C e n t e r f o r I n t e r n a t i o n a l F o r e s t r y R e s e a r c h

Research Abstracts 2001

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Preface

CIFOR's 2001 Research Abstracts is a compilation of the abstracts of in-house and external publications produced in the year 2001 by CIFOR scientists and their collaborators. The abstracts are grouped into seven themes that represent CIFOR's research activities. To facilitate easy access to the abstracts, indexes are provided by author and keyword.

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Contents

Preface	iii
General	1
Biodiversity	5
Forest Governance and Community Forestry	11
Forest Management	50
Non-Timber Forest Products	81
Plantations and Rehabilitation of Degraded Forests	86
Policy and Extrasectoral Issues	107
Author Index	133
Keyword Index	142

General

1. **Assessing the performance of natural resource systems**
Campbell, B.M., Sayer, J.A., Frost, P., Vermeulen, S., Ruiz Perez, M., Cunningham, A., Prabhu, R.

Assessing the performance of management is central to natural resource management, in terms of improving the efficiency of interventions in an adaptive-learning cycle. This is not simple, given that such systems generally have multiple scales of interaction and response; high frequency of non-linearity, uncertainty, and time lags; multiple stakeholders with contrasting objectives; and a high degree of context specificity. The importance of bounding the problem and preparing a conceptual model of the system is highlighted. This article suggests that the capital assets approach to livelihoods may be an appropriate organizing principle for the selection of indicators of system performance. In this approach, five capital assets are recognized: physical, financial, social, natural, and human. A number of principles can be derived for each capital asset; indicators for assessing system performance should cover all of the principles. To cater for multiple stakeholders, participatory selection of indicators is appropriate, although when cross-site comparability is required, some generic indicators are suitable. Because of the high degree of context specificity of natural resource management systems, a typology of landscapes or resource management domains may be useful to allow extrapolation to broader systems. The problems of non-linearity, uncertainty, and time lags in natural resource management systems suggest that systems modeling is crucial for performance assessment, in terms of deriving "what would have happened anyway" scenarios for comparison to the measured trajectory of systems. Given that a number of indicators are necessary for assessing performance, the question becomes whether these can be combined to give an integrative assessment. The article explores five possible approaches: (1) simple additive index, as used for the Human Development Index; (2) derived variables (e.g., principal components) as the indices of performance; (3) two-dimensional plots of indicators and cases emerging from multivariate techniques used to visualize change; (4) graphical

2 General

representation of the five capital assets using radar diagrams; and (5) canonical correlation analysis to explore indicators at two different scales.

Conservation Ecology (online journal) 5(2): 22p.
[online] html URL: <http://www.consecol.org/vol5/iss2/art22>.

2. CIFOR - using a 'system' approach to research evaluation *Spilsbury, M.J.*

The overarching objective for CIFOR is to ensure that research activities result in significant impacts. A secondary, but very important, requirement is to be able to measure and quantify impact. However, impact assessment at CIFOR is viewed as a component in the broader frame of research evaluation and within the dynamic system of identifying problems, planning solutions, producing outputs, promoting adoption, and securing positive outcomes in line with its mission. In the context of this changing environment, adaptation and learning are key institutional requirements. This paper describes CIFOR's work in relation to impact assessment and research evaluation more generally. It explores the rationale and strategy of the CIFOR programme on Research Impacts and describes key concepts such as "impact pathways", and efforts to foster an 'impact culture' within the organisation. Constraints opportunities and other important issues in relation to Impact Assessment at CIFOR are also highlighted.

In: The future of impact assessment in the CGIAR: needs, constraints and options. Proceedings of a workshop organised by the Standing Panel on Impact Assessment of the Technical Advisory Committee 3-5 May, 2000, FAO, Rome. Rome, FAO. TAC Secretariat. Annex 2 - 11-17. [online] URL: <http://www.cgiar.org/tac/spia0500/cifor.pdf>.

3. The forest of information: beating paths through the jungle *Paivinen, R., Mills, R., Hailu, M., Saarikko, J.*

In this article an outline is given of the history of information and publishing in forestry, communications technology is described (including mobile computing, GIS and satellite observations), and the future exchange of information via the Internet and web-based services is discussed. Two examples show the use of computer technology and decision support systems to prepare a forest management plan and to purchase

a hardwood table for the garden. A section is included on The Global Forest Information Service (GFIS), being developed by IUFRO, which is based on a distributed network of metadatabases which catalogue the information resources (digitalized or not) of contributing partners.

Unasylva 52(204): 12-23.

4. **Gender roles in history: women as hunters**

Singh, K.S.

The traditional anthropological view of man as the sole hunter is being questioned today and women's role in hunting is being highlighted. The evidence from India supports the view of women as hunters, no matter how restricted this role may be. The archaeological evidence shows that hunting involved women-men partnerships. Folklore and puranic myths represent mother goddesses as killers of major wild animals. There are many historical examples of queens shooting tigers and panthers. In the colonial period when shooting a tiger became a status symbol, there were sportswomen, both Indian and British, who shot major mammals. Also, women from rural and indigenous communities, with their simple instruments and techniques, killed major mammals to save life and property. A unique tribal hunt that survives as a remnant of women's role as hunters is known as jani shikar, held every 12 years by indigenous women when they go out to hunt wild animals, mainly minor ones today as ideas of conservation seep in. Thus, in spite of general reservations about and prohibitions on women, there is still a role for women in hunting.

Gender, Technology and Development 5(1): 113-124.

5. **Literature review of impact assessment studies of potential application to natural resource management research (some literature resources)**

Spilsbury, M.J., Poulsen, J.

This note is part of an on-going effort to gain insights to impact assessment and research uptake literature of relevance to natural resource management-related research. It is provided more for the reference list than for the merit of the associated text that is still at an early stage. Many more references have

been collected but have yet to be screened for their potential relevance.

Workshop: Integrated Management for Sustainable Agriculture, Forestry, and Fisheries in Cali, Colombia, 28-31 August 2001. Cali, Colombia, CIAT. CD-ROM. 5p.
[online] URL: http://www.inrm.cgiar.org/documents/cali_workshop.htm.

6. Research to integrate productivity enhancement, environmental protection, and human development

Sayer, J.A., Campbell, B.M.

To meet the challenges of poverty and environmental sustainability, a different kind of research will be needed. This research will need to embrace the complexity of these systems by redirecting the objectives of research toward enhancing adaptive capacity, by incorporating more participatory approaches, by embracing key principles such as multi-scale analysis and intervention, and by the use of a variety of tools (e.g., systems analysis, information management tools, and impact assessment tools). Integration will be the key concept in the new approach; integration across scales, components, stakeholders, and disciplines. Integrated approaches, as described in this Special Feature, will require changes in the culture and organization of research.

Conservation Ecology (online journal) 5(2): 12p.
[online] html URL: <http://www.consecol.org/vol5/iss2/art32>.

7. Voicing interests and concerns: challenges for forest research

Burley, J., Seppala, R., El-Lakany, H., Sayer, J.A., Krott, M.

Forest research has to change in response to the increased interest of society in the management of forestland. The president and the vice president of IUFRO, the Assistant Director-General for Forestry in the FAO and the Past Director-General of CIFOR discuss key issues. IUFRO should become a clearing-house for forest research and expertise. Research has to recognize that the culture of forestry has become a culture of conflict. More interdisciplinary and policy research should be added to the strong biophysical science in forestry. It needs science to exploit the comparative advantages of local and larger-scale forest management and also needs science to bridge the gaps between the traditional and modern pools of knowledge and experience.

Forest Policy and Economics 2(1): 79-88.

Biodiversity

8. **Atelier sur la gestion de la faune sur les concessions de l'exploitation forestière d'Afrique centrale**
Tutin, C., Nasi, R.

This article is a summary of a Workshop on Wildlife Management in Logging Concessions in Central Africa, La Lupe, Gabon, November 2000. The workshop was unique in that it brought together field-based representatives of logging companies, conservation NGOs and government ministries to discuss practical options for reducing the impact of timber exploitation on wildlife within the forests of Central Africa. This reflects a change in the private sectors concern for consumer attitudes and the risk of brand name black-listing, and the NGO sectors increasing willingness to engage the private sector even if it risks their being accused of green washing logging companies. Preliminary findings from the pilot projects indicate that loggers are willing to reduce the impact of timber exploitation on wildlife within concessions and that collaboration between the private sector and conservation NGOs is possible. Practical options do exist for reducing the impact of timber exploitation on wildlife.

Bois et Forêts des Tropiques 269(3): 90-92.

9. **Biodiversity conservation in productive forest landscapes**
Nasi, R.

An attempts to pursue biodiversity objectives in both protected areas and in production forests have often failed because the attribution of costs and benefits was unfair and regulations proved unenforceable. Most people would agree that biodiversity is most likely to be maintained if local benefits are maximised and local costs are minimised. The author argues that various sorts of multiple-use forests are likely to be the best option for biodiversity conservation in many situations where poor people live in proximity to forests rich in biodiversity. It is inevitable that timber extraction will be a major element of this multiple-use in many forest areas. This paper further argues that there are no fundamental technical obstacles to meeting many biodiversity objectives in forests managed for timber. The diversity

6 Biodiversity

of forests and people who depend upon them is so great that it is neither desirable nor possible to develop broadly generalised prescriptions for management. The extent of the trade-offs in reconciling global and local values is such that even with optimal management arrangements some form of compensation or subsidy to forest-dependent stakeholders will often be unavoidable.

In: Ganeshaiah, K.N., Shaanker, R. Uma, Bawa, Kamaajit S. (eds.). Tropical ecosystems: structure, diversity and human welfare. Proceedings of the International Conference on Tropical Ecosystems: Structure, Diversity and Human Welfare, 15-18 July 2001, Bangalore, New Delhi, Oxford-IBH. 150-152. ISBN: 81-204-1496-5.

10. **Biological diversity: balancing interests through adaptive collaborative management**

Buck, L., Geisler, C.C., Schelhas, J., Wollenberg, E. (eds.)

This book explores the use of adaptive collaborative management (ACM) as an approach to better balance local, national and global interests in conserving biodiversity with competing interests for resource use. ACM approaches resource management as an on-going learning process based on continuous, cumulative experimentation. This edited volume presents cases from around the world and interdisciplinary analyses to show how scientists, practitioners, policy makers and citizens can work together to achieve mutually agreeable outcomes.

Boca Raton, Florida, CRC Press. 465p. ISBN: 0-8493-0020-7.

11. **Bulungan ethnobiology handbook**

Puri, R.K.

This book is intended as a resource for researchers working in the Bulungan area, including the Kayan Mentarang National Park and the Bulungan Research Project (BRF), in East Kalimantan, Indonesia. It serves as both a field guide to common plants and animals, and a dictionary of their vernacular terms from 18 different linguistic/cultural groups. It facilitates communication about familiar flora and fauna among residents of the Bulungan. Finally, this book provides the basis for future analyses of regional patterns of resource use, ethnobiological classification, and comparative and historical linguistics. The handbook is divided into several sections containing a variety of formats and types of data. The first two sections present profiles of 164 plants and 111 animal types of data. Each profile page consists of an entry with

photograph or illustration and both biological and ethobiological data. The rationale for choosing the survey methods is explained in the section Documenting regional ethnobiology. It is completed with environmental glossary and indexes to scientific names and vernacular names of plants and animals.

Bogor, Indonesia, CIFOR. 310p. ISBN: 979-8764-45-5.

12. **Conservation and biodiversity monitoring in the tropics: realities, priorities and distraction**
Sheil, D.

Monitoring and research activities may hinder rather than improve conservation in tropical countries. This paper identifies some critical threats to biodiversity and the limited resources for defending against them. It suggests various contributory factors, and a few common sense options for improved practice. It concluded that there is limited capacity for conservation in many countries and resources must be allocated effectively. Research and monitoring activities must also be allocated with sensitivity to local priorities and limitations. Protected areas must be managed to protect the values they contain, not provide statistics. Managers should only be required to collect data that are useful to them in ways that they understand. Research ought not be conducted at the cost of failing to halt the overwhelming threats now facing many conservation areas. Threats must be identified and priorities revisited, but the costs and responsibilities for generating such information must be allocated with care.

Conservation Biology 15(4): 1179-1182.

13. **The ecological consequences of logging in the burned forests of East Kalimantan, Indonesia**
van Nieuwstadt, M.G.L., Sheil, D., Kartawinata, K.

Results of a 2-year study on post-fire vegetation dynamics in the unlogged dipterocarp rainforest of Sungai Wain near Balikpapan East Kalimantan, Indonesia are discussed. Results showed that the maintenance of a productive permanent forest estate is likely to be served best by avoiding logging activities in burned areas.

Conservation Biology 15(4): 1183-1186.

14. Exploring biological diversity, environment and local people's perspectives in forest landscapes: methods for a multidisciplinary landscape assessment

Sheil, D., Puri, R.K., Imam, B., van Heist, M., Saefuddin, Rukmiyati, Sardjono, M.A., Samsoedin, I., Sidiyasa, K.D., Chrisandini, Permana, E., Angi, E.M., Gatzweiler, F., Johnson, B., Wijaya, A.

This book for the first time brings together a suite of effective methods as a guidance on how to deal with the needs of local communities and biodiversity in landscapes required by decision makers. The techniques provide conventional biophysical descriptions of the landscape and explicitly relate this information to local needs, preferences and value systems. These methods can be used to guide future research and to make recommendations on options about land use and policy. The methods described in this report also provide a foundation for deeper dialogue with the forest communities.

Bogor, Indonesia, CIFOR. 93p. ISBN: 979-8764-88-9.

15. A field manual for rapid vegetation survey and classification for general purpose

Gillison, A.N.

The purpose of the manual is to introduce vegetation classification and survey to those with limited botanical or ecological experience, and people engage in policy development to research workers, teachers and students. Apart from providing some background on classification concepts and procedures, section (i) is designed specifically to introduce the Vegclass windows based software that forms the core of the manual and to demonstrate how the software can be used to describe and classify vegetation for a range of purposes. The software facilitates both data entry and summary tables of the site physical, vegetation structural, plant species and plant functional data. It also includes a facility to produce graphs on demand and is capable of producing new ecological measures of stand diversity based on plant functional attributes. Section (ii) contains a step by step introduction to data entry, coupled with an in-built error checking protocol that will help introduce the new user to the methods used to compile, tabulate and analyze the data.

Bogor, Indonesia, CIFOR and ACIAR. CD-ROM. ISBN: 979-8764-62-5.

16. A fuzzy analytic hierarchy process for assessing biodiversity conservation

Mendoza, G.A., Prabhu, R.

Biodiversity conservation, as one criterion for evaluating forest sustainability, is assessed using a fuzzy analytic hierarchical framework organized around three concepts: criteria, indicators, and verifiers. Following this hierarchical framework, a biodiversity conservation index model was developed as a two steps process. First, analysis is done at the indicator level to estimate the cumulative impacts of the verifiers, which are modeled as fuzzy variables. At the second level, the cumulative impacts of the indicators are measured. In both levels, the analytic hierarchy process is used to estimate the relative importance of each element in the hierarchy. Biodiversity experts then provided opinions, through pair wise comparisons, for elements at each level in the hierarchy, producing estimates of their relative importance. Based on these importance values, a composite biodiversity conservation index is calculated by combining index values from both levels of the hierarchy. To demonstrate this approach, a case study involving a forest located in Kalimantan, Indonesia was used.

In: Schmoldt, D.L., Kangas, J., Mendoza, G.A. and Pesonen, M. (eds.). The analytic hierarchy process in natural resource and environmental decision making. Dordrecht, The Netherlands, Kluwer Academic Publishers. 219-234. ISBN: 0-7923-7076-7.

17. Genetic resource management in ecosystems: report of a workshop organized by CIFOR for the SGRP, CIFOR, Bogor, Indonesia 27-29 June 2000

Poulsen, J.G., Parsell, D., Stewart, G. (eds.)

-abstract is not available-

Bogor, Indonesia, CIFOR. 42p. ISBN: 979-8764-63-3.

18. The restoration of forest biodiversity and ecological values

Sayer, J.A., Chokkalingam, U., Poulsen, J.

Several countries in the East and South Asian region are embarking upon major programs for the restoration of degraded forest ecosystems. This paper argues that many schemes proposed in the name of ecological restoration have failed to yield the benefits expected of them. There has often been a

lack of clarity in defining the precise objectives of restoration. A further problem is that they are not based upon a full understanding of why the forests were degraded or lost in the first place. The implications of reforestation and restoration for biodiversity are less well documented and this paper focuses on this issue. Based on recent and ongoing research this paper concludes that many programmes have taken narrow sectoral approaches to restoration. More holistic, integrated approaches are needed and they must be sustained over long periods. Restoration situations therefore require integrated 'ecosystem approaches'. This paper conclude with six principles that should be applied to restoration programmes not only to enhance their environmental and social benefits but also to reduce the risk of expensive failed programmes: 1. Involve stakeholders in the definition of objectives. 2. Define objectives in measurable ways. 3. Ensure that causes of degradation are understood and addressed and not just symptoms. 4. Invest on people and local institutions and not just in physical infrastructure. 5. Encourage learning and adaptation in the management programmes. 6. Apply ecosystem and common property management principles (fig. 1 and 2).

In: Proceedings of International Seminar on Restoration Research of Degraded Forest Ecosystem, 13-14 April, 2001. Seoul, South Korea, Seoul National University, College of Agriculture and Life Sciences. 1-12.

19. **Tropical forest management and conservation of biodiversity: an overview**
Putz, F.E., Blate, G.M., Redford, K.H., Fimbel, R., Robinson, J.

-abstract is not available-

Conservation Biology 15(1): 7-20.

Forest Governance and Community Forestry

20. **Access to resources in forest-rich and forest-poor contexts**
Porro R., Tiani, A. M., Tchikangwa, B., Sardjono, M. A., Salim, A., Colfer, C.J.P., Brocklesby, M. A.

This chapter examines the results from two pebble sorting methods designed to help assess important elements of human well-being, relating to access to resources and benefits from the forest (both intra and intergenerationally). The two methods were conducted in forest rich and forest poor sites in Indonesia, Cameroon and Brazil - described in detail in Annex 2 of the Introduction. Our hypotheses were a) that inequitable sharing of benefits (as perceived by local stakeholders) correlates with poor forest quality, and b) that people's perceptions of access to resources by their grandparents, themselves and their grandchildren would reflect forest quality in their area. Instead, it was found that patterned similarities, both in intra and intergenerational sharing of benefits, were more likely to be based on regional differences than on forest quality differences.

In: Colfer, C.J.P., Byron, Y. (eds.). People managing forests: the links between human well-being and sustainability. Washington, DC, USA, Resources for the Future and CIFOR. 250-273.

21. **Accommodating multiple interests in local forest management**
Wollenberg, E., Edmunds, D., Anderson, J. (eds.)

This special issue contains an editorial and seven articles. They examine the emerging pluralism in the governance of forests. Forests are naturally suited to pluralistic decision-making because of the many products and services they provide. They often involve complex arrangements for accommodating multiple interests, especially through local common property institutions. Yet, conflict persists among these diverse uses and users and has become more visible of late with the stronger voices of NGOs and community-based organizations. The papers suggest future direction for the improvement of accommodation on local forest management.

International Journal of Agricultural Resources, Governance and Ecology.
 Special Issue. 1(3/4): 193-356.

12 Forest Governance and Community Forestry

22. Accommodating multiple interests in local forest management: a focus on facilitation, actors and practices

Engel, P.G.H., Hoeberichts, A., Umans, L.

This paper is concerned with three questions. When, if at all, is facilitation worthwhile? When dealing with local forest management, what exactly should facilitators focus on? How does empowerment fit into facilitation efforts? Two case studies, one concerned with the establishment of the Bahuaja-Sonene National Park in Peru, the other with the impact of changes in forest legislation on the Yuracare in the Bolivian tropics, are presented. The conclusion is that mismatches between competent performances rather than conflicts of interests between relevant stakeholders are most involved when problems arise. To overcome these, facilitation should address at least three types of accommodation processes: learning-in-practice, learning-across-practices and resource-use negotiation. Moreover, it should define itself within a particular context. Facilitation strategies should be defined according to the type of situation the stakeholders are in. Key elements for judging fundamentally different situations are suggested. Empowerment is seen as a necessary element for strengthening the stakeholders' capacity to act and interact effectively in their search for new options and solutions.

International Journal of Agricultural Resources, Governance and Ecology 1(3/4): 306-326. ISSN: 1462-4605.

23. Agricultura familiar no nordeste paraense: informacoes preliminares como contribucao ao manejo sustentavel da capoeira

Carvalho, K. de O., Goncalves, D. de A., Mattos, M.M., Ferreira, M. do S.G. (eds.)

This extension booklet presents, in a simple language and aided by tables and illustrations, the initial results of a collaborative research project being carried out in the Bragantina and Guama regions, State of Para, in the Eastern Brazilian Amazon. The project aims to develop ways to increase the economic value of secondary forests growing in smallholder farms, and is coordinated by the Brazilian Enterprise for Agricultural Research (EMBRAPA), the Faculty of Agricultural Sciences of the State of Para (FCAP), the Center for International Forestry Research

(CIFOR) and the Tropical Agricultural Centre for Research and Higher Education (CATIE). The booklet represents an effort to devolve information to farmers. It includes results of a socio-economic study on the role of secondary forests in farmers' livelihoods, floristic inventories in secondary forests on smallholder farms and a market survey of promising products from secondary forests.

Belem, Brazil, Embrapa Amazonia Oriental and CIFOR. Embrapa Amazonia Oriental Documentos, no.78. 76p.

24. **Allocation of governmental authority and responsibility in Tiered governance regimes: the case of the Chivi rural district council landuse planning and conservation by-laws**
Mandondo, A.

The proper alignment of authority and responsibility within and between various levels of social organization is a fundamental governance problem. This study uses a review approach to critically interrogate the political economy of the allocation of environmental jurisdictions between the state, local communities and Rural District Councils in Zimbabwe. Rural District Councils have the authority to enact conservation and landuse planning by-laws. A subsidiary aim is to investigate the practical operation of these by-laws in everyday social life through analysis that situates the effectiveness of by-laws within the theme of proximity to citizens. Several flaws and contradictions are evident in the political economy of the allocation of authority and responsibility among these actors. Assignment of responsibilities is framed by a top-down structure in which entrustments are transferred solely to Rural District Councils at the expense of other levels of social organization, particularly those close to the citizens. Governance arrangements fostered through the by-laws punish citizens for not respecting arrangements that they do not effectively participate in crafting. Revenues accruing from fines imposed on people violating such arrangements accrue to the Rural District Councils, not to the communities from which they are extracted. The study argues for innovative governance approaches that entail fundamental changes in by-law articulation.

African Studies Quarterly (online journal). 5(3): 14p.
[online] html URL: <http://web.africa.ufl.edu/asq/v5/v5i3a3.htm>.

14 Forest Governance and Community Forestry

25. **Anticipandoce al cambio: guía para el uso de escenarios como instrumento para el manejo forestal adaptable**
Wollenberg, E., Edmunds, D., Buck, L.

Scenario methods can be used to anticipate the future and expand the creativity of people thinking about complex forest management situations. This manual describes the use of scenarios with multiple stakeholders, with examples drawn from community-based forest management. Four classes of scenario methods are described: visions, projections, pathways and alternative scenarios. Examples of rapid participatory techniques relevant to scenario methods are also summarized. It is hoped that these methods will be useful for bringing together different groups of people concerned about forest management to exchange views, expand the realm of decision possibilities and reach more innovative solutions.

Bogor, Indonesia, CIFOR. 38p.
 It is also available in English and Indonesian

26. **Anticipating change: scenarios as a tool for increasing adaptivity in multistakeholder setting**
Wollenberg, E., Edmunds, D., Buck, L.

Current trends to improve the adaptiveness of community forest management focus on monitoring past actions and emphasize internal dynamics. We show how scenario methods can be used to 1) enable managers to better understand landscape and larger scale forces for change and to work with stakeholders at these levels and 2) improve adaptiveness not only by responding to changes, but also by anticipating them. We review methods related to scenario analysis and discuss how they can be adapted to community management settings to improve the responsiveness and the collaboration among stakeholders.

In: Buck, L., Geisler, C.C., Schelhas, J., Wollenberg, E. (eds.). Biological diversity: balancing interests through adaptive collaborative management. CRC Press, Boca Raton, Florida. 329-347. ISBN: 0-8493-0020-7.

27. **Appropriation of women's indigenous knowledge: the case of matrilineal Lua in northern Thailand**
Satyawadhana, C.

The Lua, according to their mythology, are the original inhabitants of Thailand. Today, however, they are regarded as ethnic

minorities who inhabit this region. A study of their myths and legends reveals the importance of spirit cults, matriclans, and women's role in the discovery, production, and trade of salt. The matriclan system is also established in the longhouses and their social structure. However, with the entry of the Thai state, power has shifted from the Lua women to Thai men who represent the state. This has also resulted in the appropriation of women's traditional knowledge about the technology and rituals surrounding forest conservation and sustainable use of resources. Further, there has been a shift in gender relations in favor of men among the Lua people.

Gender, Technology and Development 5(1): 91-112.

28. Are women important in sustainable forest management
Colfer, C.J.P.

This paper provides three types of evidence demonstrating women's importance in forest management. The first draws on Colfer's extensive, long term ethnographic experience in the forests of the United States and Indonesia—showing the various ways in which women participate in local, informal forest management; the second draws on her participation in a criteria and indicators project (in Cote d'Ivoire, Brazil, Indonesia, Cameroon, Austria, and the United States)—showing similar evidence, based on short term studies; and the third involves a systemic analysis of factors affecting forests and human well being. This last traces the links among women's status, women's education, women's involvement in wage labour, human health, population, and forests.

In: Lidestav, G. (ed.). Women and forestry: how can gender research contribute to a more sustainable forest management: proceedings of the XXI IUFRO World Congress, Kuala Lumpur, Malaysia, August 7-12, 2000. Research Group 6.18.00. Umea, Sweden, Swedish University of Agricultural Sciences, Department of Silviculture. Report no.47. 48-56.

29. Assessing intergenerational access to resources : using criteria and indicators in West Kalimantan, Indonesia
Colfer, C.J.P., Wadley, R. L., Harwell, E., Prabhu, R.

This chapter makes use of data from research conducted in 1996 in and around Danau Sentarum Wildlife Reserve in West Kalimantan, Indonesia. Its initial purpose was to contribute to the development of principles, criteria and indicators for

sustainable forest management. The particular topic investigated here is "intergenerational access to resources" in sustainable forest management. Three methods are briefly described, along with illustrative cases and evidence demonstrating aspects of SIAR that contribute to sustainable forest management. A scoring system, linked to the CIFOR Generic C&I (criteria and indicators), is also presented. Evidence of this kind can contribute to our understanding of the causal links between intergenerational access to resources and sustainable forest management.

In: Colfer, C.J.P., Byron, Y. (eds.). People managing forests: the links between human well-being and sustainability. Washington, DC, USA, Resources for the Future and CIFOR. 190-213.

30. Assessing people's perceptions of forests: research in West Kalimantan, Indonesia

Colfer, C.J.P., Woelfel, J., Wadley, R. L., Harwell, E.

Previous research has identified three important issues of relevance to forest people's roles in sustainable forest management that we address here: the presence of a "conservation ethic", a feeling of closeness to the forest, and a significant forest-culture link. This article provides the results of a method (the Galileo) that is hoped could help clarify these issues and render them more quantitatively assessable. Instead, it was found that the method more useful in reflecting local perceptions of the forest. The differences in perceptions based on gender and ethnicity are of interest for forest management more generally.

In: Colfer, C.J.P., Byron, Y. (eds.). People managing forests: the links between human well-being and sustainability. Washington, DC, USA, Resources for the Future and CIFOR. 135-154.

31. Between voodoo science and adaptive management: the role and research needs for indicators of sustainable forest management

Prabhu, R., Ruitenbeek, H.J., Boyle, T.J.B., Colfer, C.J.P.

The development of appropriate indicators of sustainable forest management is attracting considerable interest, although some controversy still exists regarding their utility. The wrong indicators can lead to negative, destructive effects on the systems whose maintenance they allegedly seek to support, and in order for indicators to fulfil a legitimate role as information

tools for forest managers. Attention needs to be paid to their proper selection, development and use. This chapter examines how these conditions can be met. All definitions of sustainability involve value judgements, attention therefore must be paid to underlying mental models and subjectivity. Indicator sets must be both transparent and accepted by society. A hierarchical approach remains currently the most practical and effective model for dealing with criteria and indicators (C&I). C&I sets might, however, be better considered as information or communication networks as such, C&I would allow us recognize information related to systemic sustainability. Thresholds for individual indicators are important as they could theoretically indicate switch points or inflection zones for the system, including points at which the system degrades irretrievably. One major challenge facing researchers is the identification and quantification of such thresholds. Adaptive co-management is emerging as a promising means of resource management, but there is little understanding of how to maximize its contribution to sustainable tropical forest management. The whole C&I would eventually become an integral part of the monitoring and feed back systems thus facilitating adaptive co-management. It is concluded that, while indicators suffer from limitations in providing broad but not deep insights, their advantages as effective information tool in the service of forest management outweigh these limitations. They are transparent and readily understandable information tools and their scope is limited only by the extent of our knowledge of the underlying systems and translation of that knowledge into effective indicators.

In: Raison, J, Brown, A. and Flinn, D. Criteria and indicators for sustainable forest management. Wallingford, Oxon, UK, CAB International. IUFRO Research Series, no.7. 39-66. ISBN: 0-85199-392-3.

32. Bobolizan, forests and gender relations in Sabah, Malaysia
Porodong, P.

The complex web of relations between people and their environment has often been disturbed by development. For the Rungus, this has eliminated the importance of the institution of bobolizan (traditional priestess). Colonial intervention that changed the administrative system has reduced the influence of traditional leaders in social and resource control. One of the major impacts has been the transformation of indigenous

property systems from communal property to individual ownership to favor colonial interest. This has affected indigenous capabilities to support community survival, and women's role in management of forests. Traditionally, the forest was used for cultivation, hunting, gathering, and ritual purposes; now it is a cash generator. These changes in belief and property systems and economic necessity have influenced every aspect of indigenous livelihood. This article analyzes the past socio-political power and the present decline of the bobolizan and the impact of Christianity and state forest policies on gender relations among the Rungus of Sabah, Malaysia.

Gender, Technology and Development 5(1): 63-90.

33. **Can we be engineers of property rights to natural resources? some evidences of difficulties from the rural areas of Zimbabwe**
Luckert, M.A.

The desire for research to be policy relevant has caused many social science studies to have "engineering" dimensions. With respect to the engineering of property rights, economic approaches indicate that we require knowledge regarding the makeup of current property rights structures, how changes to current structures affect the use and management of natural resources, and how property rights have evolved. In the case of rural areas of Zimbabwe, research has largely disclosed complexities involved in addressing these questions, but it has not yet provided sufficient information needed to pursue property rights engineering objectives. The difference between what we know and what we need to know provides the basis for a research agenda that will require some significant changes in the way that property rights are described and analyzed.

African Studies Quarterly (online journal) 5(3)
[online] html URL: <http://web.africa.ufl.edu/asq/v5/v5i3a5.htm>.

34. **Case for local forest management: environmental services, internalisation of costs and markets**
Nathan, D., Kelkar, G.

This paper looks at forests as sources of local environmental services (e.g. nutrient recycling and soil formation). It is through the fall in supply of these services that forest communities bear the external costs that are not included in the price of timber

and other forest products. Local environmental services are taken into account in forest management decisions by local communities and form a basis for setting up local forest management systems. In arguing for the establishment of forest communities' property rights over forests, the paper supports the establishment of markets for regional and global environmental services provided by forests.

Economic and Political Weekly 36(30): 2835-2845.
[online] URL: <http://epw.org.in/36-30/sa1a.htm>

35. **Challenges to proponents of common property resource system: despairing voices from the social forests of Zimbabwe**
Campbell, B.M., Mandondo, A., Nemarundwe, N., Sithole, B., de Jong, W., Luckert, M., Matose, F.

There is a fair degree of misplaced optimism about common property resource (CPR) management. In investigating common property issues for woodlands in communal areas in Zimbabwe, there are numerous case studies showing a breakdown of local institutions for CPR management, and the lack of any emerging alternative institutions for such management. There are a number of contributing economics, social and ecological factors to this phenomenon. This article argues that the formal rule-based systems that form the cornerstones of the proposed CPR systems are far removed from the current institutional systems, rooted in norm-based controls. It suggests that advocacy of CPR systems has to be tempered with critical analysis

World Development 29(4): 589-600.

36. **Community-based conservation**
Cunningham, A.B., Shanley, P.

The practice of community-based conservation is discussed, specially social issues which are firmly embedded in the management of forest resources by communities, but too often overlooked. Good management requires not only technical expertise, but include wide social acceptance. Useful analytical frameworks for fieldworkers to better understand the complex issues surrounding community based resource management are described.

People and Plants Handbook Issue 6: 1-2.

