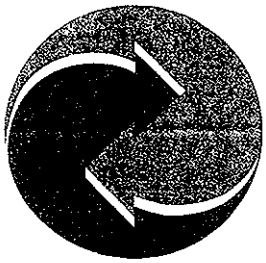
Overseas Development Administration

Renewable Natural Resources Research Strategy

Natural Resources Systems Programme



Forest/Agriculture Interface

THE IMPORTANCE OF COMMON PROPERTY ISSUES, TENURE AND ACCESS RIGHTS IN RELATION TO LAND USE MANAGEMENT AND PLANNING AT THE FOREST/AGRICULTURE INTERFACE

by

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SECTION D - FOREST CONVERSION AND AGRICULTURAL ENCROACHMENT

D1

Author Abdul Razak, M.A.

Title Prominent findings of forestry research in Malaysia.

Source *FORSPA Publication. 1993, No. 10*, iv + 40 pp. (10 pp. of ref.) CABI International Asia Regional Office, Kuala Lumpur, Malaysia.

Year 1993

Language English

Abstract Results are reviewed and discussed of research in areas designated as priorities by FORSPA (Forestry Research Support Program for Asia and the Pacific), viz. upland watershed management, reforestation of degraded lands and problem soils, conservation of ecosystems and biological diversity maintenance, improving the sustainability of plantation forestry, and promotion of community participation in forestry development. The material is presented in 3 chapters (each with references at the end): (1) Upland water management - including upstream and downstream interactions (effects of forest conversion and selective logging, effects on flow regimes), sustainable production and shifting cultivation; (2) Reforestation of degraded lands and problem soils and improving sustainability of plantation forestry; and (3) Conservation of ecosystems and maintenance of biodiversity - forest management, social forestry and urban forestry, recreational parks and wildlife reserves, non-timber forest products, wood preservation and downstream processing, and strategies for conserving biodiversity.

Keywords Asia; environmental conservation; FORSPA; natural forest; plantation; reforestation; report; sustainable development/ management; tourism/ recreation

Database CABI

D2

Author Aiken, S.R. and Leigh, C.H.

Title Vanishing rain forests: the ecological transition in Malaysia.

Source *Oxford Monographs on Biogeography No. 5* 194 pp. (31 pp. of ref., IBSN 0-19-854242-9) Clarendon Press, Oxford, UK.

Year 1992

Language English

Abstract An introductory chapter outlines and documents four topics: tropical rain forest; resource utilization; human impact; and conservation and sustainable development. These topics provide a context for the case study of Malaysia in the four main chapters: The rain forests of Malaysia (including their regional setting, formations and variations, forest fauna, and the forest system); Resource utilization and forest conversion: processes and policies (discussing the Peninsula and Borneo territories in the colonial period, and forest exploitation in the Malaysian period, including shifting cultivation); The human impact (on the environment, fauna and flora, and humans); Conservation: towards a sustainable future (measures taken to conserve and manage natural resources are described with particular reference to legislation, parks and reserves, NGOs and their activities, land-use disputes, and recent conservation strategies; kinds of 'transitions' that will be required to move towards sustainable development are surveyed). Author and subject indexes are given.

Keywords Asia; book; environmental conservation; external organisational arrangements; forestry; natural forest; policy; sustainable development/ management

Database CABI

D3

Author Aluma, J., Drennon, C., Kigula, J., Lawry, S.W., Muwanga-Zake, E.S.K. and Were, J.

Title Settlement in forest reserves, game reserves and national parks in Uganda: a study of social, economic, and tenure factors affecting land use and deforestation in Mabira Forest Reserve, Kibale Forest Reserve, and Kibale Game Reserve/Corridor

Source *Research Paper Land Tenure Center, University of Wisconsin Madison (USA).1989, no. 98*, 76 pp. (figs, tables, 15 ref. ISSN 0084-0815), Forestry Department, Makerere Univ., Kampala, Uganda.
Year 1989
Language English
Abstract Agricultural encroachment and human settlement in forest and wildlife reserves are increasingly occurring in several African countries. In this paper social, economic and tenurial causes of these trends in Uganda are examined to provide a basis for policies which reconcile the need for land for smallholder agricultural development on the one hand, and the need for forest and wildlife protection on the other. Field research was carried out in Mabira Forest Reserve (Mukono District), Kibale Forest Reserve and Game Reserve/Corridor (Kabarole District) and Queen Elizabeth National Park (Kasesse and Kabarole Districts) in 1988. The research identified landlessness and the uneven distribution of population in relation to suitable agricultural land as major factors causing encroachment in the reserve areas. Based on an assessment of resettlement schemes it is concluded that eviction of settlers will not alone insure that reserve areas are protected over the long term. More basic problems of landlessness and land tenure should also be addressed. Recommendations for addressing the problems of the areas studied are made.
Keywords Africa; environmental conservation; external organisational arrangements; farming systems; forest margins; paper; socioeconomic issues; sustainable development/ management
Database TROPAG

D4
Author Amacher, G.S., Hyde, W.F. and Joshee, B.R.
Title Joint production and consumption in traditional households: fuelwood and crop residues in two districts in Nepal.
Source *Journal of Development Studies* **30**(1): 206-225 (4 tab., 1 app., 14 ref.).
Year 1993
Language English
Abstract Forest conversion by agricultural households is the leading cause of deforestation. Little is known about agricultural household use of forest and tree products. This paper examines household production of and demand for fuelwood and fuel substitutes in two districts of Nepal. Women play a larger role in collection in the district dependent on production from common forest lands while men and agricultural capital are more important inputs in the district dependant on production from private lands. Demand elasticities for fuelwood, combustible agricultural residues and improved stoves are also measured, each by household income group. All price and income demand elasticities are less than one. Residues are more important substitutes for low income households and improved stoves are more important substitutes for high income households. Consumption evidence shows that both fuelwood and combustible crop residues tend to be inferior goods. There are favourable implications for Nepal's environment as household incomes grow, with more households converting from residues to fuelwood, eventually growing their own fuelwood. Meanwhile, non-agricultural households will convert to substitute fuels and fuel technologies. This suggests that forestry development activities will be most important for Nepal now, in the period before development proceeds far, and before traditional demands on the forest environment change.
Keywords Asia; deforestation; economics; fuel wood; gender issues; journal article; natural forest; trees on farms
Database CABI

D5
Author Aumeeruddy, Y. and Sansonnens, B.
Title Shifting from simple to complex agroforestry systems: an example for buffer zone management from Kerinci (Sumatra, Indonesia).
Source *Agroforestry Systems* **28**(2): 113-141 (35 ref.).
Year 1994-1995

Language English
Abstract Kerinci is a densely populated valley surrounded by a national park in western central Sumatra. Land use patterns, socioeconomic characteristics, and land tenure in the valley are discussed. Indigenous agroforestry systems include important cash crops like coffee (*Coffea canephora var. robusta*) and cinnamon (*Cinnamomum burmanii*), and range from alternate cycles of cash crop monocultures or simple associations, to multi-species and multi-storey gardens; these may include as many as 100 common useful species, comprising many fruit trees and indigenous timber species. After analysing trends and causes in forest conversion in the area of Kerinci Seblat National Park, a case study of one particular village (Jujun) is presented in order to describe the evolution of cyclic agroforestry systems (ladang - cinnamon gardens with a long monocrop phase, or simple cinnamon and coffee associations) into complex agroforestry systems (pelak - mixed tree gardens). The other main land use in the village was irrigated paddy fields (sawah). The composition, structure and management of the agroforestry systems were studied through interviews, botanical surveys and the method of profile diagrams. It is suggested that locally developed complex agroforestry systems evolve partly in response to changes in land availability and labour constraints. Finally the interest of such systems when designing projected buffer zones and their development in relation to new market incentives are discussed.
Keywords agroforestry; Asia; case studies; crop production; farming systems; forest margins; journal article
Database CABI

D6
Author Bajracharya, D.
Title Deforestation in the food/fuel context: historical and political perspectives from Nepal.
Source *Mountain Research and Development* **3**(3): 227-240
Year 1983
Language English
Abstract The thesis of this paper is that the primary cause of deforestation in Nepal is the clearing of forests to increase land for agriculture and fodder, and not, as generally assumed, the need for fuelwood. To successfully counteract deforestation and the resulting ecological damage, it is necessary to consider the full range of needs of the rural people: food, fodder, building materials and fuel. This paper first examines the history of the government concerns in Nepal from the eighteenth century to 1950. At that time, the peasants were conditioned into a life of subsistence while deforestation enriched the elite, who ignored scientific farm and forestry management. The second part of the paper focuses on post-1950 government policies designed to conserve forest resources. It documents the influence of the global energy crisis on proposed solutions to Nepal's deforestation problem, especially in the area of international assistance. In 1957, the government attempted to alleviate deforestation by nationalising forests. Because this policy ignored the customs and needs of local rural people, it was not effective in meeting its objective. The 1976 Forest Plan recognises the need for local participation in forest conservation, but this concept has yet to be successfully implemented (from author's summary).
Keywords Asia; deforestation; environmental conservation; external organisational arrangements; historical perspective; institutional development; journal article; natural forest; policy; socioeconomic issues
Database NRI

D7
Author Barrow, E.G.C.
Title Value of traditional knowledge in present day soil conservation practice, the example of the Pokot and the Turkana. Example 2 The Turkana (for Example 1, the Pokot, see B8).
Source Paper presented to the *Third National Workshop on Soil and Water Conservation, Kenya, 1986.* Example 2 The Turkana. (With a little supporting additional data from Barrow, E.G.C. 1988. *Trees, people and the dry lands: the role of local knowledge*. Institutional

invited paper presented to the *Second Kenya National Seminar on Agroforestry, Nairobi, Kenya.*)

