great role in rural areas, and indeed are responsible for most of the forest work. However, women's participation is made difficult by the fact that only male forest advisers have been employed to date. What is more, women as a target group have not been recognised and approached.

New, model extension approaches and monitoring instruments will have to be developed in future which take account of women's key functions in the field of forest management.

Expected Results:

- Work conditions, work-force structure and gender-specific division of labour are evaluated in the project area according to village community and family.

- Men's and women's rights of access and disposal with regard to productive means and harvest yields are analysed.

- Possibilities for participating within the framework of social forest management and agro-forestry are identified.

- Extension inputs and monitoring instruments which facilitate women's appropriate participation in future land-use activities are developed on a model basis.

Relevance and Conclusion

According to the information from the project area, women play a key role in family welfare in Vietnam. The main focus is thus on developing sustainable land-use models for various ethnic groups. The gender-specific division of labour is very important in this context and calls for an analysis of women's position in the family, the family economic unit and in society within the ethnic groups of Thai, Hmong and Kinh. The results are to be incorporated into the rural development processes. The study's investigations into the gender-specific division of labour and rights of disposal, e.g. with regard to productive means and harvest yields, make it of vital importance for future land-use planning and extension services.

Inclusion of these aspects should facilitate the elaboration of model extension approaches and monitoring instruments. Study results have confirmed the
significance of these inputs for WID within the framework of family farming operations by Vietnamese mountain peoples.

The results will be of great use to the Northwest Vietnamese forest administration, and help it to define forest policy and projects focusing on social forest management, rights of use and management by public and private organisations. Given the similar ecological and socio-cultural context in the East Asian region, the methods developed and applied by the study can be transferred to other forest projects, particularly in Laos, Thailand, the Philippines and Indonesia.
Problem Context:

Binh-Chau Phuoc Buu Forest Reserve covers some 7,051 ha and is located 100 km east of Ho Chi Minh City. In a relatively small area, this protected zone contains a series of forest formations typical for Vietnam and Indochina such as dry dipterocarp forests, *Melaleuca leucodendron* swamps, oligotrophic melaleuca/dipterocarp forests on quartz sand and mangrove forests. Since the area has not yet undergone in-depth investigation, it is ideal for research work whose results can be transferred to the country's various other ecological regions.

Building-up research capacity at the Institute of Tropical Biology in Ho Chi Minh City is intended to give particularly qualified staff members in counterpart institutions the chance to undergo academic upgrading. At the same time, the joint research inputs in Binh-Chau Phuoc Buu Forest Reserve are to produce findings relevant to everyday forest practice.

Expected Results:

- Permanent monitoring plots are set up in Binh-Chau Phuoc Buu Forest Reserve.
- Insights are gained into the structure, dynamics and growth of various typical forest formations.
- The impact of fire on specific forest types and their ecotones is determined.
- Vietnamese scientists undergo specialist upgrading.
Relevance and Conclusion:

The various forest formations found in the small area in Binh-Chau Phuoc Buu Forest Reserve are typical of Vietnam's lowlands. In contrast to the humid dipterocarp forest, there has been relatively little research into the dry dipterocarp forests. In this context, the impacts of fire on this particular forest type are also to be investigated.

The problems in the research area, including marked anthropogenic influences owing to the pronounced population pressure on the forests, can likewise be considered typical of the overall Indochinese region and must therefore be the prime focus of sustainable forest management concepts in Vietnam.

The area's protected status is particularly favourable to the establishment of permanent monitoring plots. In the long term, interesting results can be obtained here. What is more, the area offers young Vietnamese scientists in particular the chance to continually upgrade their knowledge in field of tropical forest ecology and to use the results for their graduate dissertations and doctoral theses.
Tao-Meo (*Docynia indica*, *Mall*) H'mong Plantations: A Potential Approach to the Sustainable Usage of Non-wood Products in Mountainous Areas, Vietnam

**Study type:** Research project

**Conducted by:**
- Senior Forestry Engineer Vu Dinh Quang
- Senior Food Engineer Nguyen Thi Huong Cang

**Local partners:**
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   Fax: +844/214 765

2. Forest and Forest Special Products Applied Research Centre
   No. 4 Chuong duong do Hoan kiem
   Hanoi, Vietnam

**Funding period:** 16 months (August 1995 - December 1996)

**Problem Context:**
Approx. two thirds of the 33.6 million ha surface area that makes up Vietnam are mountainous, and more than a third of the country consists of an eroded hill landscape that is virtually stripped of all vegetation and yet concomitantly home to more than 50 different ethnic groups. Since 1992, Vietnamese agricultural policy has been endeavouring to split up larger holdings and distribute them amongst numerous small farmers. As a result, the agro-forestry systems are increasingly being restructured in line with free market principles. One very promising agro-forestry option in this connection is the fruit of the tao meo.

