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**Linkages between poverty and sustainable
agricultural and rural development in the
uplands of Southeast Asia**

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Discussion papers in this series are intended to stimulate discussion among researchers, practitioners and policy makers. The papers mostly reflect work in progress. This paper has been reviewed by Clemens Breisinger (IFPRI) and Klas Sander (World Bank) whom we thank for their valuable and critical comments.

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Abstract

Most of the upland areas of Southeast Asia are characterized by insufficient infrastructure, low productivity in smallholder crop and animal production, mounting environmental problems such as soil and forest degradation and loss of biodiversity, increasing population pressure, and widespread poverty, particular in rural areas. While some upland areas in South East Asia have been experiencing considerable progress during the past twenty years, others have stagnated or even declined with respect to economic, social and environmental objectives of development. The purpose of the paper is to describe major trends regarding sustainable development in the upland areas of selected countries in South East Asia, and review explanatory approaches for the observed trends based on case studies from Cambodia, Laos, Thailand, Vietnam, and Indonesia. The conceptual framework for this paper builds on the critical triangle of sustainable rural development. Here, equity or poverty alleviation, economic growth, and the protection of the environment are the three major policy objectives. We further distinguish three explanatory approaches for land use change and agricultural and rural development. Apart from the market approach and the population approach, we suggest that future studies should focus more on governance issues as a major driving force of land use change. The governance approach appears particularly relevant for upland areas which are often politically and institutionally marginalized. The paper begins with a review of definitions of sustainability, and proceeds with a conceptual analysis of the two-way linkages between poverty and the environment, and poverty and economic growth in rural areas. This is followed by empirical findings from research on agriculture and forestry as the major land uses in upland areas of selected South East Asian countries. Based on the results of different case studies from Cambodia, Laos, Vietnam and Indonesia, we seek to contrast stories of relative success with those of failure. The paper concludes with implications for rural and agricultural development policies, and suggests future areas of research.

Linkages between poverty and sustainable agricultural and rural development in the uplands of Southeast Asia

Manfred Zeller, Tina Beuchelt, Isabel Fischer, Franz Heidhues

1. Introduction

Most of the upland areas of Southeast Asia are characterized by insufficient infrastructure, low productivity in smallholder crop and animal production, mounting environmental problems such as soil and forest degradation and loss of biodiversity, increasing population pressure, and widespread poverty, particular in rural areas. While some upland areas in Southeast Asia have been experiencing considerable progress during the past twenty years, others have stagnated or even declined with respect to economic, social and environmental objectives of development. The conceptual framework for this paper builds on the critical triangle of sustainable rural development. Here, poverty alleviation, economic growth, and the protection of the environment are the three major policy objectives. In the short-run and medium-run, there exist trade-offs and synergies between these three objectives. The purpose of the paper is to describe major trends regarding sustainable development in the upland areas of selected countries in South East Asia. The paper begins with a review of definitions of sustainability, and proceeds with a conceptual analysis of the two-way linkages between poverty and the environment, and poverty and economic growth in rural areas. Unfortunately, the current state of theory and knowledge regarding sustainability does not provide for a unified theoretical framework that is able to aggregate indicators regarding conflicting objectives into one single index of sustainability. We therefore use selected indicators of sustainability regarding the three development objectives, and review empirical findings on agriculture and forestry as the major land uses in upland areas of selected Southeast Asian countries, namely Cambodia, Lao PDR, Indonesia, Thailand, and Vietnam. Focusing on case studies linking poverty reduction, economic development and environmental protection, we seek to contrast stories of relative success with those of failure in order to identify priorities for policy design and future research. The paper concludes with policy implications for rural and agricultural development policies, and suggests future areas of pro-poor policy-relevant research.

2. Sustainability and the critical triangle of development

Sustainability is an often-used word in political discourse and in science. Given the objective of the paper on describing the trends of sustainable development in the uplands of South-East Asia, we first provide definitions of sustainability. We hereby seek to address the question whether there exists any operational definition of sustainability with which one could empirically measure whether actual agricultural and rural development – as observed for example in the uplands of Southeast Asia or elsewhere – has been sustainable or not, i.e. whether past and current development

does or does not compromise the ability of future generations to meet their own needs.

2.1 Definition of sustainable development

The concept of sustainable development became popular in the early seventies, but it was not before the 1980s that it received a firm place on the international agenda (Pezzey 1992). A milestone for the discussion of sustainable development was the report “Our Common Future” of the World Commission on Environment and Development, also known as the “Brundtland Report” (Pezzey 1992, Serageldin 1996), which dealt with environmental and global problems, sustainable development and the required change of policies to meet sustainability objectives.

According to the Brundtland Report (WCED 1987:43), “sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” This definition contains two key concepts; first, the concept of needs which also refers to the needs of the world’s poor and second, the concept of constraints imposed by the state of technology and social organization on the environmental carrying capacity (WCED 1987).

Perceiving the concept of sustainability more as an opportunity, Serageldin (1996:3) extends the Brundtland definition in the following way: “sustainability is to leave future generations as many opportunities as we ourselves had, if not more”.