37. **Conflict in resource management for ecosystem services: water in Lashi watershed, Lijiang**
Yu Xiaogang

This article discusses the role of forests at different elevations in providing ecosystem services, and particularly water. It analyses the changes in forest management and their consequences over the post liberation period, concentrating on the post-1983 devolution of forest management to village and household levels. A more detailed description of the forestry situation in three villages, Nanyao and western and eastern villages is presented. Following this, the effects of various forest management systems, including the various forms of local forest management on the provision of ecosystem services are considered. A discussion of various forms of inequality embodied in the tree extraction of external ecosystem services, the inequalities being those between the town and countryside, between lowland and upland and between men and women. The ways in which a market for the ecosystem product, water could be established are considered along with the implications of such a market for local communities.

Economic and Political Weekly 36(30): 2851-2858.
[online] URL: <http://epw.org.in/36-30/sa3.htm>

38. **Criteres et indicateurs de durabilite dans les paysages forestiers geres par les communautes: guide introductif**
Ritchie, B., McDougall, C., Haggith, M., Burford de Oliveira, N.

Community managed forest systems embody a considerable portion of the wisdom, knowledge, and practical skills and management necessary for the sustainability of forest resources globally. These systems, however, are under threat in many ways, including from the rapid rate of change of their political, socio-economic, and biophysical contexts. Adapting forest management sufficiently quickly and effectively to meet these changes is both urgent and very challenging. This guide introduces criteria and indicators of sustainability for community managed forest landscapes (CMF C&I) as a potential learning and communication tool that can help meet that challenge. It draws on CIFOR collaborative research on CMF C&I in Brazil, Indonesia, and Cameroon to propose a flexible step-by-step approach to developing and implementing self -

or collaborative forest monitoring systems, and gives examples of C&I developed by communities in these countries. The approach is targeted to communities and their partners in forest management, such as NGOs, government, or development projects, who are seeking strategies to improve local well-being and forest sustainability through more effective learning, collaboration, and decision-making in local forest management.

Bogor, Indonesia, CIFOR. 117p. ISBN: 979-8764-43-9.
Also available in English, Portuguese, and Indonesian

39. Decentralisation, local communities and forest management in Barito Selatan district, Central Kalimantan
McCarthy, J.F.

Based on field research carried out in Central Kalimantan, Indonesia during June and July 2000, this chapter examines the likely impact of the decentralisation reforms on forest management in Barito Selatan. Conclusions are derived from three major sources. First, interviews were conducted with key government officials and community figures in the provincial capital, Palangkaraya, and the district capital, Buntok. These were supplemented with information from relevant newspaper and government reports. Thirdly, brief visits were made to a number of communities around the district to examine the implications of these reforms for forest dependent communities and to consider the degree to which local communities are likely to benefit from the new decentralised arrangements. The first section of this chapter provides an overview of the geographic and economic context, at the same time discussing the forestry sector in the district. The second section examines specific disputes, controversies and decisions regarding land use, forestry regulations, law enforcement, and revenue collection, considering the roles and motivations of different stakeholders during the decentralisation process and the consequent implications for forests and people. The third section considers the situation of forest dependent communities in the district in the midst of the decentralisation process. It examines the fate of village communities dependent on rattan gardens, the circumstances of an isolated and impoverished community living in the middle of a logging concession area, and a hamlet where eleven unlicensed sawmills had opened operations over the previous twelve months. Based on this

discussion, the final section draws some conclusions regarding the real and anticipated effects of decentralisation on forest management in the district.

Bogor, Indonesia, CIFOR. Case Studies on Decentralisation and Forests in Indonesia. Case Study no.1. 34p. ISBN: 979-8764-79-X.

40. Decentralisation of administration, policy making and forest management in West Kalimantan

Soetarto, E., Sitorus, M.T.F., Napiri, Y.

This study examines the preliminary impacts of Indonesia's decentralization process on the administration and management of forest resources in Ketapang District, West Kalimantan. The case study is based on field work carried out in mid-2000, using a rapid appraisal methodology. The report covers the impacts of decentralization in three areas, in particular: customary adat communities, oil palm and rubber plantations, and conservation issues related to Gunung Palang National Park. In each of these areas, the authors examine struggles among competing interest groups that have arisen under decentralization. The study finds that with the shift of administrative authority to the district level, the district government in Ketapang took measures to generate local sources of revenues by issuing large numbers of small-scale timber extraction permits and to 'legalize' the transport of timber that had otherwise been harvested illegally. The study also finds that the very limited flow of formal revenues from the Gunung Palang National Park to the district government has encouraged an escalation of illegal logging within the park's boundaries. The authors recommend that the Ketapang District government become more involved in administering the national park to ensure that economic interests of both the district government and local communities are accommodated in the park's management.

Bogor, Indonesia, CIFOR. Case Studies on Decentralization and Forests in Indonesia. Case Study. no.8.

41. Devolution in natural resource management: institutional arrangements and power shifts: a synthesis of case studies from southern Africa

Shackleton, S., Campbell, B.M.

The study provides a comparative analysis of the devolution and empowerment process in 14 case studies drawn from eight

countries in southern Africa. Each case study examined the extent to which policy and legislation devolves significant control over decision making and benefit flows to communities; the legitimacy and power of different community institutions and their relationship with other stakeholders such as local authority structures, NGOs, donor agencies, and the private sector; and lastly the relationship and divisions between different actors and groupings in the community. The impacts of devolution were found to differ considerably among case studies both within and between countries, of the countries from which they derive. The study revealed that while some empowerment schemes appear to be marked success others appear doomed to failure, or if one is more optimistic, have resulted in the development of capacity within certain organisations but are unlikely to result in sustainable systems of natural resource management. In the countries studied, there have been progress towards CBNRM and a move away from the previous, largely unsuccessful, centralised command and control approaches to natural resources management. In some cases the move to community-based management has been more successful in empowering local communities than in others. In most instances there is little evidence, with the possible exception of specific case studies in Namibia and Malawi, to demonstrate that devolved authority has resulted in more sustainable natural resource management. The assumption is that if true community control is in place then sustainable NRM still require attention and further research effort. The study also revealed a range of factors and conditions that may help contribute to the success of CBNRM initiatives and the empowerment of local communities. The chances of CBNRM succeeding appear greater in situations where high value resources are involved, which have the potential to provide communities with an income stream which give incentive to participate and comply with rule and regulation.

Bogor, Indonesia, CIFOR. 79p.

42. **Editorial: accommodating multiple interests in local forest management**
Wollenberg, E., Edmunds, D., Anderson, J.

The authors introduce the special issue on accommodating multiple interests in forest management and provide an overview of the seven papers in the issue. The papers document and

analyze existing approaches and from them identify principles related to pluralism and good governance. Three themes emerged from the papers. First, there are serious pragmatic and theoretical difficulties in defining interests and reaching agreements. The papers demonstrated the diversity of interests that exist in apparently homogeneous groups, the tendency for interests to be constructed in response to specific contexts and for strategic purposes, and the partial and temporary nature of agreements. Second, the papers suggest that accommodation is not a steady-state condition that can be achieved, but instead a process that is necessarily ongoing. Third, weaker groups' interests were routinely ignored or negotiated away. Certain parties enjoyed disproportionate control because of a lack of democratic practice in (1) who assumed the convenor and facilitation roles (or controlled them), (2) who was represented in the process, and (3) differing capacities for communication and negotiation among participants.

International Journal of Agricultural Resources, Governance and Ecology.
Special issue 1(3/4): 193-198.

43. **The effects of Indonesia's decentralisation on forests and estate crops: case study of Riau province, the original districts of Kampar and Indragiri Hulu**
Potter, L., Badcock, S.

This study focuses on the impacts of decentralisation on forests and estate crops in the original districts of Kampar and Indragiri Hulu, located in Riau Province, Sumatra, Indonesia. The research was conducted during 2000, preceding the beginnings of decentralisation in January 2001, with a brief follow-up to March of that year. It was important to chart attitudes to decentralisation at provincial level, as well as examine the deconcentration of the regional office of the Jakarta-based Ministry of Forestry and Estate Crops. The demands for fiber of the two immense pulp and paper companies (RAPP and Indah Kiat) was analysed on a province-wide basis. Both of the original districts were recently subdivided: Kampar became three, adding Rokan Hulu and Pelalawan, while Indragiri Hulu was halved to add Kuantan Singingi. The existence of these new entities, struggling to create separate infrastructure and administrations, has complicated the decentralisation process. Much of Indragiri Hulu is occupied by Bukit Tigapuluh National Park and its buffer zone, with many stakeholders and conflicts

over illegal logging, while Kuantan Singingi has large areas under pulp plantations. Kampar and Rokan Hulu are dominated by oil palm, the plantations' occupancy of the land being contested by local populations. Pelalawan still has natural timber, the swamp forests of the sparsely populated lower Kampar basin, but is also the headquarters of RAPP in the rapidly expanding centre of Pangkalan Kerinci. The study found that during 2000, the most serious impact on the forests was a result of political reformation and the economic crises, with the Soeharto government's rules being ignored and timber being cut for its quick return under conditions of high demand. Depressed rubber prices gave further impetus to forest clearing. After decentralisation, despite greatly increased available income in the districts, serious environmental and social problems remained to be tackled. While local pride was a positive outcome, signs of both xenophobia and a rush to develop at all costs were worrying aspects.

Bogor, Indonesia, CIFOR. Case Studies on Decentraliation and Forests in Indonesia. Case Study no.6 & 7. 73p. ISBN: 979-8764-84-6.

44. Fire in East Kalimantan: a panoply of practices, views and (discouraging) effects
Colfer, C.J.P.

This paper describes 1999 research intended to shed light on the causes and effects of the devastating 1997-98 forest fires in East Kalimantan, Indonesia. The author visited six communities and interviewed representatives of several other stakeholders (oil palm plantations, industrial timber plantations, timber companies, local government officials) about the causes and effects of the fires. She describes the traditional fire management techniques known by the Kenyah (a dayak group) in several locations. The fires varied considerably in intensity and damage done, among the communities. But some sustained very severe damage to their environment and suffered serious health consequences (both physical and psychological). The paper concludes by estimating the relevance of ten propositions relating to the likelihood of fire danger to each of the six villages visited.

45. **Forest cover change analysis as a proxy: sustainability assessment using remote sensing and GIS in West Kalimantan, Indonesia**
Dennis R.A., Colfer, C.J.P., Puntodewo, A.

This study used a time series of remote sensing data from 1973, 1990 and 1994 to assess sustainability of forest use in three villages in West Kalimantan, Indonesia. This time period is characterised by a shift among three separate, recognised management systems: indigenous management; timber concessionaire management; and management as a wildlife reserve. Comparing remotely sensed data from three different sources with different spatial and spectral resolutions presented a technical challenge. A combined digital and visual classification methodology was adopted to produce comparable forest cover maps. These maps were combined within a geographical information system (GIS) with socioeconomic and cultural data. Quantitative change analysis over such a long period provided a valuable insight into forest cover dynamics in this area. The three villages selected for the study are characterised by two distinct patterns of resource use: shifting cultivation and capture fishery. Comparison of the forest change maps over the 21-year period shows that forest loss among the community of shifting cultivators is 7% less than forest loss for one of the fishing communities. Remarkably, the other fishing community examined shows only a 1.5% loss in forest over the 21-year period. Through this work we have combined forest cover change with ethnographic and socioeconomic data (both in a GIS and by conventional means). This approach can make a valuable contribution to assessing sustainability.

In: Colfer, C.J.P., Byron, Y. (eds.) People managing forests: the links between human well-being and sustainability. Washington, DC, USA, Resources for the Future and CIFOR. 362-387.

46. **Forest management and terraced agriculture: case study of Hani of Ailao mountains, Yunnan**
Wang Qinghua

This case study of the Hani in the Ailao mountains of Yunnan, China, highlights the importance of forests in providing local ecological services that are essential for the system of terraced agriculture. This paper investigates local people's knowledge of these ecological services, including water regulation and nutrient

recycling, as well as the gender differences in the local knowledge of these services. It notes that the Hani have maintained the forest condition quite irrespective of its tenurial status. Contemporary forest policies and reforestation in the area are also discussed.

Economic and Political Weekly 36(30): 2846-2850.
[online] URL: <http://epw.org.in/36-30/sa2.htm>

47. **Forest management as political practice: Indian experiences with the accommodation of multiple interests**
Baviskar, A.

The multiplicity of interests around forests in India reflects the range of social groups who have a stake in their management. Forestry practices, and the ideologies that legitimize them, have been shaped by the political differences prevailing among these collectivities. This paper examines how power relations intersecting the global, national and local levels affect forest management. It attempts to link the articulation and accommodation of specific interests in forestry to the configurations of power obtaining in particular social and historical circumstances. The analysis focuses on the central role of state institutions and ideologies in shaping forest management and discusses how state practices have changed in response to pressures from global and local actors. In conclusion, the paper examines the potential within contemporary forest management practices to further the objectives of social justice and ecological sustainability.

International Journal of Agricultural Resources, Governance and Ecology 1(3/4): 243-263.

48. **Forest management in Mesuo matrilineal society, Yunnan, China**
He Zhonghua

This study examines the effect of forestry policy devolution and economic development in two Mosuo matrilineal communities where women play a large role in the utilization, management and conservation of forest resources. Two matrilineal villages in Ninglang, China are compared, the first in which forests are well protected, tourism has made villagers relatively rich, and some negative influences on gender equality have begun to appear; and the second where a traditional livelihood made from the

forest has kept villagers poor and deforestation is severe, but gender relations remain relatively balanced. The article details the gender division of labour and how it has been affected by tourism development, changes in forest use, regulation and ownership, problems in forest management, gender relations, and Mosuo women's key role in afforestation. The author concludes that tourism development provides a better livelihood and thus helps protect the forest, which in turn benefits tourism, and therefore livelihood, in various cycle, but does this in part by displacing forest degradation to other areas. A lack of such development, by contrast, leads to a vicious cycle of forest degradation driven by the poverty of local people. In both cases, however, the Mosuo matrilineal system and its traditional use and regulation of forest resources help to protect forests.

Gender, Technology and Development 5(1): 33-62.

49. **Forest, resources and people in Bulungan: elements for a history of settlement, trade and social dynamics in Borneo, 1880-2000**
Sellato, B.

Bulungan regency is the northern part of the province of East Kalimantan, Indonesia. In the course of the last decade, Kalimantan's hinterland has been the target of unprecedented non-timber forest products (NTFP) collecting activity. More intensive NTFP use has contributed to unsustainable extractive practices and environmental damage and to deep social and political disruption. This book examines northern East Kalimantan's trade networks. The historical scope extends from about 1880 to present and primarily focus on Long Pujungan and Malinau districts. Thematically, the study is on institutions and land and forest use patterns, and their changes with emphasis on social and economic features. It explains regional patterns in the light of past relationships between tribal interior groups and trading coastal polities and seeks to understand both the economic contribution of NTFPs and the institutions controlling their use. It offers some broad ideas that should prove useful in understanding how the past has shaped the present and how the present socio-economic situation owes many of its specific features to past patterns and events.

Bogor, Indonesia, CIFOR. 183p. ISBN: 979-8764-76-5.

50. **From “participation” to “rights and responsibilities” in forest management: workable methods and unworkable assumptions in West Kalimantan, Indonesia**
Colfer, C.J.P., Wadley, R. L.

This chapter reports the results of research in West Kalimantan, Indonesia, originally designed to assess quickly and easily the level and nature of participation by local people in forest management. It briefly describes pertinent results from authors’ assessment methods. Although the functions they initially anticipated for participation are not wrong, they reflect a way of looking at forest management that were concluded needs rethinking. In the discussion of the change needed, Jordan’s concept of “authoritative knowledge” and “social” or “cultural capital” was used. The authors suggest substituting “rights and responsibilities to manage the forest cooperatively” for “participation” in places like Danau Sentarum Wildlife Reserve (DSWR). Important remaining policy-related issues include the variations in quality of local management systems, values held by the different stakeholders, and potential productivity of individual systems. Finally it concludes that, given the dynamism and complexity that characterise natural forests and their inhabitants, cooperation among all stakeholders in an ongoing dialogue is most likely the only way that sustainable forest management can in fact occur.

In: Colfer, C.J.P., Byron, Y. (eds.). People managing forests: the links between human-well being and sustainability. Washington, DC, USA, Resources for the Future and CIFOR. 278-299.

51. **Gender and diversity in assessing sustainable forest management and human well-being: reflections on assessment methods tests conducted in Bulungan, East Kalimantan, Indonesia**
McDougall, C.L.

Gender and human diversity are critical aspects of sustainable forest management and human well-being. This chapter draws on experiences of a criteria and indicators (human well-being assessment) methods test in Kalimantan, Indonesia, to explore these concepts, and gender and diversity analysis in relation to sustainability in forestry, specifically in terms of the role of such analysis in human well-being assessments for research and management. Some of the key theoretical underpinnings of gender

and diversity analysis are highlighted, including the potential tensions between the two elements. These tensions, however, are resolvable if gender is approached conceptually as existing at both the macro and micro levels; in the former creating "space" for diversity and in the latter as one of many forms of diversity. The need to emphasise relations in gender and diversity analysis, instead of just roles, is also critical. Taking a gender and diversity approach in the assessment of human well-being in Kalimantan required creativity and flexibility in design and implementation. The chapter addresses these through three lenses: "assessor" awareness, or "grounding oneself"; the assessment tool (in this case the CIFOR C&I Generic Template); and challenges and strategies for accessing local people's participation. The human well-being assessment test experience in Kalimantan, and other experiences in forestry and natural resource management, indicate that gender and diversity approaches increase the accuracy of assessments, and thus the ultimate effectiveness of research and forestry initiatives. The fundamental connection of gender and diversity analysis to issues of equity, and the links to participation and empowerment also reveal the potential potency of such analysis in promoting social change.

In: Colfer, C. J. P., Byron, Y. (eds.). People managing forests: the links between human well-being and sustainability. Washington, DC, USA, Resources for the Future and CIFOR. 50-71.

52. Gender relations in forest societies in Asia *Kelkar, G., Nathan, D.*

Based on fieldwork several indigenous societies in South and Southeast Asia, this article explores the change in gender relations from a matrilineal and/or egalitarian system to one where male domination is present as the norm. We looked at changes in gender relations in forest societies in four situations: (a) colonial and state rule over forest communities and the takeover of forests; (b) historical and contemporary revolts of forest-dwelling women and men re-establish community control over forests; (c) the response of national states to these autonomy movements by shifting to devolution as a policy; and (d) the current situation, where women's inclusion in local forest management is becoming more a policy norm. However, these norms of women's inclusion, though still

limited in space, have also come about through a process of struggle by women.

Gender, Technology and Development 5(1): 1-32.

53. **Household livelihood strategies in the Miombo woodlands of Tanzania: emerging trends**

Monela G.C., Kajembe, G.C., Kaoneka, A.R.S., Kowero, G.

The study was undertaken in Tanzania to assess the effect of some macro-economic policies on livelihood strategies for households within or in close proximity in Miombo woodlands. The focus was on how their responses are impacting on the management and use of the woodlands. Data were collected at macro level from three sites categories as remote, intermediate and peri-urban. Also data on important macroeconomic trends were collected. The results indicate that reductions on government spending have decreased agricultural support in terms of extension services and subsidies on farm inputs. The increase in prices of input factors relative to output has raised costs of farm inputs, cost of living in general and decreased disposable incomes for most rural dwellers, forcing some of them into extensive forest product exploitation and trade for each incomes. In the study sites, some forest products contribute between 50-70% of annual household incomes. However not many households have the capacity to take the advantage of promising forest-based income generating activities. Economic hardships also led to changes in gender roles particularly in peri-urban and intermediate sites. Women are increasingly expanding their roles, away from traditional domestic activities to income generating activities such as forest product exploitation and sale, casual labour and petty business. Men are gradually taking up activities that have traditionally been in the domain of women. The role of local institutions and traditional values in management of woodlands has declined. Village governments have replaced village and clan elders in land allocation. Local beliefs of value for forest protection and traditional property rights that influence utilization of communal resources have gradually been eroded. Some macro-economic policies have created conditions for broadening the cash income base of rural communities and have put

value on some otherwise non-tradable forest products. Local communities advocate for the full involvement in the management and use of these resources.

Tanzania Journal of Forestry and Nature Conservation 73: 17-33.

54. The impacts of decentralisation on forests and forest-dependent communities in Malinau district, East Kalimantan

Barr, C., Wollenberg, E., Limberg, G., Anau, N., Iwan, R., Sudana, I.M., Moeliono, M., Djogo, T.

Malinau District, established through partition in 1999, is the largest district in East Kalimantan, and contains some of its largest tracts of forest. With decentralization, the district has sought to generate revenues from its forests, but these efforts have been handicapped by a concurrent lack of institutional capacities to manage rapid forest exploitation and conflicts over claims. Timber extraction and utilization permits (Izin Pemungutan dan Pemanfaatan Kayu or IPPK) have been the main instruments for revenue generation, with 39 IPPKs covering 56,000 ha. expected to generate revenues equivalent to roughly nine times the district's 2000 budget. The IPPKs have enabled local entrepreneurs and communities to gain access to forest land and benefits previously controlled by centrally allocated concessions, however conflict has increased significantly where IPPKs' overlapped with concessions and where IPPKs did not fulfill contractual obligations to communities. Overlapping adat or customary-based claims to land have fueled further conflict. While districts now enjoy more control and economic benefits from forests, there is a high risk of re-concentration of power at the district level, especially as government officials lack accountability to villagers and communities still lack secure legal rights to resources.

Bogor, Indonesia, CIFOR. Case Studies on Decentralisation and Forests in Indonesia. Case Study 3. 48p. ISBN: 979-8764-81-1.

55. In search of a conservation ethic

Salim, A., Brocklesby, M.A., Tiani, A. M., Tchikangwa, B., Tiani, A.M., Sardjono, M.A., Porro, R., Woelfel, J., Colfer, C.J.P.

This paper makes use of the Galileo method to compare cognitive distances between selected forest-related concepts in Brazil, Indonesia and Cameroon. The purpose is to determine whether

or not there are significant differences in people's perceptions that could reflect the concept of a conservation ethic in these locations. Specific hypotheses focus on the cognitive relationships between spirit and forest; between forest, good and future; and between forest and me. Although the method provides interesting and useful information on cognition, it is less useful in clarifying the existence or measurement of a conservation ethic.

In: Colfer, C.J.P., Byron, Y. (eds.). People managing forests: the links between human well-being and sustainability. Washington, DC, USA, Resources for the Future and CIFOR. 155-166.

56. Indigenous communities' knowledge of local ecological services
Kumar, S.

This paper investigates in detail the extensive indigenous knowledge of forest ecological services in 3 villages (Katwa, Karudih, and Hesadih) situated in the eastern plateau region of India. One aspect discussed is the indigenous knowledge on the influence of forests on water regimes and water quality. Differences in perceptions about the local ecological services and attendant practices within communities that are dependent on forests are then analysed under 2 contrasting land-tenure regimes, namely, community forests and state forests. It is argued that local ecological services are the missing link in designing plans for successful decentralization and sustainable management of forests.

Economic and Political Weekly. 36(30): 2859-2869.
[online] URL: <http://www.epw.org.in/36-30/sa4.pdf>

57. Integral local development: 'accommodating multiple interests' through entrustment and accountable representation
Ribot, J.C.

Accommodating multiple interests involves integrating across-highly stratified societies. Integral local development is a means of integrating across these interests through locally accountable representative authorities entrusted with public powers. It is integral to the local community because it is based on democratic representation - where 'democratic' is substantively defined as a system of public power holders who are accountable to the public. Customary authorities, NGOs, local environmental agents

and ad hoc committees do not necessarily represent the public nor are they systematically accountable. This paper advances elected local government as a legitimate representative of local people in environmental and other matters.

International Journal of Agricultural Resources, Governance and Ecology 1(3/4): 327-350. ISSN: 1462-4605.

58. **Introduction: the challenge of adaptive collaborative management**
Schelhas, J., Buck, L., Geisler, C.C.

Efforts to link conservation and development have met with substantial challenge. Although integrated conservation and development projects (ICDPs) raised hopes that "win-win" outcomes were possible, experience has shown the many difficulties of protecting international and local agendas for conservation of biological diversity where livelihood goals were also important. Adaptive collaborative management (ACM) may be one approach that better balances local, national and global interests in conserving biodiversity with competing interests for resource use. This chapter provides an introduction to the state of the art of ACM as an approach for protected area management

In: L. Buck, C.C. Geisler, J. Schelhas, E. Wollenberg (eds.). Biological diversity: balancing interests through adaptive collaborative management. Boca Raton, Florida, CRC Press. xxii-xxxv. ISBN: 0-8493-0020-7.

59. **Introduction: history and conceptual framework**
Colfer, C.J.P., Byron, Y., Prabhu, R., Wollenberg, E.

This chapter describes the history of criteria and indicators work at CIFOR, as an introduction to the subsequent chapters in this book. It also outlines the conceptual framework used to place human well-being within the topic of sustainable forest management. This includes a definition of human well-being that includes security and sufficiency of access to resources now and in the future; economic opportunity; decision making opportunity; heritage and identity; justice; and health and safety. The chapter also briefly describes the social science methods used to assess human well being; and provides a summary of CIFOR's social criteria and indicators.

In: Colfer, C.J.P. and Byron, Y. (eds.). People managing forests: the links between human well-being and sustainability. Washington, DC, Resources for the Forests and CIFOR. 1-49.

60. **The invisible wand: adaptive co-management as an emergent strategy in complex bio-economic system**
Ruitenbeek, J., Cartier, C.

This paper provides an economic perspective on concepts related to adaptive co-management (ACM). The discussion is cast within a formal generalised complex system (CS) framework. The authors explicitly explore the hypothesis of whether ACM can be regarded as an emergent strategy under specific conditions. The conditions draw a corollary from the well-known work of Adam Smith that describes 'self interest' as a forcing factor (the 'invisible hand') that lead to stability and efficiency in economic systems. The specific hypothesis is meant as an exploratory tool that permits the authors: (i) to develop in greater detail a formal definition of the elements of the system within a CS framework; (ii) to provide economic perspectives on the literature relating to ACM; (iii) to derive some related empirical lessons from that literature; (iv) to demonstrate the limitations of existing economic modelling and analytical constructs for addressing ACM issues; (v) to identify potential policy linkages; and (vi) to elaborate research implications.

CIFOR Occasional Paper no.34. 47p.

61. **Ketergantungan masyarakat Dayak terhadap hutan di sekitar Taman Nasional Kayan Mentarang**
Uluk, A., Sudana, M., Wollenberg, E.

In Indonesia, rapid deforestation is affecting local populations' access to forest, yet little information is available about the impacts of deforestation on highly forest-dependent populations. To better understand these potential impacts, this document reports on economic and cultural uses of the forest for three villages in the Sub-District of Pujungan in East Kalimantan, Indonesia using data from household surveys conducted in 1996. It shows how local Kenyah groups depend on forests for food, medicine, construction, cash income, as well as to maintain natural resources such as water and soil fertility, and as a source of cultural symbols and even people's names. It also show the linkages of the forest to Kenyah culture and reviews local rules of use of forest resources, including the concept of tana' ulen. The study concludes that although policies making customary management of forest possible, these policies have yet to be

formally applied in the area. It is a risk to apply before the local communities feel more secure about their rights to land, their way of life, which depends so very much on the forest.

Bogor, Indonesia, CIFOR. 150p. ISBN: 979-8764-74-9.

62. Kriteria dan indikator kelestarian hutan yang dikelola oleh masyarakat (community managed forest)

Ritchie, B., McDougall, C., Haggith, M., Burford de Oliveira, N.

Community managed forest systems embody a considerable portion of the wisdom, knowledge, and practical skills and management necessary for the sustainability of forest resources globally. These systems, however, are under threat in many ways, including from the rapid rate of change of their political, socio-economic, and biophysical contexts. Adapting forest management sufficiently quickly and effectively to meet these changes is both urgent and very challenging. This guide introduces criteria and indicators of sustainability for community managed forest landscapes (CMF C&I) as a potential learning and communication tool that can help meet that challenge. It draws on CIFOR collaborative research on CMF C&I in Brazil, Indonesia, and Cameroon to propose a flexible step-by-step approach to developing and implementing self - or collaborative forest monitoring systems, and gives examples of C&I developed by communities in these countries. The approach is targeted to communities and their partners in forest management, such as NGOs, government, or development projects, who are seeking strategies to improve local well-being and forest sustainability through more effective learning, collaboration, and decision-making in local forest management.

Bogor, Indonesia, CIFOR. 111p. ISBN: 979-8764-51-X.
Also available in English, Portuguese, and French

63. Learning and adaptation for forest conservation

Sayer, J.A.

The past three decades have seen significant investments in programs to protect forests in developing countries. As a result the number and aggregate area of National Parks and equivalent protected areas have grown considerably. But a recent report released by WWF/World Bank has concluded that only small proportion of these areas is under secure and effective

conservation management. There is a clear mismatch between the high-level global commitment to nature conservation as manifested in the Convention for Biological Diversity and the lack of concrete conservation achievement in the field. This chapter draws upon the author's personal experience as a manager of conservation programs in tropical Africa and Asia. The author's first project in the late 1960s in Zambia may have been the first to use the term integrated conservation and development. As we enter the 21st century, approaches to conservation have come to be based on engagement with, and participation by, people living in and around protected areas. There is no "best outcome" for conservation. Conservation has to adapt continuously as people's conditions and aspirations change and as nature itself evolves. The hypothesis of this chapter is that, although the conceptual framework for achieving conservation is now stronger, the institutions responsible for management are still dominated by a command-and-control culture that they have inherited from the past. The chapter therefore explores some of the organizational changes that are required if management of conservation forests is to be genuinely collaborative and truly adaptive.

In: L. Buck, C.C. Geisler, J. Schelhas, E. Wollenberg (eds.). Biological diversity: balancing interests through adaptive collaborative management. CRC Press, Boca Raton, Florida. 69-79. ISBN: 0-8493-0020-7.

64. Managing resources

Martin, G.J., Barrow, S., Cunningham, A.B., Shanley, P. (eds.)

The People and plants handbook is a source of information on applying ethnobotany to conservation and community development. It is designed for people who work in the field, including park managers, foresters, students, researchers, cultural promoters, and members of non-governmental, governmental and indigenous organizations.

Paris, UNESCO/WWF/Kew. People and Plants Handbook. Issue 6. 40p.

65. Mengantisipasi perubahan skenario sebagai sarana pengelolaan hutan secara adaptif: suatu panduan

Wollenberg, E., Edmunds, D., Buck, L.

Scenario methods can be used to anticipate the future and expand the creativity of people thinking about complex forest management

situations. This manual describes the use of scenarios with multiple stakeholders, with examples drawn from community-based forest management. Four classes of scenario methods are described: visions, projections, pathways and alternative scenarios. Examples of rapid participatory techniques relevant to scenario methods are also summarised. It is hoped that these methods will be useful in bringing together different groups of people concerned about forest management to exchange views, expand the realm of decision possibilities and reach more innovative solutions.

Bogor, Indonesia, CIFOR. 38p. ISBN: 979-8764-71-4.
Also available in English and Spanish

66. **Multiple interest accommodation in African forest management projects: between pragmatism and theoretical coherence**
Antona, M, Babin, D.

In the past in Africa, State forest administration took nominal control of local forest management from rural populations. This control, based on a European concept of management, gradually deteriorated and the methods of classical forest management are no longer suited to existing conditions. This has led to a need for processes to accommodate multiple interests. Funding agencies, firms, NGOs and governments have tried different participatory approaches in their forest projects. In this evolution, social sciences have been absent or overshadowed by other disciplines. Too often, the coherence of social science has been replaced with anecdotal pragmatism. We therefore investigated the contributions of collective action theories. From this analysis, we propose a framework for analysing accommodation in forest management projects at different stages (objective setting, context identification, appraisal, implementation and evaluation). We applied the Multiple Interest Accommodation Assessment (MIAA) framework to forestry projects and environmental policies in nine African countries. Using this framework to compare these experiences, we identified key issues for the MIAA processes in complex forest management situations.

International Journal of Agricultural Resources, Governance and Ecology 1(3/4): 286-305. ISSN: 1462-4605.

67. **Municipal governments and forest management in Bolivia and Nicaragua**
Kaimowitz, D., Pacheco, P., Mendoza, R., Barahona, T.

This paper analyzes the growing role of municipal governments in Bolivia and Nicaragua in forest-related issues on the basis of some thirty case studies. It first provides background information on forest issues and legislation concerning municipal involvement in forest issues in the two countries. It then uses the case study material to derive some initial responses to six frequently asked questions about municipal forestry activities. It concludes that municipalities only devote a small proportion of their resources to these issues but show increasing interest and concern. Heavily forested municipalities tend to view forests as a productive asset, while the more deforested municipalities have greater concern for environmental degradation. Decentralization has opened opportunities for previously marginalized stakeholders to participate in forest policy decisions, but has not guaranteed that this will occur in every case. It has also favored local producers over outside interests. Inter-agency environmental commissions have achieved mixed results in Nicaragua. Municipalities implement a variety of forestry activities. However, the impact of increased municipal participation in forest issues on both forests and local livelihoods remains small compared to the magnitude of the problems. National government agencies, donor projects, NGOs, and community organizations could substantially improve these impacts in the future.