Year 1986

Language English

Abstract The Turkana, Turkana District Kenya, live in a semi-arid/arid environment. They herd camels, cattle and goats and also have sorghum gardens. In a good wet season, forage is plentiful and so there are no restrictions on stock movements and questions of resource ownership do not arise. However in the dry season and in dry years such issues become critical. It is this power over ownership of water and fodder that is central to the Turkana. Dry season grazing takes place in higher rainfall areas, and is particularly critical in the dry plains area. Here sublineage ownership of riverine woodland, containing important fodder tree species such as *Acacia tortilis*, is well defined. A herd owner's home range or dry season base is his *Ere*. Close kin have long associations with such areas and their ancestors are often buried there. There, they have ownership rights to resources which include fodder and fruit trees and a dry season well. Outsiders will not be allowed to use these resources without prior permission. Within the larger group *Ere* area, sub-group resources known as *Ekwar*, (meaning `trees by the side of the river'), include the right to exploit important individual trees or small stands of trees, as a `private' dry season fodder and browse reserve. Individuals have to have a strong network of close kin and supporters to keep *Ekwar* rights intact over time, and at times the elders have to adjudicate between rival claimants. There are individual user rights over certain important species : *A. tortilis* for fodder, *Hyphaena coriacea* for basketry, *Dobera glabra* for fodder and famine food, and also over *Cordia sinensis, Zizyphus mauritiana*, and *Faidherbia albida*). The Turkana have a well developed indigenous knowledge of their flora and its uses, with especially detailed knowledge of the browse potential for different stock, and in different seasons, of local tree species. Very few trees will be cut back completely - pollarding or lopping branches is the norm. Trees are used for construction, household utensils, fodder and medicine. Individual user rights are only recognised as long as the families concerned continue to exercise them effectively at harvest time, and rights lapse if they are not maintained. Originally, in the Turkana riverine sorghum plots, trees were not generally cut down, and only the bush and undergrowth was removed. Yet now in the areas surrounding the riverine irrigation schemes (which have trespassed on the Turkana *Ere*) all the rainfed crops are cleared of trees, in imitation of the irrigation scheme.

Keywords Africa; conflict resolution; farming systems; indigenous knowledge; internal regulations; savanna woodland; sustainable development/ management; workshop proceedings

Database ODI

D8

Author Bertrand, A.

Title Evolution de l'élevage et politique forestière en zone soudanienne. L'exemple de la 3e Région du Mali, [The development of herding and forest policy in the Sudanian zone. An example from the Third region of Mali].

Source Communication presentee au seminaire *`Relations Agriculture-Elevage', DSA-CIRAD, Montpellier, 10-13 September 1985.* In *Les Cahiers de la Recherche Développement, Nø 9-10, 1986* pp. 35-39.

Year 1986.

Language French

Abstract The author describes the Third area of Mali (Sikasso, Koutiala, Kadiolo) with `normal' yearly rainfall varying between 900 and 1300mm and recent deficits of 200 to 300mm/yr in a region which is climatically favoured. Here, livestock raising is practised by sedentary herders around villages, by nomadic herders and by urban dwellers. Cattle, sheep and goats are herded. Woody vegetation provides complementary fodder and it can be increased in volume by the reduction of herbaceous competition, i.e. by grazing, provided that rainfall is sufficient. However, groundwater deficits in upland areas where soils are thin have resulted in tree species like the *Butyrospermum parkii* and *Parkia biglobosa* being endangered and over large areas where these deficits are present natural regeneration has not taken place for years. Forest degradation has been caused by

livestock raising, bush fires, sedentary agriculture, shifting cultivation, wood harvesting (in areas near to urban centres) and drought conditions.

Keywords Africa; animal production; environmental degradation; fodder production; internal regulations; savanna woodland; seminar proceedings

Database ODI

D9

Author Bruijnzeel, L.A.

Title Hydrological impacts of tropical forest conversion.

Source *Nature and Resources* **27**(2): 36-46 (50 ref.).

Year 1991

Language English

Abstract This article is an attempt at reconciling apparently conflicting views of the role of trees and forests with regard to hydrology and soil fertility in the humid tropics. It tries to do so by describing effects of specific activities and types of conversion, each of which may be characterized by a particular level of disturbance, rather than by lumping them under such imprecise terms as 'deforestation'. It concludes that much of the hydrological damage caused by the conversion of tropical forest could be avoided through the use of better management and good land husbandry.

Keywords deforestation; forest margins; geographically non-specific; journal article; natural forest; soil fertility/ nutrient cycling; sustainable development/ management; water catchment

Database CABI

D10

Author Bruijnzeel, L.A. and Gladwell, J.S.

Title Land-use and hydrology in warm humid regions: where do we stand?

Source *Hydrology of warm humid regions: proceedings of an international symposium held at Yokohama, Japan, 13-15 July 1993*: 3-34. IAHS Publication No. 216. (190 ref., ISBN 0-947571-73-6) IAHS Press, Wallingford, UK.

Year 1993

Language English

Abstract The role of various land-use types with regard to hydrology, sedimentation and soil fertility in warm humid regions, particularly the humid tropics is reviewed. A distinction is made between disturbances of intermediate intensity (selective logging, forest fires and shifting cultivation) and those of high intensity such as forest conversion to agriculture or plantations. The effects of selective logging on soil and vegetation, catchment water yield, catchment response to rainfall, erosion and catchment sediment yield, and soil fertility are examined. The effects of forest conversion on micro- and mesoclimates (non-coastal lowlands, cloud forests), water yield, dry season flow, flooding (local effects, off-site effects), erosion and basin sediment yield (surface erosion, gully erosion, mass wasting), and soil fertility and the potential for sustained productivity are reviewed. Additional research areas were identified.

Keywords forestry; geographically non-specific; natural forest; soil fertility/ nutrient cycling; symposium proceedings; water catchment

Database CABI

D11

Author Burgess, J.C.

Title Economic analysis of the causes of tropical deforestation

Source *LEEC Paper London Environmental Economics Centre, Inter. Inst. for Environment and Development (UK). 1992, no. 3*, 21 pp. (figs, tables, 38 ref.) London Environmental Economics Centre, London, UK.

Year 1992

Language English

Abstract Following an elaboration on the extent and rate of global tropical deforestation the economic consequences of forest conversion are examined by means of a multivariate analysis. Although there is no strong statistical basis for making statements about the causes of tropical deforestation, a few broad observations can be made: (1) population

growth, agricultural and industrial timber production are positively linked to forest clearance; (2) improved agricultural yields and economic development may reduce the pressure on tropical forests; and (3) countries with relatively small forest stocks tend to run down at a rate higher than average. It is concluded that tropical deforestation must be regarded as both an environmental and an economic problem and focus should be put on sustainable forest use.

Keywords deforestation; economics; forest margins; geographically non-specific; natural forest; paper; sustainable development/ management

Database TROPAG

D12

Author Buschbacher, R.J.

Title Natural forest management in the humid tropics: ecological, social and economic considerations.

Source *Ambio* **19**(5): 253-258 (41 ref.).

Year 1990

Language English

Abstract Commercial logging is theoretically a relatively benign form of exploitation for tropical forests, but in actuality has not been practised on a sustainable basis. This article begins with a brief overview of natural forest management systems which have been used, showing that several have been sustainable from a silvicultural viewpoint. Descriptions are given of 4 such methods: the Malayan Uniform System, which was developed shortly after World War II; the Tropical Shelterwood System, as practised in Nigeria and Ghana in the 1940s; polycyclic felling systems, or selective logging with diameter limits, which are the 'standard' modern management prescription in tropical forests (e.g. the Modified Selection System in Ghana in the 1950s, the Selective Management System in Malaysia in the early 1970s, and the Indonesian Selective Cutting System); and the strip-clearcut system, a new method being practised in Peru. However, these types of methods have never been carried out on a large scale because of economic and social limitations. To overcome these obstacles will require improved economic analysis methods that recognize the long-term and external benefits of forest maintenance, elimination of incentives for forest conversion, redesign of concession agreements and royalty and tax systems to provide incentives for long-term management, and the involvement of local populations in forest management, both in terms of planning and receipt of benefits.

Keywords Africa; Asia; economics; external organisational arrangements; forestry; journal article; Latin America; natural forest; sustainable development/ management

Database CABI

D13

Author Castro, A.P. and Brokensha, D.

Title Institutions and foodsecurity: implications for forestry development.

Source Main paper presented February 1988, Bangalore for Expert Consultation on Forestry and Food Production/Security. FAO, Rome.

Year 1987

Language English

Abstract The subject of the paper is Mbeere, Kenya, a physically marginal area with uncertain rainfall and generally poor soils. It was initially savanna woodland. Until well into the colonial era, with a low population and an abundance of woodland, rights to woodland were not regulated. Even by 1970 probably 90% of Mbeere material culture came from woody vegetation, shrubs, lianes and grasses. In pre- and early colonial times some trees were recognised as individual property, especially building trees that had been individually planted like *Melia volkensii*. There was evidence of 'inadvertent conservation' for example sacred groves, the pollarding of trees and the careful propagation of desired species. But the degradation of the forest resource increased with rising population, and the introduction of improved communications, which led to production and curing of tobacco and facilitated the sale of charcoal to urban residents.