There exist around 100 other definitions of sustainability concepts, each emphasizing different values, priorities and practices and sometimes they are even conflicting between each other (Pezzey 1992, Pretty 1998). “Sustainability has been applied to a vast array of situations, ranging from the conditions for success of a World Bank agricultural development project to the problem of creating conditions for the improvement of the situation of the whole human race” in the future (Pezzey 1992:9). Despite the many differences in the concept of sustainable development, Pezzey (1992) summarizes that almost all sustainability criteria are long term criteria and are based on common ethical principles such as intragenerational and/or intergenerational fairness or justice.

Yet, a problem of the “Brundtland” sustainability concept and other sustainability definitions is the question of how many of the existing resources should be used now, and how many should be left for future generations (McIntosh and Edwards-Jones 2000). Pearce et al. (1989, cited in McIntosh and Edwards-Jones 2000) made an attempt to solve this question by classifying all resources into three classes of capital: natural capital (including the planet itself, all minerals, all species, water, soil, and air), man-made capital (including all non-natural material items like roads, cars, and buildings), and human capital (referring to knowledge, experience, and culture). Serageldin (1996) adds a fourth class i.e. social capital. We note that a further distinction could be made between social and political capital (Rosyadi et al. 2005). Based on these classes, one can distinguish between weak, sensible and strong sustainability concepts. The difference between the concepts depends on whether substitution between the different types of capital assets is permitted or not (Hazell and Lutz 1998, Serageldin 1996).

The strong sustainability concept does not allow the substitution of different forms of capital. Thus, the stock of each form of capital needs to be sustained or increased, including the natural capital (Hazell and Lutz 1998). If the strong sustainability definition is applied, next to nothing of the agricultural, rural and

overall economic development in the past decades or even centuries on our globe can be termed to be sustainable.

In contrast, the weak sustainability concept allows the substitution of different forms of capital, while the total value of capital has to remain intact or even increase. Since the relative proportion of each of the classes of capital, which we leave for the next generation, is not of importance, this concept accepts the depletion of natural capital when other forms of capital are increased at the same time (McIntosh and Edwards-Jones 2000).

Somewhere in the middle of these two extreme but clearly defined concepts stands the concept of *sensible sustainability* which allows capital substitution to a certain degree. This concept acknowledges that critical levels of each type of capital exist beyond which substitutability may not be possible. The exact boundaries of these critical limits are not known or may be a question of political choice. Consequently, this demands to avoid resource depletion as much as possible, especially in regard to natural resources (Serageldin 1996).

The weak and the sensible sustainability concept compromise between environmental protection for the sake of economic development, accepting resource degradation or depletion under the condition that “compensatory investments are made in other forms of capital to sustain the stream of consumable income over time” (Hazell and Lutz 1998:10). Both concepts show shortcomings when a dynamic framework is applied, modelling developments over time. Man-made capital often depreciates over time, leading to a declining utility. It is unclear, if utility derived from natural capital also declines over time and if it does, it may not be at the same rate as man-made capital. Therefore, a direct comparison of man-made and natural capital may be invalid (McIntosh and Edwards-Jones 2000).

The concept of weak or sensible sustainability requires the valuation of the different types of capital items. While the valuation of man-made capital is relatively straight-forward, advances have been made in the valuation of natural capital (e.g. biodiversity, landscape beauty) during the past 20 years with methods such as contingent valuation and hedonic pricing. However, especially the valuation of human and social capital are areas that deserve further economic research. Therefore, the current state of knowledge does not allow for a complete valuation of all capital items so as to assess ex-post for example whether a certain area or country has developed sustainably or not. In other words, while the concept of weak sustainability is theoretically consistent, it has – to our knowledge – not yet been empirically applied.

2.2 Sustainability definitions related to agriculture

Given the shortcomings in the empirical operationalization of the term sustainability in the literature in general, it is not surprising to see that sustainability definitions with respect to agriculture and forestry remain rather general as well. They do not lend themselves to direct operational measurement approaches. Hazell and Lutz (1998:10) define an agricultural system to be sustainable “if the amount of income extracted for consumption each year can be sustained over time”. As a requirement, the value of the total capital stock, including the natural, human and man-made capital, shall not be depleted over time. Note here that Hazell and Lutz use the concept of weak sustainability. Transforming a rainforest to an area with solar-powered greenhouses for vegetable production may therefore be termed as sustainable agricultural development because income may be sustained or even increased over time. The definition of Hazell and Lutz is quite similar to the oldest concept of sustainability,

which is derived from the field of forestry in the 17th century in Germany where they urged that the amount of timber harvested should be limited to the annual re-growth that can be achieved in the long-run (Hasel 1985). Lefroy et al. (2000:138) emphasize that not only the output is important but that sustainable land management systems require “long-term preservation of the resource base to allow adequate food production in a manner that is socially acceptable, economically viable and environmentally sound”. This definition also remains general, is, for example, a little bit of erosion allowed? Especially looking at agricultural intensification, Srivastava et al. (1998) add that sustainable agriculture should include more rational use of nutrients and energy in all land use systems, greater nutrient recycling, better use of biological resources, increased use of indigenous knowledge, and more effective measures for soil and water conservation.

Heidhues and Pape (2007:6) add that “ecological aspects of sustainability in the long term can only be achieved if at the same time such use of natural resources is economical for the users and socially acceptable to all stakeholders involved. In other words, sustainability of land use requires the integration of three aspects of sustainability: ecological, economic and social sustainability.”