At present, several hundred tonnes of the tao meo fruit are bought up by the pharmaceutical industry as medicine for various stomach ailments and exported to China. An even greater quantity of the fruit is available, however, for which there is as yet no demand. Therefore, the research project is to investigate whether the fruit from the tao meo is suitable for making a wine qualitatively comparable to the local „thang long“ wine. Fruit processing and the commercial cropping of tao meo (*Docynia indica*) for wine production could provide the local population with an additional source of income.
Expected Results:

- 5000 litres of tao meo wine are produced and can be reproduced with the same quality.
- A suitable cropping area is selected in the highlands (Bac yen or Mu cang chai district) for *Docynia indica*.
- The local population (H'mong) has received technical support in the planting of *Docynia indica*.
- A suitable site is selected for the construction of a winery and the factory is planned.
- Tao meo fruit are bought directly or indirectly by the population from the Bac yen and Mu cang chai districts.
- Suitable wine-making technologies are made available to the local population.

Relevance and Conclusion:

This project aims to investigate the availability and exploitation potential of the tree species tao meo (*Docynia indica*) in the Vietnamese highlands, including the possibility of increased cropping, with a view to wine-making. Such a development could considerably improve the living conditions of the local population, as well as other ethnic groups in neighbouring areas, by generating sustainable sources of income.
Small-scale Environmental Projects

promoted with funds from the special stamp collection

„Save the tropical rain forest“
„Species and biotope conservation“
„Help protect tropical habitats“
Eco-farming on Loi-kaw Plateau, Burma

Context
The Loi-kaw plateau is a highland region close to the border with Thailand. The population's mainstay is predominantly small-scale farming, with the focus on rice. The plateau is an important watershed for the Moyme dam which is the main supplier of drinking water to the capital city of Rangon, but is also used for obtaining energy and irrigating agricultural land.

The region's rapid population growth rate is already a key factor in the degradation of environmental resources. Intensive felling to create more farmland and obtain fuel has greatly eroded the soils. Yet another, unavoidable consequence is the increasing lack of water.

Now that Burma has gradually opened up in political terms, considerably more western influences can be felt in the country, and especially amongst the traditional smallholders who now have better access to synthetic plant-protection agents and fertilisers. Traditional land-use management is still predominant in the region today and any intensification in farming practices on Loi-kaw plateau, as must be expected in the medium term, would bring considerable risks for the quality of the drinking water.

Large-scale, ecologically compatible farming that does without any synthetic pesticides or fertilisers can reduce this risk and counteract the further destruction of natural resources. A key factor with regard to the introduction of ecological farming systems depends on the direct benefits they have for the region's smallholders. Furthermore, alternative farming models could draw attention to existing environmental problems, their long-term impacts and potential solutions.

The Project
By introducing eco-farming systems, the project is aiming to establish ecologically-oriented and income-enhancing agricultural production methods that will benefit the Loi-kaw smallholders. To achieve this aim, the German association „Naturland“ will work together with the Myanmar Agricultural Service (state agricultural extension services in Burma) and the Catholic Church.
Activities will focus on the following:

Establishing a project work group on „Eco-farming“ made up of representatives of the above-mentioned local partners and smallholders in Loi-kaw. The work group is designed as a coordinating and planning committee which will steer project activities on site.

Together with the small farmers, appropriate ecological farming methods are to be developed based on traditional agricultural practices; this study is to provide the pertinent conceptual basis. In every village on the Loi-kaw plateau, a farmer is to be identified who will act as a project contact person and implement demonstration measures on his farm in cooperation with the extension services (crop rotation, catch cropping, erosion protection, composting methods etc.).

Another study will look into the marketing options for organically grown products, both on the local and export markets. To improve supraregional marketing chances, products are ultimately to be certified in line with international eco-farming standards.