In: Palo, M., Uusivuori, J. and Mery, G. (eds.). World forests, markets and policies. Dordrecht, The Netherlands, Kluwer Academic Publishers. World Forests v.3. 279-288. ISBN: 0-7923-7171-2.

68. **The organizational structures for community-based natural resources management in Southern Africa**
Campbell, B.M., Shackleton, S.

Throughout Southern Africa there has been a move to decentralize natural resource management (NRM). Decentralization has taken many forms, resulting in different organizational structures for NRM. Fourteen case studies from eight countries can be classed into four types, depending on the key organizations for NRM: (1) district-level organizations; (2) village organizations supported by sectoral departments (e.g. village forest committees); (3)

organizations or authorities outside the state hierarchy (e.g. traditional authority, residents' associations), and (4) corporate organizations at the village level (e.g. trusts, conservancies, property associations). Attitudes towards district-level schemes amongst local people are generally negative. The greater the authority village organizations receive the more likely they are to succeed. In the cases with corporate organizations, local residents have received user or proprietary rights over resources. Such cases reflect the best chances of community-based natural resources management (CBNRM) being successful. It is clear that policies that explicitly decentralize authority to village-level organizations help to avoid some of the problems that have emerged. The impact of private sector stakeholders can be positive or negative depending on the institutional arrangements in place. Many of the cases have demonstrated the key role that external facilitation plays in building the capacity of local organizations. Traditional leaders have continued to play a role in NRM, with varying degrees of authority and control. The paper ends with a discussion of the key features for the success of CBNRM.

African Studies Quarterly 5(3).

[online] html URL: <http://web.africa.ufl.edu/asq/v5/v5i3a6.htm>.

69. **An overview of development processes and farmers' interactions in a participatory forest fire prevention programme in Jambi province, Indonesia**

Otsuka, M., Sumantri, Hariri, D., Yunardi, S.

The participatory forest fire prevention programme of Forest Fire Prevention Management Project (FFPMP) aims at intensive fuel management and fire control with the integrated green belt on community land on the boundary of Berbak National Park, Jambi Province, Sumatra. It aims to motivate farmers to cultivate their land continuously, reducing fire hazards and risks through formation of fuel breaks around the forest. Participating farmers face technical limitations in seedling production, land preparation without burning, and crop planting and protection. They cannot easily perceive benefits of the green belt with line planting of the small number of trees. Land-oriented farmers experienced in growing crops and constructing facilities are more advantaged than local farmers dependent on forest resources. Current socio-economic conditions have accelerated diverse programme evolution with farmers' different responses.

FFPMP has funded materials and facilities to substitute for farmers' lack of technical and economic capabilities. It may also modify the programme to optimize farmer participation and facilitate effective fuel break formation, including flexible design of planting sites along the green belt with various crops, new land preparation technologies, establishment of pilot small-scale nurseries, and strengthening of community organizations for less advanced farmers. This paper addresses the socio-economic sustainability of the participatory green belt programme.

In: Kobayashi, S., Turnbull, J.W., Toma, T., Mori, T., Majid, N.M.N.A. (eds.). Rehabilitation of degraded tropical forest ecosystems: workshop proceedings, 2-4 November 1999, Bogor, Indonesia. Bogor, Indonesia, CIFOR. 197-212. ISBN: 979-8764-70-6.

70. Pemetaan desa partisipatif dan penyelesaian konflik batas: studi kasus di desa-desa daerah aliran sungai Malinau, January s/d Juli 2000

Anau, N., van Heist, M., Iwan, R., Limberg, G., Sudana, I.M., Wollenberg, E.

CIFOR's ACM program has been carrying out participatory action research with local communities to devise models for forest management by multiple stakeholders. One of the early requests by communities has been for the mapping of their villages. This report describes the facilitation team's observations during the process of mapping these territories (villages along the Malinau river, Kalimantan, Indonesia). Central theme is the question what caused conflicts within and between villages and how were these handled and overcome by the communities. The role that the participatory mapping process played in identifying as well as solving the conflicts is discussed. After a general overview and analysis of the situation, each village is also described in more detail: background information, description of the conflicts and approach to solving them.

Bogor, Indonesia, CIFOR. 55p.

71. People managing forests: the links between human well-being and sustainability

Colfer, C.J.P., Byron, Y., (eds.)

This book examines aspects of human well-being (identified in earlier research on sustainable forest management) in a

variety of contexts. The 26 authors reports results of research conducted in six countries (Indonesia, Brazil, Cameroon, Gabon, Trinidad, and the United States), in conjunction with a series of social science methods tests designed to assess human well being in areas where logging was taking place. These social science results were obtained as part of a project on criteria and indicators for sustainable forest management. This book, comprised of 16 chapters, includes sections focusing on gender and diversity, and a conservation ethic, as well as two principles found important for sustainable forest management: security of intergenerational access to resources, and rights and responsibilities to manage co-operatively and equitably. It includes a chapter looking at geographical and temporal comparisons related to human well-being and sustainability.

Washington, DC, Resources for the Future and CIFOR. 447p. ISBN: 1-891853-06-6.

72. Plural perspectives and institutional dynamics: challenges for local forest management

Leach, M., Fairhead, J.

Co-management approaches in forestry have frequently failed to fulfill their promise and have generated unexpected conflicts. This is partly because they intersect with a plurality of interests and concerns, in settings that are more socially, institutionally and ecologically differentiated and dynamic than is often assumed. This article engages with current debates around pluralism in community forestry, and illustrates how they can be informed by a better understanding of institutional dynamics. It begins by characterizing the dynamic forest landscapes in which community forestry processes are enacted. It goes on to sketch out some analytical tools that can help illuminate these processes, and which expose the links between interests in forests, resource access and control, and institutions. In this context, the third part of the article illustrates how institutional dynamics can work out in practice when villagers, governmental, non-governmental and donor agencies interact in the practice of community forestry. The need to take account of multiple institutions and power relations, to manage pluralism rather than necessarily attempting to achieve consensus, and to appreciate social and ecological uncertainties, suggests that forest management

should seek to influence processes rather than to define states, and be adaptive rather than pre-planned.

International Journal of Agricultural Resources, Governance and Ecology 1(3/4): 223-242. ISSN: 1462-4605.

73. **Pluralism and the less powerful: accommodating multiple interests in local forest management**
Wollenberg, E., Anderson, J., Edmunds, D.

Forest decision-making is becoming more pluralistic. As the numbers of groups involved in forest decisions have increased, concern about how to accommodate multiple interests has similarly burgeoned. This article presents pluralism as a foundation for understanding how less powerful group's interests can be accommodated. It examines approaches to how interests are defined, communicated and coordinated to review the scope of possibilities for improving pluralism. Experience with these methods suggests that accommodation that genuinely reflects the interests of disadvantaged groups is most likely to occur where state and civil society governance institutions provide opportunities for 1) mutual learning among interest groups, 2) iterative cycles of bounded conflict and cooperation 3) public, transparent decision-making 4) checks and balances in decision-making among groups and 5) the provision of capacity building or political alliances for disadvantaged interest groups. High transaction costs, persistent injustices and impossibility of neutral facilitation pose contradictions to the possibilities of achieving accommodation and need to be recognized and negotiated.

International Journal of Agricultural Resources, Governance and Ecology.
Special issue 1(3/4): 199-222.

74. **Prioritizing criteria and indicators for sustainable forest management: a case study on participatory decision making**
Mendoza, G.A., Prabhu, R.

This paper describes an application of the analytic hierarchy process (AHP) in assessing criteria and indicators (C&I) as measures of sustainable forest management. C&I elements are organised in hierarchical manner around the three general concepts, namely: Principle, Criteria and Indicators. These elements are prioritised based on their perceived relative importance values. These values are calculated using pairwise

comparisons of the C&I elements following the principles of the AHP. Pairwise comparisons were obtained from experts representing various disciplines related to forest management. C&I analysis is done at different levels in the hierarchy. To demonstrate the method, a C&I assessment case study involves a forest located in Kalimantan, Indonesia. A generic set of C&I is used as a benchmark. AHP is used to calculate the relative weights of each C&I, prioritize them, and ultimately select a final set of C&I to be used in assessing the sustainability of the forest.

In: Schmoldt, D.L., Kangas, J., Mendoza, G.A. and Pesonen, M. (eds.). The analytic hierarchy process in natural resource and environmental decision making. Dordrecht, The Netherlands, Kluwer Academic Publishers. 115-130. ISBN: 0-7923-7076-7.

75. **Recursos forestales y gobiernos municipales en Nicaragua: hacia una gestion efectiva**
Larson, A.M.

Abstract is not available

Managua, Nicaragua, Nitlapan Institute, UCA and CIFOR. 118p.

76. **Rights to manage the forest cooperatively and equitably in forest-rich and forest-poor contexts**
Tchingkawa B., Brocklesby, M.A., Tiani, A.M., Sardjono, M.A., Porro, R., Salim, A., Colfer, C.J.P.

This chapter examines the hypothesis that sustainable forest management (as represented by currently good quality forest) is correlated with acknowledgement of the rights of concerned stakeholders to manage the forest. It used a pebble sorting method, designed to assess the allocation of rights to manage forests among stakeholders, in sites in Indonesia, Cameroon and Brazil. It concludes, guardedly, that greater management rights for local communities are related to sustainable forest management; though it reiterates authors concern that good forest quality in the present cannot in fact serve as a proxy for good forest management.

In: Colfer, C.J.P., Byron, Y. (eds.). People managing forests: the links between human well-being and sustainability. Washington, DC, USA, Resources for the Future and CIFOR. 322-343.

77. Social learning in community forests

Wollenberg, E., Edmunds, D., Buck, L., Fox, J., Brodt, S., eds.

How can different interest groups engage together in learning processes that enable them to better manage community forests? In this volume, practitioners from eight countries document their experience with the aim of identifying how to characterize social learning, as well as how to improve upon current practice. Analysis of current approaches to facilitation and the circumstances or platforms of learning indicate the need for more attention to the different avenues and styles of learning and the potential benefits of using multiple avenues. Learning styles and approaches need to be responsive to stakeholders' preferences, culture, and changes in management needs. Multiple approaches are likely if the goal is to reach all the necessary parties and to be relevant to changing conditions over time. In documenting these experiences, the authors link their observations to concepts, labels and the theory of social learning to further advance our general understanding of multi-stakeholder processes in forest management.

Bogor, Indonesia, CIFOR. 209p. ISBN: 979-8764-77-3.

78. Social learning in the collaborative management of community forests: lessons from the field

Buck, L., Wollenberg, E., Edmunds, D.

Community forest management worldwide has involved diverse types and varying levels of success in social learning, yet little efforts has been made to analyze these experiences and link them to emerging social learning theory. This chapter is a synthesis of the contributions of the workshop participants to indicate what social learning is and how it could be enhanced. The most notable contribution of chapters was in making learning phenomena more visible and giving people the concepts and labels with which to analyze their experiences. Important institutional arrangements underlying social learning were facilitation and the platforms around which stakeholders met and learned. Different types of learning, the avenues for learning and the factors influencing learning are reviewed. Any endeavor to learn jointly must be assessed and implemented with sensitivity

and strategic thinking to who can or should be participating and how.

In: Wollenberg, E., Edmunds, D., Buck, L., Fox, J., Brodt, S. (eds.). Social learning in community forests. Bogor, Indonesia, CIFOR. 1-20. ISBN: 979-8764-77-3.

79. **A strategic approach to multistakeholder negotiations**

Edmunds, D., Wollenberg, E.

Environment and development practitioners increasingly are interested in identifying methods, institutional arrangements and policy environments that promote negotiations among natural resource stakeholders leading to collective action and, it is hoped, sustainable resource management. Yet the implications of negotiations for disadvantaged groups of people are seldom critically examined. This article draws attention to such implications by examining different theoretical foundations for multi-stakeholder negotiations and linking these to practical problems for disadvantaged groups. It argues that negotiations based on an unhealthy combination of communicate rationality and liberal pluralism, which underplays or seeks to neutralize differences among stakeholders, poses considerable risks for disadvantages groups. It suggests that negotiations influenced by radical pluralist and feminist post-structuralist thought, which emphasize strategic behaviour and selective alliance-building, promise better outcomes for disadvantaged groups in most cases, particularly on the scale and in the historical contexts in which negotiations over forest management usually take place.

Development and Change 32(2): 231-253.

80. **Sustainability and security of intergenerational access to resources: participatory mapping studies in Ghana**

Gami, N., Nasi, R.

After introducing Gabon's lush forests and its people, this chapter discusses indigenous knowledge and conservation-related beliefs among related peoples in Central Africa. The authors then describe the location, the timber company and the population where a test of criteria and indicators was conducted in 1998. Participatory mapping was used to examine security of intergenerational access to resources in the area, with emphasis on hunting, the impacts of roads and logging

operations, and conflicts. The striking element in this study is the similarity of problems in this dramatically forest rich area to problems in other areas less well endowed with resources.

In: Colfer, C. J. P., Byron, Y. (eds.). People managing forests: the links between human-well being and sustainability. Washington, DC, USA, Resources for the Future and CIFOR. 214-228.

81. Tenure and management of non-state forests in China since 1950: a historical review

Liu Dachang

This article reviews the policies for the tenure and management of non-state forests that have undergone fundamental changes in China since the early 1950s. Private ownership and household management that were dominant in 1950-55 gave way to collectivization in 1956. Collective management remained dominant until reforms in the early 1980s. Since that time, rapid changes in tenure and management policy have given households more control over trees and forest resources. However, this high frequency of policy change causes a complete lack of confidence on villagers in tenure security. This has encouraged the rapid conversion of forest resources by farmers. The government and forest departments responded by promoting various shareholding systems and farmer households are also trying out new forms of collaboration of one kind or another. Empirical evidence shows that self-initiating shareholder systems created on voluntary basis perform better than those shareholding systems that are merely disguised form of former collective management. They build on existing, local, social capital and farmers are able to participate in making decision about planning, management activities, product use, and income distribution, which is the core of local forest management. Even so this is not sufficient to achieve the desired results in the case of timber trees. These trees are subject to many regulations that discourage investment in them. It is critical to vest villagers with full rights to their trees. China should apply separate regulations to natural forests and artificial plantations that are established from now on.

Environmental History 6(2): 239-263.

82. **Toward social criteria and indicators for protected areas: one cut on adaptive co-management**
Colfer, C.J.P., Prabhu, R., Wollenberg, E., McDougall, C., Edmunds, D., Kowero, G.

This chapter summarizes CIFOR's work on social criteria and indicators (C&I), developed within commercial establishments oriented toward timber harvesting. These C&I are then examined from the point of view of protected areas, based on Colfer's experience managing an Indonesian wildlife reserve in 1992-93. The conclusion is that almost all of the social C&I are equally applicable to protected areas, with only slight changes in wording.

In: Louise E. Buck, Charles C. Geisler, John Schelhas, Eva Wollenberg (eds.).
 Biological diversity: balancing interests through adaptive collaborative
 management. Boca Raton, Florida, USA, CRC Press LLC. 293-311.
 ISBN: 0-8493-0020-7.

83. **Trouble on the frontier: Dutch-Brooke relations and Iban rebellion in the West Borneo borderlands (1841-1886)**
Wadley, R.L.

The colonization of the island of Borneo by the European led to the division between British and Dutch spheres of influence and control. It has had profound consequences for the people that fell under either. Territorial boundaries sliced across well-established networks of communications, trade, common traditions, and strong kinship. From the colonial perspective, boundaries were designed to function negatively, to restrict what was deemed illegal such as smuggling and migration, and positively, to promote legitimate activities like taxation and road construction. Yet the people so partitioned routinely defied the border divisions, causing no small amount of worry to the colonial states. This article examines Dutch-Brooke relations relating to the partitioned Iban population and their efforts to suppress Iban rebellion along the frontier. It first outlines the early phase of competition between the Dutch and James Brooke, leading up to Dutch contact with the Iban settled on their side in the border. The focus then shifts to Dutch and Brooke efforts to suppress headhunting and extend their influence over the border Iban. These efforts culminated in the Kedang Expedition

of 1886, a large punitive attack on Iban living on both sides of the border. This expedition and its aftermath provide rich material for examining the difference between the Dutch and Brookes in their administration and attitudes toward the frontier and territorial boundaries.

Modern Asian Studies 35(3): 623-644.

84. Understanding the approaches for accommodating multiple stakeholders' interests

Ramirez, R.

Conflict and collaboration are often treated as mutually exclusive modes of stakeholder interaction, with little understanding of the contexts in which stakeholder relationships take place. The conceptual framework in this paper addresses accommodating multiple interests as an evolving, cyclical, iterative process, swinging back and forth from collaborative to conflictive situations. A typology is presented with nine contextual facets that come into play in accommodating multiple interests: the nature of the problem, the stakeholders, the convenor, the networks, stakeholders' capacities, stakeholders' choices over procedures to deal with conflict, negotiation, and dispute resolution. The nine facets function as lenses through which to analyse multiple stakeholder situations. The typology is used to analyse four existing approaches: Collaborative Management, Collaborative Learning, Rapid Appraisal of Agricultural Knowledge Systems (RAAKS) and 'linked local learning'. A set of criteria to assess their impact is developed, and desirable future directions for methodological development are discussed.

International Journal of Agricultural Resources,
Governance and Ecology 1(3/4): 264-285.

Forest Management

85. **Anthropogenic fires in Indonesia: a view from Sumatra**
Bowen, M.R., Bompard, J.M., Anderson, I.P., Guizol, P., Gouyon, A.

It is safe to regard all vegetation fires that occur on the main forested islands of Kalimantan, Sumatra and Irian Jaya as deliberately started by man. Accidental ignition caused by lightning strikes are rare under Indonesian conditions, exposed burning coal seems cost minor, highly localised damage and - as elsewhere through the world - discarded cigarettes are of no importance. Arson is often mentioned but no evidence offered, and even where land dispute tensions are high, arson is towards the bottom of the list of causes of vegetation fires. The roles played by the three major government agencies responsible for land management are discussed and it is concluded that their overlapping functions, together with the diffusion of responsibility, contribute greatly to the fire problem. It is concluded that the solution to Indonesia's fire problem lies largely in much improved local level land-use planning and in strengthened local management that, together, foster local initiative and allow local autonomy. A continuation of the top-down, bureaucratic approach to fire management that focuses on fire suppression will fail in the field during the next el Nino drought as it did in 1997.

In: Eaton, P. and Radojevic, M. (eds.). Forest fires and regional haze in Southeast Asia. Huntington, New York, Nova Science Publishers. 41-66.
 ISBN: 1-56072-892-2.

86. **Anthropogenic pressures in tropical forest ecosystem in Western Ghats, India: are they sustainable?**
Aravind, N.A., Rao, D., Vanaray, G., Poulsen, J., Shaanker, R.U., Ganeshaiah, K.N.

Several million of humans still thrive in the forest of tropics and use resources therein for their livelihood. It is believed that their harvesting patterns could represent a good model for sustainable use of forest resources. This paper reports the impact of Soligas indigenous community on the structure and composition of the forest ecosystem using indicator species

birds, butterflies (Kremen, 1992, 1994) and vegetation of a wildlife sanctuary in South India. The impact of disturbance did not show any discernible pattern for birds and butterfly diversity. However, within scrub jungle and dry deciduous forest, less disturbed sites showed high diversity for butterflies. The study suggests that the pattern of resource use by *Soligas* affects the forest in and around their settlements and the impact decreases with the distance from the settlements.

In: Ganeshaiah, K.N., Shaanker, R.U., Bawa, K.S. (eds.). Proceedings of the International Conference on Tropical Ecosystems: Structure, Diversity and Human Welfare, 15-18 July 2001, Bangalore, New Delhi, Oxford-IBH. 125-128. ISBN: 81-204-1496-5.

87. **Aplicacion de un tratamiento silvicultural experimental en el bosque de La Lupe, Rio San Juan, Nicaragua = Application of a silvicultural treatment in the experimental forest of La Lupe, Rio San Juan, Nicaragua**
Sabogal, C., Castillo, A., Mejia, A., Castaneda, A.

This document describes the application on experimental scale of a silvicultural treatment in a forest selectively logged by a timber company in the humid tropics of Nicaragua. Based on a diagnostic sampling in the La Lupe experimental forest, a silvicultural treatment was designed consisting in the liberation of future harvest trees through the elimination of competitors by stem girdling and poisoning. Plots for treatment and 1 ha-permanent sampling plots were established in the experimental area of 15,36 ha. A complementary silvicultural intervention took place three years later by harvesting commercial residual trees, which were sawn in the forest by local smallholders with a frame-chainsaw and the resulting blocks hauled with oxen. The cost of applying the silvicultural treatment was US\$23,8/ha, including all inputs and manual labor. Total logging costs amounted US\$1635 yielding an average of 4,3 m³ of timber per harvested hectare. The initial effects of the silvicultural interventions on forest dynamics were evaluated based on three periodic measurements of the population of trees 10+ cm dbh. In the four-year period after the silvicultural interventions mortality in the control plots was 11,2 trees/ha/year (4,9% of the original population), whereas in the treated plots it reached 20,3 trees/ha/year (2,4%). The

median yearly increment in diameter was from 0,3 to 0,4 cm/year in the control plots and 0,3 to 0,5 cm/year in the treated plots. The median yearly diameter increments during the period oscillated between 0,3 and 0,5 cm.

Turrialba, Costa Rica, CATIE. Informe Tecnico no.22. 34p.
Coleccion Manejo Diversificado de Bosques Naturales.

88. **Aprovechamiento mejorado en bosques de produccion forestal: estudio de caso Los Filos, Rio San Juan, Nicaragua**
Sabogal, C., Castillo, A., Carrera, F., Castaneda, A.

This document describes and analyzes the operations of a technically planned timber harvest applied on experimental scale by a lumber company in a humid tropical forest of the Southeast of Nicaragua. It involves an operational inventory, the planning and building of the network trails and mountain yards, the controlled logging and its dragging and post-harvest activities. The yields and costs were determined for each one of the operations. The costs are similar to those in other regions of the humid tropic. The short-term impact of the logging was evaluated in term of the damages to the forest, as well as changes in the silvicultural conditions of the remnants mass. The results show that the damages were smaller, in comparison with traditional methods in Central America; thus, the forest was in good condition to allow its handling in natural form. The population of trees and the regeneration in terms of growth, mortality and recruitment were monitored during four years through a network of permanent plots installed before the intervention. The experience in Rio San Juan indicates that benefits can be obtained with the application of low impact techniques in the commercial timber harvest. One recommendation is to validate these results on an operational scale and increase the information coverage of the results, in order to convince the lumber company, the concessionaire or the forest that a good planning, supervision and qualification in the harvest of the forest is not more expensive and it is at their reach.

Turrialba, Costa Rica, CATIE. Serie Technica. Informe Technico no.323. 57p.
Coleccion Manejo Diversificado de Bosques Naturales, no.21

89. **Benefícios das plantas da capoeira para a comunidade de Benjamin Constant, Para, Amazonia Brasileira = The benefits of plants from secondary forests to the community of Benyamin Constant in Para State, Brazilian Amazon**
Rios, M., Martins da Silva, R.C.V., Sabogal, C., Martins, J., da Silva, R.N., de Brito, R.R., de Brito, I.M., Costa de Brito, M.F., da Silva, J.R., Ribeiro, R.T.

Secondary forest, the woody successional vegetation which develops after the original vegetation of the site has been removed by human activity (usually for agriculture or livestock production), is a resource of growing importance in tropical landscapes. The community of Benjamin Constant located in one of the oldest agricultural frontier areas in the Eastern Brazilian Amazon (the Bragantina Region in Para State), is inhabited by small-scale farmers practicing subsistence agriculture. As part of their livelihoods, families in this community rely on the existence of secondary forests. As a result of ethno-botanical studies carried out in the community, 135 useful plant species were identified, providing a wide array of products such as food, tubers, latex, oils, fibers, resins, gums, balsams, condiments, candles and cellulose. After two years of collaboration with the local population, a manual to valorize their traditional knowledge on forest plants was considered a priority. The present ethno-botanical manual describes 12 useful plants selected on the basis of intensity of local use and frequency of distribution. The species included are: amapá (*Parahancornia fasciculata* (Poir.) Benoist), anani (*Symphonia globulifera* L. f.), bacuri (*Platonia insignis* Mart.), barbatimão (*Maytenus myrsinoides* Reissek), caju (*Anacardium occidentale* L.), lacre (*Vismia guianensis* (Aubl.) Choisy), muruci-do-mato (*Byrsonima aerugo* Sagot), perpétua (*Psychotria colorata* (Willd. ex Roem. & Schult.) Müll. Arg.), piquiá (*Caryocar villosum* (Aubl.) Pers.), sapucaia (*Lecythis pisonis* Cambess.), siquiba (*Himatanthus sucuuba* (Spruce ex Müll. Arg.) Woodson) and verônica-vermelha (*Dalbergia subcymosa* Ducke).

Belem, Brazil, CIFOR. 54p.

90. **A conceptual framework for the assessment of tropical secondary forest dynamics and sustainable development potential in Asia**
Chokkalingam, U., Smith, J., de Jong, W., Sabogal, C.

In this paper, we present an intensification model based on the intensity of exploitation and use of forests and forest lands as a relevant framework for analysing the appearance, dynamics, and evolution of different types of secondary forests. The systematic driving forces responsible for the disturbances and subsequent secondary forest re growth tend to change and evolve along this continuum. This dynamic, process oriented, long term framework draws on existing theories and models of the underlying factors of forest change relevant for tropical Asia, and emphasises factors related to secondary forests. We identify and characterise four general stages along this intensification continuum the extensive use stage, the intensive exploitation stage, the forest depleted stage, and the forest recovery stage. In the extensive use stage, secondary forests tend to be limited and largely arise from long rotation swidden agriculture. In the intensive exploitation stage, secondary forests tend to increase in absolute and proportional area, and arise mainly out of industrial and local logging activities and fires. In the forest depleted stage, natural forest cover is low and there is increasing interest in forest conservation, reforestation and sustainable management for timber, environmental and local needs. In the forest recovery stage, there is increased forest cover as a result of reforestation measures or regeneration with land use abandonment. This framework can help guide management and policy options for secondary forests based on threats and relative resource endowments, infrastructure, and the policy and institutional environment present in each stage. It could also be used to identify effective intervention points and to anticipate and prevent problem situations beforehand.

Journal of Tropical Forest Science 13(4): 577-600.

91. **Deforestation and economics in Ecuador: a synthesis**
Wunder, S.

This synthesis paper gives an economic perspective on the analysis of deforestation. Ecuador provides a versatile picture of factors affecting forest loss throughout different periods,

regions and ecosystems. The main fieldwork was carried out over 18 months in 1994-5 and focused on semi-structured socio-economic interviews in nine sites in the Ecuadorian highlands, as well as on the urban markets for forest and agricultural products that the study sites are linked to. The study areas differ in terms of biophysical conditions and production models. But, surprisingly the basic dynamics of deforestation were much alike across the sample, with the same driving forces and motives for rural change. In contrast to the situation in the highlands, deforestation on the coast has been much more influenced by leading export crops, such as cocoa and bananas. Examples of the forest-clearing incentives for bananas are: changing world-market demand and altering banana production technologies and derived settlement patterns greatly influenced land demand and forest conversion in the coastal region. It is shown that macroeconomic changes and domestic policy responses greatly influenced the historical speed of forest clearing. Summing up, the standard arguments of policy and market failures alone can not explain rapid deforestation in Ecuador. A root cause is that, with current technologies, prices and disparate stakeholder interests, natural forest uses in Ecuador tend to yield less income than alternative, mainly agro-pastoral land uses. The deforestation cycle usually follows a composite economic rationale, based on wood extraction, agriculture and cattle ranching. Though a slower pace of deforestation seems rational for the Ecuadorian State, on the basis of precautionary considerations, substantial success in curbing forest loss can only be achieved when payments for global forest benefits are combined with effective conservation incentives on the ground. Finally, lessons from the Ecuador case to deforestation processes in general are outlined, and a number of priority areas for future research are identified.

Copenhagen, The Royal Veterinary and Agricultural University, Unit of Forestry. Forestry Discussion Paper no.35. 29p.

92. **Effects of different land use patterns on the stream water quality in Pasoh, Negeri Sembilan, Malaysia**
Yusoff, M.K., Heng, S.S., Majid, N.M., Mokhtaruddin, A.M., Hanum, I.F., Alias, M.A., Kobayashi, S.

The study focused on the effect of land use activities on stream water quality in Pasoh, Negeri Sembilan, Malaysia. The stream originates in Pasoh Forest Reserve, Negeri Sembilan and then

flows through four different types of land use: undisturbed forest, swamp, degraded logged-over forest and agriculture. Water quality parameters chosen for the study include pH, dissolved oxygen (DO), biochemical oxygen demand (BOD), chemical oxygen demand (COD), suspended solids (SS), ammoniacal-nitrogen (NH₃-N), temperature, electrical conductivity (Ec) and turbidity. Stream flow rate was also measured. Computation of water quality status was based on Department of Environment's (DOE)-Water Quality Index (DOE-WQI) and Harkin's Index (HI). Relatively higher values of water quality parameters (DO, BOD, COD, NH₃-N, SS and turbidity) and lower value of pH were recorded in the agricultural area. Water quality status started to degrade after the stream passed through the swampy area (DOE-WQI = 88.9, HI = 26.0) and its water quality status was slightly degraded (DOE-WQI = 91.7, HI = 24.0) in the logged-over forest. Overall analysis showed that the water quality status within the agricultural area (DOE-WQI = 92.04, HI = 34.0) was significantly degraded. Stream flow rate plays a significant role in maintaining the water quality status through aeration effects. All sections of the stream fall under Class II (high quality) in terms of overall water quality status classification

In: Kobayashi, S., Turnbull, J.W., Toma, T., Mori, T., Majid, N.M.N.A. (eds.). Rehabilitation of degraded tropical forest ecosystems: workshop proceedings, 2-4 November 1999, Bogor, Indonesia. Bogor, Indonesia, CIFOR. 87-98. ISBN: 979-8764-70-6.

93. Effects of forest fire on wood: a biological (anatomical study)
Budi, A.S.

The effects of forest fire on wood were studied on fifteen dead and living trees of various tropical species. The wood reacted in the following ways: (1) creating smaller but denser pores than normal in a concentric pattern, (2) changing dimension and numbers of axial parenchyma, (3) producing more axial intercellular canals, (4) forming decay spots in the wood, (5) creating the concentric area of fibres area or forming the vessels late, (6) creating new calluses and the bole losing its cylindrical form, (7) producing abnormal gums in the wood and (8) the bole becoming hollow. These abnormalities decrease physical or mechanical properties depending on how serious the defect is in the wood. Wood deterioration was more strongly influenced by the conditions caused by the forest fire and subsequent

attacks by fungus, bacteria and insects than by fire itself. There were various effects depending on the durability and other properties of the wood. The wood was classified into four groups: "merkubung/sengon", "akasia/medang", "ulin" and "leda", according to condition in the field.

*In: Kobayashi, S., Turnbull, J.W., Toma, T., Mori, T., Majid, N.M.N.A. (eds.).
Rehabilitation of degraded tropical forest ecosystems: workshop
proceedings, 2-4 November 1999, Bogor, Indonesia. Bogor, Indonesia, CIFOR.
57-68. ISBN: 979-8764-70-6.*

94. The evolution of swidden fallow secondary forests in Asia
de Jong, W., Chokkalingam, U., Perera, G.A.D.

Swidden agriculture in tropical Asia is a diverse practice, making it difficult to draw general conclusions on trends of the development of swidden fallow secondary forests (SFSF). There is, however, sufficient evidence to recognise trends of a gradual intensification often through the incorporation of extensive tree crop production in SFSF, or a direct conversion to intensive tree cash cropping. Factors contributing to the changes include emerging markets for cash crops or timber and pulp wood production, government policies and development projects, fire, and population pressures. In Indonesia and mainland Southeast Asia, there is evidence of change towards tree and cash crop based production systems. In northeastern India, there is improved fallow management to sustain or enhance productivity of the shortened swidden agricultural cycle to support a subsistence economy. In Sri Lanka, biophysical factors inhibit the development of intensive agroforestry systems. Although swidden fallow land use has often been stigmatised as leading to forest decline and a related decline in the environmental functions that forests provide, there is sufficient evidence suggesting that conversion of a SFSF dominated landscape to more intensive tree cropping can have a negative environmental impact. Some general options for the evolution of swidden agriculture under different stages of a land use intensification model are considered.

Journal of Tropical Forest Science 13(4): 800-815.

95. **Exploitation a faible impact dans une foret a Borneo**
Chabbert, J., Priyadi, H.

-abstract is not available-

Bois et Forets des Tropiques 269(3): 82-86.

96. **Farming secondary forests in Indonesia**
de Jong, W., van Noordwijk, M., Sirait, M., Liswanti, N.