Our objective to measure whether a past development is sustainable or not is further put into question by Giampietro’s more holistic approach of sustainable agriculture (1997). The approach includes a wide range of perspectives from agronomic performance and economic return, to social and cultural effects to ecological impacts. As a farming system is facing certain boundary conditions, their characterization is necessary for any sustainability analysis. Socioeconomic constraints such as labour and land productivity and ecological constraints need to be considered as well as the available optimization strategies affecting farmer’s choices. The process of selecting and adopting feasible sustainable production technologies is constrained by context-dependent criteria such as the cultural identity, the socio-political organization, the institutional context, the macroeconomic framework, local availability of knowledge, and knowledge on ecological processes and microeconomic variables. In other words, whether a certain observed development can be termed sustainable or not does itself depend on the goals of society and the constraints it faces for fulfilling the needs of their current and their future generations. The characteristics of the natural resources and the demographic development vary widely from region to region and result in very different conditions for agricultural productivity. Thus, what a social group in one area considers as sustainable agriculture at a certain point of time may be considered unsustainable when viewed by another group and/or from a different space or time scale (Lefroy et al. 2000, Giampietro 1997).

On the basis of this review, we note that there exists a wide array of definitions of sustainability. The definitions generally suffer from a methodological gap in how to explicitly state the objectives of society and to operationalize the valuation of different types of capital in a dynamic framework. Sustainability definitions with respect to agriculture or forestry remain equally partial, and emphasize certain criteria of sustainability, mainly related to natural systems such as nutrient recycling or conservation of soils. Given the lack of a holistic theoretical and empirical framework on sustainability, we are also left with a partial choice of indicators of sustainability for describing case studies on rural development in the uplands of Southeast Asia. To further develop these criteria, a brief discussion of the critical triangle of sustainable development is being done next.

2.3 The critical triangle of sustainable development

In the context of soil degradation and deforestation in developing countries, Vosti and Reardon (1997) present the concept of a critical triangle between three development objectives: economic growth, poverty alleviation, and environmental sustainability. The critical triangle postulates that these three objectives are linked: “pursuing one without regard of the others is a path of failure in the long-run” (Vosti and Reardon 1997). The critical triangle constitutes a holistic, multidisciplinary framework that enables to conceptualize potential trade-offs as well as synergies between these three objectives. Vosti and Reardon (1997) state that in order to successfully address the challenges embedded in the critical triangle, households and communities ought to be put first, and that empirical research is required to better understand the trade-offs and synergies between the three objectives, as perceived and acted upon by farm households and their communities. Such empirical research would not only contribute to a better understanding of why rural households in forest margins behave the way they behave, but would also eventually identify policies, technologies as well as adapted institutional arrangements governing resource use that may have the potential to better meet the three objectives both from a private (the farm household’s view) and a social perspective (the view of the social planner) (Reardon and Vosti 1992). However, the households view has also disadvantages as policy design focusing on households could neglect societal priorities or environmental degradation in remote regions.

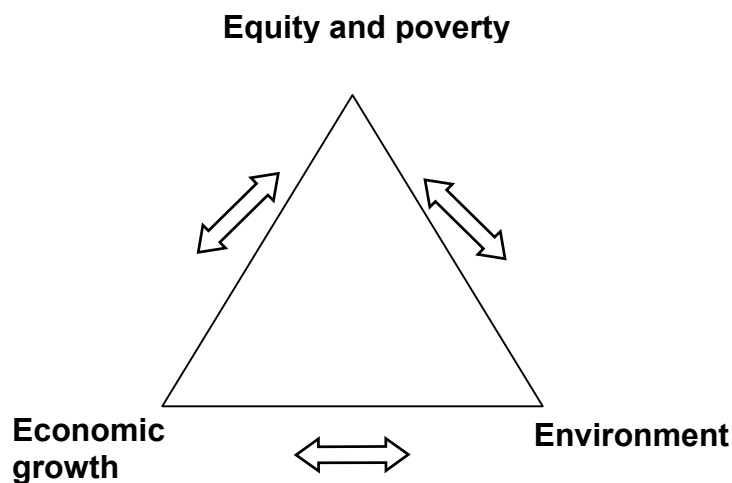


Figure 1: The critical triangle of sustainable development

The environmental aspect in the critical triangle of development can relate to many different concepts such as soil and water conservation, biodiversity conservation, forest protection, emission of greenhouse gases, and air quality. In this paper, the focus is on biodiversity, soil and forest conservation aspects in relation to economic aspects, especially agricultural growth in the smallholder sector, and poverty reduction. In the following, we explore some of the conceptual linkages between the three objectives further.

In the last decade, the conservation of biodiversity has emerged as a major priority on the political agenda. Biodiversity conservation and agriculture are strongly

linked. The worldwide demand for food, especially meat products, as well as for other agricultural products including agrofuels is growing, leading to an intensification of agricultural production and also an expansion into new, so far undisturbed natural habitats. Agricultural development is often perceived as a threat to the conservation of biodiversity as it contributes to the loss or fragmentation of native habitats (Tonneijck et al. 2006). However, such a perception regards agriculture falsely to not be a part of biodiversity (see also Srivastava et al. 1998), denying thus also positive linkages between agriculture and biodiversity, for example with respect to enhanced biodiversity found in some adapted agricultural systems.