An extension and re-structuring concept is to be devised in cooperation with the Myanmar Agricultural Service, the Church and other organisations, with the key focus on information campaigns and upgrading for extension officers in the technical and economic aspects of alternative farming. The campaigns themselves are to function along the lines of environmental awareness-raising inputs in that they are to show the rural population how agriculture can degrade resources. At the same time, the local people are to be informed about the risks fertiliser- and pesticide-intensive cropping hold both for themselves, the consumers and the environment.

On-site partner: Bishop Sotero Phamo  
c/o Christ the King Cathedral  
Loi-kaw 09011 Kayah States  
Myanmar, Burma

German partner: Naturland-Verband e.V.  
Udo Censkowsky Tel.: +49/89-854 50 71  
Kleinhaderner Weg 1 Fax: +49/89-855 97 4  
82166 Gräfelfing

Funding period: 2 years (July 1995 - June 1997)
Environmental Education and Rural Development in Sabah, Malaysia

Context
Sabah, a Malaysian province located on the island of Borneo, has the oldest and most species-prolific rain forests on earth. In fact, there are more tree species in one hectare than in the whole of Europe. Borneo is the natural habitat of some 500 bird species, 180 species of mammal and 20,000 flowering plants. Sabah is also very rich in cultural terms - more than 75% of the population belongs to indigenous tribes.

The forests in Sabah and Sarawak are at serious risk from felling and timber exports. In 1987, Sabah's rain forests covered some 61% of its surface area; if logging rates remain the same, the last forests will be destroyed in a few years time. The cleared areas are planted with fast-growing eucalyptus, rubber and oil-palm plantations. The indigenous small farmers are shifting cultivators who are caught up in the conflict between traditional culture and the imminent western-oriented modernisation. Once the forests disappear, their natural habitat and culture will be lost too.

The numerous governmental development programmes do not touch on aspects such as natural resource conservation or environmental protection. Therefore, this environmental education programme has been specially designed for Sabah where it will attempt to mediate between the various economic and ecological interests.

The Project
The environmental education programme aims to promote environmentally compatible, socio-economic development in Sabah and is geared to the indigenous ethnic groups who inhabit the last tropical forest areas. Environmental training and awareness-raising programmes are to be elaborated together with these target groups, the objective being to achieve ecologically acceptable and sustainable usage of the tropical rain forests and adjacent areas.

The project focuses on three main issues:

1. School programme

The school programme is to support existing regional activities, such as environmental awareness-raising for teachers, elaboration of teaching and training materials and the establishment of regional environmental stations. The school programme can tap experience gained by the WWF in the neighbouring province of Sarawak.
2. Development programme for the rural population

This programme aims to demonstrate the positive advantages of sustainable management to the village communities. First the village communities' specific problems are analysed, the reasons identified and solutions elaborated that are then implemented in a joint process. To enhance communication with the ethnic groups, the materials used are based on traditional forms of communication involving music and theatre.

Planting rattan in secondary forests and promoting eco-tourism constitute alternatives to timber felling and eucalyptus plantations. The WWF will provide assistance with product marketing. Again, the successful inputs made in Sarawak can be taken as role model.

3. Partnership project for school classes and youth groups

The theme of tropical forest conservation is equally as important for industrialised nations as for the tropical countries. A partnership programme between Malaysia and the Federal Republic of Germany is designed to promote awareness in both countries.

The overall project is to be initiated by setting up the work group "Sabah Education and Rural Development Programme" at the "Ministry of Tourism and Environmental Development" (MTED). Cooperation is aimed for with other ministries and non-governmental organisations. The project objective will have been attained when, in the fourth year, the government in Sabah employs one or several environmental educators in the civil service and adopts the tried-and-tested methods as a basis for teacher upgrading and its nature conservation policy. Based on the positive experience in Sarawak the chances of this happening are very good indeed.

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<th>Implementation:</th>
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<th>On-site partner:</th>
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| Funding period: | 3 years (September 1993 - August 1996) |
Sustainable Agricultural and Forestry Systems in Nepal

Context
Owing to its spatio-geographical complexity, Nepal has a great many different eco-systems that each have an abundant diversity of life. Up to a few years ago, large parts of the country had forest cover, but the now remaining montane forest areas are coming under increasing pressure from a growing population and the heavy monsoon rains are causing serious landslides and erosion. The mostly very poor mountain farmers are fully aware of their environment's decline, especially as, in many cases, they feel the full brunt of it themselves. However, they do not have enough alternatives to fall back on, since they are not familiar with more environmentally-compatible methods of resource usage and suitable agricultural areas are no longer available.