Estimates of the area of swidden fallow secondary forest in Indonesia are inaccurate, partly because swidden agricultural practices giving rise to the secondary forest are heterogeneous. Throughout Indonesia, swidden agriculture is evolving into more intensive land use. A mixed secondary forest tree crop management appears to be the first stage towards a tree crop based production in Sumatra and Kalimantan. This changes the value of the forest/tree component of swidden agriculture, or the systems it evolves into. The trade offs between productivity, environmental functions, biodiversity, and sequestered carbon are only qualitatively understood. Some of the proposed large-scale estate crop production programmes in Indonesia disregard the benefits (a diverse agriculture, forest landscape, better environmental functions, higher biodiversity) that development along these endogenous trends may provide.

Journal of Tropical Forest Science 13(4): 705-726.

97. **Fire resistance of tree species in Bukit Soeharto Education Forest, East Kalimantan, Indonesia**
Delmy, A.

The effects of the forest fire on anatomical and ecophysiological resistance of tree species was investigated in Bukit Soeharto Education Forest, an area about 5000 ha, in East Kalimantan, Indonesia. The forest was impacted seriously by forest fire in 1998. This forest land is dominated by *Dipterocarpaceae* species, especially *Shorea* spp., with some *Dryobalanops*, *Cotylelobium* and *Anisoptera* species. The investigation was conducted in a single plot of burned primary forest with scattered gaps. The gaps had mixed pioneer and non-pioneer species, such as *Eusideroxylon zwageri*, *Macaranga hypoleuca*, *Shorea laevis*, *Macaranga gigantea*, *Palaquium*

rostratum and *Polyalthia sumatrana*. Tree density (>10 cm diameter) was 337 ha⁻¹. After the forest fire there were 147 dead trees ha⁻¹ mainly *Macaranga hypoleuca*, *Macaranga gigantea*, *Shorea laevis*, *Palaquium rostratum*, *Polyalthia sumatrana* and *Hydnocarpus polypetala*. There were 41 sprouted tree species ha⁻¹, mainly *Eusideroxylon zwageri*, *Litsea* sp., *Durio carinatus*, *Gironniera nervosa* and *Diospyros curaniopsis*. There were 151 living, but unsprouted, trees ha⁻¹ dominated by *Eusideroxylon zwageri*, *Shorea laevis*, *Shorea palembanica*, *Palaquium macrophyllum* and *Shorea smithiana*. The numbers of dead and sprouting trees were related to the fire conditions and only some tree species had sprouts. Bark thickness was positively correlated with fire resistance and the healthiness of the trees in the canopy.

In: Kobayashi, S., Turnbull, J.W., Toma, T., Mori, T., Majid, N.M.N.A. (eds.).
Rehabilitation of degraded tropical forest ecosystems:
workshop proceedings, 2-4 November 1999,
Bogor, Indonesia, CIFOR. 27-34. ISBN: 979-8764-70-6.

98. **Formation and recovery of secondary forests in India: a particular reference to western Ghats in South India**
Bhat, D.M., Murali, K.S., Ravindranath, N.H.

This paper analyses the underlying causes of secondary forest formation and recovery in India, particularly the Western Ghats region of south India, from pre-colonial times to the present. In the pre-colonial period, hunter gatherers, shifting cultivators and settled cultivators were the dominant users of forest land, with some limited timber felling by local chieftains and kings. There was limited secondary forest formation following extractive activities by the communities and the State. The State takeover of forests for commercial timber exploitation during the colonial period, the resulting alienation of local community rights, and the over exploitation of forest products from limited areas accessible to the community were key factors in the large-scale formation of secondary forests. In the post independence period, the diversion of forestland for other purposes and industrial pressures led to deforestation and forest degradation. Currently, forest cover is relatively low and primary forests exist only in hilly tracts. However, forest cover has stabilised in spite of increasing population density. With the passing of the Forest Conservation Act of 1980, which banned

forest clearing, forest conversion pressures were reduced. During the last decade, the rehabilitation of degraded secondary forests and the regeneration of secondary forest on degraded land by communities have contributed to the stabilisation of forest cover. The paper hypothesises that joint management of forests by governments and communities, as well as policies to reduce dependence on fuelwood, may have paved the way for this favourable development.

Journal of Tropical Forest Science 13(4): 601-620.

99. **Impact of logging and forest fires on soil erosion in tropical humid forest in Kalimantan**
Sudarmadji, T.

Logging and/or forest fires cause a direct impact of reducing vegetation cover, and in many cases create a pre-condition for the increase of soil erosion rates during high rainfall. Such an increase in soil erosion rate may be higher than the normal threshold rate from a sustainable forest land productivity. Field measurement was focused on surface runoff (overland flow) and eroded soil mass on slopes of 25-35% with light and heavy intensities of logging and control plots. Both logging intensities directly increased surface runoff and eroded soil mass, especially on timber felling, skidding trails establishment and log skidding and/or hauling from the logging compartments through feeder roads to the temporary logyard. Higher rainfall amounts and intensity tended to increase the volume of surface runoff and for some cases also eroded soil mass. The volume of surface runoff was 2559 litre ha⁻¹ year⁻¹; 4711 litre ha⁻¹ year⁻¹ and 5123 litre ha⁻¹ year⁻¹; while the cumulative eroded soil mass was estimated to be 0.073 t ha⁻¹ year⁻¹; 0.046 t ha⁻¹ year⁻¹, and 0.060 t ha⁻¹ year⁻¹ for the light, heavy and control of logging intensities respectively. However, the eroded soil mass in all research plots confirmed that there was no significant relationship between soil erosion rate and logging intensity, and the eroded soil mass was lower than the tolerable/permisible/acceptable soil erosion rate. Therefore, erosion control measures in relation to land productivity after logging and fires do not need to be carried out immediately. Regarding the erosion process, the slope and its length (microtopography) was the most important

factor for increasing soil erosion rate. Further, vegetation cover was important in reducing and/or minimising the occurrence of surface runoff and soil erosion.

In: Kobayashi, S., Turnbull, J.W., Toma, T., Mori, T., Majid, N.M.N.A. (eds.).
Rehabilitation of degraded tropical forest ecosystems: workshop
proceedings, 2-4 November 1999, Bogor, Indonesia. Bogor, Indonesia, CIFOR.
35-44. ISBN: 979-8764-70-6.

100. Inventory of diseases on dipterocarps in natural forest with different cutting intensities and on mixed species in a taungya system plantation
Mardji, D.

The research was conducted at Bukit Soeharto, East Kalimantan, Indonesia. In the natural forests, there were as many healthy as diseased trees. There were no clear differences in disease incidence among forests with different intensities of cutting and among different diameter classes. Observations were made on 49 trees of 15 species in sample plots. Among them only *Dipterocarpus convertus*, *D. cornutus*, *Shorea leprosula*, *S. ovalis* and *S. seminis* remained sound. Stem canker was judged to be the most dangerous disease. Invasion of disease in uncut forest (control) was low level compared with cutting treatments, but difference of disease invasion between the forests with different cutting intensities was not clear because of low numbers of sample trees. Sound trees should be preferred to diseased trees for seed trees. In the taungya plantation there were generally more sound plants of all species compared to diseased and dead ones, except for *Manihot esculenta* and *Glycine max* which were more diseased than sound. Leaf spots were found in all species of plants. Among the forestry plants, the highest incidence of leaf spot disease occurred in *Hevea brasiliensis* and among the agricultural plants, the highest incidence was in *G. max*. Generally, invasion of diseases in *M. esculenta* and *G. max* caused moderate damage, while other species had a low level of damage. Mixed planting in the taungya system presents no problem from disease viewpoint because of the specificity of the diseases.

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Rehabilitation of degraded tropical forest ecosystems: workshop
proceedings, 2-4 November 1999, Bogor, Indonesia. Bogor, Indonesia, CIFOR.
45-56. ISBN: 979-8764-70-6.

101. IUFRO international symposium: integrated management of neotropical rain forests by industries and communities, applying research results, involving stakeholders and defining policy
Sabogal, C., Macedo Silva, J.N.

This paper contains brief information on the objective of the symposium and the symposium program themes: industrial forest management, community forest management and means to promote the adoption of sustainable forest management. It followed by main conclusions and recommendations.

Bois et Forêts des Tropiques 269(3): 95-97.

102. Large-scale fire: creator and destroyer of secondary forests in Western Indonesia
Dennis, R.A., Hoffmann, A., Applegate, G., von Gemmingen, G., Kartawinata, K.

Large scale, catastrophic fires have become a significant and visible part of the tropical forest landscape in the past two decades with increased commercial exploitation of forests, forest conversion and increased population pressure. Secondary forests are an increasingly prominent feature of tropical landscapes and fires play a significant role in both the creation and destruction of these forests. In the past two decades large-scale forest fires have become more frequent in the moist tropics. In addition to climatic factors, the nature of tropical forests appears to be changing and becoming, as a consequence, more predisposed to burning. Secondary forests arising from intensive logging, in particular those that are in a degraded condition are particularly vulnerable to repeated burning and further degradation. There has been limited general success in fire prevention and rehabilitation of secondary forests affected by fire. In addition, forest policy is not yet sufficiently attuned to address the management needs of the ever increasing area of secondary forests affected by or developing following fire. Little is known about the exact extent and economic value or potential of post fire secondary forests in Asia. It is clear, however, based on the experience of the past two decades, that there has been a significant increase in secondary forest affected by fire, particularly in Indonesia. Rough estimates for Indonesia infer that there could be as many as 5 million ha of

post fire secondary forests following the 1997/98 fires. Based on this knowledge alone, it would seem that post fire secondary forest is already an important forest type that will provide important goods and services both to the environment, the state and local communities alike, as the area of primary forest diminishes through overexploitation and conversion.

Journal of Tropical Forest Science 13(4): 786-799.

103. Long-term observations of rain forest succession, tree diversity and responses to disturbance
Sheil, D.

The relationship between succession and tropical forest diversity has been much debated. A fundamental disagreement hinges on whether high local species richness is a transient successional property, albeit one that can be maintained by disturbance, or is rather a property of stable late successional communities. This paper addresses this controversy employing a series of long-term permanent sample plot data spanning seven decades. W.J. Eggeling studied the vegetation of Budongo forest, Uganda during the 1930s and 1940s. He described a series of ten plots (1.4 and 1.86 ha) as a successional progression of forest types in which tree species numbers show a unimodal rise-and-fall over time - a pattern best known from Connell's illustration of his intermediate disturbance hypothesis. Tree communities in five of the original plots have been intermittently re-assessed over the subsequent decades. One data-series provides observations spanning 54-years from one intact 'undisturbed' old-growth forest plot. The remaining four plots were assessed before and after controlled disturbances (tree poisoning) executed in the late 1950s and early 1960s, and the resulting data-series span c.20 years of pre-disturbance and c.35 years of post-disturbance changes. The unimodal pattern of species-richness in the original comparative plot-series is paralleled by a similar rise-and-fall in stem-densities, but rarefaction confirms that the unimodal pattern in richness also holds for fixed stem-counts. The proportion of species occurring in both large and small stem-size-classes increases across the series. As richness declines in later succession, low abundance species occur predominantly in larger stem-sizes. All time-series show a rise in species richness ranging from 12 to 177 % ha⁻¹ (over 50-60 years). Each of the disturbed plots ultimately reaches greater richness than was recorded anywhere in

Eggeling's original series. Contrary to expectation a small rise was also recorded in the undisturbed late successional plot (c.42 species ≥ 10 cm diameter ha^{-1} , rising to c.47). The lowest species density observed in the study is a 1940s record of c. 10 species ≥ 10 cm diameter ha^{-1} in monodominant *Cynometra* [*Caesalpinoidae*] forest and the highest record is c.61 ha^{-1} recorded in 1992, in the youngest vegetation type monitored. These observations indicate both the volatile nature of tree-richness patterns and the limitations of simple models as aids to interpretation when confronted with real patterns of long-term change.

Plant Ecology 155: 183-199.

104. Maximum yield?: sustainable agriculture as a tool for conservation

Margoluis, R., Russel, V., Gonzalez, M., Rojas, O., Magdaleno, J., Madrid, G., Kaimowitz, D.

Deforestation is one of the primary threats to biodiversity in tropical forests around the world. Deforestation has many direct causes, including conversion of forests to pasture for livestock, expansion of agricultural lands, commercial logging, and urbanization. Indirectly, deforestation is influenced by a host of other factors, including road construction, technological change, agricultural prices, household incomes, and land tenure and security. In recent decades, the destruction of tropical forests has been a primary concern of conservation organizations. These organizations have tried many different approaches to reduce deforestation, including direct protection, restoration, education, policy changes, and the use of various incentives. However, relatively little practical guidance exists for conservation project managers in the field to compare different conservation tools to determine which one has the highest probability of success at their site. What is missing are clear, useful, and practical principles for designing, managing, and monitoring conservation strategies to reduce threats to biodiversity. To make wise choices about best practices - what works, what doesn't, and why - we must learn about the conditions under which specific strategies are most effective. In recent years, sustainable agriculture has been promoted as an effective tool to reduce deforestation in tropical

areas. This analysis explores the conditions under which sustainable agriculture works to achieve conservation in tropical forest setting.

Washington, D.C., Biodiversity Support Program. 62p.

105. Metodologías para evaluar la aplicación de criterios e indicadores en el manejo forestal de bosques tropicales en América Latina

Pokorny, B., Sabogal, C., de Camino, R.

Criteria and indicators to evaluate forest management (C&I) facilitate the understanding of and communication about sustainability. Thus an increasing number of national and international initiatives defined C&I sets for certification, monitoring and auditing of forest management. Because of the variety of C&I applications and the heterogeneity of C&I users, the demands and requirements on C&I in relation to application, evaluation and interpretation are diverse. To ensure viability and acceptance of C&I based forest management tools, this diversity has to be considered in the process of developing C&I sets. Based on a revision of C&I initiatives in Latin America, experiences made by the Center for International Forestry Research (CIFOR) and consultations with experts, the paper identifies and discusses the demands and requirements related to the application of C&I and its practical implications.

Revista Forestal Centroamericana 36:14-19. ISSN: 1021-0164.

106. Need for criteria and indicators for SFM as a means of monitoring the compliance of the national forest policy in India

Prabhu, R.

The paper examines the implications of using criteria and indicators for sustainable management as tools for policy feedback in the context of India's forests. It explores some of the theoretical underpinnings of developing and implementing policy in the face of complexity and establishes a role for criteria and indicators as negotiated and scientifically sound tools for providing feedback on the effectiveness of policy. Examples of criteria and indicator development across the globe are explored with respect to their information for India's needs.

Finally the paper examines how criteria and indicators of the Bhopal-India process might be applied.

Proceedings of National Workshop on National Level Criteria and Indicators for Sustainable Forest Management in India, 4-5 July, 2000, India International Centre, New Delhi. Bhopal, India, Indian Institute of Forest Management. SFM Series. 18-33.

107. An overview of post-extraction secondary forests in Indonesia
Kartawinata, K., Riswan, S., Gintings, A.N., Puspitojati, T.

Indonesia has extensive areas of post extraction secondary forests and degraded lands arising from intensive exploitation of forest resources in recent decades. Using the area of forests resulting from selective logging practices as an estimate, in year 2000, post extraction secondary forests covered about 23 million ha, or about 55% of the total concession area. This paper analyses the underlying causes of transformation of primary to secondary forests and degraded lands, including policy and regulations in forestry and forest resources, poor enforcement of regulations, and the lack of recognition of timber exploitation rights for local communities. The government is committed to promoting participation of local communities in managing forests. Recent policy changes for ameliorating some of the degrading factors have resulted in increased pressure on secondary forests due to rampant illegal logging and use claims by local communities and land speculators. While the largest proportion of post extraction secondary forests has been maintained as part of the permanent forest estate, substantial areas have been converted for swidden agriculture, industrial tree and estate crop plantations and transmigration areas. Local community involvement and an understanding of the underlying degradation pressures would be imperative for the effective rehabilitation and sustainable management of post extraction secondary forests.

Journal of Tropical Forest Science 13(4): 621-638.

108. Prediction of the impact of logging activities on forest cover: a case study in East province of Cameroon
Mertens, B., Forni, E., Lambin, E.F.

Geographic information system techniques were used in combination with remote sensing data to define the net

commercial value of standing timber at two sites (Batouri and Bertoua) in the East province of Cameroon. Observed forest cover modifications for the two sites were assessed in relation to the commercial accessibility of the forest areas. Results showed that, in one site, half of the very high rent areas have already been logged indicating that the unlogged high rent area is scarce and the low rent or marginal forest area remains largely unlogged. However, this was not the case throughout the study area as shown by the observations at the other site. The two main species exploited were sapelli (*Entandrophragma cylindricum*) and Ayous *Triplochiton scleroxylon*.

Journal of Environmental Management 62(1): 21-36.

- 109. Rehabilitation of degraded tropical forest ecosystems: workshop proceedings, 2-4 November 1999, Bogor, Indonesia**
Kobayashi, S., Turnbull, J.W., Toma, T., Mori, T., Majid, N.M.N.A., (eds.)

This conference proceedings contains 26 papers based on the activities of partner institutions that the Center for International Forestry Research (CIFOR) has facilitated. There are 4 sections: (i) evaluation of forest harvesting and fire impacts on forest ecosystems; (ii) development of methods to rehabilitate logged-over forests and degraded forest lands; (iii) development of silvicultural techniques on degraded forest lands; and (iv) network of the rehabilitation of degraded forest ecosystems.

Bogor, Indonesia, CIFOR. 226p. ISBN: 979-8764-70-6.

- 110. Secondary forest: a working definition and typology**
Chokkalingam, U., de Jong, W.

With past and continued destruction of primary forest worldwide, secondary forests constitute a large and growing component of forest cover and have been found to be very important for a wide range of goods and services. Despite its widespread usage, there is considerable ambiguity with regard to the meaning of the term 'secondary forest' and the different forest types it encompasses. This paper reviews existing definitions, or perceptions, of secondary forests and examines the three main points of contention: nature (human or natural) of disturbance, intensity of disturbance, and nature of vegetation development

matters in its definition. It then arrives at a broad working definition for secondary forests, and develops a secondary forest typology based on the underlying disturbances or land use practices that create conditions for the appearance of secondary forest. Both the definition and typology are based on clear and objective criteria and are generalizable across regions, which should make them widely applicable.

International Forestry Review 3(1): 19-26.

111. Secondary forest dynamics in the Amazon floodplain in Peru
de Jong, W.

Studies in secondary forest in Latin America have largely been confined to terra firme lands. This paper reports on a study of dynamics of secondary forest and its interactions with land use for agriculture and utilization of primary forest in the floodplains of the Uyacali and Amazon rivers in Peru. This environment is marked by more fertile soils than generally found on terra firme lands. Floodplains soils may flood yearly or once every several years. Farmers grow combinations of crops on different agricultural sites, and under annual production and multi-annual regimes. Secondary forest plays an important role in this environment. The main trends in the process of formation of secondary forest have been analysed through a survey among 218 farmers, collecting data on land use, primary and secondary forest management, and other economic activities. The results show that processes of secondary forest formation are influenced by advancing market access, changes in the dominant land type as a result of river floods, and population pressure when villages become older. As villages age farmer's holding tend to become smaller. While this happens private primary forest reserves are replaced by secondary forest, but total forest cover does not decline. The economic importance of secondary forest increases when these forests age, but improved market access seems to off-set this trend. The concept of frontier expansion, and the related change of the role secondary forest in the landscape, typical for colonization areas, does only partly apply to this environment.

Forest Ecology and Management 150(1-2): 135-146.

112. The secondary forest situation in Sri Lanka: a review
Perera, G.A.D.

Most forests in Sri Lanka are secondary, are mostly confined to the dry and intermediate zones of the country, and arise out of swidden agriculture. The majority of secondary forests which regenerate after swidden farming in the dry parts of Sri Lanka are grown from vegetative parts, that are from remaining roots and stumps. Secondary forests provide numerous products of importance to local people. They also help to bridge seasonal gaps in livelihoods. Secondary forests of Sri Lanka are being disturbed or transformed by intensive cultivation, fire, the implementation of development projects, the establishment of plantations and by the construction of houses by the local people. Secondary forests in the dry parts of Sri Lanka could be managed as conservation areas for timber production or for multiple uses. Regional climate, the ecology of secondary forests and anthropogenic pressures need to be considered when selecting suitable management options for a given site. Most of the secondary forests are heavily degraded and need to be rehabilitated. Intensification towards improved fallow systems or plantations is inhibited by poor site conditions, the threat of destruction by elephants, and insecure tenure.

Journal of Tropical Forest Science 13(4): 768-785.

113. Secondary forests in Asia: their diversity, importance, and role in future environmental management
Chokkalingam, U., de Jong, W., Smith, J., Sabogal, C. (eds.)

This special issue brings together 15 papers entirely dedicated to secondary forests in tropical Asia: 1. Tropical secondary forests in Asia: introduction and synthesis. 2. A conceptual framework for the assessment of tropical secondary forest dynamics and sustainable development potential in Asia. 3. Formation and recovery of secondary forests in India: a particular reference to Western Ghats in South India. 4. An overview of post-extraction secondary forests in Indonesia. 5. Status and perspectives on secondary forests in tropical China. 6. Secondary forests in the Philippines: formation and transformation in the 20th century. 7. Secondary forests in the lower Mekong subregion: an overview of their extent, roles and importance. 8. Tropical secondary

forests in Nepal and their importance to local people. 9. Farming secondary forests in Indonesia. 10. Secondary forests of the Himalaya with emphasis on the north-eastern hill region of India. 11. Secondary forests in swidden agriculture in the highlands of Thailand. 12. Secondary forest situation in Sri Lanka: a review. 13. Large-scale fire: creator and destroyer of secondary forests in Indonesia. 14. The evolution of swidden fallow secondary forests in Asia. 15. Secondary forests associated with rehabilitation of degraded lands in tropical Asia - a synthesis.

Journal of Tropical Forest Science. Special issue 13(4). 839p. ISSN: 0128-1283.

114. Secondary forests in swidden agriculture in the highlands of Thailand

Schmidt-Vogt, D.

Swidden farming is the main agent of conversion of primary forests to secondary forests in the highlands of mainland Southeast Asia, but there is a deterioration and decline of the practice with land use intensification. The population growth in northern Thailand has forced lowland farmers practising permanent wet rice cultivation to turn to short rotation swidden in the foot hill zone. Highland swidden agriculturists are adopting more intensive forms of swidden or are shifting to permanent farming. This change is supported by road construction and increased marketing opportunities for temperate crops grown in the highlands. The decline of swidden farming is causing a net degradation and decrease in fallow related secondary forest cover, with consequent losses in the biodiversity and economic potential of these forests. There exists no policy or legal framework in Thailand that allows for the preservation and sustainable legal use of these forests. Major obstacles for the development of such a framework are the prevailing assessment of secondary vegetation as degraded scrub, and a highland development policy that does not encourage forest use by local communities. The introduction of community forestry legislation is still pending. There is a need to design land use systems that integrate fallow forest management with agricultural production.

Journal of Tropical Forest Science 13(4): 748-767.

115. **Secondary forests in the lower Mekong subregion: an overview of their extent, roles and importance**
Mittelman, A.

Much of mainland Southeast Asia's primary forest has been converted into secondary vegetation types in the past several decades. In the Lower Mekong subregion, nearly 100 million ha of forests were significantly altered or removed, with depletion in terms of areal percent most severe in Thailand and Vietnam. Timber extraction and conversion of forestland to agriculture are the two principal causes of forest degradation in the region. Logged sites are often later occupied by migrant homesteaders. The current regional focus of logging has shifted to Laos, Cambodia and Myanmar. Secondary forests, despite their frequently degraded status, continue to play direct and supportive roles with respect to socioeconomic development. Widespread removal of primary forests has made secondary forests the principal source of supplemental livelihood products for millions of poor rural households. Given the critical role of forests in supporting sustainable development, regional governments and a range of non government, research and donor organisations are exploring, developing and supporting strategies for reforestation and natural forest regeneration. There is growing acknowledgement that governments on their own are inadequately equipped to achieve sustainable forest management, and new policies delegate greater decision making authority and forest management responsibility to local communities. Most of the area which policies now envision giving over to community based sustainable management is secondary forest.

Journal of Tropical Forest Science 13(4): 671-690.

116. **Secondary forests in the Philippines: formation and transformation in the 20th century**
Lasco, R.D., Visco, R.G., Pulhin, J.M.

Secondary forests are the largest and most dynamic natural forest ecosystems in the Philippines. This paper examines the characteristics and dynamics of secondary forests in the country. In the last century, the country lost 50% of its natural tropical forest cover. At present, the major land cover types in terms of

area coverage are upland farms, secondary forests, protected forests, brushlands, grasslands and tree plantations. The two most dominant types of secondary forests are post extraction secondary forests and swidden fallow secondary forests. The former stems from legal and illegal logging, which are ultimately rooted in corruption, poverty and high population pressure. At present, post extraction secondary forests are the main source of wood products of the country. Although secondary forests initially increase as a result of heavy commercial logging, they subsequently decrease due to degradation to brushland and conversion to agriculture. Swidden fallow secondary forests are generally associated with indigenous cultural communities who derive many ecological and socio economic benefits from them. However, there are very limited quantitative data available on these forests, including areal coverage. The paper emphasizes the need for research efforts directed at the sustainable use and conservation of secondary forests in the Philippines.

Journal of Tropical Forest Science 13(4): 652-670.

117. **Secondary forests of the Himalaya with emphasis on the north-eastern hill region of India**
Ramakrishnan, P.S., Kushwaha, S.P.S.

Secondary forests form a major component of the forest types in the Central Himalayan region and in the north eastern hills of India. Deforestation in these areas is largely due to external pressures of timber extraction for industrial use. When large-scale deforestation from outside the region is superimposed upon the demands of the local communities for food, fodder and fuelwood, the previously balanced use of forest resources, including the management of swidden fallow secondary forests, becomes impaired. Understanding the local linkages between ecological and social processes is important in order to design strategies for the sustainable management of secondary forests in the region where traditional societies live. A particular approach suggested is to benefit from the sociocultural heritage related to keystone species such as *Alnus nepalensis*. The traditions around these and related species and their particular ecological attributes allow for the design of adaptive management strategies to resolve problems with both environmental and sociocultural dimensions. In designing such

an adaptive management plan that could be operationalised at the landscape level where both natural and human managed agro ecosystems are well integrated, designing appropriate institutions at the local level is important for ensuring community participation.

Journal of Tropical Forest Science 13(4): 727-747.

118. Sistemas tradicionales de gestión del bosque tropical en Indonesia: ecología y prácticas silviculturales
García-Fernández, C.

Tropical forests have been perceived as biodiversity sanctuaries that should be preserved from human action. However, rural communities have lived in these forests over millennia using their biodiversity to satisfy a wide range of needs (timber, food, medicinal plants, etc.), without threatening the long run the benefits they provide. Non-timber forest products (NTFPs) were identified as a valid option to achieve sustainable development. Recently, traditional forest management systems, created and implemented by rural communities, have been identified as another way to favor the sustainable use of these areas. Management practices are extremely complex and ever changing to fit the different environmental, cultural and economic conditions of each territory. The study conducted is focused in two traditional management systems in Indonesian forest, third country in extension of tropical forest after Brazil and Zaire. The resources studied, exploited in small management units (gardens), are benzoin resin (*Styrax paralelloneurum*) and rattan canes (*Calamus caesius*). Both are forest resources classified as NTFPs. Benzoin is a tree characteristic of mature forest that requires shade in the first stages of growth, therefore it is planted under forest cover once the undergrowth vegetation have been eliminated. After the first years the samplings need more sunlight so it become independent of the forest that provided shelter. Therefore regular clearance is practiced once the exploitation of the resin starts, seven to ten years after the planting. On the other hand, rattan is a multi stemmed climbing palm that it is established together with rice in shifting cultivation plots where all the vegetation have been eliminated. After one or two years the plot is abandoned and the rattan grows with the secondary vegetation. This palm will need trees to climb to

so the canes have good quality. In this systems the silvicultural activities are directed to maintain a forest cover that it is not too dense, it would not allow sunlight to come in, not too open, which would restrict climbing possibilities. Silvicultural practices are human alterations of the natural dynamics of forest and therefore they can provoke structural changes in forest structure. Benzoin gardens the density of *Styrax* trees is the main discriminant variable. They can have go from the plantation extreme (where 80% of the trees above 10 cm dbh are cultivated) to the forest like extreme (benzoin represents 45% of the stems), with presence of lianas, epiphytes and other elements of mature forest. In the first case, even with high density of plantation (477 tress/ha) the undergrowth vegetation is clear but diverse, which differentiate them from real plantations, that are mono specific, and that require in general external inputs. Rattan gardens on the other extreme are structurally more similar to a forest. Tree density (dbh³ 10 cm) ranges from 374 to 651 compare to 600 trees/ha in primary forest areas. Differences are related tree cover and size and with *Calamus* clusters density. This uniformity is an indication of the low intensity of management required to keep the gardens in good conditions. A parameter with major importance in the context of this work is the diversity this gardens hold compared to the one in mature forest areas.

Madrid, Spain, Facultad de Biologia,
Universidad Complutense de Madrid. 228p. Thesis.

119. Soil conditions under natural logged-over and secondary stands of tropical seasonal forest in Thailand

Yarwudhi, C., Kobayashi, S., Tanaka, N., Suksawang, S.

Soil samples from permanent sample plots of natural mixed deciduous, logged-over mixed deciduous and the secondary stands in the tropical seasonal forest were analysed for physical and chemical properties. Bulk density and soil hardness of A-horizon in the natural stand were slightly higher than in logged-over and the secondary stands with average bulk densities 1.2, 1.1 and 1.0 g cm⁻³ and soil hardness 17, 16 and 15 respectively. Secondary stands had slightly higher B-horizon hardness than the natural and the logged-over stands. Total pore value (volumetric %) of the secondary stand was higher than the logged-over and the natural stands with the average of 48, 45 and 42 % respectively. Secondary stand fine pore percentage was also

higher than that of the natural and the logged-over stands with the average of 29, 25 and 24 % respectively. Soil permeability was highest in the secondary stand with an average of 122 ml minute⁻¹ while in logged-over and natural stands it was 116 and 45 ml minute⁻¹ respectively. Soil organic matter in the secondary, natural and logged-over stands was 7.3, 6.0 and 5.0% respectively. There is much variation in P, K, Ca and Mg content in all stands. The maximum content of P in the natural, logged-over and secondary stands are 35, 57 and 26 ppm. respectively, while the minimum P content was 4, 4 and 2 ppm respectively. Average P contents were in the range 9-12 ppm. The average K content in natural, logged-over and secondary stands was 188, 230 and 555 ppm, average Ca was 963, 938 and 1109 ppm, and average Mg 289, 528 and 413 ppm respectively. It is concluded that there is little difference in most soil properties in these stands, except soil permeability in the natural stand is lower than in the other two stands. This may be the effect of high soil bulk density and the low coarse pore volumetric percentage.

In: Kobayashi, S., Turnbull, J.W., Toma, T., Mori, T., Majid, N.M.N.A. (eds.). Rehabilitation of degraded tropical forest ecosystems: workshop proceedings, 2-4 November 1999, Bogor, Indonesia. Bogor, Indonesia, CIFOR. 99-106. ISBN: 979-8764-70-6.

120. Status and perspectives on secondary forests in tropical China
Zaizhi, Z.

Tropical China has relatively low forest cover and faces high pressures for its depleting forests. Following intensive exploitation of its forest resources over several decades, large areas of post extraction secondary forests exist. These remaining natural forests play very important roles in water resources retention, and the supply of small diameter timber, fuelwood, poles, and non- timber forest products for sustaining the livelihoods of mountain communities. However, the extent of these resources is fast diminishing and most of it is highly degraded. This paper illustrates that the transfer of forest use fights to local communities can in fact lead to increased forest degradation when implemented in the context of a long history of changing policies on forest use rights. The paper also suggests that a shortage of financial support, incentive mechanisms, management knowledge and techniques, the over taxation of wood, and poverty are affecting the management and use of

secondary forests. Policy requirements and management options need to be explored for overcoming the constraints to the ecologically and economically viable use of secondary forests, and the integrated development of the communities that depend on this resource.

Journal of Tropical Forest Science 13(4): 639-651.

121. Structure and spatial patterns of trees in old-growth northern hardwood and mixed forests of northern Maine
Chokkalingam, U., White, A.