2.4 Poverty and the environment

It is widely accepted that biodiversity loss and poverty are linked problems (Adams et al. 2004). Many countries in Southeast Asia are biodiversity hotspots which are defined as regions with an exceptional concentration of endemic species and, at the same, are severely threatened by human activities (Myers 1988, Myers et al. 2000). Many of the most endangered biodiversity hot-spots are concentrated in those areas in which rural poverty is widespread (Tonneijck et al. 2006, Snel 2004). Therefore, biodiversity conservation and poverty reduction should be addressed simultaneously. However, there are divergent opinions on how to address best both issues due to different experiences of success and failure. One strategy practiced for a long time was focusing only on conserving biodiversity in “protected areas”, but is not working well and the creation of protected areas had often negative impacts on poverty (Adams et al. 2004, Srivastava et al. 1998). Part of it may refer to the fact that forests products are important sources of products for domestic consumption and for income-generation by people living in and around forests (Fisher 2000), in particular for the poorer households (see, for example, Schwarze and Zeller 2005) so there are little incentives to respect boundaries of protected areas when no additional means are taken to offer them alternatives.

There is a general agreement that biodiversity and resource conservation should be better integrated into strategies for economic development and poverty reduction (Adams et al. 2004, Tonneijck et al. 2006, Coxhead 2002). However, in practice many projects aiming at the integration of conservation and development have tended to bring little results. Investigating the theory that income generation from forest products triggers sustainable use and leads to conservation of forests, while at the same time alleviating poverty, Fisher (2000) and Gilmour et al. (2004) conclude that evidence of the benefits, both to conservation and poverty alleviation, have not yet been convincingly documented.

Forest products can be used for commercial exploitation, subsistence or domestic consumption, including food security, or as a contribution to poverty alleviation through forest-based income generation (Fisher 2000, Angelsen and Wunder 2003). The latter is often difficult due to various reasons. Non-Timber-Forest-Products (NTFP) are often open access resources, requiring high labour inputs but little capital and skills. These characteristics make them attractive for the poor. However, NTFP produce low returns, often have a low market value and thus, poor people whose survival depend on NTFP are most likely to stay trapped in poverty. Yet, NTFP fulfil an important function in supporting livelihoods of people, buffering their lives against a series of risks through complementing income. Therefore, NTFP may be useful for poverty prevention but they have no big potential to contribute to poverty alleviation (Fisher 2000, Angelsen and Wunder 2003). In the case of high

value forest products, outsiders or rich people instead of the local poor usually take over the extraction as it is highly beneficial (Fisher 2000, Angelsen and Wunder 2003).

The nature of markets also plays an important role. While some scarce and low exploited forest products such as cardamom, yang oil or hemp have a high value, the prices and demand may tend to decline as greater quantities are collected. “Such products can only provide significant opportunities for a limited number of people and wider promotion of enterprises based on them will limit their potential” (Fisher 2000:7).

As the links between conservation and poverty are dynamic and locally specific, it may only be possible to combine biodiversity conservation and poverty reduction goals simultaneously under specific institutional, ecological and developmental conditions, leading hence more to case-specific recommendations than general policy conclusions (Adams et al. 2004, Fisher 2000). Based on our review of selected case studies, and given the three explanatory approaches for land use change and rural development in relation to poverty, we concur with the conclusion by Adams et al (2004). There may be a potential for poverty alleviation in the newly emerging area of payments for ecological services of forests (for example under the Clean Development Mechanism) which is predicted to have a high growth potential (Angelsen and Wunder 2003). To date, it is not clear how large and widespread these transfers will be and how much poor people will be able to capture benefits from these emerging markets.

2.5 Explanatory approaches to agricultural and rural development, economic growth, poverty, and the environment

A number of more recent studies sought to explore the underlying factors of agriculturally driven land use change, and its interaction with forest loss or forest degradation, biodiversity loss, poverty, inequality, and economic growth (see for example, Kaimowitz and Angelsen 1998; Tonneijck et al. 2006, Pham 2005). Modelling the relationships between changing environments to agricultural production systems and biodiversity, Tonneijck et al. (2006) found out that the relation between biodiversity conservation and agriculture depends on the livelihood and income improvement strategy people embark on in rural areas. Of the three main strategies, intensification of agriculture, diversification of rural income sources, or expansion of agricultural production, the expansion of land to increase agricultural production would result in the greatest loss of biodiversity. They estimate that up to 80% of species diversity would be lost due to full conversion because even in low-input production systems species diversity is below 20%. Therefore, the best strategy is to intensify agricultural production on a limited area, leaving the remainder untouched, as it has the lowest impact on biodiversity loss. Srivastava et al. (1998) emphasize that agricultural intensification is even possible while conserving and enhancing biodiversity, but it depends heavily on the agricultural practices used, the policy environment as well as on institutional development. “Dramatic changes will be needed in the ways that people raise crops and livestock if much biodiversity is to survive the next 50 years. How agriculture is transformed and intensified in a sustainable manner will be the key to how many species and how much genetic variation are still around in the next century” (Srivastava et al. 1998:230).