Keywords Africa; charcoal production; crop production; environmental degradation; historical perspective; internal regulations; paper; population pressure; savanna woodland

Database ODI

D14
Author Centre Technique Forestier Tropical
Title *Faidherbia albida*. (Del) A. Chev. (Synonyme: *Acacia albida*). Monographie.
Source CIRAD, pp. 29-36 & 50-61.
Year 1988.
Language French
Abstract The paper looks at the value of *Faidherbia albida* in East and West Africa, among sedentary cultivators and herders. This tree provides African populations with a range of uses. It is used as fuelwood, fodder and as windbreak. The seeds are edible, the bark is used for saddle making, the wood for hive and hut construction, and the ashes for soap making. Parts of the tree have medicinal value. This tree is also beneficial as a shade tree for livestock and can also increase soil fertility. *F. albida* is grown in a productive system in association with corn, millet and sorghum, and also as a shade tree for coffee plantations in Tanzania. In the Sudan, Fur cultivators' law system forbids cutting of the species. Also, Sultan Tanimoun in the 1860s in Niger decreed that anyone caught cutting a gao would be beheaded and that anyone found maiming the tree would have an arm cut. This law resulted in high densities of 100 to 120 trees/ha which led to the disappearance of swidden-fallows. Because such local laws are not in effect any more, degradation within these man-made forests has resulted due to excessive lopping and pruning, and ageing of the trees. Because of the absence of leaves during the rainy season and deep rooting, the presence of the trees does not affect agricultural output negatively. However, upkeep of the crops under *F. albida* becomes more important.
Keywords Africa; agroforestry; fallow systems; indigenous knowledge; internal regulations; paper; plantation; trees on farms
Database ODI

D15
Author Cox, J.A.
Title Remote sensing and land evaluation for planning elephant corridors in Sri Lanka.
Source *ITC Journal, International Institute for Aerial Survey and Earth Sciences. 1988, No. 2*: 172-177 (fig., 1 tab., 8 ref.).
Year 1988
Language English
Abstract Deforestation of the Yala National Park border zone in southeastern Sri Lanka is resulting in the degradation of wildlife habitat. Agricultural encroachment into these areas is severely limiting the ability of elephant herds to move between their traditional feeding grounds, and has increased the conflict between development and conservation interests. The creation of elephant corridors and buffer zones between the Yala and Uda Walawe National Parks, crossing the Pelwatte Sugar Estate, would ensure that the sub-populations are interconnected, would protect agriculture, and would decrease dispersal mortality and land degradation. The demarcation of two proposed elephant corridors was based on a reconnaissance scale evaluation of land resources in the study area, carried out according to FAO principles.
Keywords Asia; conflict resolution; deforestation; environmental degradation; journal article; natural forest; remote sensing
Database CABI

D16
Author DeBeer, J.H. and McDermott, M.J.
Title The economic value of non-timber forest products in Southeast Asia with emphasis on Indonesia, Malaysia and Thailand.
Source 175pp. IUCN, Amsterdam, Holland.
Year 1994
Language English
Abstract This report draws together information on non-timber products in Southeast Asia, assesses their current value to, and trends in national and rural household economies

and recommends future policy, management and research. For rural household communities non-timber products provide food security, traditional medicines, raw materials for building and household and other implements, and income and employment. At the national level they provide income and materials for direct consumption and use, employment and foreign exchange (export values are estimated). While market demand is increasing for many products, forest decline is eroding the resource base. To reverse this loss, and realise the potential of non-timber forest products, it is recommended that policy be reoriented to account for their value; active measures to conserve and restore the natural resource base are taken that build on traditional management systems; some products are cultivated; and harvesting, processing and marketing measures are improved. Rural communities need formalisation and enforcement of their traditional forest dweller rights and to be involved in control and management of the local forest and its non-timber forest product resources.

Keywords Asia; economics; external organisational arrangements; internal regulations; natural forest; non-timber products; policy; report; sustainable development/ management

Database NRI

D17

Author Garcia Oliva, F., Casar, I., Morales, P. and Maass, J.M.

Title Forest-to-pasture conversion influences on soil organic carbon dynamics in a tropical deciduous forest.

Source *Oecologia* **99**(3-4): 392-396 (37 ref.).

Year 1994

Language English

Abstract On a global basis, nearly 42% of tropical land area is classified as tropical deciduous forest (TDF). Currently, this ecosystem has very high deforestation rates, and its conversion to cattle pasture may result in losses of soil organic matter, decreases in soil fertility, and increases in CO2 flux to the atmosphere. The soil organic matter turnover rate in a TDF after pasture conversion was estimated in Mexico by determining natural abundance of 13C. Changes in these values would be induced by vegetation changes from the C3 (forest) to the C4 (pasture) photosynthetic pathway. The annual rate of loss of remnant forest-soil organic matter (fSOM) was 2.9 t/ha in 7-year-old pasture and decreased to 0.66 t/ha by year 11. For up to 3 years, net fSOM level increased in pastures; this increment can be attributed to decomposition of remnant forest roots. The sand-associated SOM fraction was the most and the silt-associated fraction the least depleted. TDF conversion to pasture results in extremely high rates of loss of remnant fSOM that are higher than any reported for any tropical forest.

Keywords deforestation; geographically non-specific; journal article; natural forest; soil fertility/ nutrient cycling

Database CABI

D18

Author Ghimire, K.

Title Forest or farm? The politics of poverty and land hunger in Nepal.

Source 213 pp. Oxford University Press,New Delhi, India.

Year 1992

Language English

Abstract This book is about the political economy of poverty and land hunger in Nepal. It suggests that the historically evolved unequal distribution of cultivated land across tenure classes, and in particular the existence of extremely small units of land held by a majority of the farmers - combined with declining yields and population growth - has produced a gradual process of landlessness. At the same time, the overwhelming rural economy, the seasonal nature of agricultural wage employment, and low wage rates have made attractive as well as self-perpetuating the desire to become a 'land-holding' peasant among the rural poor. One consequence of this is the high level of migration and spontaneous settlement in the forest areas in the Nepal Tarai, and conversion to agriculture. However state policies are protecting these forest areas in conflict with the susbsistence needs of the landless. The main argument which runs through the book is

that a poor country like Nepal could increase social benefits through promoting small-holder land settlements in regions most suitable for agriculture, instead of pursuing a policy of luxury for conservation which lets productive land lie idle while the hungry people of that area multiply (from author's summary).

Keywords Asia; book; environmental conservation; external organisational arrangements; policy; social organisation; socioeconomic issues

Database NRI

D19

Author Guijt, I., Hinchcliffe, F. and Melnyk, M.

Title The hidden harvest: the value of wild resources in agricultural systems.

Source Sustainable Agriculture Programme for the International Institute for Environment and Development (IIED), London.

Year 1995

Language English

Abstract The Hidden Harvest is a research project by the IIED, aiming to investigate, through local-level valuation, the importance of wild plant and animal resources in agricultural systems and to rural livelihoods. Conventional agriculture and forestry research have concentrated on major commodity crops, neglecting the importance of wild resources for livelihoods and the maintenance of genetic and biological diversity. This summary outlines the importance of wild resources for food security, agricultural systems throughout the world, economic, cultural and existence values, genetic resources and sustainable management. A comprehensive bibliography has already been published, a methodology for understanding the value of wild resources for local people has been designed using participatory rural appraisal with economic concepts and tools, and a series of case studies developed. Work to date has identified key areas where policy should be strengthened if the full value of wild resources is to be realised and their sustainable management encouraged. These include policies related to biodiversity conservation, food security, agricultural research and forestry management. New biological survey techniques are to be added, recognising the importance of ensuring ecological sustainability of wild resource use by rural peoples. The methodological approach used by The Hidden Harvest could also be useful to communities attempting to defend and manage the resources on which they depend in the face of external pressures.

Keywords economics; geographically non-specific; IIED; indigenous knowledge; natural forest; project methodology; report; sustainable development/ management; training/ extension/ technology transfer

Database NRI

D20

Author Hammer, T.

Title Reforestation and community development in the Sudan.

Source *Energy in Developing Countries Series* Discussion Paper D-73M, unpublished, Resources for the Future, Washington.

Year 1982

Language English

Abstract The paper describes the Kordofan region of Sudan, with 200-800mm rainfall annually. This was once an area of exceptionally high fertility, but soil fertility began to decrease 30-40 years ago. Important local tree species include: *Acacia senegal, A. tortilis, A. mellifera, A. tortilis, F. albida, A. seyal, Combretum cordofanum, Zizyphus spina-christi* and *Balanites aegyptiaca*. The population are sedentary farmers with animals. Originally, shifting cultivation was practised, with 3 plots on a rotational basis. A plot was cultivated for 3 to 6 years, with grazing of the fields after harvest by the cultivators animals or those of nomadic herders for fees. *A. senegal* naturally regenerated and was either left to grow alongside the agricultural crops or cleared until the field was left fallow (very occasionally seeds of *A. senegal* was sown). During the fallow the trees were tapped for gum. In the late 16th century a quasi-privatisation of land developed, in which farmers began to claim rights to plots after the cultivation period in order to secure income from the *A. senegal*.

Until the mid 1950s dead and fallen branches were used for fuel, and living trees were only cut for land clearance. Gum bearing *A. senegal* was never cut. However there has been a general decline in the land's capacity to support the local population since the middle of this century for a number of interrelated reasons desert encroachment from the north over-exploitation of the woodland savanna: overly intensive agriculture, overcutting of wood for fuel and overgrazing. The intensification of pressure of land was caused by increasing indigenous human and animal populations, and migration from the degraded area to the cultivable village land in the core of the Gum Belt. Pressure for land has also made sheikhs less willing to give village land to newcomers. They may be rented land but have no rights to the land or the trees that grow on it after the cultivation period. The tenants therefore have little incentive to try to maintain or improve soil fertility. Due to falling gum yield and increasing local demands for fuelwood live trees including *A. senegal* are beginning to be cut, although sheikhs try to punish those that do. Also there is now demand for cutting of trees for charcoal for markets up to 300km away.