Stand structure including spatial patterns was studied in northern hardwood and mixed forest types in the 2000-ha old-growth Big Reed Forest Reserve in northern Maine using complete stem mapping, dendrochronology, and spatial analyses on ~0.5 plots. The inclusion of saplings, dead wood, age distributions, spatial pattern, and interactions provided some idea of underlying processes and temporal change. Structural characteristics were most comparable to spruce-northern hardwood forests of northern New England and New York, and most characteristics matched expected patterns for old-growth forests of the region. Results indicated smaller maximum-tree sizes, lower basal areas (26-34) and downed-wood volumes (29-64), higher densities (475-649), but similar species longevities compared to other mesic old-growth forests further south and in the Lake States. The stands were dominated by very shade-tolerant tree species, including *Fagus grandifolia* Ehrh., *Acer saccharum* Marsh., *Picea rubens* Sarg. and *Abies balsamea* (L.) Mill, with each species found in many crown positions and age and size classes. The sapling layer was dominated by *Fagus grandifolia* followed by *Picea rubens*. Most species had reverse-J shaped diameter distributions, but age distributions were indicative of synchronous, episodic recruitment. In most plots, *Acer saccharum* diameter distributions were skewed towards the mid-larger size classes. Lack of young and small *Acer saccharum* stems suggested change in forest composition towards *Fagus grandifolia* dominance. Most species formed small-scale clusters (≤ 15) perhaps in response to small gap disturbances. Snags were the dominant dead wood type and were randomly to regularly distributed in most plots. Logfall directions were unrelated to hurricane paths. Recent small-scale disturbance

events and topographic position appear to be important in explaining current structure and dynamics of the hardwood and mixed forests of Big Reed Forest Reserve in northern Maine. The continued effects of beech bark disease had a greater effect on hardwood plots, whereas a recent spruce budworm outbreak had a greater effect on plots with higher conifer density. The dominance of very shade tolerant tree species in small-scale clusters, and randomly distributed snags rather than clustered uproots were indicative of the prevalence of small scale gap disturbance regimes in the hardwood and mixed forests of Big Reed Forest Reserve in northern Maine. Varying topographic position may allow for slight changes in disturbance regime leading to consequent variation in structure and dynamics. H1, a more open plot on upper exposed slopes, had distinctly different characteristics such as lower live and dead tree and sapling densities than the other plots, but more uprooted trees and *Acer saccharum* saplings. Such small scale gap disturbance regimes operating on an episodic basis, and effects of slight variations in this regime on stand composition and structure have significant implications for silvicultural interventions and management of these forest types.

Plant Ecology 156(2): 139-160.

122. Tree and forest management in floodplains of the Peruvian Amazon
de Jong, W.

This paper discusses different tree and forest management strategies in Yanallpa, a ribereno village located within the Ucayali floodplain, Peru. In the village, studies on tree and forest management were conducted through surveys, participative observation and unstructured interviews with farmers. Farmers in the floodplain rely on a mixed portfolio of agricultural production, including tree and forest management. Fields in which tree or forest management occur are of two types: (1) forest gardens in which a large number of species are being produced, (2) and fields in which annual crops are combined with one or several tree species. Within each of these two categories distinctive tree or forest management strategies are recognized. In forest gardens, tree production is the main economic activity. On agricultural field especially in the lower

elevations that have the more fertile soils, trees may be grown in addition to annual or semi-perennial crops. Two species, *Cedrela odorata* and *Calycophyllum spruceanum* are prominently managed in the latter field types. It appears, however, that the specific tree composition of the fields is closely related to the alternative options of crop-production on those fields. These alternative options are largely related to the biophysical condition of these fields. Tree and forest management appears to be an appropriate option as part of floodplain agriculture, but options have to be adapted to the specific circumstances that different sites offer.

Forest Ecology and Management 150(1-2): 125-134.

123. Tropical secondary forests in Asia: introduction and synthesis
de Jong, W., Chokkalingam, U., Smith, J., Sabogal, C.

This paper provides the general objectives of the special issue: secondary forests in Asia: their diversity, importance and role in future environmental management. It provides a brief overview of the renewed attention to tropical secondary forests and sketches the history of research on this subject. The paper introduces two analytical tools that are used throughout this special issue to better understand the current situation and trends of secondary forests in Asia, a typology of tropical secondary forest in Asia, and a conceptual framework that explains the formation and dynamics of these forests. It then outlines some of the main messages that emerge from discussions in the various papers and ends with recommendations for actions and needs for future research.

Journal of Tropical Forest Science 13(4): 563-576.

124. Tropical secondary forests in Nepal and their importance to local people
Kanel, K.R., Shrestha, K.

Most forests in tropical Nepal are secondary, resulting largely from episodes of large-scale timber harvesting in the past along with accumulated small-scale extraction of timber and non-timber forest products by local people over centuries. Currently in the forest depleted stage, remaining tropical secondary forests

are still very important for fulfilling the subsistence and economic needs of local people, as well as for biodiversity conservation, groundwater recharge, and the protection of lowland agriculture from landslides and floods. Protection of degraded lands by community forest user groups in places has led to the successful development and management of some rehabilitated secondary forests. In government managed secondary forests with a production focus, people's participation in management is now being considered. Institutional, socio economic, and ecological issues related to the sustainable management and use of secondary forests along with implications for action are outlined.

Journal of Tropical Forest Science 13(4): 691-704.

125. **Vegetation structure, floristic composition and growth characteristics of *Aucoumea klaineana* Pierre stands as influenced by stand age and thinning**
Fuhr M., Delègue, M. A., Nasi, R.

The coastal forest of Gabon abounds in mono specific secondary *Aucoumea klaineana* stands derived from natural regeneration after shifting cultivation. This paper aims to describe the changes in the structure and dynamics of these stands with age. It then assesses the impact of selective thinning in the upper storey on both structural and dynamic parameters. The experiment consisted of 34 Permanent Plots in stands from establishment to more mature stages (ca. 50 years old). Thirteen plots (17–45 years old) were thinned. More than 80% of the removal came from supernumerary dominant *A. klaineana*. *A. klaineana* represented 60% of the total density in stands ca. 15 years old but >90% of the dominant trees in older stands. The changes with age in the floristic composition of the unthinned stands showed three successional stages during which pioneer species associated with *A. klaineana* (from establishment to ca. 15 years) were progressively replaced by mature forest species. Basal area increased and density decreased with age before reaching stable values at ca. 40–45 years. Mortality was very high in young stands but decreased in the older ones. Mortality generally affected small diameter individuals in the dominated storey. Diameter and basal area increments showed that the stand growth resulted from the growth of dominant *A. klaineana*. Diameter increments of *A. klaineana* were elevated during the first years

of colonisation (1.9 cm/year) and were still ca. 0.7 cm/year for 50-year-old dominant trees. Thinning did not increase the mortality of the dominant population. It favoured the individual growth of *A. klaineana*. The gain was substantial for dominated trees and small dominant trees (from 60 to 100%) but was lower for large dominant trees (ca. 25–30%). Therefore, stimulation of individual growth did not compensate for the loss of basal area at the stand level.

Forest Ecology and Management 140(2-3): 117-132.

126. Whose forest is this, anyway?: criteria and indicators on access to resources

Colfer, C.J.P., Salim, A., Tiane, A.M., Tchikangwa, B., Sardjono, M.A., Prabhu, R.

This chapter provides a brief history of the social component of Center for International Forestry Research (CIFOR)'s project, 'Assessing sustainable forest management: testing criteria and indicators', with special reference to the issue of security of inter-generational access to resources (SIAR). It first presents an overview of the literature on assessing SIAR; then the social criteria and indicators (C&I) "Best Bets" and some method for assessing them. It concludes with earliest tentative findings relating to the possible causal links between sustainable forest management on the one hand, and one element in SIAR (sharing of forest benefits), on the other. In this analysis, it used data from two forest-rich sites (Bulungan, East Kalimantan, Indonesia and the Dja Reserve, Cameroon) and two forest-poor sites (Long Segar, East Kalimantan and Mbalmayo, Cameroon). It was found that timber companies and the government were perceived to have dominant shares of cash and timber in all sites, though to varying degrees; and that local communities were seen to have dominant shares of other forest products. Differences based on forest quality were not striking. It concludes by discussing on plans and recommendations for future research.

In: Raison, J., Brown, A.G. and Flinn, D. (eds.). Criteria and indicators for sustainable forest management. Wallingford, Oxon, UK, CAB International. IUFRO Research Series. 67-92. ISBN: 0-85199-392-3.

Non-Timber Forest Products

127. **Balance is beautiful: assessing sustainable development in the rain forests of the Bolivian Amazon**

Bojanic Helbingen, A.J.

This thesis aims at improving the understanding of the economic, environmental and social inter-relationships inherent in development processes. This study specifically deals with the problems and efforts involved in the use of rain forests of the Bolivian Amazon. The core issues addressed in the different chapters are: economic growth and distribution of income in the Brazil nut industry; the social-institutional constraints in the conduct of transactions by means of the advance payment system (*habilito*), the financial viability of forest management under the Bolivian forestry law; rent capturing in the timber industry; and an environmentally Extended Social Accounting Matrix (ESAM) used to explore the interactions between the economic, environmental and social development. It also compares the benefits of alternative forestland use options. The final chapter discusses the policy implications of the various scenarios and formulates recommendations.

Riberalta, Beni, Bolivia, Programa de Manejo de Bosques de la Amazonia Boliviana. PROMAB Scientific Series no.4. 255p. ISBN: 90-393-2757-2.

128. **Bamboo forestry in China: toward environmentally friendly expansion**

Ruiz Perez, M., Fu Maoyi, Yang Xiaosheng, Belcher, B.

Bamboo, with a long tradition in China, is one of the emerging sectors in the Chinese economy. It is making an increasingly large contribution to farmers' income and playing an important role in rural industrial development. Bamboo products are also being substituted for wood products, a process that has been accelerated by a variety of policy measures. However, the bamboo expansion has come at a cost to the environment. This article discusses the bamboo sector, with particular focus on Anji County (Zhejiang), and reviews the new policies being applied in an attempt to integrate the interests of development and the environment.

Journal of Forestry 99(7): 14-20.

129. Can non-timber forest products match tropical forest conservation and development objectives?

Arnold, J.E.M., Ruiz Perez, M.

The contributions that non-timber forest products (NTFPs) can make to rural livelihoods, and the fact that their use is less ecologically destructive than timber harvesting, have encouraged the belief that more intensive management of forests for such products could contribute to both development and conservation objectives, and have led to initiatives to expand commercial use of NTFPs. This paper reviews evidence that indicates that this conservation through commercialization thesis needs to be revised. In practice, the selective nature of market demand, and the uneven distribution of resources of use value within forests, mean that with NTFP harvesting the resource can become altered and degraded. The pressures that market forces can place on local control mechanisms, and the conflicting interests of those using forest resources for subsistence and income generation, can also result in poorer users becoming disadvantaged as NTFP commercialization is intensified. An approach that recognizes such areas of conflict, and attempts to arrive at a realistic balance between development and conservation, is proposed.

Ecological Economics 39: 437-47.

130. Comparison of bamboo production systems in six counties in China

Ruiz Perez, M., Belcher, B.

The cases studied show a lively bamboo sector that is expanding, contributing to employment and economic development in rural areas of China. County variations seem to indicate alternative land use options and different degrees of industrial development among them. New demands, notably for bamboo shoots are widening the range of species being planted, signaling a trend towards greater diversification, although most bamboo remains the dominant species. A new emerging issue is how to improve bamboo management while trying to satisfy development and environmental objectives. While bamboo intensification is showing signs of environmental impact, many naturally occurring species of bamboo remain still under-utilized if not blatantly ignored, being sometimes

considered as a weed. The first phase of land reform seems to have reached a ceiling. There is a wide consensus that the reforms undertaken have triggered a major expansion of the bamboo sector. However, a new momentum in the reform process is needed. Extending the length of contracts, improving the conditions and guarantees for inheritability of rights, allowing for some flexibility in the allocation of land and a new approach to subleasing, as well as incentives to improve management of state and collective farms are currently being discussed and applied in an experimental way. The recent bamboo raw material price stagnation and even decline seem to indicate a market glut. The Asian economic crisis has had an effect in this trial installed capacity, old technologies and insufficient response to new demands has also contributed to the decline of prices. Restructuring the bamboo industry, focusing it on quality and innovation, seem to be one of the key tasks ahead.

In: Fu Maoyi, Ruiz Perez, M., Yang Xiaosheng (eds.). Proceedings of a Workshop on China Social Economics, Marketing and Policy of the Bamboo Sector, Beijing, 16-18 June 1999. Beijing, China Forestry Publishing House. 18-54.

131. Harvesting of non-timber forest products: is sustainability achievable?

Nasi, R.

-abstract is not available-

In: Secretariat of the Convention on Biological Diversity. Assessment, conservation and sustainable use of forest biodiversity. Montreal, Canada, Secretariat of the Convention on Biological Diversity. CBD Technical Series, no.3. 17-20.

132. Incentives for collecting gaharu (fungal-infected wood of *Aquilaria* spp.; *Thymelaeaceae*) in East Kalimantan
Wollenberg, E.

The economic importance of Gaharu is assessed in three villages on the Bahau River in north-central Borneo to gain insights about the incentives for harvesting and management of valuable non-timber forest product. Three indicators of economic value-level and proportion of income, returns to labor, and proportion of Gaharu collecting households per village - are used to demonstrate the multiple incentives that NTFP income can

generate. The concept of incentives logic is developed as an analytical technique to show how economic values can be linked to incentives for different types of management actions. The article discusses how incentives from Gaharu income were most likely linked to the stake local people had in the resource, their preferences about which forest which forest product to harvest, and their willingness to engage in collective action. These incentives contributed to sustainability to the extent they induced actions that reduce threats to the resource. The article suggests that an understanding of the influence of economic incentives on people's resource management can be improved by recognizing three factors: the multiple incentives created by an income, the logical link of those incentives to a management action, and the influence of other socio-cultural and biophysical factors on management.

Economic Botany 55(3): 444-456.

133. **Proceedings of Workshop on China Social Economics, Marketing and Policy of the Bamboo Sector, 16-18 June 1999, Beijing**
Fu Maoyi, Ruiz Perez, M., Yang Xiaosheng, eds

Over the past few years, a number of Chinese researchers have collaborated with CIFOR and INBAR/IDRC in a systematic, two-phase socio-economic study of the bamboo sector in China. This proceedings contains a synthesis from the main research findings from research programs related to socioeconomics, marketing and policy in the bamboo sector of China. The current status and planning in the main bamboo - growing regions and industry systems are addressed. The studies cover strategic objectives, major projects, planning and actions, as well as problems and countermeasures to remedy them. The directions of development and prospects for sustainable development of the bamboo sector into the 21st century are considered.

Beijing, China, China Forestry Publishing House. 235p. ISBN: 7-5038-2704-1.

134. **Rattan cultivation and livelihoods: the changing scenario in Kalimantan**
Belcher, B.

This article discusses an analysis of the changing role of rattan in people's livelihoods in an area of Kalimantan, Indonesia where

it has been cultivated in a traditional rice-swidden system for more than 100 year.

Unasylva 52(205): 27-34.

135. The role of cocoa agroforestry in rural and community forestry in southern Cameroon

Sonwa, D.J., Weise, S.F., Tchatat, M., Nkongmeneck, B.A., Ndoye, O., Gockowski, J.

Over 70 years of familiarity with cocoa agroforests enables farmers of southern Cameroon to obtain food, medicinal plants and income from the ecosystem. Since 1994, social forestry activities in Cameroon have focused primarily on the idea of community forests. This approach is likely to encounter problems inherent in the way that administration works and in the structure of the communities. The ban on individuals exploiting non-timber forest products (NTFPs) and timber from community forests for profit increases the appeal of "private" land (such as cocoa agroforests). This paper argues that the objectives of the community forestry programme could partially be met through the good management of cocoa agroforests. This paper recommends that: 1. community forestry projects be designed to form part of a general land management concept which includes cocoa agroforests; 2. NTFPs be domesticated in cocoa agroforests to reduce pressure on the forest and 3. domestication projects take account of the intra- and inter-specific diversity of forests in the zone.

Rural Development Forestry Network (25g): 1-10.

Plantations and Rehabilitation of Degraded Forests

136. Adaptability of six native forest tree species to degraded lands in Pucallpa, Peruvian Amazon

Soudre, M., Ricse, A., Carbajal, Y., Kobayashi, S., Sabogal, C., Alegre, J.

Preliminary results of a field study in Pucallpa, Peruvian Amazon, to determine the establishment of six native forest tree species of economic value on degraded areas abandoned after intensive past agricultural use are reported. Study sites were on slash-and-burn farms partially covered with abandoned agricultural areas on ultisols dominated by invading vegetation mainly composed of *Imperata brasiliensis*, *Rottboellia cochinchinensis* and *Baccharis floribunda*. Tree species used in the trials were: *Schizolobium amazonicum*, *Tabebuia serratifolia*, *Calycophyllum spruceanum*, *Terminalia oblonga*, *Amburana cearensis* and *Cedrelinga catenaeformis*. These six species were planted in three degraded habitats characterised by the presence of one of the above weed species. After 13 months, *Schizolobium amazonicum* was the best adapted in the three experimental treatments, followed by *Tabebuia serratifolia* and *Calycophyllum spruceanum*. Habitats dominated by *Baccharis floribunda* offered comparatively better conditions for tree establishment and initial growth.

In: Kobayashi, S., Turnbull, J.W., Toma, T., Mori, T., Majid, N.M.N.A. (eds.).
Rehabilitation of degraded tropical forest ecosystems: workshop
proceedings, 2-4 November 1999, Bogor, Indonesia. Bogor, Indonesia,
CIFOR. 123-128. ISBN: 979-8764-70-6.

137. Assessing stakeholder agreements: a new research focus for CIFOR's plantation programme in Southeast Asia

Guizol, P., Cossalter, C.

The total amount of industrial plantations around the world is still small compared with the total area of global forests, but plantation forestry in the tropics is expected to increase quickly because of growing demand for timber and the depletion of wood from natural forests. Forestry plantations in the tropics have a comparative advantage over temperate plantations in terms of potentially higher yields. Tropical countries are trying

to encourage greater private-sector investment in forestry plantations and downstream wood industries. In many countries, however, land ownership and access is disputed by a variety of stakeholders. A major challenge for plantation companies is to reach agreements with these stakeholders to ensure a supply of raw material. Agreements between plantation companies and communities or other stakeholders offer a means of meeting the different objectives of various groups. Yet, in actual forest planning decisions, some stakeholders have more power than the others. This is especially true when large international companies are dealing with local communities whose residents may have little understanding of what an agreement entails. In such a context whether agreements are sustainable is questionable. CIFOR's Plantation Programme is engaged in research to develop tools and methods for assessing and monitoring the viability of such agreements between plantation companies and other stakeholders.

In: Philippines. Department of Environment and Natural Resources. Forest Management Bureau. Proceedings of the International Conference on Timber Plantation Development, November 7-9, 2000, Manila, Philippines. Manila, Philippines, Forest Management Bureau, Department of Environment and Natural Resources. 345-353. ISBN: 971-8986-39-1.

138. Changes in biological factors of fertility in managed *Eucalyptus* plantations on a savanna soil in Congo

Bernhard-Reversat, F., Laclau, J.P., Loubana, P.M., Loumeto, J.J., Mboukou, I.M.C., Reversat, G.

Biological factors of fertility were assessed through the study of litter quantity and quality, soil organic matter quantity and quality, soil microfauna, soil macrofauna, organic matter dynamic, particularly decomposition and non-symbiotic nitrogen fixation in an age series of *Eucalyptus* PF1 and one stand of *E. urograndis* (*E. urophylla* x *E. grandis*). The litter system underwent drastic changes with plot age: litter fall was higher in the older plots than in the younger ones. Soluble carbon and lignin content decreased significantly with plot age and decomposition rate increased. Change in soil organic matter amount occurred in the top layer of soil only and increased with plot age. This enhanced cation exchange capacity. Increase in soil organic matter content was due to the light organic fraction (>0.05 mm), and the amount of C did not change in the organo-mineral

fraction. Soil organic matter quality changed also, and the C/N ratio increased with plot age. A drastic decrease in free living nematode density from savanna to young plantations was observed after which it increased slowly with plot age although in the 19-year-plots it was still about ten times lower than in savanna. The importance of *Xiphinema parasetariae*, a parasite of eucalypts, was confirmed. Its density increased markedly with plot age and the size of the patches where it occurred increased. All soil macrofauna, earthworms, termites and litter inhabiting groups, except the ant group, increased in density with plot age. Termite density decreased in logged stands but no other measured parameters showed any significant difference between plantations and clear felled areas. The long-term effect of harvesting was observed mainly in the litter system and it appeared to be strongly disturbed by previous logging. Previous logging did not affect soil organic matter and nematode populations, either free living or plant parasitic. Soil macrofauna groups slightly increased after harvesting. Total phenolic compounds and fibre content were very different in leaf litter among clones and hybrids.

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179-190. ISBN: 979-8764-70-6.

139. Coppicing ability of teak (*Tectona grandis*) after thinning
Thaiutsa, B., Puangchit, L., Yarwudhi, C., Wacharinrat, C.,
Kobayashi, S.

The research was carried out at the Forest Industry Organization's Thongphaphum Plantation in Kanchanaburi province, Thailand. The main objective was to determine the effects of different thinning methods on coppicing ability of 17-year-old teak leading to two canopy levels. Teak stumps were planted in 1980 at a spacing of 4 x 4 m and average survival rate was 72%. In 1997 the thinning experiment was set up in a random block design with 3 replications and 4 treatments: low thinning, 1:1 mechanical thinning, 2:2 mechanical thinning, and clear cutting. Average stand density after thinning was 40 trees plot⁻¹, equivalent to 250 trees ha⁻¹. The thinned teak had average diameter breast height (dbh) of 18.5 cm and a commercial volume of 0.2411 m³ tree⁻¹. Thinning methods did not affect shoot density,

but affected shoot growth. Three months after thinning, there were 11.6 shoots stump⁻¹. This dropped to 7.9 shoots stump⁻¹ at 1-year-old, due to competition. Average dbh and total height of 1-year-old shoots varied with available space after thinning having maximum figures for clear cutting (dbh 3.2 cm, height 2.91 m), followed by 2:2 thinning (dbh 2.6 cm, height 2.29 m), 1:1 thinning (dbh 2.5 cm, height 2.20 m), and low thinning (dbh 2.1 cm, height 1.75). The findings indicate that shoot growth is promoted by wider gaps after thinning due to the light-demanding characteristics of teak.

In: Kobayashi, S., Turnbull, J.W., Toma, T., Mori, T., Majid, N.M.N.A. (eds.). Rehabilitation of degraded tropical forest ecosystems: workshop proceedings, 2-4 November 1999, Bogor, Indonesia. Bogor, Indonesia, CIFOR. 151-156. ISBN: 979-8764-70-6.

140. Degrading rainforest and challenge of the regeneration

Ishida, A., Toma, T.

-abstract is not available-

Journal of the Institute of Electrostatics Japan. 25(4): 192-201.

141. Designing sustainable large-scale industrial plantation landscapes: use of natural forest remnants and corridors to maintain biodiversity, retain environmental functions/services, and reduce social tensions between plantation companies and local people

Poulsen, J.

Tropical large-scale industrial plantations are rapidly expanding as a source of industrial wood and fuel and are also often used as part of afforestation and reforestation schemes. The article explores how appropriate design and management of natural forest corridors and remnant patches may be used to mitigate or reduce the negative impacts of large-scale industrial plantations on native biodiversity and towards maintenance of environmental and social functions of the original natural forest landscape. First, plantation landscapes should be designed so that the landscapes are penetrable and permeable for those biodiversity components which are of conservation concern in the area under consideration, but impenetrable and impermeable for pests, weeds, and invasive. Second, from a human/social

standpoint, the priority must be to design plantation and manage landscapes in a way that minimizes the adverse impacts on the local people and communities living in and around these areas. This paper presents work conducted in Riau, Sumatra, Indonesia. Incentives for better landscape/spatial design and management of those areas that are set aside from production for corridors and conservation areas are identified. Corridors have been considered as merely constraints to maximizing short-term earnings. Potential short-term economic incentives and benefits include: minimizing plantation damage caused by wind throw, fire and insect pest attack (by functioning as windbreaks, firebreaks, and providing habitat for biological control organisms), protecting and maintaining water quality and supply to both the plantation stands and the people living there, providing resources such as beneficial plants, and other NTFPs, for those local people who live within and around the plantation landscape, and, decreasing the plantation establishment and maintenance cost. The paper also describes improved sets of criteria and indicators for sustainable management of large-scale plantations, by i) suggesting increasing emphasis on landscape scale and conservation and socio-economic issues, and, ii) ensuring that the criteria and indicators are sufficiently linked to practical management, specifically by establishing explicit links between the criteria and indicator sets and codes of practice.

Proceedings of the International Symposium on Rehabilitation of Degraded Forest Environment for the Next Generation, Department of Forest Resources, Sangju National University, Sangju, Korea, 23-27 April 2001. Sangju, Korea, Sangju National University, Department of Forest Resources. 31-47.

- 142. Effect of exotic tree plantations on plant diversity and biological soil fertility in the Congo savanna: with special reference to eucalypts**
Bernhard-Reversat, F. (ed.)

In the southern coastal region of Congo near Pointe-Noire, savanna covers large areas on very poor sandy soils. These savannas have been used since 1978 for plantations of fast growing trees, mainly eucalypts, which are grown commercially. A particular feature of the Congolese plantations was their establishment on savanna with poor soil and vegetation. This document reports a study on the importance of the biological factors in fertility. The report is divided in three parts: (i) The

effect of both savanna and forest on undergrowth colonisation, and the trends of understorey vegetation changes with age. (ii) The relationships between vegetation and fertility are closely linked to litter and soil organic matter quality and quantity and these were studied in an age series of eucalypt hybrids and clones. (iii) The density of the main taxa of macrofauna and nematodes was assessed according to the age of plantation and logging. Nitrogen fixation ability, related to the dramatic N shortage expected to occur in aging plantations was also studied. In the harsh environment like the Congolese savanna, silviculture is a land use that has numerous positive effects although there are many problems still to be addressed. The increase in soil organic matter accounts for many positive changes is a fragile process. All management practices likely to decrease inputs, such as the burning of harvest residues, the harvest of twigs and leaves for fuel, and the harvest of logs with the bark, are expected to counteract environmental improvements resulting from eucalyptus growth. The choice of species and hybrids beside their growth and wood qualities should take into account litter quality and decomposition rate. Further research is needed on the cumulative effect of silvicultural practices involved in short-rotation forestry and its relation with soil organic matter.

Bogor, Indonesia, CIFOR. 71p. ISBN: 979-8764-72-2.

- 143. Evaluation of forest harvesting impacts on forest ecosystems**
*Mac Donagh, P., Gauto, O., Lopez Cristobal, L., Vera, N.,
 Figueredo, S., Fernandez, R., Garibaldi, J., Alvez, M., Keller,
 H., Marek, M., Cavalin, J., Kobayashi, S.*

In the Guarani preservation area 100 ha of forestland was cut to evaluate harvest impact in natural subtropical forest. Two treatments were applied: "commercial logging" in which the logging contractor works in the traditional way, and "improved harvest" in which trees are selected and the skidding trails and landings planned. Forest structure and composition, seedlings and regenerations and soil physical parameters such as soil density, penetration resistance were measured before harvesting. The trees were cut by chainsaw and moved by a rubber tyred skidder to the landing area for loading on a truck. After harvesting, damage by cutting and by skidding was measured. All previous parameters were re-measured and traffic intensity in each plot calculated. The harvest yields were 9.9

$\text{m}^3 \text{ha}^{-1}$ for the improved harvesting and $16.4 \text{ m}^3 \text{ha}^{-1}$ for the commercial treatment. Trees felled were $6.8 \text{ trees ha}^{-1}$ for improved harvest and $9.9 \text{ trees ha}^{-1}$ for the commercial harvest. For canopy trees, commercial harvesting reduced the initial dominance 19.3%, while improved harvesting only decreased it 9.5% so forest structure is less affected by the improved harvesting. There was little change in abundance and species composition. Changes were observed in the order of importance of some species, e.g. *Parapiptademia rigida* was replaced by species of lesser importance. Regeneration after the commercial harvesting was less than in the improved harvesting method. Commercial harvesting had more (60%) traffic intensity ($\text{Mg km}^{-1} \text{ha}^{-1}$) along all the skid trails in the plots.

In: Kobayashi, S., Turnbull, J.W., Toma, T., Mori, T., Majid, N.M.N.A. (eds.).
Rehabilitation of degraded tropical forest ecosystems: workshop
proceedings, 2-4 November 1999, Bogor, Indonesia, CIFOR.
69-79. ISBN: 979-8764-70-6.

144. Evaluation of methods for rehabilitation of logged-over lowland forest in Pasoh, Negeri Sembilan, Malaysia

Maswar, Mokhtaruddin, A.M., Majid, N.M., Hanum, I.F., Yusoff, M.K., Azani, A.M., Kobayashi, S.

Four rehabilitation methods were tested in logged-over lowland tropical forest in Pasoh Forest Reserve, Negeri Sembilan, Peninsular Malaysia. The treatments were: line planting (T1), gap planting $10\text{m} \times 10\text{m} \times 5 \text{ ha}^{-1}$ (T2), gap planting $20 \text{ m} \times 20 \text{ m} \times 5 \text{ ha}^{-1}$ (T3) and gap planting $10 \text{ m} \times 10 \text{ m} \times 9 \text{ ha}^{-1}$ (T4). *Hopea odorata*, *Azadirachta excelsa* and *Vitex pubescens* were planted in the lines and gaps. One year after planting, percentage survival of seedlings were: 97%, 96%, 93% and 93% respectively for T1, T4, T2 and T3 for *Hopea odorata*; 96%, 90%, 88% and 85% respectively for T4, T1, T3 and T2 for *Azadirachta excelsa*; and 97%, 94%, 87% and 76% respectively for T4, T1, T3 and T2 for *Vitex pubescens*. The costs for each treatment per hectare were RM 2862; RM 1520; RM 684 and RM 380 for T1, T3, T4 and T2 respectively. In general soil properties (bulk density, organic matter, soil moisture and pH) before and after rehabilitation treatments were not significantly different suggesting all the rehabilitation methods can prevent soil degradation. Technically, line planting and gap planting methods were suitable for rehabilitation of this area but in terms of economic cost and effective area planted, gap planting was more efficient and effective than line planting.

Hopea odorata, *Azadirachta excelsa* and *Vitex pubescens* are suitable for rehabilitation of this forest.

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135-140. ISBN: 979-8764-70-6.

145. Forest rehabilitation requires fire prevention and community involvement

Toma, T., Oka, T., Marjenah, Fatawi, M., Mori, T.

In East Kalimantan, Indonesia drought is frequently followed by fire. The eastern part of Kutai Regency is susceptible to large-scale wildfires during severe droughts related to strong El Niño Southern Oscillation (ENSO) events as shown by the 1982-83 and 1997-98 fires. Since the 1982-83 forest fire, many trials have been conducted to rehabilitate the burned forests. However, the 1998 fires burned both natural and rehabilitated forests in East Kalimantan. It is to be expected that severe droughts related to strong ENSO events and subsequent wildfires will occur again in the near future. At the time of the next severe ENSO event, people should remember that extremely severe drought is likely to recur early in the following year. Without effective fire prevention, the rehabilitated areas will be burned again and the rehabilitation process will not have enough time to reach completion. To rehabilitate burned forests and grasslands as well as to conserve the remaining natural forests, it is important that community-based initiatives are undertaken to reduce potential fire sources and to enhance fire management activities. Clear benefits to the local community should be introduced and announced to the local people before and during forest rehabilitation

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107-114. ISBN: 979-8764-70-6.

146. FORSPA initiative for rehabilitation of tropical forests in Asia-Pacific region

Appanah, S., Nair, C.T.S.

Tropical forests of the Asia-Pacific region are the most heavily threatened from high population density and rapid economic

growth. Extensive forest areas have become degraded as a result of over-exploitation and poor management. Unless these degraded forests are rehabilitated, they will come under pressure from other land uses. Recognising this, the Forest Research Support Programme for Asia and the Pacific (FORSPSA) of FAO initiated a Rehabilitation Programme and has started to set up a series of model plots of about 100 ha in each of the eco-climatic regions of Asia and the Pacific. Unproductive second growth forest areas will be rehabilitated using indigenous species of commercial value and techniques that are most familiar locally and well proven. The plots will be model areas for research and training extend the methods to other parts of the region with similar ecological conditions. These plots, which are accessible to international scientists, will be maintained for long enough to achieve and extend results. To further enhance the rehabilitation work, the group of scientists and forest managers will be soon linked through the Asia Pacific Forest Rehabilitation Network (APFReN). This will link together scientists and managers engaged in rehabilitation work to share experiences and solve problems. The Rehabilitation Programme will include training courses, workshops and publication of literature on forest rehabilitation issues.

In: Kobayashi, S., Turnbull, J.W., Toma, T., Mori, T., Majid, N.M.N.A. (eds.). Rehabilitation of degraded tropical forest ecosystems: workshop proceedings, 2-4 November 1999, Bogor, Indonesia. Bogor, Indonesia, CIFOR. 219-226. ISBN: 979-8764-70-6.

147. The impact of rubber on the forest landscape in Borneo
de Jong, W.

Rubber is the most widespread smallholder tree crop in Southeast Asia. Some analysts have blamed the expansion of rubber for greatly contributing to the conversion of mature tropical forest in both Indonesia and Malaysia. The paper critically examines to what extent smallholder rubber production actually led to forest conversion in West Kalimantan (Indonesia) and neighbouring Sarawak (Malaysia). The paper concludes that the introduction of rubber in West Kalimantan contributed little to encroachment into primary forest. Rather, it apparently favoured the restoration of forests in areas where land use became less intensive. This happens only where specific conditions in the local context allowed this to take place. The findings suggest that tree

technologies should be preferred when trying to improve local agriculture. Incorporation of local resource management technologies, especially tree planting or forest management technologies, may enhance positive outcomes in terms of increased income and forest preservation.