Earlier studies also conclude that in certain areas intensification of agriculture and rural income diversification through enhanced market access, creation of

employment in rural areas, and technical progress in smallholder agriculture can stabilize forest frontiers by enabling smallholder farmers and rural households to earn sustainable incomes. For example, Deininger and Minten (1999), Shively (1991), Zeller et al. (2000) as reviewed by Maertens et al. (2006) find that irrigation development with subsequent increases in the level and stability of crop yields significantly reduces forest clearing.

However, there are also a number of studies that show that improved access to agricultural markets and technology as well as roads have an accelerating effect on forest clearing (see, for example, the review by Maertens et al. 2006). Indeed, the theoretical literature on the effect of improved technology on deforestation and agricultural land expansion is – according to Kaimowitz and Angelsen (1998) - divided into two approaches with diverging assumptions and quite opposite policy conclusions. The “population approach” based on subsistence models identifies population growth, hunger and poverty linked to low agricultural productivity, and poor technology as the main drivers of agricultural expansion into upland and forest areas. According to this approach, technological progress would result in higher agricultural productivity, and thus induce farmers to crop less land for meeting subsistence needs. However, this land-saving effect of agricultural research and technology transfer has been much larger in lowland compared to upland areas. This is because technological progress, in particular for rice, has been much faster for irrigated lowland areas compared to upland areas in Southeast Asia (Heidhues and Rerkasem 2006, von Uexkull 1998). The “market-based approach” (Kaimowitz and Angelsen 1998), on the other hand, emphasizes the role of access to markets and technology for enhancing the profitability of agriculture as the main driver for agricultural expansion. These two approaches, however, do not adequately capture the governance issue linked to large-scale logging by national and multinational firms, followed by the expansion of plantations such as oil palm in Indonesia and rubber in Laos. We therefore distinguish a third explanatory approach which we may term the “governance approach”. Here, we recognize institutional and power factors as well as individual or collective greed and outright policy failure playing the pivotal role in the conversion of forested land for plantation agriculture. Not smallholders are the actors, but also large-scale corporations colluding with national or local government. The governance approach also includes the choice of macro-economic or sectoral policy instruments that favour certain socio-economic or lobby groups, such as heavy taxation of agriculture to favour certain industry sectors, or the so-called urban bias in development policy.

Depending on which of the three explanatory approaches best describes the underlying causes of land use change and related changes in socio-economic and environmental development, the preferred policy mix also will differ much. In our review of case studies, we seek to identify which of the three approaches might explain best the observed development.

In our view, the three approaches can – depending on the conditions of a particular region – be useful in explaining the linkages between agriculture, environment and poverty (Table 1).

Table 1: Major explanatory approaches for agricultural expansion in Southeast Asia

Type of approach	Underlying drivers	Local conditions	Result	Examples from case studies	Policy responses
Population approach	Poverty, food insecurity	Low level of technology, lack of political voice and market access	Deforestation, soil degradation, expansion of agric area at low levels of productivity	Early 1990s in Northern Vietnam, poor smallholders in Lore Lindu and Laos	Agricultural research, investment in human capital, pro-poor technology policies
Market-based approach	Increased market access and improved infrastructure/technology raise profitability in agriculture	Smallholder farmers obtain access to inputs and markets	Agricultural intensification, falling poverty rates, but environmental degradation like in approach 1 if not coupled with policy interventions to protect environment (e.g. community-based forestry, agricultural extension, payments for ecological services)	Smallholder coffee and cocoa booms in Vietnam and Indonesia, respectively Maize boom in the 2000s in Northern Vietnam	Pro-poor policies related to human capital, infrastructure, and access to markets and institutions, but coupled with policies protecting the environment and providing payments for ecological services
Governance approach	Institutional factors and poor governance lead to the marginalization of certain social/ethnic groups and their traditional land rights, and favour external investors and migrants	Lack of decentralized decision-making and local voice/control, corruption, collusion, and strategic alliances by the powerful	Increased marginalization of indigenous ethnic groups, possibly rising poverty levels if these groups do not benefit as wage workers or outgrowers from plantation agriculture Large-scale destruction of natural habitats	Cocoa expansion driven by migrant Bugis in Lore Lindu region Illegal logging and oil palm expansion in Kalimantan and Sumatra Rubber plantations by Chinese investors in Laos	Strengthen decentralized, community-based systems, national reforms/changes regarding governance, strengthening of NGO/civic sector, and political voice of the poor/marginalized

For remote areas in Lao PDR, where poverty and food insecurity is high and market access low, improvements of technology in upland agriculture – such as the currently quite neglected upland rice - could have a land- and resource-saving effect, at least in the short-run. For areas well-connected to markets and infrastructure, technological improvements in upland agriculture can give additional impetus for expansion of agricultural areas. From a policy point of view, situations of the first kind require massive investments in agricultural research and extension. In the other areas, investments in technology, markets and infrastructure need to be combined with environmentally oriented policies for protection of natural resources because of the inherent market failures to account for the negative and positive externalities of agriculture. Similarly, if deforestation is driven by commercial and multinational interests, the policy must address the underlying failures in governance systems. Agricultural research, investment in infrastructure, or other measures useful for situations closer to explanatory approach I or II are not suitable for situations closer to the third explanatory approach. They can be even counterproductive, for example, raising the profitability of producing agrofuels from oil palm through agricultural research may boost unwanted developments following the third approach.