Keywords Africa; environmental degradation; fallow systems; fuel wood; historical perspective; internal regulations; non-timber products; paper; population pressure; savanna woodland; sustainable development/ management; tenural change and evolution

Database ODI

D21

Author Hecht, S.B.

Title The sacred cow in the green hell: livestock and forest conversion in the Brazilian Amazon.

Source *Ecologist* **19**(6): 229-234 (22 ref.).

Year 1989

Language English

Abstract The article discusses the displacement of forests and cultivated lands by livestock in the Brazilian Amazon basin. Both the environment and forest people's livelihoods are devastated by pasture development, the reason behind most of the deforestation in the Amazon. Pasture-driven deforestation cannot be explained solely in terms of international commodity markets. Behind the devastation is a combination of local processes, regional policies and national economies in which cattle and their pastures have a flexibility unmatched by other more ecologically appropriate land uses, and an ability to serve a myriad of economic purposes. The article discusses the profitability derived from cattle and explains the logic of livestock for both large owners and peasants. It goes on to examine the ecological effects of pastures and possible means of controlling the processes of deforestation.

Keywords animal production; deforestation; economics; forest margins; journal article; Latin America; policy

Database CABI

D22

Author Hecht, S.B., Anderson, A.B. and May, P.H.

Title The subsidy from nature: shifting cultivation, successional palm forests, and rural development.

Source *Human Organisation* **47**(1): 25-35

Year 1988

Language English

Abstract This paper outlines the importance of the small-scale extractive sector to extremely impoverished households in rural areas of tropical Brazil. Extractive activities are important as inputs to household reproduction, and are critical as a source of cash income. In the case study we analyse, small-scale extraction was roughly equivalent to wage labour and to agriculture in its contribution to household income. We suggest that in rural development analysis, a significant source of both use and exchange values has been overlooked. This issue is of particular concern for three main reasons. First, the importance of small-scale extraction is more pronounced among the more impoverished. Second, extraction is a major source of cash for women, who are often denied access to alternative means of acquiring income to rural areas. Finally, current rural development

programs are actively undermining access to the resources and often imply their destruction. Through a detailed social and ecological analysis of the babassu palm / shifting cultivational system in Northeast Brazil, we show the interdependence of regional biological and human agricultural systems. Changes in social relations and technology can undermine the bases for the sustainability of the stable interactions between shifting cultivators and palms. (from author's summary).

Keywords economics; gender issues; journal article; Latin America; natural forest; socioeconomic issues; sustainable development/ management

Database NRI

D23

Author Korsgaard, S.

Title Guidelines for sustained yield management of mixed dipterocarp forests of South East Asia.

Source *Field Document No. 8* 78pp. (41 ref.), Food and Agriculture Organization of the United Nations, Bangkok, Thailand.

Year 1985

Language English

Abstract A report from the FAO Asia-Pacific Region trust fund project 'Special Study on Forest Management, Afforestation and Utilization of Forest Resources in the Developing Regions' (GCP/RAS/106/JPN), which includes financial contributions from Japan. After an introduction, there are 7 main parts: (1) The elements of forest management planning, discussed with respect to long- term planning for sustained yield from the 4 main forest categories (conversion forest, community forest, protection forest and production forest); (2) Growth and yield projections as a tool for analysing the effects of different management options - mainly an account of the use of a 'stand table projection simulation model' developed in cooperation with FAO in Sarawak; (3) Short term tactical and operational planning (surveys, road planning etc.); (4) Guidelines for forest operations (road and skid trail construction, logging etc.); (5) Silvicultural activities (silvicultural systems and improvement, sample plots etc.); (6) Technical supervision and training; and (7) Summary of recommendations.

Keywords Asia; book; FAO; forestry; natural forest; plantation; reforestation; sustainable development/ management; training/ extension/ technology transfer

Database CABI

D24

Author Krishnankutty, C.N.

Title Bamboo marketing in Kerala, India: a study for the Integrated Rural Bamboo Project

Source Natural Resources Institute, R2295(c), Chatham, UK.

Year 1995

Language Engliah

Abstract Most commercial bamboo in Kerala grows on home-gardens rather than in forests. This cultivated or rural bamboo supplies an established marketing system dominated by wholesale depots in Palakkad district. This system extends beyond the border of Kerala state (which constitutes only a small part of the trade) into Tamil Nadu, Karnataka and other states. Although less than forty years old, the amount of bamboo traded has been stable over the last ten years and the price has been rising steadily. Despite farmers' general ignorance of bamboo's market value and the added costs resulting from government permits, the farm-gate price and the percentage of the wholesale price received by farmers is reasonable, especially given the low level of inputs. The available evidence suggests that even though the demand from some sectors is declining, depletion of forest bamboo means there is increasing demand from other sectors. Nonetheless, farmers are disinclined to invest in bamboo, perhaps because of the lack of information on techniques and markets. Yet as economic reform threatens to remove subsidies that have made traditional cash crops more attractive in the past, investment in bamboo, while not offering a total solution, at least seems a worthwhile endeavour. Central to any such initiative are the depots. On the one hand, short-sightedness by some depots and agents is leading to the destruction of bamboo clumps. On the other

hand, depots and agents are the only existing source of information available to farmers and could play an important role in extension efforts to promote rural bamboo (from author's summary).

Keywords Asia; crop production; economics; report; sustainable development/ management; technical methods; training/ extension/ technology transfer; trees on farms

Database NRI

D25

Author Lal, R.

Title Conversion of tropical rainforest: agronomic potential and ecological consequences

Source *Advances in Agronomy (USA).* **39**: 173-264 (figs, photos, tables; biblio (p. 257-264) ISBN 0-12-000739-8), International Inst. of Tropical Agriculture (IITA), Ibadan, Nigeria.

Year 1986

Language English

Abstract Tropical rain forest (TRF) refers to the climax vegetation of the lowland humid tropics where there is either a short period of water deficit or none at all. The high stability of the TRF ecosystem is attributed to high diversity. Soils under TRF are extremely poor, characterized by low nutrient retention capacity (most of it is attributed to the humus content, which declines rapidly with cultivation), and low water-holding capacity. With limited nutrients available, the forest vegetation has developed special mechanisms to recycle the nutrients contained in leaf litter rapidly. Distribution of TRF, soils under TRF, microclimate in TRF, rates of deforestation, need for forest conversion, the ecological impact of deforestation in the case of conversion for pastures or plantation crops, the utilization of TRF, the control of Imperata and research needs, are discussed.

Keywords biodiversity; geographically non-specific; journal article; natural forest; soil fertility/ nutrient cycling

Database TROPAG

D26

Author Lal, R., Shearer, W. and Ghuman, B.S.

Title Sustainability of different agricultural production systems for a rainforest zone of southern Nigeria.

Source *Transactions 14th International Congress of Soil Science, Kyoto, Japan, August 1990, Volume VI*:186-191 (16 ref.).

Year 1990

Language English

Abstract Results of a sustainability study of agriculture in a tropical rainforest zone are presented. It is concluded that soils supporting a tropical rainforest ecosystem are low in inherent fertility. Furthermore, climatic conditions do not favour intensive cultivation for grain crop production. If the forest conversion is inevitable, appropriate farming systems for this ecological region are those based on perennial crops or forestry plantations, root crops or pastures. Nonetheless, the rainforest region has more potential for achieving sustainable agriculture than arid regions e.g. the West African Sahel.

Keywords Africa; conference proceedings; crop production; forest margins; sustainable development/ management; trees on farms

Database CABI

D27

Author Lugo, A., Brown, S., Herrera, R., Medina, E., Klinge, H., Jordan, C.F., Kartawinata, K., Vayda, A.P. and Dosso, H.

Title Section 1. The search for sustained production systems in the humid and subhumid tropics.

Source *Ecology in practice. Part I: Ecosystem management*: 23-201. (Eds. di Castri, F, Baker, FWG, Hadley, M), Tycooly International Publishing for United Nations Educational, Scientific and Cultural Organisation, Dublin, Eire.