The Project
It is in this problem context that the non-governmental organisations „Self-reliance Service Society Lamjung“ and „Rural Co-operation Service Center“ in Chitwan District are now operating. Using directly implementation-oriented surveys, these NGOs elaborate a more effective and environmentally-acceptable form of resource usage in the fields of agriculture, livestock keeping and forestry together with the farmers concerned. Experimental fields are set up in certain villages and tended by the farmers under specialist supervision. These fields also serve as demonstration plots for farmers from neighbouring villages.

The above measures help to:

• identify and disseminate transferable, sustainable land-use systems
• improve resource usage and enhance soil fertility
• raise the local population's environmental awareness and self-help potential

The methods and experience are to be documented in brochures and disseminated to facilitators such as extension officers from the agricultural development bank, training centres and non-governmental organisations. Both organisations are to be supported in their activities by the GTZ-assisted „Small Farmers Development Project“. 
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Fax: +977/1-521 982 |
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Sensitising the Population of Papua New Guinea to the Consequences of Forest Destruction Resulting from Timber Felling

Context
Papua New Guinea (PNG), with a forest growth covering some 85% of its total surface area, is one of the most densely afforested areas in the world. Mountain chains, extensive highland areas and flat coastal regions all bring forth the most varying forest vegetation, such as low-land rain forests, swamp and cloud forests, making Papua New Guinea into one of the most prolific regions on earth in terms of species diversity.

Papua New Guinea is only very sparsely populated and the majority of people live off traditional shifting cultivation. In contrast to many other areas, land titles are almost exclusively in the hands of the village communities. Besides large-scale mining projects, the greatest threat to Papua's forests at present is commercial timber felling. Now that large areas of Southeast Asia are completely deforested, timber felling in Papua New Guinea, especially for export, has undergone a drastic increase: timber is currently being harvested in more than 30 regions using the clear-felling system. With its 2.3 million ha per year, forest harvesting takes up more than ten times the area needed for shifting cultivation. What is more, reafforestation is only conducted sporadically. The village communities either lease or sell the land directly to the timber companies or to the government of Papua New Guinea. The government, for its part, then grants concessions, mostly to foreign companies. The local population's income is thus very low and generally used up in a short space of time. The locals themselves are often unaware of the forests' monetary value. However, erosion destroys the soils, and thus the population's life-sustaining resources, for a long time to come. Thus, the fatal ecological consequences of timber harvesting are compounded further by serious social disruptions. The villagers generally do not know and cannot perceive what kind of fate is awaiting them. For this reason, it is vitally important that these consequences are made clear to the people concerned and alternative options put forward.

The Project
The project therefore aims to support two local initiatives, and thus help raise the local population's awareness, ultimately leading to the preservation of the tropical forest ecosystem.

a) Support inputs for the Melanesian Environment Foundation (MEF)
The Melanesian Environment Foundation is one of the few, nationally active environmental groups in Papua New Guinea. It focuses predominately on public relations and awareness-raising and supports "grass roots" activities and local self-help organisations.

In 1992 the MEF launched an awareness-raising campaign on the ecological and social consequences of commercial logging, bringing the land owners into contact with the villages in which trees were being felled. The exchange of information and experience convinced a lot of the land owners that their long-term perspectives were not any better if they leased their land to multi-national timber companies. The income alternatives put forward by the MEF, such as marketing non-wood forest products (nuts etc.), rattan furniture and bags made of tree fibres appealed to quite a number of land owners who are now receiving information from the MEF on accounting and marketing procedures.

Financial support for the MEF will enhance its PR inputs in English, Pidgin and Hirir Motu. A brochure on tree felling supports this work in schools and communities. The poster „Our Forest“ and the postcard „Clear-felling by JANT“ help raise awareness in all provinces of the country.

b) Support for the Siassi theatre group

On Siassi, a densely afforested island in Northeast Papua New Guinea, large sections of the rain forest are scheduled for felling by a Korean firm as of mid 1993. For this reason, a theatre group was set up in 1990 with the aim of demonstrating the terrible consequences to the people concerned. Many of the land owners subsequently revoked their existing lease agreements.