In: A. Angelsen, D. Kaimowitz (eds.). Agricultural technologies and tropical deforestation. Oxon, UK, CABI Publishing. 367-381. ISBN: 0-85199-451-2.

148. Information and dataset system on the rehabilitation of degraded tropical forest ecosystems project for international network

Anazawa, M., Sawada, H., Kobayashi, S.

This information and dataset system aims to facilitate international exchange and synthesis of the scientific and technical information based on results of the CIFOR/Japan project on the rehabilitation of degraded tropical forest ecosystems. There are two main pathways. One path integrates general information at the study site from annual reports, site map, remote sensing data, aerial chart and vegetation map into plot data of each site. Their outputs are data on site condition, vegetation, soil, climate, etc. which are accessible to the public. Another path is to accumulate experimental raw data into "Download" the use of which is restricted and requires a password. Version 1 of this system is experimentally located on the website at: <http://www.ffpri.affrc.go.jp/labs/fmrt/cifor/start.htm>

In: Kobayashi, S., Turnbull, J.W., Toma, T., Mori, T., Majid, N.M.N.A. (eds.). Rehabilitation of degraded tropical forest ecosystems: workshop proceedings, 2-4 November 1999, Bogor, Indonesia. Bogor, Indonesia, CIFOR. 213-218. ISBN: 979-8764-70-6.

149. Landscape rehabilitation of degraded tropical forest ecosystems: case study of CIFOR/Japan Project in Indonesia and Peru

Kobayashi, S.

Tropical forests are decreasing at the rate of 16.9 million hectares per year due mainly to clearing for agriculture and shifting cultivation. Rehabilitation is aimed to improve biological diversity, increasing commercial value for timber and non-timber products, increasing forest functions, improve soil fertility. In Indonesia, CIFOR co-operates with Mulawarman University, and looks at (a)

evaluation of forest harvesting impacts on the forest ecosystems, and (b) evaluation of forest harvesting and fire impacts on the forest ecosystems and development of methods to rehabilitate logged-over forest and degraded lands. The site is Bukit Soeharto Education Forest, a mixed Dipterocarp forest logged by INHUTANI I in 1976. The forest has been heavily burnt in 1998 after experimental treatment. The approach to rehabilitation has been through the "taungya system" whereby farmers are allowed to grow annual crops among the newly-planted trees. With the Instituto Nacional de Investigacion Agraria (INIA), Peru, the project is trying out re-vegetation of abandoned fallow fields after agricultural use. There is specific interest to select tree species having high economic value that can adapt and grow rapidly in abandoned agricultural land and on infertile soils. Sites are all located in the Ucayali region of the Peruvian Amazon. After the first two years, results are pointing to specific promising species that can be recommended. The project involves small farmers in silvicultural activities and even species choice takes into account their preferences.

Proceedings of International Seminar on Restoration Research of Degraded Forest Ecosystems, College of Agriculture and Life Sciences, Seoul, Korea, April 13 -15, 2001. Seoul, South Korea, Seoul National University, College of Agriculture and Life Sciences. 11-23.

150. Linking C&I to a code of practice for industrial tropical tree plantations

Poulsen, J., Applegate, G., Raymond, D.

Over the last ten years there has been an increasing emphasis on development of plantation estates for both wood fiber and agricultural crops such as oil palm. The principles for sustainable development and establishment of industrial plantations also account for the social, environmental and biodiversity aspects. This document showed the first attempt of CIFOR to develop a process designed to link the development of criteria and indicators (C&I) more closely with practical and sustainable plantation development principles and practices, the latter expressed through a Code of Practice. To ensure that the two systems are mutually compatible they have been developed simultaneously. The process aims to ensure that the standards for practical development of industrial plantations reflect, properly and appropriately, the needs and concerns expressed in the criteria and indicators for sustainable management and

development of planted forests. This is intended to both increase the relevance and hence perhaps the adoption of C&I, such as those developed by CIFOR. Criteria and indicators can provide the benchmark for a plantation owner to assess progress towards sustainable forest management within their forest estate. It can be used as a means of assessing compliance with suitable set of benchmarks such as contained within a Code of Practice for industrial tree plantation development in the tropics (Code).

Notes: This book contains two topics: 1. Poulsen, J., Applegate, G. C&I for sustainable development of industrial tropical tree plantations (with links to a code of practice). 2. Applegate, G., Raymond, D. Code of practice for industrial tree plantation development in the tropics. Bogor, Indonesia, CIFOR. 36; 86p. ISBN: 979-8764-65-X.

- 151. Nutrient export by clear cutting *Eucalyptus grandis* of different ages on two sites in Brazil**
Bellote, A.F.J., Dedeczek, R.A., Da Silva, H.D., Gava, J.L., Menegol, O.

At two sites, where *Eucalyptus grandis* plantations were 7 and 12 years old, twelve dominant trees were cut and measured. The 12-year-old-trees were 29.4 m mean height, 19.9 cm diameter over bark and estimated volume 0.40 m³ tree⁻¹. The 7 year-old trees were 30.7 m mean height, 20.6 cm diameter and estimated volume 0.49 m³ tree⁻¹. Of total biomass, 92% was trunk (sapwood, heartwood and bark). Based on a population of 1500 trees ha⁻¹, there is an export of biomass of 296 t ha⁻¹ from 302 t ha⁻¹ being produced when the entire trunk is removed. When only commercial stems are removed, there is an export of 277 t ha⁻¹. Within a whole tree, N is the nutrient present in greatest amount, followed by K, Ca, Mg and P. When parts of the tree are analysed, calcium is the nutrient present in greatest amount in bark. Phosphorus was not detected by the chemical analysis in heartwood in trees of 12 years of age, but it was present in trees aged 7 years. The amount of N and K extracted from soil by the trees is greater than the amount of these nutrients supplied by fertiliser, usually around 20 g plant⁻¹ of N and 15 g plant⁻¹ of K₂O. More than 50% of N, Ca and Mg are in the heartwood, sapwood and bark. Even if only commercial stems are taken from the plantation area, most of the nutrients will be exported.

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 173-178. ISBN: 979-8764-70-6.

152. Pest outbreaks in tropical forest plantations: is there a greater risk for exotic tree species?

Nair, K.S.S.

In the context of the ongoing expansion of forest plantations of exotic tree species in the tropics, a critical assessment was made of the risk of insect pest outbreaks in exotics. To date, there have been two opposing views: that plantations of exotic species are at greater risk compared to indigenous species and conversely, that exotics are at lesser risk. Both views rest on theoretical arguments. In this study, an empirical approach was used to address the issue. For nine most commonly planted species in the tropics, the pest problems in natural forest stands, in countries in which the species are indigenous (native plantations), and in exotic plantations were compared. The species chosen were *Acacia mangium*, *Eucalyptus* spp., *Gmelina arborea*, *Hevea brasiliensis*, *Leucaena leucocephala*, *Paraserianthes falcataria*, *Pinus caribaea*, *Swietenia macrophylla* and *Tectona grandis*. The results showed that: (1) monoculture itself caused an increase in the pest problems; and (2) the pest risk of exotics was variable, for some species similar to that of native plantations, while greater or lesser for others. The risk of pest outbreak is therefore not solely dependent on the exotic or indigenous status of a species. Empirical results also showed that pest outbreaks occurred in native plantations. The theory relating to insect population dynamics and causes of pest outbreaks is discussed and based on a mix of empirical evidence and theory. It is concluded that the following factors determine the risk of pest outbreak in exotic monoculture plantations: (1) presence or absence of plant species closely related to the exotic; (2) extent of area under the exotic species; (3) genetic base of the planted stock; (4) distance from the native habitat of the exotic; (5) existence of serious pests in the native habitat of the exotic; (6) time elapsed since introduction; (7) chemical profile of the exotic species; and (8) innate biological attributes of the insects associated with a tree species. The overall conclusion from this study is that while all monoculture plantations are at greater risk of pest outbreaks than natural forests, plantations of exotics are at no greater risk than plantations of indigenous species. It should be possible to develop a pest risk rating system for different tree species for different locations, based on these criteria.

153. Quantification of the biomass and nutrients in the trunk of *Eucalyptus grandis* at different ages

Da Silva, H.D., Ferreira, C.A., Bellote, A.F.J.

The accumulation and cycling of nutrients in planted forest is essential to the establishment of management practices that can lead to the sustainable production of the forest site. The uptake, accumulation and release of nutrients depend on tree age and stage of development. The knowledge of accumulation and cycling of nutrients allows the estimation of output and replacement of nutrients to the forest site. This makes it possible to correct nutritional disorders caused by the use of inadequate management techniques. The usual method of sampling biomass and nutrients is always destructive making it impossible to establish permanent plots for nutritional monitoring. This study aimed at selecting models to estimate the biomass (volume and weight) and the nutrient contents in different parts of the trunk of *Eucalyptus grandis*, and reducing costs of sampling and analysis. Forty-five trees were selected from the dominant class (15 trees), co-dominant (15 trees) and suppressed (15 trees) in commercial plantations of *E. grandis* at ages 3, 5 and 7 years, in the municipality of *Itatinga*, SP, Brazil. Samples were taken of bark, sapwood and heartwood separately. Models to estimate volume and weight in the different components of the trunk were generated from the diameter at breast height (dbh) using regression analysis. Models to estimate content of N, P, K, Ca and Mg in the bark, sapwood and heartwood from the nutrient contents in a section of the trunk were also defined, so enabling a recommendation for non-destructive sampling.

In: Kobayashi, S., Turnbull, J.W., Toma, T., Mori, T., Majid, N.M.N.A. (eds.). Rehabilitation of degraded tropical forest ecosystems: workshop proceedings, 2-4 November 1999, Bogor, Indonesia. Bogor, Indonesia, CIFOR. 165-172. ISBN: 979-8764-70-6.

154. Rehabilitation and restoration of degraded forests

Kobayashi, S.

-abstract is not available-

Farming Japan. 35(1): 26-36.

155. Rehabilitation of degraded forest with *Shorea leprosula* and *S. selanica* cuttings

Sakai, C., Subiakto, A., Heriansyah, I., Nuroniah, H.S.

Komatsu Ltd. and the Forest and Nature Conservation Research and Development Center (FNCRDC) of the Ministry of Forestry, Indonesia developed a cutting propagation technique for dipterocarp species. This technique uses a fog-cooling system to lower the temperature inside cutting boxes in a greenhouse. This method is suitable for mass production of vegetative propagules of some dipterocarps species. Rooting percentage of *S. leprosula* and *S. selanica* (meranti) cuttings was 95% and 92% respectively during the experimental stage, and 67% at mass production stage. The planting stock production of the dipterocarp cuttings in 1997 and 1998 were 42 000 and 53 000 respectively. Reforestation of degraded forest by using these dipterocarp cuttings was studied on 70 ha trial plot in West Java. Planting stock from cuttings and seedlings of *S. leprosula* and *S. selanica* were planted at various spacing. Preliminary results indicated that at this site *S. selanica* grows better than *S. leprosula*, planting stock from cuttings of both species performed better than planting stock from seedlings, and closer spacing resulted in better growth and survival. These findings suggest that planting stock from cuttings can be used to reforest degraded forest.

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191-196. ISBN: 979-8764-70-6.*

156. Rehabilitation of degraded forests in lowland Kutai, East Kalimantan, Indonesia

Mori, T.

Undisturbed lowland primary forest in Kutai, East Kalimantan is usually distinguished by dominance of dipterocarp species in number of individuals, in basal area and by their emergence to more than 50 m in height. Forests in most lowland concession areas have been logged selectively and suffered from surface forest fires at least twice since 1970. Canopy height and dominance levels have decreased in proportion

to extent and frequency of disturbances by logging and fires but the area of pioneer species has increased proportionally with degradation. Secondary forest species or pyrophytic trees have become dominant in all forestlands. Forest degradation in lowland Kutai is more serious than where forest has had only commercial logging. Rehabilitation methods should be tailored to existing forest structures; e.g., natural regeneration is most appropriate in forest dominated by primary species, and enrichment by patch planting in gap sites in forest with few mother trees. Macaranga forest or pyrophytic shrub forest should be artificially planted. This paper focuses on planting dipterocarps. Generally single species plantations of dipterocarps should be avoided, except for a few species e.g. *Dryobalanops aromatica* and *Shorea robusta*. When dipterocarps are used, the key to successful planting is light control and species choice. Light control should correspond to the light requirements of a species during its growing stages, so planting methods should reflect site conditions and growth characteristics of the species. These characteristics vary widely among dipterocarp species. Degraded forest types in East Kalimantan and rehabilitation measures for them are reviewed.

In: Kobayashi, S., Turnbull, J.W., Toma, T., Mori, T., Majid, N.M.N.A. (eds.).
Rehabilitation of degraded tropical forest ecosystems: workshop
proceedings, 2-4 November 1999, Bogor, Indonesia. Bogor, Indonesia, CIFOR.
17-36. ISBN: 979-8764-70-6.

157. Rehabilitation of degraded tropical forest ecosystems project
Kobayashi, S., Turnbull, J.W., Cossalter, C.

Tropical forests are being cleared at a rate of 16.9 million hectares per year and timber harvesting results in over 5 million hectares becoming secondary forests annually without adequate management. This decrease and degradation affect both timber production and many environmental values. Selective and clear cutting, and burning are major causes of land degradation. An assessment is needed of harvesting impacts that influence rehabilitation methods. The harvesting impacts on ecosystems vary with time and methods of logging, timber transporting methods, logged tree species, soil characteristics, topographies, local rainfall patterns etc., and must be assessed in a range of conditions with long term monitoring. Increased supply of wood

from plantation forests has the potential to reduce pressure on natural forest resources as well as contributing to environmental care and economic advancement for landholders. Short-rotation plantations can result in changes in nutrient storage and cycling processes due to factors such as harvesting wood, fertilisation, erosion, leaching, and modified patterns of organic matter turnover. These factors can affect storage and supply of soil nutrients for tree growth and consequently the sustainability of plantation systems. Opportunities exist to manipulate soil organic matter through silvicultural practices but these must be technically feasible, economically viable and socially acceptable. The following research objectives are proposed: (1). evaluation of forest harvesting and fire impacts on the forest ecosystems, (2). development of methods to rehabilitate logged-over forests, secondary forests and degraded forest lands, (3). development of silvicultural techniques on plantation and degraded lands, (4). network on the rehabilitation of degraded tropical forest ecosystems. It is anticipated that the results of these studies will contribute to the sustainable use of forest resources and environmental conservation.

In: Kobayashi, S., Turnbull, J.W., Toma, T., Mori, T., Majid, N.M.N.A. (eds.).
Rehabilitation of degraded tropical forest ecosystems: workshop
proceedings, 2-4 November 1999, Bogor, Indonesia. Bogor, Indonesia, CIFOR.
1-16. ISBN: 979-8764-70-6.

- 158. Rehabilitation of tropical rainforests based on indigenous species for degraded areas in Sarawak, Malaysia**
Azani, A.M., Majid, N.M., Meguro, S.

A study was conducted on forest rehabilitation based on indigenous species at the Universiti Putra Malaysia, Bintulu, Sarawak. Areas of open abandoned shifting cultivation, man-made mounds, Macaranga secondary forest and shrubby undergrowth were used for trial planting with different types of planting techniques. The research showed that selected species from the natural vegetation community easily adapt to the site conditions similar to their native habitat. The planted seedlings were classified as light demanding, shade tolerant and late growth species on the basis of their height growth performance in the trials. The indigenous tree species recommended for checkerboard plantations are: *Shorea ovata*, *S. mecistopteryx*, *S. macrophylla*, *Dryobalanops aromatica*,

Parashorea parvifolia, *Hopea beccariana*, *Durio carinatus* and *Eusideroxylon zwageri*.

In: Kobayashi, S., Turnbull, J.W., Toma, T., Mori, T., Majid, N.M.N.A. (eds.).
Rehabilitation of degraded tropical forest ecosystems: workshop
proceedings, 2-4 November 1999, Bogor, Indonesia. Bogor, Indonesia, CIFOR.
141-148. ISBN: 979-8764-70-6.

159. **Secondary forests associated with the rehabilitation of degraded lands in tropical Asia: a synthesis**
Chokkalingam, U., Bhat, D.M., von Gemmingen, G.

Rehabilitated secondary forests constitute a potential new and emerging resource requiring changes in policy favouring the rehabilitation of the large areas of degraded land in tropical Asia. Conversion of degraded lands into rehabilitated secondary forests rather than into monoculture plantations of exotics may be better for meeting the diverse product needs of local people, other stakeholders, and changing markets, as well as for environmental amelioration. It is also a relatively inexpensive method, suitable for rehabilitation by local people. Government and other stakeholder interest in and scope for rehabilitating degraded lands to secondary forest systems tend to increase along a proposed land use intensification model. Attempts to rehabilitate degraded lands in the intensive exploitation stage because of international pressures or funding availability are often not viable because the underlying socio economic and institutional causes of degradation may continue to operate. In the depleted stage forest, the biophysical and socio economic situation is riper for policy changes and implementation favouring rehabilitated secondary forests. The driving forces behind the rehabilitation efforts tend to shift from large-scale timber production to local livelihood, more diverse local market and environmental needs coinciding with the depletion of forest resources. However, the development of rehabilitated secondary forests may still be constrained by degraded site conditions, the persistence of chronic disturbances and lack of incentives. Rising international and national commitment to biodiversity conservation, community based management, forest rehabilitation, timber certification and climate stabilisation could as well focus more on secondary forest regeneration and management in protected areas and as community forests, serving both conservation and production goals.

160. Site characterisation and the effects of harvesting on soil tillage on the productivity of *Eucalyptus grandis* plantations in Brazil
Dedecek, R.A., Bellote, A.F.J., Gava, J.L., Menegol, O.

Two commercial eucalypt sites were selected in São Paulo State, Brazil, to evaluate productivity and soil chemical and physical properties before clearcutting, and the effect of harvesting and soil tillage system on productivity of second rotation. At site 1, the *Eucalyptus grandis* plantation was 7 years old, on its first rotation, and reached 21 m mean height, 13.6 cm diameter breast height (dbh), an estimated commercial volume of 479 m³ ha⁻¹ and a mean annual increment of 68 m³ ha⁻¹ year⁻¹. At site 2, *E. grandis*, also on its first rotation, but 12-years-old, had 25 m mean height, dbh 16 cm, an estimated volume of 662 m³ ha⁻¹ and a mean annual increment of 55 m³ ha⁻¹ year⁻¹. Litter collected at site 2 before harvesting totalled 19.8 t ha⁻¹, and after harvesting and new planting, litter left on surface totalled 2.64 t ha⁻¹. At site 1, 31.3 t ha⁻¹ of litter accumulated before harvesting and 7.6 t ha⁻¹ after new planting. Soils of both sites are classified as Dark Red Latosol (Oxisol), having loam texture at site 2 and clay texture at site 1. Clay content difference between sites was around 10 %, available soil water content between sites varied less than 0.02 cm³ cm⁻³. Penetrometer soil resistance measured before harvesting and after new planting was less than 21 kg cm⁻², at 50 cm besides tree row, on both sites. Greater soil resistance measured at tree row was found at 15-cm depth, in both sites. Soil of site 1 has greater CEC, base saturation and organic matter content compared to site 2. One year after planting eucalypts growing on soil tilled with subsoiler with one shrank were smaller at site 2.

In: Kobayashi, S., Turnbull, J.W., Toma, T., Mori, T., Majid, N.M.N.A. (eds.).
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proceedings, 2-4 November 1999, Bogor, Indonesia. Bogor, Indonesia, CIFOR.
157-164. ISBN: 979-8764-70-6.

161. Soil factors affecting growth of seedlings in logged-over tropical lowland forest in Pasoh, Negeri Sembilan, Malaysia
Mokhtaruddin, A.M., Maswar, Majid, N.M., Yusoff, M.K.,
Hanum, I.F., Azani, A.M., Kobayashi, S.

Effects of soil properties on growth of young tree seedlings of *Hopea odorata* and *Azadirachta excelsa* in line and gap enrichment

planting in logged-over tropical lowland forest were evaluated. At 13 months, the trees were grouped into "good" and "poor" growth based on their height increment in the previous 6 months. Organic matter content, penetration resistance, soil texture, thickness of A-horizon, Ca and Mg contents differed significantly between soils with "good" and "poor" growth. Organic matter, thickness of A-horizon, Ca and Mg contents were found to be significantly higher in "good" growth soils than "poor" ones, but penetration resistance was the reverse. Surface soils under "good" growth had lower clay content and higher sand content compared to that under "poor" growth. Favourable soil conditions for good growth were also manifested in biomass and litter accumulation. The mean dry biomass in the "good" and "poor" growth was 174 and 72 g m⁻² respectively, and for dry litter 300 and 154 g m⁻² respectively. Properties most limiting seedling growth performance, were bulk density (mechanical resistance), depth of A-horizon and amount of clay in the surface soil. Correction of these factors is therefore important in ensuring the success of rehabilitation and reforestation of logged-over degraded forest.

In: Kobayashi, S., Turnbull, J.W., Toma, T., Mori, T., Majid, N.M.N.A. (eds.).
Rehabilitation of degraded tropical forest ecosystems: workshop
proceedings, 2-4 November 1999, Bogor, Indonesia. Bogor, Indonesia, CIFOR.
129-134. ISBN: 979-8764-70-6.

162. Taungya experiment for rehabilitation of burnt-over forest in East Kalimantan
Sutisna, M.

The objective of the forest rehabilitation study with taungya system was to find out optimum method, cash crop species, constraints, and how much this system benefits forest rehabilitation. It was carried out using red meranti (*Shorea smithiana*) and rubber (*Hevea brasiliensis*) as plantation trees, and rice (*Oryza sativa*), maize (*Zea mays*), soya bean (*Glycine max*) and cassava (*Manihot esculenta*) for intercropping. The research has shown that there are a number of constraints to the use of taungya in East Kalimantan, Indonesia for the rehabilitation of burnt, logged-over forest. The problems are a mix of technical, economic and social. It was found that the costs of establishing the taungya is comparable with that for establishment of industrial forest plantations but technical

problems such as the lack of soil preparation, poor quality seed and inadequate fertiliser application techniques resulted in very low yields of the intercropped. This was exacerbated by protection problems and significant damage by birds and browsing animals further reduced yields. Some of these problems may be overcome by guarding the taungya fields and planting crops such as fibre producers which need less protection. However, unless the taungya system can be made economic and attractive to villagers it will be difficult to implement, especially in an area where there is no shortage of land close to the villages.

In: Kobayashi, S., Turnbull, J.W., Toma, T., Mori, T., Majid, N.M.N.A. (eds.).
Rehabilitation of degraded tropical forest ecosystems: workshop
proceedings, 2-4 November 1999, Bogor, Indonesia. Bogor, Indonesia, CIFOR.
115-122. ISBN: 979-8764-70-6.

163. Tree species composition and above ground biomass of a 15-year-old logged-over forest at Pasoh, Negeri Sembilan, Peninsular Malaysia

Hanum, I.F., Norhisyam, T.M., Sabri, M., Azani, A.M.,
Mokhtaruddin, A.M., Maswar, Yusoff, M.K., Majid, N.M.,
Kobayashi, S.

From a study conducted in Pasoh Forest Reserve, 149 tree species in 92 genera and 38 families, all trees with a diameter breast height (dbh) of 1 cm or above were enumerated in a one hectare plot. The most abundant species was *Ficus fistulosa* across all dbh classes followed by *Monocarpia marginalis* and *Dipterocarpus cornutus*. The most diverse family was *Euphorbiaceae* with 25 species followed by *Dipterocarpaceae* (13 spp.) and *Leguminosae* (13 spp.). Stand density was 1951 stems ha⁻¹ with *Euphorbiaceae* contributing about one-fifth the total number of stems. High densities of pioneer species such as *Macaranga* spp., *Vitex pinnata* and young trees of primary species, such as *Dipterocarpus* spp. and *Shorea* spp., indicate that the forest is still in an early stage of succession, yet has recovered rather well from previous disturbances, such as forest harvesting. The estimated above ground biomass was 160.8 t ha⁻¹, a reasonable value for a 15-year-old forest, also suggesting the capability of this forest to recover from previous forest harvesting.

In: Kobayashi, S., Turnbull, J.W., Toma, T., Mori, T., Majid, N.M.N.A. (eds.).
Rehabilitation of degraded tropical forest ecosystems: workshop
proceedings, 2-4 November 1999, Bogor, Indonesia. Bogor, Indonesia, CIFOR.
81-86. ISBN: 979-8764-70-6.

Policy and Extrasectoral Issues

164. **Agricultural intensification, deforestation, and the environment: assessing tradeoffs in Sumatra, Indonesia**
Tomich, T.P., van Noordwijk, M., Budidarsono, S., Gillison, A., Kusumanto, T., Murdiyarso, D., Stolle, F., Fagi, A.M.

The key hypotheses underlying ASB research in Indonesia has been intensifying land use as an alternative to slash and burn can simultaneously reduce deforestation and reduce poverty. The intensification hypothesis hinges on the existence of opportunities to raise the productivity of smallholder systems at the forest margins without degrading forest function. Estimates of returns to land and labor presented in this chapter indicate that from a purely private perspective, returns to forest conversion are high in Sumatra's pine plains. Because all derived land uses are inferior to natural forest, based on global environmental concerns, ASB research in Indonesia has shown that land use changes involve tradeoffs between these environmental concerns and the objectives of poverty alleviation and national development. If there is no action on these tradeoffs, by identifying workable options either to change incentives for conversion or to restrict access to the remaining natural forests, thus rain forests will continue to disappear. This research also provides evidence that land-use alternatives differ significantly in their ability to substitute for the global environmental services provided by natural forests. Carbon stocks are similar for long rotation tree-based systems, which are superior to all other land uses by this criterion except for natural forest themselves. Similarly, alternative land uses also differ significantly in their potential for biodiversity conservation, ranging between the extremes of smallholders' complex, multistrata agroforestry systems and large-scale plantation monoculture. While there may be a tradeoff between potential profitability and biodiversity in tree-based production systems, this requires further verification. There may be little or no tradeoff between policy makers' objectives and those of smallholder households appears to be comparable to that of large-scale estates, however, this also requires further verification. There are also important institutional questions that must be addressed to enable widespread adoption of profitable

alternatives by smallholders. To obtain estimates of regional or global impacts directly from measures, it is necessary to assume independence and hence additivity across space. This assumption is reasonable for some measure, but it is only a rough approximation for others. Among these measures biodiversity is the most sensitive to scaling issues. While the agronomic sustainability measure used here concerns only on-site, field level effects, the extent and spatial arrangement of land-use alternatives also produce environmental externalities. One of the key challenges of future research is to be able to assess these phenomena at the landscape level. Ultimately, instead of single land-use system or technology, the most attractive way to achieve the multiple objectives is likely to come from combinations of complementary land-use practices within a varied landscape.

In: Lee, D.R. and Barrett, C.B. (eds.). Tradeoffs or synergies?: agricultural intensification, economic development, and the environment. Wallingford, Oxon, UK, CAB International. 221-244. ISBN: 0-85199-435-0.

165. Agricultural land expansion and deforestation in Malawi
Mindle, I.J., Kowero, G., Ngugi, D., Luhanga, J.

The literature on deforestation in Malawi points to a number of causes, including high population in relation to available land, poverty, market and policy failures, drought, and the activity of structural adjustment policies. Agricultural statistics from Malawi indicate substantial increases in area under maize and tobacco between 1970-1994. Maize is the main single crop, occupying about 69 % of the cultivated land while tobacco is the main export and cash crops. A regression model was employed to highlight factors responsible for the expansion. The analysis suggests that the structural adjustment policies aimed at liberalization of tobacco production marketing of maize and tobacco, as well as increasing accessibility to foreign currency had a positive and moderately significant influence on the expansion of the land area under maize but less on that under tobacco. Given declining real producer prices for both crops, the driving force for the increasing area seems to be the desire by farmers to maintain their income from the sale of these two crops combined, rather than their prices. A household survey in three study areas chosen to cover a range in distance from the nearest town, confirmed significant increases in household

land holdings in the recent past. Villagers living around the forest resources were identified as being key agents of deforestation, mainly through careless cutting of trees, opening up of gardens, grazing livestock and charcoal burning. These four activities constitute 84% of the reasons given by farmers for the increasing environmental degradation. The regression analyses provide some indication of factors associated with agricultural land expansion. The household study provides some insights on the agents of deforestation and to a limited extent how the increasing population is reacting to land famine.

Forests, Trees and Livelihoods 11: 167-182.

166. Agricultural technologies and tropical deforestation
Angelsen, A., Kaimowitz, D., eds.

Do improvements in agricultural technology protect or endanger tropical forests? This book examines this controversial issue. It includes both theoretical frameworks for analysing the issue as well as case studies covering a wide range of geographical regions, technologies, market conditions and types of agricultural procedures. The authors identify technologies, contexts and policies that are likely to be beneficial to both farmers and forests. In this way the book provides concrete guidance to international aid agencies, agricultural research and technology transfer programmes, conservation projects and forestry organizations. This book contains 22 chapters: introduction and overviews, papers and case studies from developed countries, Latin America, Africa, Asia, and summaries. It is suitable for those working and researching in the areas of forestry, tropical agriculture and development economics and policy.

Wallingford, Oxon, UK, CABI Publishing in association with Center for International Forestry Research (CIFOR). 422p. ISBN: 0-85199-451-2.

167. Agricultural technology and forests: a recapitulation
Angelsen, A., Kaimowitz, D.

This chapter summarises the key insights from the case studies included in the book. First, it discusses the technology-deforestation link in six different types of cases: developed countries, commodity booms, shifting cultivation, permanent upland (rainfed) agriculture, irrigated (lowland) agriculture, and

cattle production. Next, it returns to the hypotheses presented in the book, and discusses the key conditioning factors in the technology-deforestation link. A number of factors determine the outcome. Among those, labour market effects and migration are critical in a majority of the cases. Another critical effect is that new technologies can help relax farmers' capital constraints, which may lead to higher or lower deforestation depending on how they invest their additional funds. The scale of adoption and the policy context are also critical conditioning factors.

In: A. Angelsen, D. Kaimowitz (eds.). Agricultural technologies and tropical deforestation. Oxon, UK, CABI Publishing. 383-402. ISBN: 0-85199-451-2.

168. Banking on sustainability: structural adjustment and forestry reform in post-Suharto Indonesia

Barr, C.

In 1997 a major financial crisis struck Asia. In the wake of that crisis, the International Monetary Fund and the World Bank provided large loans to the Indonesian government in return for their commitment to implement policy reforms intended to stabilize the economy and rekindle growth. Those reforms included various measures explicitly designed to improve forest management, most of which focused on forest concessions run by large Indonesian conglomerates. This book contains analysis on the prospects for policy interventions aimed at promoting sustainable forest management in three important arenas: (1) HPH concession management and timber trade. (2) Pulp and paper expansion and financial risk assessment. (3) Corporate debt resolution.

Washington, DC., USA, WWF Macroeconomics Program Office and CIFOR. 140p.

169. Cuatro medio verdades: la relacion bosques y agua en Centroamericana

Kaimowitz, D.

This paper looks at four "half-truths" about the relations between forests and water in Central America. The first is that deforestation has reduced rainfall in certain regions of Central America. The second is that forest help to maintain dry season stream flow. The third is that deforestation has led to more intense flooding. The fourth is that the region's hydroelectric reservoirs and the Panama Canal are rapidly becoming

sedimented. As the name implies, the article argues that each of these has some elements of truth but other aspects that are myths. The author emphasizes that even though some of these claims are myths action still needs to be taken to avoid inappropriate deforestation and forest degradation.

Revista Forestal Centroamericana 33: 6-10.

170. Decentralisation and forest management in Kapuas district, Central Kalimantan
McCarthy, J.F.

This case study discusses decentralisation and forest management in Kapuas district, Central Kalimantan, focusing specifically on the impact of these administrative reforms on timber concessions operating there. It is based on field research carried out during June and July 2000. The study is based on interviews with government officials, forestry department staff, university researchers, NGO workers and the employees of timber workers in the provincial capital, Palangkaraya, and the district capital, Kuala Kapuas. Research was also carried out in Gunung Mas in the headwaters of the Kahayan River and further interviews were conducted with businessmen, sub-district government officials and lower level forestry staff, community leaders and local villagers. This document provides: (1) Essential background regarding the geography, economy and history of forestry in Kapuas district. (2) A discussion focuses on decentralisation and forest management, analysing the financial situation of the district administration, the efforts of the district government to create district laws to regulate the forestry sector in the district, and the initial impacts of decentralisation on spatial planning and environmental management. (3) Analyses the situation of timber concessionaires in Gunung Mas just before the decentralisation laws took effect, focusing on the changing relationships among timber companies, the local administration and local communities. The case study examines the endemic conflicts occurring between local communities and logging concessionaires in the area. Finally, it draws some conclusions regarding the impact of decentralisation on forest management in the district.

Bogor, Indonesia, CIFOR. Case Studies on Decentralisation and Forests in Indonesia. Case Study no.2. 45p. ISBN: 979-8764-80-3.