Year 1984

Language English

Abstract Includes 9 papers of which 4 focus on tropical forestry: Lugo, A.; Brown, S. Research and training needs in the tropics: the need for re-evaluation. 57-70 [23 ref.] Herrera, R.; Medina, E.; Klinge, H.; Jordan, C.F.; Uhl, C. Nutrient retention mechanisms in tropical forests: the Amazon caatinga, San Carlos pilot project, Venezuela. 85-97 [49 ref., 1 pl.] Kartawinata, K.; Vayda, A.P. Forest conversion in East Kalimantan, Indonesia: the activities and impacts of timber companies, shifting cultivators, migrant pepper-farmers, and others. 98-126 [68 ref.] Dosso, H. Large-scale land development and conservation in the Tai forest region of the Ivory Coast. 127-143 [33 ref.].Africa; Asia; book; forest margins; forestry; Latin America; natural forest; sustainable
Keywords development/ management
Database CABI

D28
Author MacKinnon, K., Irving, A. and Bachruddin, M.A.
Title A last chance for Kutai National Park - local industry support for conservation.
Source *Oryx* **28**(3): 191-198 (21 ref.).
Year 1994
Language English
Abstract Kutai National Park in East Kalimantan, Indonesia, was originally established as a game reserve in 1936 and became a national park in 1982. The park's lowland forests have suffered from logging, agricultural encroachment and extensive fires during the prolonged dry season in 1982 and 1983. During the 1980s a new coal mine opened at Sangatta to exploit rich coal deposits along the northern boundary of the park. The new mine could have been the 'last straw' for Kutai. Instead, industrial development has provided a new and exciting opportunity to strengthen park protection and management.
Keywords Asia; environmental conservation; external organisational arrangements; journal article; natural forest; non-timber products
Database CABI

D29
Author Malingreau, J.P. and Tucker, C.J.
Title Large-scale deforestation in the southeastern Amazon basin of Brazil.
Source *Ambio* **17**(1): 49-55 (26 ref.).
Year 1988
Language English
Abstract Deforestation estimates are made from an analysis of polar-orbiting meteorological satellite data from the Advanced Very High Resolution Radiometer (AVHRR) carried on National Oceanic and Atmospheric Administration (NOAA) satellites. As part of an introduction, the use of AVHRR data is contrasted with that of data from other satellite sensors (Landsat MSS, SPOT and TM). All 5 AVHRR bands were used in a preliminary analysis of data available for 1981-82 and 1984-86, which gave a spatial resolution of 1 km. The first 2 AVHRR bands are similar to MSS bands 2 and 4 and TM bands 3 and 4; of the remaining 3 thermal bands, that in the 3.5-3.9 æm channel was found to be the best for detailed analysis of contrasting forest-covered and cleared areas. The best images of the year were used to derive estimates of deforested and disturbed areas in Acre, Rondonia and Mato Grosso. Field observations made by the senior author in 1986 in Rondonia corroborated conclusions made in other published studies that AVHRR data give a conservative estimate of deforestation in comparison with higher resolution Landsat MSS or TM data but are suitable for detecting large areas of deforestation. A substantial increase in forest conversion and deforestation occurred from 1984 to 1985. The 1985 data gave a total deforested area for the 3 regions of 89 000 km2 and a disturbed area (in which deforestation is actively occurring) of 265 000 km2. Data from 1986 also indicated continuing expansion of large-scale deforestation in many areas of the Amazon basin S. of the river; multiplicative increases were associated with the establishment of all-weather roads.
Keywords deforestation; journal article; Latin America; remote sensing
Database CABI

D30
Author May, P.H. and Reis, E.J.
Title The user structure in Brazil's tropical rain forest
Source *Kieler Arbeitspapiere Institut fur Weltwirtschaft, Universitat Kiel (Germany). 1993, no. 565*, 33 pp. (figs, tables, 19 ref.; summary (En) ISSN 0342-0787), Programme in Ecological Economics and Agrarian Policy, Universidade Federal Rural do Rio de Janeiro (UFRRJ), Rio de Janeiro, Brazil.
Year 1993
Language English
Abstract Quantitative evidence is presented on the relationship between forest conversion and the productivity of agropastoral activities in the Amazon region of Brazil. The processing of wood (timber, fuelwood and charcoal) is related to the agropastoral expansion in this region. Physical coefficients are established, defining intersectoral connections in the economy of Brazil. Subjects dealt with include (1) geographical characteristics of the original vegetation types of the region; (2) deforestation rates and areas affected; (3) the various reasons for deforestation, e.g. animal production, crop production; (4) descriptions of sectoral activities and land occupation patterns; (5) an analysis of the major determinants of productivity in agropastoral activities; and (6) a gross estimate of wood removal associated with agropastoral expansion, as compared with wood and fuel production figures. Agricultural occupation rates were significantly higher in the non-forested areas, a tendency which was reinforced by the difficulties of settlement in the dense tropical forest. Nevertheless, crop productivity was higher in the forest municipalities, at least during the period of initial settlement. This attraction was offset by the labour requirements of land clearing, and the far more difficult access to markets. Wood removal associated with agropastoral expansion is generally quite inefficient. From authors' summary.
Keywords animal production; crop production; deforestation; Latin America; natural forest; paper
Database TROPAG

D31
Author Medina, E.
Title Deforestation in the tropics: evaluation of experiences in the Amazon basin focusing on atmosphere-forest interactions.
Source *Ecosystem experiments* p. 23-43, SCOPE 45 (Eds. Mooney HA, Medina E, Schindler DW, Sculze ED, Walker BH; 47 ref., ISBN 0-471-92626-3) John Wiley & Sons Ltd., Chichester, UK.
Year 1991
Language English
Abstract A discussion of: why and how fast deforestation is taking place in the tropics; actual changes in nutrient balances of tropical forests induced by deforestation of different intensities; and recovery capacity of tropical forest ecosystems after disturbance. The consequences are explored of large-scale deforestation for global carbon balance, and the potential influence of secondary succession in reducing carbon emissions caused by different types of forest conversion. Examples drawn mainly from the Amazon basin are used to highlight processes considered to be essential for the future design of ecosystem experiments.deforestation; journal article; Latin America; research requirements; soil fertility/ nutrient
Keywords cycling
Database CABI

D32
Author Metz, J.J.
Title A reassessment of the causes and severity of Nepal's environmental crisis.
Source *World Development Oxford* **19**(7): 805-820 (BLDSC, 100 ref.).
Year 1991
Language English
Abstract Accounts of the 1988 monsoon flooding of Bangladesh tend to blame recent population growth of Himalayan farmers for the deforestation which causes upland erosion and

lowland flooding. The focus of this article is the Nepal Himalayas because many of the rivers flooding the lowlands rise in Nepal, because previous writers have blamed Nepalese mountain farmers for lowland flooding, and because Nepalese deforestation initially appears to be solely the result of subsistence activities. First, the reputed causes of deforestation, i.e. the activities of a rapidly expanding population of subsistence farmers, are critically examined. This analysis requires an examination of: historical and recent changes in forest cover; the role of government policies in forest conversion and degradation; the role of subsistence farmers in deforestation and their responses to forest depletion; and the patterns and causes of population growth. The second part considers the effects of deforestation on rates of erosion, flooding, sedimentation, and desertification. The paper concludes with seven summary statements which argue that, during the past 250 years, both government and subsistence farmers have caused deforestation, that recent deforestation has had a relatively small but as yet unspecified impact on erosion, flooding and sedimentation, and that reforestation schemes are unlikely to solve the environmental problems of the Himalayas, although they will help mountain farmers.

Keywords Asia; deforestation; environmental degradation; external organisational arrangements; historical perspective; journal article; water catchment

Database CABI

D33

Author Moench, M.H.

Title Politics of deforestation: case study of Cardamom Hills of Kerala.

Source *Economic and Political Weekly.* **26**(4): 47-60, (29 ref.).

Year 1991

Language English

Abstract Current settlement patterns and the ethnic composition of the High Ranges have their roots in the political relations between communities in adjoining areas. The causes of deforestation in the Cardamom Hills in the Idukki District of Kerala, India, can only be understood in the context of the relationship between ethnic and religious communities which greatly influenced migration, forest encroachment and conflict over the control of land. The history of settlement and land control in Idukki is outlined, focusing on the patterns of settlement and the factors underlying migration at different times and by different groups. Attention is given to the ongoing debate over land control conducted within and between states and communities. This debate has been conducted on many levels, political, legislative and via direct action, and has been a major force shaping social relations in the High Ranges. A brief historical overview is presented first. Subsequent sections focus on the periods 1750- 1860, 1860-1940 and 1940-64. Developments during each of these periods had separable and distinct influences on social relations and land-use patterns. The final section summarizes the influence of the communal and political history and land-use changes in the study area.

Keywords Asia; deforestation; external organisational arrangements; forest margins; historical perspective; internal regulations; journal article; natural forest; social organisation

Database CABI

D34

Author Myers, N.

Title The primary source: tropical forests and our future.

Source 399pp. (ISBN 0-393-01795-8) WW Norton & Co., New York, USA.

Year 1984

Language English

Abstract This book reviews the importance and vulnerability of the world's tropical forests. A tropical forest is defined in the book by its differences to other forests, and their ecology is reviewed, highlighting their richness and complexity. The impacts of modern man are discussed including the impacts of commercial loggers, fuelwood gatherers, cattle and forest farmers. The foods, pharmaceuticals, other non-timber products and energy resources in tropical forests are described as well as the importance of forests for

environmental conservation and climate regulation. The book concludes with opportunities to help conserve tropical forests.
Keywords book; deforestation; environmental conservation; geographically non-specific; sustainable development/ management
Database NRI

D35
Author Nelson, R., Horning, N. and Stone, T.A.
Title Determining the rate of forest conversion in Mato Grosso, Brazil, using Landsat MSS and AVHRR data.
Source *International Journal of Remote Sensing* **8**(12): 1767-1784 (55 ref.).
Year 1987
Language English
Abstract State-wide estimates of clearing indicate that between 1981 and 1984 some 353 966ñ77 000 ha (0.4% of state area) were converted each year.
Keywords deforestation; journal article; Latin America; remote sensing
Database CABI