Support for the theatre group will help finance a tour in the neighbouring province of Morobe. Awareness-raising inputs are to be pursued particularly intensively in areas in which agreements are due to be signed between timber companies and the present land owners.

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<td><strong>Funding period:</strong></td>
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Environmental Education and Reafforestation on 
Leyte and Palawan, Philippines

Context

The Philippines is one of the countries most severely affected by deforestation in the entire world. The latest surveys have shown that forest stands, mainly dipterocarp, now only cover less than 15% of the total surface area. The destruction of the tropical forests is also seriously endangering a great many plant and animal species. The ecological damage also means far-reaching, negative developments for the local population.

The local climate has increasingly longer dry periods which are having ever greater negative impacts on the remaining forests, disrupting their vital regulatory function on the islands' water budget - a vicious circle which is compounded by the often heavy, erosive rainfall that reduces soil fertility under shifting cultivation still further. The floods and land-slides triggered off by erosion and the lack of water retention facilities constitute a growing risk for the population's safety.

Sustainable protection, both of the environment, the indigenous peoples and their land-use systems, can only be achieved by conserving the remaining tropical forests and building up as near-natural productive forests as is possible. However, reafforestation is only successful if it is conducted in cooperation with and for the benefit of the local population. Therefore, both from an ecological and a development-policy point of view, afforestation must be based on a variety of endemic species with the greatest possible exploitation potential for the local population.

The ViSCA - GTZ Ecology Program has developed just such a technology under the name of "Closed Canopy and High Diversity Forest Farming System" which is currently being tested at two locations, namely, Leyte and Palawan, together with selected farmers.

The Project

The project aims to design and test reafforestation measures which cater for both environmental protection and the population's need for a reliable source of income. The target groups are mainly landless families who live in the mountain areas. Technological development is essentially based on the establishment of communities of not less than 100 different, synergetic tree species, thus generating a highly diverse forest eco-system which offers
endangered species a chance of survival whilst also permitting sustained usage. Put in simple terms, the tree species are divided into umbriferous, umbrose and canopy-piercing species. A large part of the shade-loving species are fruit trees whose products are suitable for consumption, marketing and grafting. After just six years, the yield can be high enough to support a family on two hectares of land. Family support during the first six years is necessary to establish the forest ecosystem. However, the yields gained mean that these investments can be amortised rapidly and the financial inputs transferred to other farmers. In terms of legal security, the landless farmers are to receive 25-year usage contracts from the government with the option of prolongation for another 25 years.

Project promotion is geared to supportive environmental education, in which both technology and the forest's significance for the population and the environment as a whole are to be made clear.

To this end, the following measures are planned:

- A widely illustrated guide is to be disseminated in two local languages.
- Families willing to cooperate are to be identified and organised.
- Tree nurseries are to be set up, families are to receive three months training in nursery management, forest seed collection and the tending of young plants.
- A forest system is to be established, plant holes dug and planting effected during the rainy season; silvicultural measures.
- Sector-specific and organisational support and steering inputs are to be provided by the project and local agricultural colleges.

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Environmental Education to Conserve Bio-diversity in West Visayas, Philippines

Context
The Philippines with more than 7000 islands are extraordinarily rich in flora and fauna, many of which are endemic species. The destruction of natural habitats is, however, posing a serious existential threat to this natural pluralism. The Philippines have one of the highest percentage decreases in forest stands: today, the Philippines' forests only just cover 15% of the total surface area — with a continuing downward trend.

One of the main reasons the natural heritage is threatened can be traced back to the country's inadequate environmental policy and legislation. What is more, those generally ineffectual laws that do exist are hardly enforced at all. This situation reflects the markedly low status society accords to nature and environmental protection. Even amongst the higher, better educated levels of society, from which the political decision-makers are generally recruited, knowledge of ecological interrelations and an awareness of the value and significance of natural resources are very poor indeed. School children, whose school books usually come from the USA, are often better informed about the biology and geography of the western world than their own country.

Latest experience at province level has shown, however, that targeted environmental education can make people much more aware of the importance of nature conservation, leading to definite improvements in environmentally-relevant knowledge. This is especially so when local decision-making bodies, environmental protection groups and other influential persons or groups are targeted by and involved in the measures. A lack of funds means that, unfortunately, measures of this kind could only be implemented on a local basis and very sporadically at that. What is needed is a coordinated and long-term environmental education project.