171. Decentralisation of policies affecting forests and estate crops in Kutai Barat district, East Kalimantan

Casson, A.

This study examines the initial impacts of decentralisation of policy making and policies affecting forests and estate crops in the district of Kutai Barat, East Kalimantan. Fieldwork was conducted in mid 2000 and the author relied on secondary material and key informants to up date some information. Kutai Barat was formed through the partition of the original Kutai district shortly after the Habibie government issued Laws 22 and 25 in May 1999 on the decentralisation of authority from the central government to provincial and district governments. As a newly formed district, Kutai Barat has limited infrastructure and revenue. Local government officials also have limited capacity to develop policy and manage natural resources sustainably. However, decentralisation does provide opportunities for the government of Kutai Barat to secure a greater portion of the revenues generated by forests and mineral resources extracted within the district, and to build up the district's physical infrastructure and industrial facilities. During 2000, the Kutai Barat district government issued large numbers of small-scale timber extraction licenses, known as HPHH permits, to establish a district regulatory regime for forest exploitation. The district government also indicated that it would seek to encourage investors in the oil palm industry to establish operations in Kutai Barat. However, these plans have been undermined by continuing problems with PT London Sumatra, the district's largest estate crop investor. Social conflict resulting from large-scale mining operations at the PT KEM site is also presenting problems for the newly formed district.

Bogor, Indonesia, CIFOR. Case Studies on Decentralisation and Forests in Indonesia. Case Study no.4. 30p.

172. Decentralisation of policies affecting forests and estate crops in Kotawaringin Timur district, Central Kalimantan

Casson, A.

Kotawaringin Timur district lies within the Dayak heartland of Central Borneo, Indonesia. Prior to the late 1960s, most of the district was covered in dense tropical forest. However, these forests have been increasingly exploited since the 1970s when former-president Soeharto granted large timber concessions to

logging companies in the area. Although Kotawaringin Timur's forests still supply 49 percent of Central Kalimantan's log production and half of its sawn timber and moulding, its forest resources are close to being exhausted. The rate of deforestation and forest degradation in the area is also increasing as the illegal logging trade takes hold. By 2000, around 511,823 m³ of meranti logs, or close to half of the district's official log production, were 'illegally' harvested in the district. In the era of regional autonomy, the Kotawaringin Timur government is increasingly relying on the district's forest resources for income. In doing so, it has effectively legalised and legitimised illegal logging in the district and wrested much of the revenues obtained from large-scale logging from the provincial and central governments. For example, the district government was able to generate an estimated US\$ 6.2 million from the natural resource sector in 2000. More than half of this revenue was obtained from the illegal logging trade alone. As Kotawaringin Timur's forest resources decline, the district government hopes to generate income from the plantation sector—particularly the oil palm sub-sector. This paper examines the status of forest resources in Kotawaringin Timur and details some of the changes resulting from the new decentralisation laws released by the Habibie government in 1999. It also examines the status of the oil palm sub-sector in the district and explores some of the challenges that the sub-sector faces in an era of economic and political change. Fieldwork for this study was undertaken in 2000. Numerous changes have undoubtedly occurred since the decentralisation laws came into effect in January 2001 and ethnic violence broke out in the district in February 2001. Continuing violence in the district will inevitably deter investors in the oil palm sub-sector.

Bogor, Indonesia, CIFOR. Case Studies on Decentralisation and Forests in Indonesia. Case Study no.5. 38p. ISBN 979-8764-83-8

173. Economic crises, small farmer well-being, and forest cover change in Indonesia

Sunderlin, W., Angelsen, A., Resosudarmo, I.A.P., Dermawan, A., Rianto, E.

Field research was conducted on 1,050 Indonesian households to understand the effects of the Asian economic crisis on the well-being of small farmers outside of Java and on their forest-clearing practices. The main findings are: (a) most farmers

perceived themselves as worse off during the crisis than before, challenging the claim that farmers with export income would be better off and (b) forest clearing by farmers increased significantly during the crisis to expand rubber holdings and other tree crops, with the aim of increasing future income security. Among the policy lessons are that crop diversification and targeted aid can minimize impoverishment and avert increased forest clearing following macroeconomic destabilization.

World Development 29(5): 767-782.

174. Economic crises, small farmers and forest cover in Cameroon and Indonesia

Sunderlin, W.D., Resosudarmo, I.A.P., Ndoye, O.

Cameroon and Indonesia are two countries that have received much attention in the literature on tropical deforestation. Both have also experienced devastating economic crises and subsequent macroeconomic adjustment policies. Through a contrast of the two countries' experiences, this chapter explores the effect of such economic events on small farmers and their forest management practices, and the subsequent effects on tropical forest cover. In both countries, economic crises led to changes in farming systems and to a significant increase in the rate of forest clearing, yet the circumstances leading to this outcome are strikingly different. In Cameroon, a collapse of the prices of leading agroexport commodities (cocoa and coffee), withdrawal of government subsidies for these commodities, and restrictions on food imports made farmer's clear land to produce food crops for domestic consumption. In Indonesia, a drastic depreciation of the national currency against the USD made certain agroexport commodities profitable, with the consequence that many farmers cleared land to produce these crops. There are three main lessons to be drawn from a comparison of the two countries' experiences. First, opposite forms of macroeconomic destabilization (i.e. decrease or increase of agroexport prices) can lead to the same forest cover consequences. Second, this suggests that increased rates of forest clearing have more to do with destabilization, in and of itself, rather than with the direction of change in farm commodity prices. Third, policymakers should be aware of the ways in which

widely differing economic shocks and macroeconomic adjustment policies can lead to unexpected, and in some cases undesirable social and environmental consequences.

In: Palo, M., Uusivuori, J. and Mery, G. (eds.). World forests, markets and policies. Dordrecht, The Netherlands, Kluwer Academic Publishers. World forests, v. 3. 219-230. ISBN: 0-7923-7171-2.

175. The economics of sustainable forest management and wildlife conservation in tropical forests

Byron, N.

The chapter examines the opportunities and limitations of economics to contribute to sustainable forest management and wildlife conservation. It began with a brief interview of the constraints facing natural resource economists, ending with a discussion of where these individuals can contribute to the sustainable forest management debate. This is followed by a discussion of current efforts to bring about change in the timber harvest status quo. Two case studies reviewing the costs and benefits associated with conventional and reduced impact logging practices are presented. The chapter closes with a discussion of how economics can contribute to the advancement of sustainable forest management practices in the near- and long-term.

In: Robert A. Fimbel, Alejandro Grajal, and John G. Robinson (eds.). The cutting edge: conserving wildlife in logged tropical forests. New York, Columbia University Press. 635-648.

176. Ecuador goes bananas: incremental technological change and forest loss

Wunder, S.

What policy lessons derive from the half-century of banana expansion in the coastal region? For that whole period bananas had a catalytic role in promoting coastal deforestation. At first, this was mostly through direct banana frontier expansion. Later the gradual settlement effects proved key. Modest credit subsidies, the large-scale construction and improvement of roads and ports, and a devalued exchange rate were probably the most important policies that contributed to the expansion of banana production, though they varied in importance during the different periods. How one evaluates this process depends

heavily on the relevant policy objectives. Ecuadorian policy makers clearly considered deforestation, sustained coastal settlement and integration with the highland economy positive contributions to economic development.

In: A. Angelsen, D. Kaimowitz (eds.). Agricultural technologies and tropical deforestation. Oxon, UK, CABI Publishing. 167-194. ISBN: 0-85199-451-2.

177. Feasibility and operationalisation of an investment promotion entity (IPE) for sustainable forest management—highlights from the main papers

Chipeta, M.E., Joshi, M.

This synthesis paper was prepared based on key findings and issues of two separate papers and the highlighted issues included are: (1) Should the international community proceed with the Investment Promotion Entity (IPE) idea, and if so, what steps are needed to promote partnerships and other forms of co-operation with private party? (2) Given that private-sector fund managers are likely to invest only in developing countries with lowest risk and the most stable investment environments, how can IPE work to ensure that the benefits reach many of the poorest countries in greatest need of investment, and how can the public international sector assist in this regard? (3) At the currently suggested scale, the IPE may not effectively begin to satisfy the level of need. How can the IPE be made to raise new and additional funds rather than diverting existing assistance, and how can the volume of investments made through this new proposed instrument be increased? (4) Is there support for the idea of establishing the IPE at the global level, with a possibility of establishing regionally oriented IPEs later on, and for hosting regional IPEs at regional multilateral development banks?

In: Chipeta, M.E. and Joshi, M. (eds.). Financing sustainable forest management: proceedings of an international workshop, Oslo, Norway, 22-25 January 2001. Bogor, Indonesia, CIFOR. 7p. CD-ROM. ISBN: 979-8764-69-2.

178. Financing sustainable forest management: proceedings of an international workshop, Oslo, Norway, 22-25 January 2001

Chipeta, M.E., Joshi, M., eds.

This proceedings contains the highlights of the International Workshop of Experts on Financing Sustainable Forest Management that was held 22-25 January 2001 in Oslo, Norway

and also the full set of papers for the workshop. The meeting was organised to provide support to the U.N.'s post-Earth Summit international dialogue on forests by advancing discussions on the financing of sustainable forest management (SFM). It focused on three topics: the feasibility of a proposed mechanism known as Investment Promotion Entity (IPE); private-sector financing of SFM; and other means of increasing financial resources from all sources, including the proposed Global Forest Fund. The highlights include: 1) the poor competitiveness of the forest sector in general and SFM in particular; 2) low priority accorded to forests and SFM by developing countries, donors and external partners alike; 3) a perception that SFM is risky as an investment option; and 4) idealistic and unrealistic expectations of achieving progress toward SFM in relation to every forest, which are seen as overly ambitious and likely to fall short of the mark, thereby discouraging potential investor. The papers input at the workshop offered a wide range of views and examples related to current financing of SFM. Some areas of overlapping interest, concern and agreement were apparent, especially with regard to observation of what factors constrain private-sector involvement in SFM and what is necessary to change the situation and encourage investment.

Bogor, Indonesia, CIFOR. CD ROM. ISBN: 979-8764-69-2.

179. **Financing sustainable forest management: report of the International Workshop of Experts, 22-25 January 2001, Oslo, Norway**
Chipeta, M.E., Joshi, M. (eds.)

This report summarizes the outcome of the workshop and consists of three parts. Part 1 is highlights that were issued at the end of the workshop. Funding is not the sole constraints to investment in sustainable forest management (SFM) in developing countries. It also requires an enabling environment at the international level. A continuing decline in commodity prices at the international level has prevented the forest sector from yielding adequate financial surpluses that could be reinvested into sustainable forest management. Greater investment is needed from private sector, public sector, and official development assistance. Means of promoting SFM financing: investment promotion entity (IPE), global forest fund (GFF) and other international financial resources were discussed. Part 2 provides summaries of the papers prepared for the workshop.

Part 3 contains the speeches and agenda of the workshop, a list of relevant documents and a list of participants. This workshop proceedings is published only in a CD-ROM and consists of the highlights and the full set of papers for the workshop.

Bogor, Indonesia, CIFOR. 100p. ISBN: 979-8764-68-4.

180. Forest cover and agricultural technology

Angelsen, A., Kaimowitz, D.

A widespread belief among development and forest researchers and practitioners holds that technological progress in tropical agriculture is good for forest conservation. Higher yield enables farmers to produce the same amount of food on less agricultural land. The alternative view suggests that productivity improvements make it more profitable for farmers and companies to convert forests to agriculture. New agricultural technologies should therefore stimulate deforestation. This article synthesizes research done by the Center for International Forestry Research (CIFOR) on this issue. It points to several critical factors which can make new technologies speed up or slow down the rate of deforestation: the market characteristics, the farmers' objectives and constraints, the technologies' labor and capital intensities, and the agricultural systems and areas in which the technology is applied. Several empirical studies are used to illustrate the importance of these factors. While new technologies in frontier agriculture often stimulate forest clearing, conditions and technologies for "win-win" outcomes also exist or can be created by appropriate policies.

In: Palo, M., Uusivuori, J. and Mery, G. (eds.). World forests, markets and policies. Dordrecht, The Netherlands, Kluwer Academic Publishers. World Forests, v.3. 231-238. ISBN: 0-7923-7171-2.

181. Forest policies in Malawi, Mozambique, Tanzania and Zimbabwe

Kowero, G., Kaoneka, A.S., Nhantumbo, I., Gondo, P., Jumbe, C.B.L.

Many countries in eastern and southern Africa have lost significant natural forest resources. Initially the pace was gradual, but it has accelerated very much in the recent past. Some of the efforts made to contain the situation include revising past policies to improve forestry development and conservation. This paper traces the evolution of such policies together with

corresponding implementation mechanisms in Malawi, Mozambique, Tanzania and Zimbabwe. Although broad policy statements on involving local communities in forestry have existed in some countries for several decades, adequate resources have not been committed for their effective operationalisation. Generally, the forestry sector in southern Africa has lagged behind other sectors in revising its policies to adequately reflect political and socio-economic changes. Political and socio-economic policies appear to have taken precedence over forest sector policies, with far reaching consequences for the sector. However, current forest policies are more comprehensive in terms of stakeholders considered and issues addressed.

In: Palo, M., Uusivuori, J. and Mery, G. (eds.). World forests, markets and policies. Dordrecht, The Netherlands, Kluwer Academic Publishers. World forests, v. 3. 311-326. ISBN: 0-7923-7171-2.

182. Forestry, poverty and aid
Arnold, J.E.M.

Very large numbers of the rural poor derive some part of their livelihood inputs from forest resources, in different ways and to different extents. For many the dependence on forests is a function of their poverty, because they lack better alternatives. Helping meet their subsistence and survival needs can therefore be as important a role for forestry aid as supporting those able to increase their incomes through forest activities, but needs to avoid encouraging forms of forest dependence that could lock the very poor into continued poverty. Programmes to devolve forest use and management rights to local users have often improves access by the poor, but their impact has frequently been limited by government failures to transfer full or effective rights and by regulations and actions that restrict access by small producers to formal sector markets for forest products. This has taken the form of the state retaining rights to timber and other valuable components of the resource, of restrictions in favour of biodiversity conservation, of governments being unable in a period of declining budgets for forestry to period necessary support, and of forest departments and corporations intervening as trade intermediaries and competing producers. In addition, weaknesses in the institutional arrangements for devolved forest management and control have often resulted in transfers favouring the less poor, or outside users. Assistance to

smallholder tree growing and commercial activities has also often failed to take sufficient account of the poorer amongst those being targeted. The paper suggests a number of ways in which forestry aid might address some of these issues and become more effectively poverty oriented.

CIFOR Occasional Paper no. 33(E). 17p.

183. Forests and the future: regional perspectives

Umeh, L.I., Omoluabi, C., Salleh, M.N., Prins, C., Tomaselli, I., Abdel Nour, H.O., Dombeck, M., Moad, A., Sayer, J.A.

Six brief articles envisage forests and forestry in 2050 in Africa (Umeh; Omoluabi), Asia and the Pacific (Salleh), Europe (Prins), Latin America and the Caribbean (Tomaselli), the Near East (Abdel Nour) and North America (Dombeck; Moad). A final section by Sayer discusses the future management of tropical forests. All the authors concluded that timber harvesting from natural forests will diminish, and these forests will be used increasingly for recreation, conservation and biodiversity.

Unasylva 52(204): 33-52.

184. Forum de Belem "Desafios Para a Pesquisa Florestal na Amazonia", Belem, 14 a 15 de Junho de 1999: palestras e resumos

This document is a compilation of abstracts and summaries from the forum on Challenges for the Forestry Research in Amazonia, organized by Embrapa and CIFOR in June 1999 in Belem, Brazil. The main topic is sustainable management of the Amazonian forests. The discussions were divided into three sessions: 1. the first session is focused on big scale aspects of forest management such as forest policy, commercial exploitation of forests, industrial plantations. 2. the second session is more focused on local forest community level such as cooperative forest management, community forest management. 3. the third session debate is on global dimension and concern on Amazonian forest management such as globalization and the Brazilian Amazon, Amazonia and its role on the regional and global climate.

Belem, Brazil, Embrapa Amazonia Oriental and CIFOR. EMBRAPA Amazonia Oriental. Documentos. no.72. 57p.

185. **The global forest fund from Rio to IFF4: what issues remain**
Joshi, M., Chipeta, M.E.

The paper reviewed the ongoing international forest policy deliberation on finance issues, and specifically a proposal to establish an international forest fund. The paper includes annexes from the report of the final sessions of the Intergovernmental Panel on Forests and the Intergovernmental Forum on Forests. Justifications given for Global Forests Fund include the need to pay for international public goods produced by forests and for the cost of making the transition to sustainable forest management practices. Opponents of the Global Forest Fund advocate better use of the existing funds before calling for a new mechanism. This paper provides a basis for further discussion by the Oslo Workshop of issues left unresolved.

In: Chipeta, M.E. and Joshi, M. Financing sustainable forest management: proceedings of an international workshop, Oslo, Norway, 22-25 January 2001. Bogor, Indonesia, CIFOR. 14p. CD-ROM. ISBN: 979-8764-69-2.

186. **Goal programming: application in the management of the Miombo woodland in Mozambique**
Nhantumbo, I., Dent, J.B., Kowero, G.

Community based management of natural resources is a priority in Mozambique's policy on forestry and wildlife resources. In essence the government's policy is to manage the natural resources in partnership with the rural communities and the private sector. This represents a change in policy in the agricultural and natural resources sectors, and has potential for significant impact in economic development. This paper demonstrates the potential for employing goal programming as a planning tool in participatory natural resource management in Mozambique. The focus is on the Miombo woodlands which are the main natural forest resources in the country and which most of the local communities, the forestry and tourist industries depend on for a variety of forest products and services.

European Journal of Operational Research 133(2): 310-322.

187. **A goal programming model for planning management of Miombo woodlands**
Nhantumbo, I., Kowero, G.

This paper presents a methodology employed in reconciling demands of households, private sector, and government on Miombo woodlands of Southern Africa. A Weighted Goal Programming approach is presented for planning management and use of the woodlands as well as a framework for policy analysis. The approach is based on essentially two models, viz., household and private sector models, which are linked into a Miombo woodlands model (MIOMBOGP). The MIOMBOGP provides a framework for evaluating the impact, on these two sectors and the woodlands, of some government macro-economic policies as well as some forestry and agricultural sector policies.

CIFOR Occasional Paper 35:1-15.

188. **Historical perspectives on forest policy change in Asia: an introduction**
Edmunds, D., Wollenberg, E.

Forest devolution policies have generated much hope for sustainable development in rural areas of the South. Yet such policies have not always generated economic benefits for the poor, and have seldom transferred substantial decision-making authority to the poorest forest users. We discuss four case studies of the history of devolution policies in Asia that ask why. We draw several conclusions from these cases. Devolution policies will fail to meet the expectations of the poorest forest users unless they address historical 'holdovers', particularly ideologies and institutions within government that continue to favor centralized control and elite/subordinate relations at the local level. At the same time, policies must include scope for building capacity at the local level to deal with new forests and new institutional and political conditions. The state can play a role in capacity building, but will succeed only by working collaboration with social movements and NGOs that advocate on behalf of forest users, especially the poor among them. Because addressing holdovers and building capacity are difficult tasks, policies should be organized so that they can be reviewed and reformed in a collaborative fashion on a regular basis.

Environmental History 6(2): 190-212.

189. Introduction: the role of agricultural technologies in tropical deforestation

Angelsen, A., Kaimowitz, D.

This introductory chapter sets the scene for the discussion in the edited volume on how new agricultural affects tropical forests. It critically reviews four hypotheses that have been central in the claim that better technologies help protect forests: the Borlaug, the subsistence, the economic development and the land degradation-deforestation hypotheses. Each of them appears to be valid only under certain restrictive conditions. The chapter then gives the aims and scope of the book, the key conclusions, as well as a summary of each of the chapters. A key objective of the book is to identify which technologies under which conditions lead to a win-win situation or trade-off between forest conservation and increasing farm productivity.

In: A. Angelsen, D. Kaimowitz (eds.). Agricultural technologies and tropical deforestation. Wallingford, UK, CABI Publishing. 1-17. ISBN: 0-85199-451-2.

190. L'exploitation forestiere illegale en Indonesie: un inquietant processus de legalisation

Obidzinski, K., Suramenggala, I., Levang, P.

This article points to the importance of systems and praxis-oriented approach in understanding the problem of illegal logging in Indonesia. In recent years, there has been a tendency on the part of industry analysts and forestry sector observes to view the seemingly irremediable spread of illegal logging in the country in isolation, as a result of disassociated and pre mediated criminal acts. This paper proposes a different view of the problem. It suggests that illegal logging is not a simple criminal offense, but a complex system with multiple stakeholders at its base. It further argues that illegal logging is also a way for local people to get a share of the profits from logging, profits denied by the central government for the last thirty years. Recent developments, like the possibility for local government to grant small-scale concessions now enable illegal timber operators to conduct their business legally. As a result, local communities are courted by so-called investors who covet their forests. With the implementation of regional autonomy in Indonesia, local politicians also find it their interests to support small concessions.

Recent attempts by the central government to control this new rush on forest have failed. Local governments are no longer willing to comply with the injunctions of the central government. The only way for the Ministry of Forestry to regain control (or at least to minimize unsustainable logging practices) would be to acknowledge this new paradigm and find a place for it within the overall forest policy. Long term solutions to the problem will probably involve a combination of community-based logging and joint-venture arrangements with industrial concessionaires.

Bois et Forets des Tropiques 270(4): 85-97.

191. Lessons for change: getting more from international forestry assistance

Fruhling, P., Persson, R.

During the last few decades, forestry assistance has benefited from the positive interest in environmental issues and has generally been less questioned than many other sectors of fields within international development assistance. If compared with its own goals and the resources invested, it has achieved rather modest results. The privileged position of forestry assistance may thus soon be challenged, by legitimate demands for increases efficiency in times of decreasing overall volumes of international development aid. Now it is time to embark upon the discussion on how to improve quality and effectiveness, how to spend smarter or even how to do more with less. The purpose of this booklet is to contribute to this much-needed discussion, drawing upon relevant lessons learnt within other fields of international development assistance, analyzing the current situation concerning forestry assistance and finally outlining some suggestions on new paths for the future.

Stockholm, Sweden, SIDA and CIFOR. 32p. ISBN: 91-586 89 81-8.

192. Lock the tropical forests up? no way

Sayer, J.A

The author explores the pros and cons on whether tropical forests as national parks should be locked up and reserved or they should be managed directly and sustainably by local people for various benefits. An example is at Metut, a village adjacent to Bulungan Research forest in Indonesia where scientists from

the Centre for International Research Centre (CIFOR) are studying effects of development of forest areas. In this remote place, the way of life is changing. Now outboard motors bring villagers relatively easy to the outside world while it took weeks by canoe a generation ago. Many of the younger men leave their village to seek employment in logging concessions. Even so, their lives still depend on the forests. The forest faces many threats, ranging from open-cast coal mining to illegal logging and the clearance of forest for oil palm plantations. These threats have also provided opportunities, as development has brought employment, roads and schools. Forests will only survive in Asia if they yield more benefits to the people who live in and around them. Industrial forestry and nature protection will be part of the solution. Both can create employment and generate revenues for local communities.

Asian Timber 20(4): 28-29.

193. Management of secondary forests in colonist swidden agriculture in Peru, Brazil and Nicaragua

Smith, J., Finegan, B., Sabogal, C., Goncalves Ferreira, M.D.S., Siles Gonzales, G., van de Kop, P., Diaz Barba, A.

Recent studies have shown that although swidden agriculture contributes to tropical deforestation in Latin America, swidden farmers also regenerate significant areas of secondary forests on their farms as part of the following process. This paper discusses the opportunities and constraints to farmers' regeneration and management of secondary forests. The analysis generalizes findings from case studies of new and old settlement areas in Peru, Brazil and Nicaragua, to derive generic management principles. In each country diagnostic farm surveys, multi-resource forest inventories and farmer-participatory research were carried out. Results show that about 25% of farm area remains under secondary forest even after a century of settlement. Secondary forests are the only significant forest resource available to the rural poor in older settlement areas. Secondary forests consist primarily of secondary forest fallows. Small areas are also maintained more permanently. Results show that an integrated resource management approach will be required, with management of secondary forests complemented by policy reforms and management of soils and residual forests. Different management strategies will be required for new and

older settlement areas. For older settlement areas, strategies to reduce pressures for shorter fallows are identified, as well as principles for management of secondary forest fallows for soil recuperation and forest products. For newer areas, policies and technologies for slowing down the conversion of residual forest to agriculture and secondary forest would result in more biodiversity conservation and less, but more productive, secondary forest at later stages of frontier development. Management of secondary forest for high timber productivity, complemented by trade in forest carbon, may induce farmers to convert some of their fallow forests to permanent secondary forests.

In: Palo, M., Uusivuori, J. and Mery, G. (eds.). World forests, markets and policies. Dordrecht, The Netherlands, Kluwer Academic Publishers. World forests, v. 3. 263-278. ISBN: 0-7923-7171-2.

194. Modelling methods for policy analysis in Miombo woodlands
CIFOR

The Miombo woodlands of eastern, central and southern Africa are some of the most extensive dry forests in Africa. They supply a myriad of products and services for local populations, governments and the private sector - the main stakeholders. Planning the management and use of the woodlands to meet the needs of the many and diverse stakeholders who often have conflicting interests in the woodlands continues to be a great challenge to national governments and other interested parties. This paper presents two modelling approaches, a systems dynamics model and a goal programming model, that have potential for use in planning woodland use and in analysing the implications of various policies on people and the woodlands.

The document contains two articles: 1. Nhantumbo, I. and Kowero, G. A goal programming model for planning management of Miombo woodlands. 2. Sumaila, U.R., Angelsen, A. and Kowero, G. A system dynamics model for management of Miombo woodlands
CIFOR Occasional Paper no.35. 30p.

195. Playing games in the forest: state-local conflicts of land appropriation
Angelsen, A.

This paper explores possible strategic interactions between the state and local community in games of tropical forestland

appropriation. Three typical cases are discussed, corresponding to a development over time of increased resource competition and market integration. The local response to more state deforestation depends on the costs, market, and behavioral assumptions, and less on the structure of the game (Cournot or Stackelberg). The state fuels local deforestation by providing infrastructure (roads) which reduces the net costs of agricultural expansion, or when markets are imperfect and local behavior determined by survival needs. The game structure is, however, important for total deforestation.

Land Economics 77(2): 285-299.

196. Policy recommendations

Kaimowitz, D., Angelsen, A.

This final chapter of the book offers a set of policy recommendations. It presents some typical win-win outcomes, including technologies suited for forest poor areas, labour intensive technologies promoting intensification to replace land extensive farming practices, and promoting agricultural systems that provide environmental services similar to those of natural forests. It also discusses some typical win-lose outcomes of situations with trade-offs: technologies which require little or displace labour, new products for large markets with abundant labour, eradication of diseases that limit deforestation, and technological progress in forest margin areas with rapidly growing labour forces. The chapter also relates the issues this volume discusses with the current trend towards greater economic liberalisation and globalisation and with the overall policy objectives of poverty reduction and economic growth.

In: A. Angelsen, D. Kaimowitz (eds.). Agricultural technologies and tropical deforestation. Oxon, UK, CABI Publishing. 403-411. ISBN: 0-85199-451-2.

197. Poverty alleviation and tropical forests - what scope for synergies?

Wunder, S.

This paper explores the "state of the art" of the two-way causal links between poverty alleviation and natural tropical forests. Micro-impacts of rising poverty can increase or slow forest loss. At the macro-level, poverty also has an ambiguous effect, but it is probable that higher income stimulates forest

loss by raising demand for agricultural land. The second question is what potential forest-led development has to alleviate a country's poverty, in terms of producer benefits, consumer benefits and economy-wide employment. Natural forests widely serve as "safety nets" for the rural poor, but it proves difficult to raise producer benefits significantly. Urban consumer benefits from forest, an important target for pro-poor agricultural innovation, are limited and seldom favor the poor. Absorption of (poor) unskilled labor is low in forestry, which tends to be capital-intensive. Natural forests may thus lack comparative advantage for poverty alleviation. There are few "win-win" synergies between natural forests and national poverty reduction, which may help to explain why the loss of tropical forests is ongoing. This may have important implications for our understanding of "sustainable forest development" and for the design of both conservation and poverty-alleviation strategies.

World Development 29(11): 1817-33.

198. The private sector speaks: investing in sustainable forest management

Chipeta, M.E., Joshi, M., eds.

Worldwide, the private sector is expected to play a lead role in economic and production activities, while the public sector provides the supportive policy as well as the legal and other institutional environment for this. National governments of most developing countries have limited financial resources to fund sustainable forest management (SFM) and society is increasingly expecting the private sector to fund SFM. However, the participation of the private sector is not forthcoming as many would like to see. This book presents the papers prepared for the Oslo workshop which convey the perceptions and views of the private sector, including: a glimpse of the current status of private sector involvement in the forest sector in general, and SFM in particular; the main obstacles the private sector currently faces that deter it from making greater investments; the desired changes in the policy and operating environment which can make conditions more 'enabling for private sector engagement. The first chapter gives a brief background on financing SFM, and a synthesis blending ideas from the papers and the

discussions at the workshop on the role of the private sector. The nine chapters are the original Oslo workshop papers.

Bogor, Indonesia, CIFOR. 303p. ISBN: 979-8764-72-2
Also available on CD ROM. ISBN: 979-8764-69-2. Contents include Report of
financing sustainable forest management workshop, Oslo, Norway, 22-25
January 2001

199. Rich forests, poor countries: adapting forest conservation to economic realities

Sayer, J.A., Swartzendruber, J.F., Nasi, R., Byers, B.A.

In the Congo Basin, very large areas of species-rich forests exist in countries that are among the world's poorest. Decision makers and ordinary people in these countries are far more concerned about meeting short-term local and national needs than about long-term value of global biodiversity. Given present economic realities, it is hard to see how such investments can be sustained unless much greater emphasis is given to reconciling conservation objectives with economic needs. Forest conservation in the Congo Basin will require more diversified approaches in order to manage a wider range of land-use systems more effectively, at lower cost, and with significant more local and national participation. The current enthusiasm for the big, remote, pristine parks model of forest conservation is risky.

Washington, D.C., Central African Regional Program for the Environment (CARPE) and Biodiversity Support Program. Congo Basin Information Series, Issues Brief #3. [online] html URL: http://www.bsponline.org/bsp/publications/africa/127/congo_03.html.

200. A shared research agenda for landuse, landuse change, forestry and clean development mechanism: developed through an international workshop held 6-8 March, 2001, Bogor, Indonesia
CIFOR

About 20% of global greenhouse gas emissions are from landuse, landuse change and forestry (LULUCF) and mostly are from deforestation in the tropics. In March 2001 the Centre for International Forestry Research facilitated an international workshop to identify a global agenda of high priority research questions key to research areas related to the Clean Development Mechanism (CDM) and LULUCF. This document summarizes the workshop report that discussed the following issues: Capacity building and information sharing are critical for

building support and political will for backing LULUCF projects; Scale was identified as a main issue in the current negotiation process; A global overview and evaluation of the potential for different CDM options is needed to provide insight into scale issues; The need to reduce costs was identified and set up as the main agenda for further research; Solving the problems of permanence is crucial if forestry projects are to be included in the protocol; Leakage is one of the main concerns raised by negotiators and other stakeholders opposed to the inclusion of LULUCF in the CDM; The production of forest carbon requires consistent, reliable and verifiable monitoring; A reliable, verifiable and cost-effective baseline is needed to calculate the additional certified emissions reduction (CER) accruing to CDM. A number of broader research topics were identified.

Bogor, Indonesia, CIFOR. 62p.

201. Soybean technology and the loss of natural vegetation in Brazil and Bolivia

Kaimowitz, D., Smith, J.

This paper looks at the impact of the introduction of new soybean technologies on the clearing of natural vegetation (forest and savanna) in southern Brazil, the Brazilian Cerrado, and Santa Cruz, Bolivia. The paper looks at how technological change interacted with other government policies and examines general equilibrium effects on product and labor markets as well as the direct on-farm effects. In southern Brazil new technologies made large-scale mechanized soybean production more profitable. This led to the displacement of many small farmers that moved to the Brazilian Amazon and clearing forests for agriculture. It may have also encouraged deforestation in southern Brasil itself. In the Brazilian Cerrado and Santa Cruz Bolivia the new technologies made it possible to plant soybeans in areas where it had previously not been economically feasible. Large areas of forest and other natural vegetation were cleared as a result.

In: Angelsen, A., Kaimowitz, D. (eds.). Agricultural technologies and tropical deforestation. Oxon, UK, CABI Publishing. 195-211.

202. **A system dynamics model for management of Miombo woodlands**
Sumaila, U.R., Angelsen, A., Kowero, G.

The Miombo woodlands of eastern, central and southern Africa are some of the most extensive dry forests in Africa. They supply a myriad of products and services for local populations, governments and the private sector, the main stakeholders. Planning the management and use of the woodlands by many and diverse stakeholders who often have conflicting interests in the woodlands continues to be a great challenge to national governments and other interested parties. This paper presents a system dynamic model, MIOMBOSIM, which has potential for facilitating planning developments in the woodlands in ways that reconcile the aspirations of the three major stakeholders. The model holds potential for analysing various policy implications on people and the woodlands, as well as the desirability of various partnership arrangements for managing and using the woodland resources.