3. Trends in upland areas of Southeast Asia

In many Asian countries, like elsewhere, economic growth rates and poverty alleviation has been achieved at massive cost to the environment. Market failures due to ill-defined property rights endanger forests, fisheries and agricultural soils due to intense natural resource depletion, and question the sustainability of the ongoing development. The expansion of the agricultural area took place mainly at the expense of forests, which is shown by the remarkable reduction in forest covers (Table 2). For example, Thailand’s forest cover has diminished from over 80% a century ago to currently 28%. Since Cambodia catches up with the economic growth in the other Asian countries it experiences similar decreases in their natural forest cover, but also Indonesia and the Philippines show strong deforestation rates (Coxhead 2002).

Table 2: Changes in land use patterns in Southeast Asia, 1990-2003

	Total area (thousand sq. km)	Land area		Land use (% of land area)					
		Arable land per capita (hectares)	2001- 03	Arable land		Permanent crop land		Forest land	
				1990	2003	1990	2003	1990	2003
Cambodia	177	0.38	0.28	20.9	21.0	0.6	0.6	73.3	59.2
Indonesia	1,812	0.11	0.10	11.2	11.6	6.5	7.4	64.4	48.9
Lao PDR	231	0.19	0.17	3.5	4.1	0.3	0.4	75.0	69.9
Myanmar	658	0.23	0.20	14.6	15.4	0.8	1.4	59.6	49.0
Philippines	298	0.09	0.07	18.4	19.1	14.8	16.8	35.5	24.0
Thailand	511	0.32	0.24	34.2	27.7	6.1	7.0	31.3	28.4
Vietnam	325	0.08	0.08	16.4	20.5	3.2	7.1	28.8	39.7

Source: World Development Indicators 2006.

3.1 Definition of the uplands in Southeast Asia

Despite intense research in the uplands, there exists no common definition of the “uplands” in Southeast Asia. Depending on the source, uplands are defined according to their soils, elevation or slope. Often the word upland is synonymously used for mountainous regions and for highland areas (for example see SFB 564 (1999)). Gomez and Gomez (1983, cited in Ranaweera 1993) define uplands less in relation to the elevation of land but as areas with unsubmerged and well-aerated, “dry” soils that prevail during the cropping period in contrast to the submerged soils of the lowlands. Hardaker et al. (1993) define upland farming systems as those found in elevated areas, usually on sloping or steep land. Coxhead (2002) characterizes uplands predominately based on their sloping area. Pandey (2000) describes the Southeast Asian uplands much broader, focusing on the heterogeneity in the upland region. According to Pandey, the upland area includes sloping and flat areas, fertile and unfertile soils, humid and subhumid climates and hence also different agricultural practices and crops.

The uplands in Southeast Asia cover most of Cambodia, Lao PDR, Myanmar, Thailand, Vietnam, Indonesia and The Philippines. The lowland areas in these countries are relatively small while the upland areas constitute between 60 and 90% of the total land area of the respective countries (Garrity 1993). The upland area in Southeast Asia covers around 50 million hectares with over 100 million people directly dependent upon them (Pandey 2000). This region is inhabited by many different ethnic groups. Despite these differences, the uplands have also common features relating remoteness, lack of infrastructure and thus reduced or no access to markets, inputs, extension or credits. With few exceptions, the uplands are economically disadvantaged, relatively impoverished regions which are often politically and institutionally marginalized (Heidhues and Rerkasem 2006, Pandey 2000, Coxhead 2002).

3.2 Trends regarding land use, poverty, and the environment in Southeast Asia

While the population density per hectare land surface is relatively high in The Philippines and Vietnam, the other countries in Southeast Asia do not have a very high population density (Table 3). Numbers increase dramatically when the population density per hectare cropland is looked at, the density per hectare cropland is highest in Vietnam and The Philippines and lowest in Thailand and Cambodia. The share of the rural population out of total population is shrinking but in most countries still more than 70% of the population is living in rural areas, except Indonesia and The Philippines.

Table 3: Population density and rural population

	Population density		Rural population		
	(per ha land surface)	(per ha cropland)	share of total (%)		average annual growth (%)
	2005	2001	1990	2004	1990-2004
Cambodia	0.8	3.7	87	81	1.9
Indonesia	1.2	6.5	69	53	-0.5
Lao PDR	0.3	5.6	85	79	1.9
Myanmar	0.7	4.5	75	70	1.0
Philippines	2.8	7.1	51	38	0.0
Thailand	1.3	3.3	71	68	0.8
Vietnam	2.5	9.3	80	74	1.0

Source: United Nations Department of Economics and Social Affairs (2005) and World Development Indicators 2006.

Poverty in these countries is still widespread. If Thailand is excluded, the population below the national poverty lines hovers around 27 percent in Indonesia and 39 percent in Lao PDR (Table 4). In all countries, poverty is concentrated in the rural areas where 30 to 50 % of the population lives below the poverty line. Of the urban population, shares from 7% in Vietnam up to 27% in Lao PDR live in poverty.