The Project
The project „Environmental Education to Conserve Bio-diversity in West Visayas, Philippines“ is designed to rectify these deficits. The framework conditions for the development and implementation of such a programme are very favourable indeed. There is already a network of established environmental groups and local experts, and the institutional infrastructure provides conditions most conducive to cooperation.
The environmental education programme aims to sensitisce the general public and local decision-making authorities to the need to protect local species diversity; it further aims to impart basic ecological know-how. A key focus of the initially 2-year-long programme is the field of school education. Although the schools lay the foundations for society's future handling of nature and the environment, there are, as stated above, some quite considerable deficits with regard to locally appropriate know-how and corresponding instructional media. Another key target group includes those responsible at the political decision-making level. In short:

- A central element of the environmental education programme will involve an information event, which is to be implemented at as many schools as possible, in remote villages, community centres and other public and official forums. These events are designed to rouse the target groups' interest and prompt a discussion process.

- Various information media (slide show, information sheets) which take special account of the local ecological, social and economic conditions are to be produced and disseminated.

- With the help of regular „teachers' letters“ this group, which is particularly important for environmental education, is to become interested in this theme and receive sector-specific information.

- Contributions to environmental and species protection are to be produced and disseminated in cooperation with TV and radio.

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**Funding period:** 2 years (September 1995 - August 1997)
Context
Thailand's very pronounced regional differences in terms of landscape and climate have led to the development of a sheer plethora of vegetational forms and a great wealth of species.

Depending on the height and precipitation levels, tropical rain forests and ever-green montane forests as well as deciduous forests were formed. These forest areas, which originally covered some 80% of the total surface area, account for less than half that much today. The reasons for this decline include, inter alia, shifting cultivation, coupled with the practice of slash-and-burn and uncontrolled settlements. The ecological consequences of deforestation are extremely serious. In the mountain regions especially, the unprotected soils are at a particularly high risk from erosion and their capacity to store rainwater is receding, a development that has increasingly resulted in flooding in the lower parts of the country. Yet another consequence is the change in the local climate: precipitation has become unreliable and droughts more frequent. One economic legacy resulting from the destruction of its forests is the fact that, since the 1970s, Thailand has been forced to import wood.

The Project
The project would like to make young people especially more aware of the value of their natural surroundings and of their responsibility for an intact environment. This is considered as the basis of an ecologically appropriate, social development and thus a pre-condition for any long-term improvements in the Thai population's living standards.

The project is scheduled to conduct the following activities in support of this awareness-raising process:

With the help of volunteers, „tree-planting volunteers“ as they are known, Thailand's decimated forests are to be reforested. This activity constitutes a contribution to practical environmental protection and will help the people concerned identify with „their“ forest.

By organising actions groups, nature camps and tree-planting demonstrations at schools and universities, young people are to be made aware of nature
conservation and the problems it is facing. These events will concomitantly help disseminate ecologically-relevant know-how.

By producing and distributing various information materials such as posters, brochures and video films and even T-shirts and stickers, as many people as possible are to be exposed to the environment issue.

The project wishes to support cooperation between all official and unofficial groups and organisations involved in the environmental sector and to promote the exchange of experience by organising regular rounds of discussion.

The project will directly address a total of more than 100,000 school pupils and students in the Chiang Mai and Lamphun regions. Furthermore, project activities also target the entire population in these areas.

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| **Funding period:** | 2 years (July 1995 - June 1997) |
Post-graduate Courses in Environmental Management and Nature Conservation at the University of Hanoi, Vietnam

Context

Thanks to its geographical position, Vietnam is a key centre of bio-diversity. Population growth and the results of almost 30 years of uninterrupted war have had a massive impact on Vietnam's forest stands. Today, only some 20% of the country has forest cover, most of which is found in the mountains whilst the lowlands are intensively farmed.

Reafforestation of some 60,000 ha a year with site-inappropriate and fast-growing eucalyptus contrasts sharply with the deforestation of between 150,000 - 200,000 ha. Natural resources are exploited without even vaguely adequate concepts or planning on the part of the state.