D36
Author Ostberg, W.
Title We eat trees: Tree planting and land rehabilitation in West Pokot District, Kenya: A baseline study
Source *Working Paper no. 82* Swedish University of Agricultural Science, International Rural Development Centre, Uppsala.
Year 1988
Language English
Abstract Study data on West Pokot (rainfall 875mm) is used here. The people are agriculturalists who depend on livestock for security against drought. Sorghum and finger millet are the original crops with maize, pulses and beans become rapidly more important. Wild plants are picked during the rainy season as vegetables. There is clan management of grazing and farming land. Both men and women emphasise the need for fodder species. Thatching grass is in shorter supply than firewood. Men have greater knowledge about trees useful for fencing, because they are responsible for animals. Tools and weapons are made from trees. Fields are dug by hoe and fallowed for four years after 3-5 years of cultivation. Trees are maintained in the fields for dry-season fodder and are not lopped by neighbours. Fodder trees are also saved close to the house to provide fodder for sick animals kept at home when the rest are elsewhere. *Balanites aegyptiaca* is considered to be the most useful. It produces fruits in the dry season and its leaves are used as vegetable relish. It can tolerate moderate lopping. There are two types of fields: thorn fenced shamba with heavily lopped trees inside, and shamba with a living fence and moderately lopped trees. (These suggest regularly fallowed, and permanently cultivated fields respectively. Ed.) *Ficus natalensis* (simwoto) is considered sacred, its longevity and huge size encouraging people to see it as a symbol of the lineage. Thus the blessing: `have branches and leaves like the simwoto tree'. *Ficus sycamorus* is also valued and protected. A rising population and the shift towards agriculture, are weakening the indigenous clan system and its authority, both increasing risk, and also strengthening the importance of the individual household.
Keywords agroforestry; farming systems; internal regulations; savanna woodland; social organisation; working paper
Database ODI

D37
Author Pearce, D.W., Barbier, E.B. and Markandya, A.
Title Sustainable management of Amazonia.
Source *Sustainable development: economics and environment in the Third World.* p.190-209 (ISBN 1-85278-167-X), Edward Elgar Publishing Ltd., Aldershot, Hampshire, UK.
Year 1990
Language English

Abstract A new economic strategy that takes into account the total value of the Amazonian ecosystem is called for. Following a brief overview of: deforestation in Amazonia; the economic contribution of Amazonia; proximate and underlying causes of Amazonian deforestation; and the economic costs of deforestation, policies for sustainable development in Amazonia are described. These include: (1) set aside areas of forest land that appear to have high protection or conservation value; and (2) the allocation of remaining land to its best economic use, such as timber production; large scale mineral, hydroelectric and agricultural development; smallholder agriculture, including shifting cultivation; and ranching. Here immediate priorities are required: a land classification system that would distinguish forests of high production value from areas more suitably converted; the subsidies and other economic incentives that are encouraging inefficient and unsustainable forest conversion to ranching, large scale development projects and commercial cropping should be ended; and distortions in land registration, titling and purchases, as well as income and tax breaks that encourage land speculation in Amazonia (which particularly work against smallholders) should be halted.
Keywords book; deforestation; economics; external organisational arrangements; Latin America; natural forest; sustainable development/ management
Database CABI

D38
Author Peters, C.M., Gentry, A.H. and Mendelsohn, R.O.
Title Valuation of an Amazonian rainforest.
Source *Nature London* **339**(6227): 655-656 (9 ref.).
Year 1989
Language English
Abstract Data concerning inventory, production and current market value for all commercial tree species occurring on 1 ha of species-rich forest in Peru are presented to support the contention that exploitation of non-wood resources and sustainable forest use are financially more beneficial than forest conversion and conserve the forests.
Keywords economics; journal article; Latin America; natural forest; non-timber products; sustainable development/ management
Database CABI

D39
Author Pinedo Vasquez, M., Zarin, D. and Jipp, P.
Title Economic returns from forest conversion in the Peruvian Amazon.
Source *Ecological Economics* **6**(2): 163-173 (16 ref.).
Year 1992
Language English
Abstract Rural people in the Peruvian Amazon both extract the products of intact tropical forest and convert forested land to swidden agriculture. Since the 1950s agriculture has exceeded forest production extraction in economic importance in the region. Little incentive exists for rural populations to pursue land-use strategies with immediate returns lower than those available from swidden agriculture. Land remains relatively abundant in the region, land and resource tenure are rarely secure, and markets for non-timber forest products are less than dependable. The economics of timber extraction, swidden agriculture, and the harvesting of fruits and latexes from intact forest are examined and compared within a single village near the city of Iquitos. The analysis indicates that rural populations in the region can be expected to continue converting forested land to swidden agriculture unless alternative land uses become more attractive economically.
Keywords economics; external organisational arrangements; fallow systems; journal article; Latin America; natural forest
Database CABI

D40
Author Poore, D. (ed.)
Title The vanishing forest. The human consequences of deforestation.

Source 89pp. (OAE, 73 ref., ISBN 0-86232-631-1 (hardback)\0-86232-632-X (paperback)). Zed Books Ltd, London, UK. Independent Commission on International Humanitarian Issues.
Year 1986
Language English
Abstract The report highlights the human consequences of the rapid destruction of the world's tropical forests. It maintains that, while loggers and ranchers, road and dam builders are destroying this precious natural resource for short-term gains, the world is losing what could be its long-term economic base. Deforestation threatens irreversible climatic changes and loss of the gene pools required for future agricultural and medical progress. In addition to the long-term consequences affecting all humanity, the disappearance of tropical forests is at present causing great suffering and deprivation to large tribal populations living in and around these forests. The report focuses on the suffering endured by people immediately dependent on dwindling forest land and how this process is affecting their health and livelihood. It stresses the urgent need for policy changes that will make forest conversion a vehicle of sustainable development and enable human civilization in the tropics to continue.
Keywords book; deforestation; environmental degradation; geographically non-specific; natural forest; sustainable development/ management
Database CABI

D41
Author Raghubanshi, A.S., Jha, C.S., Pandey, C.B., Singh, L. and Singh, J.S.
Title Effect of forest conversion on vegetation and soil carbon and functional trait of resulting vegetation.
Source *Impact of global climatic changes on photosynthesis and plant productivity. Proceedings of the Indo-US Workshop held on 8-12 January 1991 at New Delhi, India*: 723-749 (Eds. Abrot, YP, Govindjee, Wattal, PN, Ort, DR, Gnanam, A, Teramura, AH.; 33 ref., ISBN 81-204-0614-1) New Delhi, Oxford and IBH Publishing Co. Pvt., India.
Year 1991
Language English
Abstract The effects of forest conversion (degradation) on carbon storage in dry tropical regions were studied in Sonbhadra district, Uttar Pradesh (India). Major vegetation types and land uses were identified using IRS 1A LISS I data. Changes in the forest cover from 1982 to 1989 were examined using LANDSAT 4 MSS images. The storage and flux of carbon were measured. Forest basal area was linearly related to carbon stored in vegetation, soil and the total ecosystem. Total vegetation carbon in the vegetated area (760 385 ha) was estimated as 14.03 Tg in forest, 3.03 Tg in savanna and 0.66 Tg in cropland. Amounts of carbon stored in soil to a depth of 30 cm were estimated as 6.57, 5.30 and 11.71 Tg in forest, savanna and cropland, respectively. The forest conversion between 1982 and 1989 resulted in a net release of 6.62 Tg vegetation carbon and 1.11 Tg soil carbon. The resultant vegetation had an increased flux relative to carbon storage. It was more tightly coupled to the rainfall variability and was expected to respond quickly to climate change.
Keywords Asia; deforestation; remote sensing; soil fertility/ nutrient cycling; workshop proceedings
Database CABI

D42
Author Repetto, R.
Title Creating incentives for sustainable forest development
Source *Ambio (Sweden)* **16**(2-3): 94-99 (colour photos, fig, tables, 14 ref. ISSN 0044-7447), Coast, Phillippines, World Resources Inst., Washington, D.C., USA.
Year 1987
Language English
Abstract Much deforestation stems from government policies towards forest exploitation and competing land uses. Investment incentives, tax and credit subsidies, farm pricing policies, and the terms of logging consessions in public forests often intensify forest exploitation. On the basis of case studies of Malaysia, Ghana, Indonesia, the Philippines, Ivory Coast and Brazil, an analysis is made of forest sector policies. Attention is paid to

the race of private contractors for timber consessions and to the structure of forest revenue systems; especially the system of highgrading of rain forest is elucidated. The main mechanism of incentives for wood processing industries is explained and the negative policies outside the forest sector are outlined. A case study is given of incentives for forest conversion in Brazil and its negative aspects are explained. In order to stop environmental losses and negative economic development, rational policies towards forest exploitation have to be designed.

Keywords Africa; Asia; case studies; economics; forestry; institutional development; journal article; Latin America; natural forest; policy

Database TROPAG

D43

Author Repetto, R.

Title Incentives for sustainable forest management.

Source *The earth in transition: patterns and processes of biotic impoverishment. Based on contributions to a conference held at Woods Hole Research Centre, Massachusetts, October 1986*: 239-255 (Ed. Woodwell, GM., 11 ref. ISBN0-521-39137-7 (hardback)\0-521-39818-5 (paperback), Cambridge University Press, Cambridge, UK.

Year 1990

Language English

Abstract Rapid deforestation is related to rapid population growth, landholding patterns and policies, slow growth of employment, and government policies (on forest exploitation and competing land uses, investment incentives, tax and credit subsidies, farm pricing, and logging concessions). Particular attention is given to the role of forest-sector policies (such as rent-seeking in timber concessions, structure of forest revenue systems and incentives for wood-processing industries), and policies outside the forest sector which encourage forest conversion to other uses.

Keywords conference proceedings; deforestation; external organisational arrangements; geographically non-specific; policy; population pressure; sustainable development/ management

Database CABI

D44

Author Rollins, K. and Bishop, R.C.

Title Net social costs of preserving biological diversity.

