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Land Use, Nature Conservation and the Stability of Rainforest Margins in Southeast Asia

With 87 Figures

Springer
Preface

Southeast Asia constitutes one of the world's most extended rainforest regions. It is characterized by a high degree of biodiversity and contains a large variety of endemic species. Moreover, these forests provide a number of important and singular ecosystem services, like erosion protection and provision of high quality water, which cannot be replaced by alternative ecosystems. However, various forms of encroachment, mostly those made by human interventions, seriously threaten the continuance of rainforests in this area.

There is ample evidence that the rainforest resources, apart from large scale commercial logging, are exposed to danger particularly from its margin areas. These areas, which are characterized by intensive man-nature interaction, have been identified as extremely fragile systems. The dynamic equilibrium that balances human needs and interventions on the one hand, and natural regeneration capacity on the other, is at stake. The decrease of rainforest resources is, to a substantial degree, connected with the destabilization of these systems. Accordingly, the search for measures and processes, which prevent destabilization and promote stability is regarded as imperative. This refers to both the human and the natural part of the forest margin ecosystem.

Applying the concept of stability to a system which, by its very nature, is in a permanent process of change, deserves some explanations. Stability, in this context, does not imply any standstill of conditions or processes. It rather denotes a state of resilience which is required to keep the basic functions of the system intact. This refers, on the one hand, to the persistence of human livelihood which, to some extent, depends on continuous interventions into the natural environment. On the other hand, it applies to the capacity of the natural ecosystem to cope with such interventions, i.e. to regenerate and to provide a basis for human livelihood in the long run. Hence it follows that stability of forest margin areas has to be seen in terms of space and time. With regard to the first, a stable margin area remains spatially unchanged, preventing adjacent ecosystems of the rainforest from further conversion and fragmentation. With regard to the latter, the stability concept implies that the natural ecosystems provide long-term resilience to balance anthropogenic as well as natural disturbances.

In view of the multitude of unanswered questions concerning the issue described, the promotion and sharing of discipline-specific expertise still seem to be indispensable. However, the investigation of factors supporting stability or cause destabilization ultimately requires a holistic approach which combines socio-economic, biological and technological views and knowledge. Moving towards such an integrated perspective is one of the major objectives of the long term German-Indonesian research program on the “Stability of Rainforest Margins” (STORMA), jointly conducted by the universities of Göttingen, Kassel, Bogor (IPB) and Palu (UNTAD) and funded by the German Research Association (DFG). This collaborative program started in 2000 and focuses on the margin area of the Lore Lindu National Park in Central Sulawesi.
This reader reflects recent research findings on “Land Use, Nature Conservation and Stability of Rainforest Margins in Southeast Asia”, discussed in an international Symposium held at Bogor from September 29 to October 3, 2002. This event, jointly organized by the four above-mentioned universities, was meant to represent STORMA’s state of the art and, at the same time, match it with relevant research in other parts of the world, with special emphasis on Southeast Asia. This includes the identification of gaps of knowledge which may lead to the definition of meaningful research issues in the future.

The reader starts with a discussion of the socio-economic dimension of forest margin destabilization (Chapter 1). Deforestation and degradation of forests raise legitimate environmental concerns and can create high social costs for current and future generations. If unchecked by policy and institutional arrangements among stakeholders, private benefits (be they driven by despair or greed) from use of forest resources will continue to trigger chain-saw or slash-and-burn action in the remaining tropical forest margins of our world. Policies have therefore a pivotal role to play in the sustainable use of natural resources. Pluralistic policy frameworks and suitable governance structures are preconditions for appropriate policy design and effective policy enforcement. Moreover, policy design requires an understanding of the determinants, actors, stakeholders, and processes of deforestation and forest degradation. On the other hand, local practices of sustainable forest use and resource management need to be analyzed and documented in order to guide supporting policy measures. This part of the book provides social science research in various disciplines (cultural geography, sociology, agricultural and institutional economics, and political science) that seeks to offer some insights useful for better understanding the problem as a precondition for the design of improved policies. Case studies are presented from forest margins in Indonesia, Thailand and Vietnam, and feature topics such as land tenure, migration, informal institutions of resource management, as well as socio-cultural patterns and economic models of land use. A paper synthesizing the current knowledge on the causes of deforestation at the global level and related policy options and a paper reviewing the developments and policies in Indonesia precede the micro-level analysis in the three Southeast-Asian countries.

The second chapter deals with aspects of biodiversity and conservation. Major questions in recent research related to these themes refer, among others, to strategies of land use which maintain a high degree of biodiversity, the response of plant and animal groups to land use changes, and the relationship between biodiversity and ecological functions. Answers to such questions could provide relevant input to the design of adequate conservation concepts. The discussion on this matter in the present reader begins with a survey of a holistic approach to study resource use patterns in an old forest landscape in Ethiopia. It is followed by an account of resource utilization in a protected area complex in India, showing that appropriate natural resource management is absolutely necessary for warranting the livelihood of the rural population. Complementary to these contributions, which particularly highlight the interplay between man and natural environment, the third article deals with the long-term impact of rainforest conversion by shifting cultivation on tree diversity, species composition and soil nutrients. It is based
on research in West Kalimantan. The other five contributions in this chapter concentrate on innovative biological findings in the context of the STORMA project in Central Sulawesi. These include the patterns of tree diversity in secondary forests, a study which has been accompanied by the establishment of the first herbarium in Sulawesi, as well as the diversity of butterflies that shows how an important biodiversity indicator taxon responds to increasing forest modification and land use. Two contributions are autoecological accounts, dealing with the ability of selected vertebrates to persist in disturbed habitats, i.e. the Dian’s tarsier (Tarsius dianae) and the Tonkean macaque (Macaca tonkeana). These two primate species have never before been thoroughly studied in their natural environment. Finally, a model on bird species loss through deforestation is presented. It shows that relatively minor changes in forest cover within protected areas may have important consequences for the regional and global biodiversity.

Chapter 3 gives a comprehensive view on the interrelated aspects of water and nutrient cycles, land use systems and the modelling of land use. The first part deals with particular effects of forest conversion and land use on water and nutrient fluxes. Research results indicate the specific role of the regional context and the outstanding impact of human intervention in terms of forest conversion and land use patterns. In this context, the first two contributions relate to the hydrological consequences of forest conversion at two different stages: (1) recent conversion, and (2) older land use development with concomitant conflicts on water tenure. The ensuing two papers concentrate on field experiments with annual crops, aiming at optimizing the use of soil nutrients. Three contributions on the impact of different forest use strategies on soil nutrients round off this section. Corresponding data refer to modern agroforestry systems (rubber plantations) and to the traditional forest gardens. A comparative analysis investigates nutrient cycles and biodiversity in a secondary forest and in a mature forest plantation.

The authors of the two concluding papers take a perspective that includes a number of socio-economic and environmental factors to explain land use changes in Southeast Asia. They demonstrate the feasibility of spatially explicit regression models as tools for explaining land use changes as well as for scenario analysis.

The reader closes with a postscript which highlights the experience of two years of research in an intercultural setting. This experience was considered to be worth sharing, as many schemes nowadays involved in research on global environmental issues tend to be not only interdisciplinary but also intercultural in composition. This raises the problem of minimizing potential frictions and, at the same time, maximizing the benefits emerging from the diversity of expertise, knowledge systems and methodological approaches. At this point it is appropriate to convey special thanks to the German Academic Exchange Service (DAAD) which, by its generous co-funding, has particularly facilitated the inclusion of the intercultural issue into the proceedings of the Symposium.

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