In 1985, the "Centre for Natural Resource Management and Environmental Studies" (CRES) developed a "National Nature Conservation Strategy" for Vietnam, which is unique in its comprehensive economical problem analysis and the precision of its recommendations for action. Sadly, a lack of money and the inadequate educational status of state employees has prevented its implementation to date. For this reason, the CRES is offering upgrading courses for university graduates now in the state's employ who are charged with environmental and resource-related tasks and decisions.

Since 1989, courses have been offered annually for 20-30 participants. Indeed, they are so successful that they cannot keep up with demand. However, funding is sporadic and comes from private, foreign sponsors; further financing has not been secured.

The Project

The project's aim is primarily the application-oriented and interdisciplinary training and upgrading of management-level staff and decision-makers in public bodies, who, on completing the course, are in a position as managers or researchers to further develop and implement national strategies on resource usage and environmental protection.

Promotion is initially designed to secure funding of 5 courses. The post-graduate studies are structured as follows:

- Entry requirements and teaching staff
30 university-level graduates of Geology, Geography, Agricultural Science, Forest Science, Soil Science, Water Management, Construction Engineering and Planning Science with at least 3-years vocational experience are eligible for the 6-month CRES course at Hanoi University. Teaching staff is made up of scientists from various specialist disciplines from a number of universities and research institutions in Vietnam and abroad. Foreign experts will be involved in course organisation and implementation.

- **Course Schedule:**

  17 weeks of lectures, discussions and laboratory work  
  5 weeks' excursions, field work and seminars  
  1 week of exams in line with the regulations in force at Hanoi University  

On successful completion of the course, a Diploma is awarded in „Environmental Management and Nature Conservation“

- **Contents:**

  1. Ecology of production systems  
  2. Agro-ecosystem management  
  3. Forest ecosystem management  
  4. Aquatic ecosystem management  
  5. Air and water pollution control  
  6. Project planning and implementation  
  7. Geographic information system (GIS)  
  8. Planning and implementation of concrete environmental protection projects  
  9. Environmental impact assessments  
  10. Written essay/case study on a relevant theme of student's choice

Forests are a vital resource. The sheer variety of forest eco-systems in Vietnam, the massive threat they are facing and their great need for protection mean that forests form a key focus of the course. On successful completion, the participants are awarded a Diploma in „Environmental Management and Nature Conservation“ by the University of Hanoi.
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| **Funding period:** | 2½ years (June 1992 - May 1995); completed, report available |
Planning and Designation of a Protected Zone in an Intact Rain Forest Area in Vietnam

Context

Great diversity of form and swiftly changing landscapes, soils and climate in Vietnam provide ideal conditions for an exceptionally large wealth of species with a very high proportion of endemic and rare animals and plants. Vietnam alone has some 16 types of primary forest that are endangered by commercial felling, a growing shortage of land and in-appropriate land-use. Indeed, only 20% of Vietnam's total surface area is covered with forest today.

Ha Tinh forest close to the village of Ky Son is not only important because of its abundance of species, but because it protects the watershed of a retaining dam constructed in 1976 which is used to irrigate the surrounding rice fields (approx. 18 000 ha) and to obtain electricity. The reservoir's capacity to fulfil its function, and thus meet the needs of the 10,000 inhabitants that are dependent on it, is increasingly jeopardised by deforestation. Species with relatively large territorial demands, such as rare, silviculous pheasant species, large mammals and various types of monkey, are all threatened, too. Consequently, a protected forest zone is vital for Ha Tinh province.

Designation of the approx. 20,000 ha Ky Son zone is designed to conserve the region's bio-diversity whilst allowing the local population to the exploit the natural resources to their benefit. To this end, a buffer zone is to be established between the heart of the protected area and the surrounding agricultural acreage inhabited by approx. 5,000 farmers. Since the pressure from felling and hunting also has to be reduced, additional environmental education measures for the local population and seminars for the hunters and forest workers are of essential importance for the long-term success of project activities.

The Project

Designation of the protected area Ky Anh - Ke Go with a view to securing the natural habitat and existence of the people dependent on it and conserving many species threatened with extinction constitute the project's main objective. The following measures have been planned to this effect:

- A local nature-conservation authority is to be set up and the educational status of personnel improved via seminars.
- The protected area is to be mapped in geographical, botanical and zoological terms.
- A buffer zone is to be established between the sanctuary's main core and the surrounding cropland.
- The watershed status of the Ke-Go river is to be secured, as is the water reservoir it feeds.
- Management plans are to be elaborated for the protected area and buffer zones.
- Environmental education inputs and awareness-raising are to be conducted.
- Practical training is to be provided in sustainable land-use systems.