Source *Working Paper Department of Agricultural Economics and Business, University of Guelph. 1992, No. WP92-03*, 30pp. (31 ref.).

Year 1992

Language English

Abstract The decision framework in which to choose from among economic alternatives when they include preservation is not well developed. As an alternative to cost-benefit analysis, a safe minimum standard (SMS) policy goal may be used. The publication first discusses the practical application of a SMS policy in general, then discusses case studies from the Talamance region of Costa Rica. It considers the relationship of various levels of economic decision-making to social policy goals, the performance of cost-benefit vis-a-vis SMS criteria when economic choices may cause losses of biological resources, and the estimation of net social costs of conservation of maintaining a SMS policy. In Costa Rica, with its growing population and staggering debt and conflict over land use, decision makers must specifically address the social costs of maintaining its system of protected areas to preserve biological resources. Social costs of conservation are discussed in the context of two specific case studies in Talamanca where future economic development is dominated by: (1) the extreme poverty of the people of Talamanca; (2) an accelerating rate of forest conversion and resource degradation; and (3) policy level decisions to establish and maintain protected areas over 93% of Talamanca's area.

Keywords biodiversity; case studies; economics; environmental conservation; Latin America; policy; socioeconomic issues; working paper

Database CABI

D45

Author Ross, M.S.

Title A method for selecting agricultural land from production and conversion forests in Indonesia.

Source *CFI Occasional Papers, Commonwealth Forestry Institute, University of Oxford. 1983, No. 22,* 72pp. (9 tab., OF; 72 ref.).

Year 1983

Language English

Abstract In the Indonesian Fourth 5-Year Development Plan, Repelita IV, at least 12 Mha of production and conversion forests will be required to be converted to agricultural settlements for transmigrants. It would appear that the 12 Mha could easily be selected from the 30 Mha of conversion forest. This is not so, for government policy demands that the settlers are self sufficient in food. In general, sustained food cropping without environmental deterioration requires relatively flat ground. In practice, this means that planners are instructed in their TOR to include one out of 3.5 ha per family of land on slopes less than 8%. This is to be used for the production of dryland rainfed arable crops or, if suitable, wetland rice production. Unfortunately, the topography makes this requirement very difficult to satisfy. Thus transmigration planners sometimes have to look inside the production forest area for land satisfying the slope requirements. Because of sectoral interests, an objective and scientific method is required to select such land, taking into consideration both sustained forestry aspects and agricultural requirements. The paper suggests a method of classifying moist tropical forests according to their ability to yield industrial logs. Seven areas examined for their suitability for transmigration in 1982 are tested both for their suitability for forestry by the introduced method and by the FAO method for agriculture. The suitabilities are then compared according to the "methodology" and conclusions drawn as to the best use of the land. As all the areas have been put to transmigration, the results show that in some cases areas should have been left as forests and alternate areas tested for their suitability for agriculture.

Keywords Asia; crop production; external organisational arrangements; forest margins; forestry; natural forest; paper; sustainable development/ management

Database CABI

D46

Author Serrao, E.A.S., Uhl, C., Nepstad, D.C. and Baker, M.J.

Title Deforestation for pasture in the humid tropics: is it economically and environmentally sound in the long term?

Source *Grasslands for our world*: 832-838 (39 ref., ISBN 0-908654-47-2), SIR Publishing, Wellington, New Zealand.

Year 1993

Language English

Abstract Environmental and socioeconomic consequences of forest conversion (deforestation) for pasture- based cattle production in the humid tropics is discussed in relation to the extent and causes of deforestation for pasture, and the agrotechnical aspects of pasture development through deforestation. It has been shown in Latin America that by controlling interrelated environmental and technological factors causing pasture degradation that it is possible to obtain agrotechnically sustainable pastures. It was recommended that cattle ranching should be developed on already deforested land and that sustainable semi-intensive management practices should be adopted.

Keywords animal production; conference proceedings; deforestation; forest margins; geographically non-specific; natural forest; socioeconomic issues; sustainable development/ management

Database CABI

D47

Author Siebert, S.F.

Title Hillside farming, soil erosion, and forest conversion in two southeast Asian national parks.

Source *Mountain Research and Development* **10**(1): 64-72 (31 ref.).
Year 1990
Language English
Abstract Relationships between soil erosion on hillside farms and forest conversion to farmland in adjacent national parks were examined in the Bayhang watershed near Leyte Mountains National Park, Philippines, and the Sungai Ning watershed near Kerinci-Seblat National Park, Indonesia. A random sample of hillside farms revealed accelerated soil erosion in both watersheds, including splash and sheet erosion, and rill and gully formation. Erosion under line transects and on enclosed runoff plots revealed mean spoil losses of 422 t/ha during the first six months of cultivation on recently cleared farms in Bayhang and 3.8 t/ha during the cropping year on continuously cultivated farms in Sungai Ning. Analysis of eroded sediments and uneroded soil indicated erosion-induced reductions in soil productivity. Soil erosion and land degradation contributed to forest conversion in both national parks. The farmers' response to land degradation in Bayhang was to clear forest for new farms in Leyte Mountains National Park, while farmers in Kerinci replaced nutrient-demanding crops with cassava, and cleared forest for new farms in Kerinci-Seblat National Park. Potentially sustainable and appropriate soil conversion and economic development activities for use in the two watersheds are reviewed.
Keywords Asia; crop production; deforestation; environmental degradation; forest margins; journal article; natural forest
Database CABI

D48
Author Siebert, S.F.
Title The dilemma of a dwindling resource: rattan in Kerinci, Sumatra.
Source *Principes* **33**(2): 79-87 (4 ref.).
Year 1989
Language English
Abstract Deforestation and rattan exploitation are examined in the Kerinci region of west-central Sumatra. A discussion of forest conversion and rattan use is followed by a study of the cultivation and management of *Calamus pilosellus* as a means of economic development and forest conservation.
Keywords Asia; crop production; deforestation; economics; environmental conservation; natural forest
Database CABI

D49
Author Siebert, S.F. and Belsky, J.M.
Title Forest-product trade in a lowland Filipino village.
Source *Economic Botany* **39**(4): 522-523 (19 ref.).
Year 1985
Language English
Abstract A study during Feb. 1983-Feb. 1984 in a village on Leyte showed that over half the village households depend on 8 species of commercially valuable rattan and 8 species of timber as a primary source of livelihood. All village households collected forest products for supplementary and emergency income. The future of the rattan and timber trade on Leyte is seriously threatened by agricultural encroachment and intensive collecting pressures in the absence of forest management.
Keywords Asia; crop production; economics; journal article; natural forest; sustainable development/ management
Database CABI

D50
Author Smiet, A.C.
Title Forest ecology on Java: conversion and usage in a historical perspective.
Source *Agroforestry Systems* **18**(3): 225-244 (18 ref.).
Year 1992
Language English

Abstract A description and analysis is given of past forest use and management on Java in relation to increasing population pressure, with emphasis on the non-teak forests (i.e. the natural forests and non- teak plantations). The global scope of the discussion about conversion of tropical rain forest is new, but in some regions deforestation is an old problem. Environmental impacts of deforestation on Java were noted 150 years ago and measures to mitigate these impacts have been debated for at least 100 years. The Javanese forests have diminished gradually by conversion until the last century, when this process accelerated in line with population increase and in response to economic interests. Although many groups and individuals at the time called for a halt to forest conversion, and proposed measures to retain and restore forest cover, colonial forest policy was slow in recognizing other forest values besides timber production. Until 1927 forest policy actively pursued protection of hydrological resources by forest management and reforestation. Forest management for the protection of nature conservation values was not effective until 1967. Natural forests now cover only 7.6% of Java. Large areas of forest are degraded by past and ongoing use to fulfill local needs for forest products. Forest policy presently aims at finding a balance between on the one hand, production, conservation and hydrological protection functions of the forest, and on the other hand, the needs of the local population.

Keywords Asia; deforestation; economics; environmental conservation; historical perspective; natural forest; plantation; policy

Database CABI

D51

Author Stewart, T.

Title Land-use options to encourage forest conservation on a tribal reservation in the Philippines.

Source *Agroforestry Systems* **18**(3): 225-244 (18 ref.)

Year 1992

Language English

Abstract The Negrito (Ati) tribe of Nagpana, Iloilo, Philippines, has traditionally been dependent on shifting cultivation and on hunting and gathering of non-timber forest products for its livelihood. In recent decades the Ati have derived increasing income from wage labour for adjacent landowners and from permanent rice cultivation. The consequent clearing of residual forests has resulted in extensive soil degradation, reduced crop yields, and loss of both commercial and subsistence non-timber forest products. Various agroforestry systems which incorporate permanent tree crops into traditional systems have great potential to reverse these losses. This study analyses the economic sustainability of four different land-use options for the Ati: (1) continuation of the present agricultural and hunting- gathering practices (current use model); (2) clearing of forest for charcoal and permanent agriculture (forest conversion model); (3) charcoal plantations (of *Leucaena leucocephala*) with hunting-gathering (charcoal model); and (4) agricultural crops for 4 years, with limited planting of *L. leucocephala* followed by charcoal plantations (of *L. leucocephala*), with hunting-gathering throughout (crop/charcoal model). The last model approximates to traditional swidden agriculture. The net present value (NPV) of each system is assessed under various different assumptions (including changes in the discount rate, charcoal price and production, and risks of crop loss) and other considerations are also analysed (including the valuation of non-traded forest products, returns to the intact forest, benefits of forest conservation, and socioeconomic, political and environmental constraints to implementation). It is concluded that the charcoal model is superior.