Table 4: Population below the national poverty line

Population below the national poverty line				
Country	Year	Rural %	Urban %	National %
Cambodia	2004	38.0	18.0	35.0
Indonesia	1999	34.4	16.1	27.1
Lao PDR	1997-98	41.0	26.9	38.6
Myanmar	n.a.	n.a.	n.a.	n.a.
Philippines	1997	50.7	21.5	36.8
Thailand	1992	15.5	10.2	13.6*
Vietnam	2002	35.6	6.6	28.9

Note: *Data from 1998

Source: World Development Indicators 2006 and World Bank Development Report 2008.

Major upland food crops in Southeast Asia are rice, maize, wheat, and legumes (mungbean, soybean, and groundnut), and – among root crops - cassava, potatoes, and sweet potatoes are most important (Ranaweera 1993). The demand for coarse grains, pulses, animal products and vegetables is increasing in Southeast Asia and since these crops are best grown in the uplands, there is a huge potential for their production when soil constraints can be overcome (von Uexkull 1998). Rice is planted on around 45 percent, or 42 million hectare, of Southeast Asia's cropland. The majority of that area is irrigated or rainfed rice (together 86%), the rest of the area is equally shared by deep water and upland rice with each 3 million hectare (or 7%) (Mutert and Fairhurst 2002). Rice plays an important role in the uplands. However, upland rice yields are usually low (Table 5) due to extremely shortened fallow periods, low or no external inputs, highly acid soils, and cultivation on unsuitably steep slopes leading to land

erosion and soil degradation (von Uexkull 1998). An increase in upland rice yields is a determining factor in reducing the encroachment of agricultural land into forest areas (Heidhues and Rerkasem 2006) if coupled with effective policies for protection of forest areas. There is a trend to shift from upland rice production to other upland crops due to low yields of upland rice. Especially hybrid maize, among non-rice upland crops, has been rapidly adopted by farmers in Southeast Asia. In Vietnam, both the area under rainfed maize and the yield of maize experienced about a doubling during the period 1980-2003 (Dao The Anh et al. 2005).

Table 5: Comparison of rice yield (t ha⁻¹) grown in various ecosystems in Southeast Asia, 1996

System	Yield (t ha⁻¹)	Crops grown annually	Productivity (t ha⁻¹ year⁻¹)
Irrigated rice	5.0	2.5	12.5
Deep water rice	1.0	1	1.0
Rainfed rice	2.5	1	2.5
Upland rice*	1.0	1	0.125**

Note: *Grown in slash-and-burn systems, usually on sloping land.

**This is calculated based on a fallow period of 8 years. To be sustainable without external inputs, upland rice requires fallow periods of 10-15 years but nowadays it is often less than 5 years.

Source: adopted from von Uexkull (1998)

The changes of agricultural production were not only limited to a shift in the crops produced. Land use patterns and, as stated above, increases in arable and permanent crop land came mainly at the expense of forest area (see Table 2). Despite ongoing deforestation, the total available arable land per capita is continuously diminishing, although to a varying degree between the countries in Southeast Asia. The figures given for the forest area do not reflect the amount of fully natural, virgin forests since the World Bank and FAO definition of forests includes natural or planted stands of trees, whether productive or not. This becomes important as in recent times, forest plantations increased at large rates (FAO 2007). For example in Thailand and Vietnam, 20 percent of the total forest is already plantation forest. These plantations are also counted as forests - from a biodiversity conservationist point of view, it is hardly possible to speak of "forests" in this case.

Deforestation rates are still high (Table 6). Of all world regions, Southeast Asia experienced the largest decline in forest area. The greatest forest loss occurred in Indonesia, followed by Myanmar, Cambodia, the Philippines, and Malaysia. Several countries are losing forests at rates exceeding 1.5 percent per year which are among the highest rates of forest loss in the world (FAO 2007). Few countries such as China and Vietnam were able to reverse the forest loss during the period 1990-2000 (Table 5). In the two countries, massive investment in afforestation programs helped to increase forest cover. However, when looking at forest data caution must be taken as in the recent years forest plantations are increasing strongly in Southeast Asia, especially in China, Vietnam, Indonesia, Myanmar, and Lao PDR (FAO 2007). Much of these forest plantations are monocultures e.g., with eucalyptus, rubber, or palm.

Forest plantations are usually counted as forest due to changes in its definition⁵ (Coxhead 2003, FAO 2007). That these forest plantations very often replace natural forests is also shown by the consistent decline of primary forest cover in Southeast Asia, with primary forest losses exceeding two percent a year, a disturbing amount with strong negative effects on biodiversity (FAO 2007).

Table 6: Forest cover, forest plantations and annual change rate in Southeast Asia, 2005

	Total forest (1000 ha)	Forest plantations (1000 ha)	Annual rate of change of forest area (%)	
	2005	2005	1990-2000	2000-2005
China	197 290	31 369	1.2	2.2
Cambodia	10 447	59	-1.1	-2.0
Indonesia	88 495	3 399	-1.7	-2.0
Lao PDR	16 142	224	-0.5	-0.5
Myanmar	32 222	849	-1.3	-1.4
Philippines	7 162	620	-2.8	-2.1
Thailand	14 520	3 099	-0.7	-0.4
Viet Nam	12 931	2 695	2.3	2.0

Source: adopted from FAO (2007)

Deforestation is strongly linked to land degradation (Table 7). Due to deforestation and badly managed agricultural production systems in sloping areas human-induced land degradation is severe, in particular in the upland regions. Thailand, Vietnam and Cambodia show very severe degrees of land degradation, demonstrating the unsustainability of the current production systems and thus questioning any future potential development.