CIFOR Occasional Paper 35:17-30.

203. **Technological change and deforestation: a theoretical overview**
Angelsen, A., van Soest, D., Kaimowitz, D., Bulte, E.

This chapter spells out the theoretical framework for the discussion and case studies of the book. First, it provides precise definitions of technological change and classify technological change into different types based on their factor intensities. The discussion starts off with a single farm household. Two key concepts for understanding how that household will respond to technological changes are economic incentives and constraints. The former relates to how new technologies influence the economic return of different activities. The latter has to do with how the technologies modify the labour and capital constraints that farmers face. Then, the chapter shifts to the macro level and discusses how aggregate changes in output supply and input demand affect prices, wages, and migration. Such general equilibrium effects can modify or even reverse the conclusions obtained when only considering the individual farm households.

In: A. Angelsen, D. Kaimowitz (eds.). *Agricultural technologies and tropical deforestation*. Oxon, UK, CABI Publishing. 19-34. ISBN: 0-85199-451-2.

204. When does technological change in agriculture promote deforestation

Angelsen, A., Kaimowitz, D.

This chapter attempts to systematically examine some of the main analytical arguments and empirical evidence regarding the impact of technological progress in agriculture on deforestation. Three factors have been highlighted that are important in determining deforestation outcomes: (1) the type of technological change; (2) in which subsectors of agriculture it occurs; (3) in what labour market and product market conditions it occurs. Three conclusions emerge: (1) technological progress in the intensive sector is generally good for forest conservation; (2) labour intensive technological progress will tend to reduce forest clearing; (3) the effect of pure yield increasing and labour-saving technological progress in the extensive sector is sensitive to market assumptions.

In: Lee, D. R., Barret, C. B. (eds.). Trade offs or synergies?: agricultural intensification, economic development and the environment. Wallingford, Oxon, UK, CAB International. 89-114.

Author Index

A

- Abdel Nour, H.O.
183
- Alegre, J.
136
- Alias, M.A.
92
- Alvez, M.
143
- Anau, N.
54, 70
- Anazawa, M.
148
- Anderson, I.P.
85
- Anderson, J.
21, 42, 73
- Angelsen, A.
166, 167, 173, 180, 189, 195,
196, 202, 203, 204
- Angi, E.M.
14
- Antona, M.
66
- Appanah, S.
146
- Applegate, G.
102, 150
- Aravind, N.A.
86
- Arnold, J.E.M.
129, 182
- Azani, A.M.
144, 158, 161, 163

B

- Babin, D.
66
- Badcock, S.
43
- Barahona, T.
67
- Barr, C.
54, 168
- Barrow, S.
64
- Baviskar, A.
47
- Belcher, B.
128, 130, 134
- Bellote, A.F.J.
151, 153, 160
- Bernhard-Reversat, F.
138, 142
- Bhat, D.M.
98, 159
- Blate, G.M.
19
- Bojanic Helbingen, A.J.
127
- Bompard, J.M.
85
- Bowen, M.R.
85
- Boyle, T.J.B.
31
- Brocklesby, M. A.
20, 55, 76
- Brodt, S.
77
- Buck, L.
10, 25, 26, 58, 65, 77, 78

Budi, A.S.
 93
 Budidarsono, S.
 164
 Bulte, E.
 203
 Burford de Oliveira, N.
 38, 62
 Burley, J.
 7
 Byers, B.A.
 199
 Byron, N.
 175
 Byron, Y.
 59, 71

C
 Campbell, B.M.
 1, 6, 35, 41, 68
 Carbajal, Y.
 136
 Carrera, F.
 88
 Cartier, C.
 60
 Carnevalheiro, K. de O.
 23
 Casson, A.
 171, 172
 Castaneda, A.
 87, 88
 Castillo, A.
 87, 88
 Cavalin, J.
 143
 Chabbert, J.
 95
 Chipeta, M.E.
 177, 178, 179, 185, 198
 Chokkalingam, U.
 18, 90, 94, 110, 113, 121,
 123, 159

Chrisandini
 14
 CIFOR
 194, 200
 Colfer, C.J.P.
 20, 28, 29, 30, 31, 44, 45, 50,
 55, 59, 71, 76, 82, 126
 Cossalter, C.
 137, 157
 Costa de Brito, M.F.
 89
 Cunningham, A.
 1
 Cunningham, A.B.
 36, 64

D

Da Silva, H.D.
 151, 153
 da Silva, J.R.
 89
 da Silva, R.N.
 89
 de Brito, I.M.
 89
 de Brito, R.R.
 89
 de Camino, R.
 105
 de Jong, W.
 35, 90, 94, 96, 110, 111, 113,
 122, 123, 147
 Dedeczek, R.A.
 151, 160
 Delègue, M. A.
 125
 Delmy, A.
 97
 Dennis R.A.
 45, 102
 Dent, J.B.
 186
 Dermawan, A.
 173

Diaz Barba, A.
193
Djogo, T.
54
Dombeck, M.
183

E

Edmunds, D.
21, 25, 26, 42, 65, 73, 77, 78,
79, 82, 188
El-Lakany, H.
7
Engel, P.G.H.
22

F

Fagi, A.M.
164
Fairhead, J.
72
Fatawi, M.
145
Fernandez, R.
143
Ferreira, C.A.
153
Ferreira, M. do S.G.
23
Figueredo, S.
143
Fimbel, R.
19
Finegan, B.
193
Forni, E.
108
Fox, J.
77
Frost, P.
1
Fruhling, P.
191

Fu Maoyi
128, 133
Fuhr M.
125

G

Gami, N.
80
Ganeshaiah, K.N.
86
García-Fernández, C.
118
Garibaldi, J.
143
Gatzweiler, F.
14
Gauto, O.
143
Gava, J.L.
151, 160
Geisler, C.C.
10, 58
Gillison, A.
164
Gillison, A.N.
15
Gintings, A.N.
107
Gockowski, J.
135
Goncalves Ferreira, M.D.S.
193
Goncalves, D. de A.
23
Gondo, P.
181
Gonzalez, M.
104
Gouyon, A.
85
Guizol, P.
85, 137

H

- Haggith, M.
38, 62
Hailu, M.
3
Hanum, I.F.
92, 144, 161, 163
Hariri, D.
69
Harwell, E.
29, 30
He Zhonghua
48
Heng, S.S.
92
Heriansyah, I.
155
Hoeberichts, A.
22
Hoffmann, A.
102

I

- Imam, B.
14
Ishida, A.
140
Iwan, R.
54, 70

J

- Johnson, B.
14
Joshi, M.
177, 178, 179, 185, 198
Jumbe, C.B.L.
181

K

- Kaimowitz, D.
67, 104, 166, 167, 169, 180,
189, 196, 201, 203, 204
Kajembe, G.C.
53

- Kanel, K.R.
124
Kaoneka, A.R.S.
53
Kaoneka, A.S.
181
Kartawinata, K.
13, 102, 107
Kelkar, G.
34, 52
Keller, H.
143
Kobayashi, S.
92, 109, 119, 136, 139, 143,
144, 148, 149, 154, 157, 161,
163
Kowero, G.
53, 82, 165, 181, 186, 187,
202
Krott, M.
7
Kumar, S.
56
Kushwaha, S.P.S.
117
Kusumanto, T.
164

L

- Laclau, J.P.
138
Lambin, E.F.
108
Larson, A.M.
75
Lasco, R.D.
116
Leach, M.
72
Levang, P.
190
Limberg, G.
54, 70

- Liswanti, N.
 96
 Liu Dachang
 81
 Lopez Cristobal, L.
 143
 Loubana, P.M.
 138
 Loumeto, J.J.
 138
 Luckert, M.
 35
 Luckert, M.A.
 33
 Luhanga, J.
 165
- M**
 Mac Donagh, P.
 143
 Macedo Silva, J.N.
 101
 Madrid, G.
 104
 Magdaleno, J.
 104
 Majid, N.M.
 92, 144, 158, 161, 163
 Majid, N.M.N.A.
 109
 Mandondo, A.
 24, 35
 Mardji, D.
 100
 Marek, M.
 143
 Margoluis, R.
 104
 Marjenah
 145
 Martin, G.J.
 64
 Martins da Silva, R.C.V.
 89
- Martins, J.
 89
 Maswar
 144, 161, 163
 Matose, F.
 35
 Mattos, M.M.
 23
 Mboukou, I.M.C.
 138
 McCarthy, J.F.
 39, 170
 McDougall, C.
 38, 62, 82
 McDougall, C.L.
 51
 Meguro, S.
 158
 Mejia, A.
 87
 Mendoza, G.A.
 16, 74
 Mendoza, R.
 67
 Menegol, O.
 151, 160
 Mertens, B.
 108
 Mills, R.
 3
 Mindle, I.J.
 165
 Mittelman, A.
 115
 Moad, A.
 183
 Moeliono, M.
 54
 Mokhtaruddin, A.M.
 92, 144, 161, 163
 Monela G.C.
 53
 Mori, T.

109, 145, 156

Murali, K.S.

98

Murdiyarso, D.

164

N

Nair, C.T.S.

146

Nair, K.S.S.

152

Napiri, Y.

40

Nasi, R.

8, 9, 80, 125, 131, 199

Nathan, D.

34, 52

Ndoye, O.

135, 174

Nemarundwe, N.

35

Ngugi, D.

165

Nhantumbo, I.

181, 186, 187

Nkongmeneck, B.A.

135

Norhisyam, T.M.

163

Nuroniah, H.S.

155

O

Obidzinski, K.

190

Oka, T.

145

Omoluabi, C.

183

Otsuka, M.

69

P

Pacheco, P.

67

Paivinen, R.

3

Parsell, D.

17

Perera, G.A.D.

94, 112

Permana, E.

14

Persson, R.

191

Pokorny, B.

105

Porodong, P.

32

Porro R.

20, 55, 76

Potter, L.

43

Poulsen, J.

5, 18, 86, 141, 150

Poulsen, J.G.

17

Prabhu, R.

1, 16, 29, 31, 59, 74, 82, 106,

126

Prins, C.

183

Priyadi, H.

95

Puangchit, L.

139

Pulhin, J.M.

116

Puntodewo, A.

45

Puri, R.K.

11, 14

Puspitojati, T.

107

Putz, F.E.

19

R

Ramakrishnan, P.S.
117

Ramirez, R.
84

Rao, D.
86

Ravindranath, N.H.
98

Raymond, D.
150

Redford, K.H.
19

Resosudarmo, I.A.P.
173, 174

Reversat, G.
138

Rianto, E.
173

Ribeiro, R. T.
89

Ribot, J.C.
57

Ricse, A.
136

Rios, M.
89

Riswan, S.
107

Ritchie, B.
38, 62

Robinson, J.
19

Rojas, O.
104

Ruitenbeek, H.J.
31

Ruitenbeek, J.
60

Ruiz Perez, M.
1, 128, 129, 130, 133

Rukmiyati
14

Russel, V.
104

S

Saarikko, J.
3

Sabogal, C.
87, 88, 89, 90, 101, 105, 113,
123, 136, 193

Sabri, M.
163

Saefuddin
14

Sakai, C.
155

Salim, A.
20, 55, 76, 126

Salleh, M.N.
183

Samsuodin, I.
14

Sardjono, M.A.
14, 20, 55, 76, 126

Satyawadhana, C.
27

Sawada, H.
148

Sayer, J.A.
1, 6, 7, 18, 63, 183, 192, 199

Schelhas, J.
10, 58

Schmidt-Vogt, D.
114

Sellato, B.
49

Seppala, R.
7

Shaanker, R.U.
86

Shackleton, S.
41, 68

Shanley, P.
36, 64

Sheil, D.
 12, 13, 14, 103
 Shrestha, K.
 124
 Sidiyasa, K.D.
 14
 Siles Gonzales, G.
 193
 Singh, K.S.
 4
 Sirait, M.
 96
 Sithole, B.
 35
 Sitorus, M.T.F.
 40
 Smith, J.
 90, 113, 123, 193, 201
 Soetarto, E.
 40
 Sonwa, D.J.
 135
 Soudre, M.
 136
 Spilsbury, M.J.
 2, 5
 Stewart, G.
 17
 Stolle, F.
 164
 Subiakto, A.
 155
 Sudana, I.M.
 54, 70
 Sudana, M.
 61
 Sudarmadji, T.
 99
 Suksawang, S.
 119
 Sumaila, U.R.
 202
 Sumantri
 69

Sunderlin, W.
 173
 Sunderlin, W.D.
 174
 Suramenggala, I.
 190
 Sutisna, M.
 162
 Swartzendruber, J.F.
 199

T

Tanaka, N.
 119
 Tchatat, M.
 135
 Tchikangwa, B.
 20, 55, 126
 Tchingkawa B.
 76
 Thaiutsa, B.
 139
 Tiane, A.M.
 126
 Tian, A. M.
 20, 55, 55, 76
 Toma, T.
 109, 140, 145
 Tomaselli, I.
 183
 Tomich, T.P.
 164
 Turnbull, J.W.
 109, 157
 Tutin, C.
 8

U

Uluk, A.
 61
 Umans, L.
 22
 Umeh, L.I.
 183

V

- van de Kop, P.
193
- van Heist, M.
14, 70
- van Nieuwstadt, M.G.L.
13
- van Noordwijk, M.
96
- van Noordwijk, M.
164
- van Soest, D.
203
- Vanaray, G.
86
- Vera, N.
143
- Vermeulen, S.
1
- Visco, R.G.
116
- von Gemmingen, G.
102, 159

W

- Wacharinrat, C.
139
- Wadley, R. L.
29, 30, 50, 83
- Wang Qinghua
46
- Weise, S.F.
135
- White, A.
121
- Wijaya, A.
14
- Woelfel, J.
30, 55
- Wollenberg, E.
10, 21, 25, 26, 42, 54, 59, 61,
65, 70, 73, 77, 78, 79, 82,
132, 188

- Wunder, S.
91, 176, 197

Y

- Yang Xiaosheng
128, 133
- Yarwudhi, C.
119, 139
- Yu Xiaogang
37
- Yunardi, S.
69
- Yusoff, M.K.
92, 144, 161, 163

Z

- Zaizhi, Z.
120

Keyword Index

A

Abandoned Land
136

Adaptability
136

Adaptation
6, 10, 25, 26, 31, 58, 60, 63, 65

Administration
40, 83

Afforestation
18, 46, 67, 147

Africa
66, 183, 202

Agricultural Development
204

Agricultural Policy
196

Agricultural Products
53, 204

Agricultural Sector
91, 187

Agriculture
17, 46, 104, 111, 164, 166, 167, 180, 189, 193, 196, 203

Agroforestry
122, 135, 164, 182

Alley Cropping
69

Amazonia
23, 122, 184

Aquilaria
132

Asia
52, 90, 113, 123, 146, 159, 183, 188

Assessment
1, 2, 5, 6, 14, 29, 30, 38, 45,

50, 51, 59, 62, 66, 71, 82, 90, 113, 152

Aucoumea Klaineana
125

Azadirachta
144, 161

B

Bamboos
128, 130, 133

Bark
153

Biodiversity
9, 10, 12, 14, 16, 17, 18, 19, 141, 142, 199

Biogeography
11

Biological Indicators
86

Biomass
136, 151, 153, 163

Birds
86

Bolivia
67, 127, 201

Borneo
83

Boundaries
83

Brazil
20, 23, 55, 89, 151, 160, 193, 201

Brazil Nuts
127

Bulungan
11, 20, 49, 51

Burning
13

C

Calamus Caesius
134

Calycophyllum
122, 136

Cambodia
115

Cameroon
20, 55, 108, 135, 174

Canes and Rattans
134

Caribbean
183

Case Studies
27, 34, 41, 46, 56, 68, 70, 74,
108

Cattle Husbandry
167

Cedrela Odorata
122

Cedrelinga
136

Central Africa
8

Central America
169

Central Kalimantan
39, 170, 172

CGIAR
17

Change
25, 26, 31, 32, 37, 45, 52, 63,
65, 116, 120, 121, 130, 133,
142, 160, 168, 173, 188, 189,
191, 200, 203

China
37, 46, 48, 81, 120, 128, 130,
133

Classification
15, 110, 123

Clean Development Mechanism
200

Clear Felling
151

Coastal Areas
91, 176

Cocoa
135

Code of Practice
141, 150

Collective Agreements
137

Colonization
83

Communication
3

Communities
21, 22, 24, 30, 44, 49, 54, 61,
67, 72, 73, 85, 120, 137, 181,
190, 195

Community Action
79

Community Development
64

Community Forestry
14, 38, 52, 54, 62, 71, 72, 77,
78, 81, 107, 114, 124, 135,
141, 182, 190

Community Involvement
10, 25, 26, 36, 41, 42, 57, 64,
65, 68, 70, 135, 145, 159

Concessions
108, 168, 170, 190

Conferences
17, 31, 69, 77, 78, 92, 93, 97,
99, 100, 101, 106, 109, 119,
126, 133, 136, 138, 139, 143,
144, 145, 146, 148, 149, 151,
153, 155, 156, 157, 158, 160,
161, 162, 163, 166, 177, 178,
179, 184, 185, 198, 200

Conflict
22, 37, 39, 54, 70, 73, 80, 84,
170, 195

Congo

138, 142, 199

Conservation

36, 55, 64, 104, 129, 195, 197

Constraints

178, 180, 198

Conversion

107

Cooling Systems

155

Cooperation

10, 58, 72, 84

Cooperative Activities

76

Coownership

35

Coppicing

139

Corridor Systems

141

Cost Benefit Analysis

175, 200, 201

Costs

34, 87, 88, 195

Criteria16, 29, 38, 51, 59, 62, 74, 82,
105, 106, 126**Culture**

32, 61

Customary Law

54, 61

Cutting

100, 155

Cycling

46, 153, 160

D**Databases**

3

Dead Wood

121

Decentralization39, 40, 43, 54, 56, 57, 67, 68,
75, 170, 171, 172, 190**Decision Making**

6, 16, 21, 26, 42, 67, 73

Deforestation91, 104, 109, 129, 136, 164,
165, 166, 167, 169, 174, 176,
180, 189, 195, 196, 201, 203,
204**Degraded Forests**90, 109, 112, 136, 145, 148,
149, 154, 155, 156, 157, 169**Degraded Land**

120, 158, 159

Democracy

57

Demonstration Forests

146

Dendrochronology

121

Development

105, 123, 133

Development Agencies

191

Development Aid

179, 182, 191

Development Plans

18

Development Programmes

63

Development Projects

63, 66, 69

Diameter

87, 121

Diffusion of Information

3

Dipterocarpaceae

13, 100, 156

Disturbed Forests

103

Diversity

123

Dryobalanops aromatica

158

Durio carinatus

158

Dynamic Models

194, 202

E

East Kalimantan

13, 44, 49, 51, 54, 61, 97,
132, 134, 145, 156, 162, 171

East-West Center

11

Ecological Disturbance

13

Ecology

11, 13, 118

Economic Analysis

60, 91

Economic Crises

168, 173, 174

Economic Development

23, 127

Economic Growth

130, 196

Economic Policy

165

Economics

132, 199, 203

Ecosystems

17, 18, 37, 63, 143, 148, 154,
157

Ecuador

91, 176

Environment

57, 197

Environmental Degradation

48

Environmental Factors

25, 65

Environmental Impact

34, 141, 196

Environmental Management

123, 128

Environmental Policy

24, 66

Erosion

99

Establishment

136

Ethics

55, 71

Ethnic Groups

27, 32, 51, 61, 80, 83

Ethnicity

30

Ethnobotany

11, 89

Eucalyptus

138, 142

Eucalyptus grandis

151, 153, 160

Europe

183

Eusideroxylon zwageri

158

Evaluation

2, 109, 143, 144, 149, 157,
187

Exotics

152

Expert Systems

186

Externalities

34

F

Factor Analysis

167

Factors of Production

203

Fallow

94, 96, 114

Farmers

69, 89, 173, 174, 180

Fauna

11

Fencing

69

Finance

177

- Fire Causes**
 - 44, 85
- Fire Effects**
 - 44, 109, 162
- Fire Prevention**
 - 69, 145
- Fire Resistance**
 - 97
- Floodplains**
 - 111, 122
- Flora**
 - 11
- Foods**
 - 61
- Forest Damage**
 - 143, 192
- Forest Dynamics**
 - 111
- Forest Ecology**
 - 34, 56, 86
- Forest Economics**
 - 184
- Forest Fires**
 - 13, 44, 69, 85, 93, 99, 102, 149
- Forest Fragmentation**
 - 109
- Forest Inventories**
 - 100
- Forest Litter**
 - 142
- Forest Management**
 - 10, 16, 18, 19, 21, 22, 25, 26, 28, 31, 34, 38, 39, 40, 42, 46, 50, 52, 55, 56, 58, 60, 62, 65, 66, 71, 72, 73, 74, 76, 77, 78, 79, 81, 82, 101, 105, 106, 122, 124, 127, 137, 141, 170, 175, 177, 178, 179, 182, 184, 185, 187, 188, 198, 202
- Forest Plantations**
 - 18, 85, 98, 137, 150, 152, 168, 183
- Forest Policy**
 - 39, 40, 46, 48, 75, 106, 107, 170, 181, 184, 188, 190
- Forest Products**
 - 23, 53
- Forest Products Industries**
 - 39, 127, 134, 137, 141, 150, 168, 170
- Forest Resources**
 - 12, 20, 29, 32, 48, 49, 54, 59, 61, 71, 80, 81, 126, 172
- Forest Trees**
 - 87, 94, 97, 136, 147, 163
- Forestry**
 - 3, 7, 47, 168, 182, 183, 191, 197, 200
- Forestry Development**
 - 183
- Forestry Law**
 - 85, 127, 172
- Forests**
 - 14, 37, 41, 43, 45, 46, 56, 72, 73, 126, 169, 171, 193, 199
- Frontier Areas**
 - 193
- Funding**
 - 179, 185
- G**
- Gabon**
 - 80, 125
- Game Theory**
 - 195
- Gender Relations**
 - 4, 27, 32, 34, 46, 48, 51, 52
- Genetic Resources**
 - 17
- Geographical Information**
 - Systems
 - 45, 108
- Girdling**
 - 87

Government
24, 47, 195

Government Policy
85, 201

Grasslands
156

Green Belts
69

Growth
136, 161

Guidelines
17, 25, 63, 65, 196

Guinea
72

H

Habitat Destruction
136

Handbooks
11, 15, 25, 38, 62, 65

Harvesting
149

Heartwood
153

Hevea brasiliensis
162

Highlands
91, 114

Himalaya
117

History
3, 4, 34, 49, 188

Home Gardens
122

Hopea
158

Hopea Odorata
144, 161

Household Expenditure
53

Household Surveys
165, 173

Households
53, 81, 187, 194, 203

Humid Zone
99

Humidity
155

Hunting
4

I

Illicit Logging
172, 190

Immigration
176

Impact
2, 5, 6, 39, 149, 157, 167,
170, 201, 203

Incentives
132

Income
53, 61, 131, 132

Income Distribution
127

Increment
87

India
4, 47, 56, 86, 98, 106, 117

Indicators
1, 16, 29, 31, 38, 51, 59, 62,
71, 74, 82, 105, 106, 126

Indigenous Knowledge
7, 27, 34, 46, 50, 56

Indonesia
20, 29, 39, 40, 43, 44, 45, 49,
50, 54, 55, 61, 85, 96, 102,
107, 118, 132, 134, 145, 147,
149, 164, 168, 170, 171, 172,
173, 174

Industry
130, 150

Information Needs
126

Information Services
3

Information Systems
148

Information Technology

3

Insect Pests

152

Institutions35, 41, 47, 68, 72, 81, 85,
127, 164, 200**Integrated Systems**

6, 17, 101

Intensification

90, 94, 96, 113, 164

Intensive Cropping

94

Interdisciplinary Research

7

Interest Groups

66, 73, 84

International Cooperation

17, 178, 179, 200

International Organizations

179, 191

Internet

3

Intervention

22

Inventories

88

Investment

178, 179, 198

IUFRO

101

K**Kalimantan**

11, 39, 70, 102, 170

L**Labour**

48, 167, 201, 204

Land Clearance

173, 195, 204

Land Management

85, 135

Land Use69, 90, 92, 94, 96, 111, 113,
114, 116, 127, 164, 165, 176,
195, 199, 200**Land Use Planning**

85

Landscape

9, 14

Laos

115

Latin America

105, 111, 183

Law

24

Learning

65, 77, 78, 84

Legislation

181

Light Intensity

155, 156

Linkage

104

Litter-Plant

138, 142

Living Conditions

37, 53, 71

Local Government24, 39, 40, 54, 57, 67, 75,
170, 172, 190**Local People**

51, 55, 120, 124

Local Population20, 21, 22, 35, 36, 39, 50, 73,
80, 170, 192**Logging**9, 13, 39, 67, 82, 87, 88, 108,
115, 117, 154, 157, 168, 170,
175**Logging Effects**13, 99, 108, 109, 119, 143,
144, 160, 161, 163**Losses**

154

Lowland Areas
109, 144, 156, 157, 161, 167

M

Macroeconomics
165, 174, 187

Madagascar
66

Maize
162, 165

Malawi
165

Malaysia
32, 92, 144, 147, 158, 161

Malinau
70

Management
1, 5, 31, 53, 63, 68, 84, 150

Mapping
70, 80, 121

Markets
23, 34, 133, 167, 180, 195,
201, 204

Mathematical Models
108

Matriarchy
27, 48

Measurement
145

Methodology
10, 14, 25, 26, 50, 51, 65, 80,
105, 109, 144, 157

Middle East
183

Migrant Labour
176

Mixed Crops
100

Models
1, 6, 60, 153, 165, 187, 194,
195, 204

Monitoring
12, 38, 62, 103, 106

Mortality
87

Mountain Areas
120

Mozambique
186

Multiple Use
61

Multipurpose Trees
89

Myanmar
115

N

National Parks
40, 61, 69

Natural Forests
100, 119

Natural Resources
1, 5, 17, 29, 33, 36, 41, 53,
57, 64, 68, 75, 79, 80, 186

Nature Conservation
9, 10, 10, 12, 16, 19, 27, 63,
71, 164, 199

Negotiation
79

Nepal
124

Netherlands
83

Nicaragua
67, 75, 87, 88, 193

Nitrogen Fixation
142

Non-Timber Forest Products
127, 128, 129, 130, 131, 132,
133, 135

North America
183

Nutrient Availability
153, 160

Nutrient Transport
151

O**Oil Palms**

172

Organization of Research

7

Outbreaks

152

P**Pacific Islands**

146

Parashorea

158

Participation22, 28, 38, 50, 51, 62, 66, 67,
69, 70, 80, 124, 182**Partnerships**

202

Peninsular Malaysia

92, 144, 161, 163

Perception

30, 55

Performance

1

Peru

111, 149, 193

Philippines

116

Planning17, 22, 25, 26, 65, 88, 126,
186, 187, 194, 200, 202**Plant Diseases**

100

Plant Protection

69

Plantation Crops

43, 171, 172

Plantations44, 100, 134, 138, 141, 142,
147, 150, 157, 160, 176**Pluralism**

21, 42, 72, 73

Poisoning

87

Policy10, 41, 43, 60, 61, 68, 79, 91,
116, 120, 128, 133, 164, 171,
172, 174, 178, 187, 194, 198,
202**Political Power**

41

Politics

47

Poverty

164, 182, 197

Private Ownership

81

Private Sector

178, 179, 187, 194, 198

Production

128, 130, 133

Productivity

130, 160

Programming

186, 194

Projects

135

Property rights

33, 34, 81

PROSEA

11

Protected Areas

10, 12, 63, 67, 82

Protection of Forests

166, 189, 196

Pulp and Paper Industry

168

Q**Quantitative Analysis**

153

R**Rain Forests**

13, 101, 158, 164

Raw materials

133

- Regeneration**
 - 98
- Regulations**
 - 54, 81, 85
- Rehabilitation**
 - 109, 144, 145, 146, 148, 149,
 - 154, 155, 156, 157, 158, 159,
 - 162
- Relationships**
 - 49, 71
- Remote Sensing**
 - 45, 108
- Research**
 - 2, 5, 30, 31, 123, 126, 200
- Research Institutes**
 - 7
- Research Policy**
 - 7
- Research Projects**
 - 17, 104, 109, 146, 148, 149,
 - 157
- Research Support**
 - 146
- Reserved Forests**
 - 121
- Resource Allocation**
 - 195
- Resource Management**
 - 1, 10, 17, 33, 35, 36, 37, 41,
 - 57, 64, 79, 80, 130, 132, 193
- Resource Utilization**
 - 90
- Riau**
 - 43
- Rice**
 - 162
- Right of Access**
 - 20, 29, 61, 71, 76, 80
- Risk**
 - 152
- Road Construction**
 - 176
- Rubber Plants**
 - 147
- Rural Communities**
 - 18, 34
- Rural Development**
 - 57, 128, 129
- Rural Economy**
 - 128
- Rural Industry**
 - 133
- S**
- Sabah**
 - 32
- Sampling**
 - 103
- Sapwood**
 - 153
- Savannas**
 - 138, 142
- Schizolobium**
 - 136
- Secondary Forests**
 - 23, 89, 90, 94, 96, 98, 102,
 - 107, 110, 111, 112, 113, 114,
 - 115, 116, 117, 119, 120, 123,
 - 124, 125, 157, 159, 193
- Seedlings**
 - 144, 161
- Selective Felling**
 - 87, 107, 143
- Settlement**
 - 49
- Shifting Cultivation**
 - 94, 96, 104, 112, 113, 114,
 - 115, 116, 117, 134, 136, 147,
 - 164, 167, 193
- Shorea**
 - 155, 158, 162
- Shrubs**
 - 156
- Silvicultural Systems**
 - 109, 118
- Silviculture**
 - 87, 125, 157

- Site Type**
 - 160
- Small farms**
 - 23, 147
- Social Benefits**
 - 18
- Social Change**
 - 50
- Social Development**
 - 127
- Social Differentiation**
 - 47, 72
- Social Environment**
 - 77, 78
- Social Forestry**
 - 26
- Social Sciences**
 - 59
- Social Welfare**
 - 23, 28, 48, 51, 59, 76, 173
- Socioeconomic Status**
 - 76
- Socioeconomics**
 - 49, 133, 157, 164
- Sociology**
 - 82
- Soil Chemical Properties**
 - 119
- Soil Fertility**
 - 138, 142
- Soil organic matter**
 - 138, 142
- Soil Physical Properties**
 - 119
- Soil Properties**
 - 161
- Southern Africa**
 - 35, 41, 68, 181, 187, 194
- Soyabeans**
 - 162, 201
- Spatial Analysis**
 - 121
- Species**
 - 89, 97, 136, 152, 158
- Species Composition**
 - 121, 163
- Species Richness**
 - 103
- Stand Structure**
 - 121
- Stems**
 - 121
- Structural Adjustment**
 - 168
- Sumatra**
 - 43, 164
- Surveys**
 - 15
- Sustainability**
 - 16, 30, 31, 71, 74, 104, 105, 106, 127, 131, 150, 154, 175, 177, 178, 179, 184, 185, 198
- Systems**
 - 1, 60
- T**
- Tabebuia**
 - 136
- Tanzania**
 - 53
- Taungya**
 - 100, 162
- Taxonomy**
 - 11
- Teak**
 - 139
- Technical Progress**
 - 204
- Techniques**
 - 26, 88, 109, 157
- Technology**
 - 69, 147, 166, 167, 180, 189, 196, 201, 203
- Tectona grandis**
 - 139
- Tenure Systems**
 - 37, 81, 130, 133

Terminalia

136

Terminology

110

Terracing

46

Thailand

27, 115, 119, 139

Theory

79, 106, 203, 204

Theses

118, 127

Thinning

139

Tillage

160

Timber Supply

183

Timber Trade

108

Tobacco

165

Tourism

48

Trade

49

Traditional Society

32, 46, 52, 61

Traditional Technology

118

Trees

122, 150, 152

Tropical Forests

9, 12, 13, 19, 66, 99, 101, 103, 104, 105, 108, 109, 113, 118, 119, 123, 129, 146, 149, 157, 158, 161, 166, 180, 189, 192, 195, 197, 203

Tropics

90, 120, 150, 159, 167

Trunks

153

U

Uganda

103

UK

83

Ultisols

136

Uncertainty

25, 31, 65

Upland Areas

167

V

Vegetation

13, 15, 142

Vegetative Propagation

112

Vietnam

115

Villages

70

Vitex

144

W

Water

37

Water Flow

92

Water Quality

56, 92

Water Resources

169

Watersheds

37, 70

Weeds

136

West Africa

72

West Kalimantan

29, 30, 40, 45, 50, 83, 147

Western Ghats

98

Wildlife

41

Wildlife Conservation

175

Women

4, 27, 28

Wood Anatomy

93

Wood Defect

93

Woodlands

35, 53, 186, 187, 194, 202

Y

Yields

88, 204

Z

Zimbabwe

33, 35

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