Keywords agroforestry; Asia; charcoal production; environmental conservation; fallow systems; journal article; natural forest; non-timber products; socioeconomic issues; trees on farms

Database CABI

D52

Author Suliman, M. and Baranga, D.

Title Encroachment on forest habitats and agricultural productivity in Uganda.

Source *Alternative development strategies for Africa. Volume two: environment; women*: 107-109 (Ed. Suliman M., 1 tab., 10 ref. ISBN 1-870425-29-4(paperback)), Institute for African Alternatives, London, UK.
Year 1991
Language English
Abstract Agricultural encroachment and indiscriminate deforestation are common threats to environmental protection in East Africa. This chapter reviews the impact of such activity on agricultural and forest lands in Uganda. Crop raiding is known to result in lower agricultural output and the loss of natural and human resources in Africa. In Uganda, red-tailed monkeys are particularly known for their damage to banana plantations. By controlling the distance between forests and plantations, and by choosing the correct crops, it is believed that crop raiding and environmental degradation can be minimized.
Keywords Africa; chapter; crop production; deforestation; forest margins
Database CABI

D53
Author Sumantri, I., Machfudh, W.E. and Haryono,
Title Change in forest land use in the vicinity of Kampar River in Riau.
Source *Jurnal Penelitian Hasil Hutan* **4**(3): 10-16 (4 ref.).
Year 1987
Language Indonesian
Abstract Trends in forest land use changes in this area in Indonesia were analysed in relation to population pressure and land carrying capacity (based on the level of social welfare), for the period 1964-84. Land use was determined from 4 sets of data: aerial photographs from 1964; a 1974 forest map; a 1982 land use map; and a ground check done in 1984. Data on land use changes are tabulated for the periods 1964-74 and 1974-84, and demonstrate incursions of the population into both limited production forest and conversion forest in the sub-districts of Kampar Kiri and Sengingi. The analysis indicated the causes to be both population pressure and low income. [With English tables.]
Keywords Asia; deforestation; economics; journal article; land use patterns/ mapping; remote sensing
Database CABI

D54
Author Thomasius, H.
Title Dynamics of natural forest communities in the eastern Erzgebirge, their modification by environmental changes and their importance for rehabilitation measures.
Source *Archiv fur Naturschutz und Landschaftsforschung* **30**(3): 161-176 (15 ref.)
Year 1990
Language German
Abstract Details are given of the natural Abieto-Fagetum communities in the montane zone (500-700 m altitude) and the Piceetum communities in the lower zone (>100 m altitude) of the Erzgebirge (Ore Mts.) in Saxony, E. Germany. These forests are the result of centuries of autogenic successions (described), which were disrupted by large-scale forest conversion in the 19th century, and are now being affected by air pollution. The present influences on the environment will affect the rehabilitation of the pollution-damaged forests. Some practical forestry conclusions are drawn on the basis of the ecological information.
Keywords environmental conservation; Europe; forestry; historical perspective; journal article; natural forest
Database CABI

D55
Author van Orsdol, K.G.
Title Agricultural encroachment in Uganda's Kibale Forest.
Source *Oryx* **20**(2): 115-117 (4 ref.).
Year 1986
Language English

Abstract Results of a survey in June 1982 to Jan. 1983 show that 17% of this 56 km2 reserve had suffered from encroachment by agriculturalists between 1971 and 1982. Other problems during that period included poor management practices and poaching of endangered forest wildlife. Steps taken by the Government in 1983 had resulted in 60% of occupied forest plots being abandoned by early 1984. Other measures to protect the forest resource are outlined.
Keywords Africa; environmental conservation; environmental degradation; forest margins; journal article; natural forest
Database CABI

D56
Author World Commission on Environment and Development,
Title Our common future
Source 356 pp. Oxford University Press, UK.
Year 1987
Language English
Abstract The World Commission on Environment and Development, was set up as an independent body in 1983 by the United Nations. Its brief was to re-examine the critical environment and development problems on the planet and to formulate realistic proposals to solve them, and to ensure that human progress will be sustained through development without bankrupting the resources of future generations. The resulting book, Our Common Future, is divided into three parts: common concerns which describes the threatened future, the move towards sustainable development and the role of the international economy; common challenges involved with population and human resources, food security, species and ecosystems, energy, industry and the urban challenge; and common endeavours of managing the commons, peace security, development and the environment, and towards common action with proposals for institutional and legal change.
Keywords book; economics; environmental conservation; geographically non-specific; policy; population pressure; sustainable development/ management
Database NRI

D57
Author Wormald, T.J.
Title The management of the natural forests in the arid and semi-arid zones of East and Southern Africa.
Source A report for ODA.
Year 1984
Language English
Abstract There are two types of forest in this large area: the northern Somali-Maasai *Acacia-Commiphora* deciduous bushland, sparse except by rivers and with sparse grass cover; and the southern *Miombo (Brachystegia spp.)* with a vigorous grass layer. In both areas, large tracts of forest have been preserved by the presence of tsetse fly. Yields are low - perhaps 0.3cu.m./ha/yr. There is a natural cycle of degradation and renewal as a response to irregular rainfall. In the northern woodlands, animal herding is the chief economic activity, with some agriculture; in the southern woodlands, agriculture is the main activity of a more sedentary population, with some animal raising. Unfarmed land in both areas has been held in the past under communal lineage or clan arrangements, but has often been transformed into State land in the last 3-4 decades, with a resulting reduction in local interest in sustainable management: clearcut tenure being an absolute prerequisite for good local management. Trees are vital in both areas for browse, fuelwood, building materials, fibres and soil fertility, with honey and charcoal important for income generation. In addition, the *Acacia-Commiphora* woodlands are important for a variety of gums, exudates, relishes, dietary supplements and medicines. The woodlands have been maintained and kept open by human intervention over a long period. Grazing keeps the balance between annual and perennial grasses, and between grassland and bush, and is instrumental in reducing inopportune fires. Fire is also used as a management tool, particularly in the *miombo* areas, but harm can be caused in more

fragile situations. There is now much more noncyclical degradation to be seen, resulting from excessive clearing: for cultivation as population density rises; for mechanised agricultural schemes such as those of the Sudan; and as a result of large-scale population movements of refugees in North East Africa. Animal herds are also crowded into smaller graze and browse areas as a result of large-scale clearing for agriculture. The report contains an excellent bibliography.

Keywords Africa; environmental degradation; farming systems; report; savanna woodland; tenural change and evolution

Database ODI

D58

Author

Title Siberut: will the Tuddukat play again? Investigation report June 1990 to July 1991.

Source 55 pp., Indonesia, Assosiasi Masyarakat Siberut, SKEPHI, SOS Siberut.

Year 1991

Language English

Abstract Siberut is the largest island (448 000 ha) in the chain of four Mentawai Islands in the province of Sumatera Barat (West Sumatra), Indonesia, and is recognized as a National Biosphere Reserve by the UNESCO MAB Programme. However, certain areas of this tropical rain forest island are designated for permanent production and conversion forest, and uncontrolled logging and tourism, together with resettlement of the local people have occurred to the extent where the rain forest and flora and the traditional culture are endangered. This document describes the present status of the island, discussing the consequences of deforestation, land status, and proposed development plans (logging, palm oil plantations, transmigration, resettlement and tourism). It is suggested that the proposed plans and current activities be cancelled, suspended or reassessed as appropriate, and alternative ideas on sustainable development (agroforestry and non-timber forest products (NTFP), tourism, conservation and autonomous status) are presented. Reference materials are included in annexes.

Keywords Asia; deforestation; natural forest; report; socioeconomic issues; sustainable development/ management

Database CABI

D59

Author

Title Sustainable agriculture and the environment in the humid tropics.

Source 702pp. (tab., 22pp. of ref. ISBN 0-309-04749-8). National Academy Press; Washington. USA, National Research Council.

Year 1993

Language English

Abstract The increasingly adverse effects of human activities on the earth's land, water, atmospheric, and biotic resources have demonstrated that a new approach of sustainable management is required if global resources are to be conserved and remain productive. Nowhere is this need more urgent than in the world's humid tropics. This study represents the work of the Committee on Sustainable Agriculture and the Environment in the Humid Tropics and is presented in two parts. Within part one, the executive summary discusses the findings of the committee and presents key recommendations. Chapter 1 describes the humid tropics, the consequences of forest conversion and deforestation, environmental factors affecting agriculture, and the fostering of sustainable land use in the humid tropics. Chapter 2 discusses major land use options that local, regional, and national managers might choose in making decisions to achieve food production goals, maintain or increase local income levels, and protect the natural resource base. Chapter 3 discusses technical research needs and presents recommendations on land use options. Chapter 4 presents policy imperatives to promote sustainability. The Appendix to part one presents a discussion of emissions of greenhouse gases associated with land use change. To enhance understanding, the committee commissioned a series of country profiles to gather information on land use and forest conversion in different countries, to evaluate general causes and

consequences within specific contexts, to identify sustainable land use alternatives, and to compare policy implications. Seven country profiles are presented in part two. Agricultural practices and environmental issues are reviewed for Brazil, Cote d'Ivoire, Indonesia, Malaysia, Mexico, the Philippines, and Zaire.

Keywords Africa; Asia; book; deforestation; Latin America; socioeconomic issues; sustainable development/ management

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KEYWORDS INDEX

Category 1 - Geographical area

Category 2 - Institutional focus

Category 3 - Subject focus

Category 4 - Nature of the resource

Category 5 - Areas of management covered

Category 6 - Type of publication

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