Before the area can be declared a protected zone, it is imperative to elaborate management plans for the reserve and the buffer zones. Furthermore, the area's borders are to be delineated and marked on a map. To secure the watershed, the forest's importance as a water reservoir for the population is to be documented. The local population's awareness of the need for and requirements of environmental and nature conservation is to be raised via environmental education inputs in the form of posters, brochures, excursions and forest seminars, as well as awareness-raising activities geared specifically to the ecological significance of various species of fauna. Demonstrations and practical training inputs geared to sustainable and ecologically-acceptable usage of the forest and buffer zones are to raise the villagers' level of acceptance and willingness to take an active part in the project. To build up local nature-conservation authorities, local personnel are to undergo training and upgrading via seminars and excursions.

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| Funding period: | 2 years (June 1993 - May 1995); completed, report submitted |
Environmental Education and Awareness-Raising in "Cuc Phuong National Park", Vietnam

**Context**
According to present figures, Vietnam harbours the largest number of endemic animal species, i.e. species exclusive to this region, on the entire Southeast Asian mainland. In 1962, "Cuc Phuong" was established as the first national park in the country. Of its 220 km² total surface area, some 180 km² still have relatively original forest vegetation and form one of the largest forest areas in North Vietnam. Cuc Phuong was classified in various international nature-conservation studies as a national park worthy of the highest level of protection. The park's biological diversity is extraordinarily impressive:
64 mammal species, 319 bird and 33 reptile species. In addition, some 1800 insect species have been identified to date.

In spite of the legal provisions on protection and relatively good human resources, the national park is at considerable risk today. The illegal collection of firewood, unauthorised grazing and other agricultural interventions are destroying natural resources and poaching is jeopardising the park's animal life: in fact, the Delacour langur, one of the most rare primate species in the world, is on the verge of extinction. The local population's role in the protection of the forest area has simply not been given enough consideration to date which means that the locals have not been included to a sufficient extent in protection inputs or environmental education activities. This not only applies to "Cuc Phuong" national park, but to nature conservation as a whole in Vietnam.

**The Project**
The project aims to develop a programme which will promote understanding for nature conservation amongst the population in the national park's area. By strengthening the local population's appreciation of the national park's special value and significance, it is hoped to reduce the pressure on its natural resources. Direct assistance is to be provided to those endangered species for whom Cuc Phuong is one the last refuges. The development of programmes with which to raise awareness for nature conservation will not only benefit Cuc Phuong. Indeed, the project is to have a model character which goes far beyond its immediate sphere of activity, and is to provide the basis for the elaboration of management strategies for new and scheduled conservation areas in Vietnam. To this end, the following activities are planned:
To analyse the local population's attitude towards nature conservation and natural resources, interviews are to be held over a period of 3-4 months in at least 20 of the 100 communities in the park's vicinity. At least 1000 people are to be questioned individually. Special account will be taken of village leaders, teachers, and known hunters. The data obtained is to undergo statistic evaluation and serve as a basis on which to develop a public information and sensitisisation strategy. Practical implementation in environmental awareness-raising programmes is to be effected in close cooperation with the local communities. To this end, workshops and discussions are to be held with the local population and cooperation partners, with a view to establishing environmental education programmes at a later date. These events will also provide a good forum on which to discuss the extent to which traditional forms of communication can be used to disseminate the concept of environmental protection and nature conservation.

Together with teachers, for example, sensitisation programmes are to be developed focusing on particularly significant animal species such as the Delacour langur, or other rare species. Illustrated and text-based materials are to be printed and disseminated in this connection. Nature-conservation clubs for children and young people have often proved to be a very successful means of raising general ecological awareness and are therefore to be applied in the Cuc Phuong National Park too. This approach would appear to be particularly promising because the teaching staff concerned command a great deal of respect and influence within the village community. A nature-conservation club was recently set up for village leaders in the Cuc Phuong district. Its members include top-ranking officials from various villages, the party and administrative organs. The programme is to use this club as a promotion aid for a larger club infrastructure.

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| Funding period: | 2 years (September 1995 - August 1997) |