Table 7: Human-induced land degradation rates and its causes in Southeast Asia, 2000.

	Severity of human-induced land degradation (% of total area)					Cause
	None	Light	Moderate	Severe	Very severe	
Cambodia	13	2	36	27	22	D
Indonesia	1	36	26	32	6	D,A
Lao PDR	0	16	83	0	1	D
Malaysia	0	0	17	83	0	D,A
Myanmar	1	0	63	35	1	D,A
Philippines	3	0	18	3	3	D
Thailand	0	2	20	28	50	D,A
Vietnam	0	0	21	29	49	D,A

Note: A = Agriculture. D = Deforestation.

Source: adopted from FAO (2000).

⁵ According to the FAO (2005:16), forests are defined as “land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use”. The term forest is determined both by the presence of trees and the absence of other predominant land uses but it includes areas with bamboo and palms provided that height and canopy cover criteria are met as well as plantations primarily used for forestry or protection purposes, such as rubberwood plantations and cork oak stands.

With the degradation and elimination of natural habitats, also biodiversity is threatened. In Southeast Asia, species diversity is extremely high, not only of plants but also of mammals and birds as well as fish. At the same time, many species in Southeast Asia are threatened by extinction. For example, in Cambodia, Indonesia and The Philippines, around one fifth of all known mammal species are threatened by extinction. In the other countries like Vietnam, Lao PDR and Thailand it varies around 12-15%. These are alarmingly high figures (Table 8). Thus, all countries were declared as biodiversity hotspots, which are defined as regions with an exceptional concentration of endemic species and, at the same, are severely threatened by human activities (Myers 1988, Myers et al. 2000). Only some of the countries, such as Cambodia and Thailand, have larger areas of protected land, the others have only a few protected areas. But as poverty is still prevalent, and especially when combined with a high population density, the poor often have no other choice than to unsustainably extract natural resources, thus threatening the biodiversity treasures (Snel 2004).

Table 8: Biodiversity and threatened species in selected countries of Southeast Asia

	Higher plants species		Mammal species		Bird species		Protected areas as % of total land area
	Total	In threat	Total	In threat	Total	In threat	
	2004	2003	2004	2003	2004	2003	2004
Cambodia	unknown	31	127	23	521	24	20.5
Indonesia	29375	383	667	146	1604	79	4.5
Lao PDR	8286	19	215	30	704	21	Unknown
Myanmar	7000	38	288	39	1047	41	0.3
Philippines	8931	212	222	50	590	70	5.1
Thailand	11625	84	300	36	971	42	12.7
Vietnam	10500	145	279	41	837	41	3.4

Note: Figures are not necessarily comparable among countries because taxonomic concepts and the extent of knowledge about actual species numbers vary. Country totals of species are underestimates of actual species numbers.

Source: adopted from WRI (2005)

4. Case studies of linkages between poverty, environment and economic growth in upland agriculture of Southeast Asia

As shown, the upland areas of Southeast Asia are ecologically, economically and socio-culturally heterogeneous and hence affected by various pressures. Once richly endowed, Southeast Asian countries have in varying degrees undergone natural resource degradation and depletion, which is caused by the interplay of population and state-promoted economic growth on the environment (Heidhues and Rerkasem 2006, ADB 2000, FAO 2007). According to Dauvergne (1999, cited in ADB 2000:3), it is evident that environmental degradation, tends to mainly affect the poor (particularly ethnic minorities) who live in remote areas. They suffer from polluted and unsafe water, inadequate sanitation, erosion and flooding, toxic waste and indoor air pollution. Thus, for policy prescriptions, the poor, while also potential

contributors, are most appropriately seen as victims of the mounting environmental degradation.

Our principle hypothesis in the review of case studies is that general policy recommendations are doomed to fail mainly because of two reasons. First, the underlying drivers of agricultural and rural development and the related land use change in the uplands are quite diverse. This is itself a result of the heterogeneous initial conditions, such as economic, social, institutional and natural characteristics. In section 4.1, we review findings from meta-analyses on land use change that support this view. Second, the diversity of underlying drivers can be broadly grouped into three explanatory approaches as shown in section 2.4. We distinguished first the “population approach” that mainly explains agricultural expansion by smallholder farmers due to poverty and food insecurity concerns. Second, the “market-based approach” (Kaimowitz and Angelsen 1998) emphasizes the role of access to markets and technology for enhancing the profitability of agriculture as the main driver for agricultural expansion. Third, the “governance approach” emphasizes the role of institutions and power, including policy failure, for allowing large-scale commercial logging and agribusiness enterprises to acquire forested land for plantation agriculture. Depending on which underlying causal variables are most important, development policies to address these causes must necessarily be different from one socio-economic and agro-ecological context to the next.

4.1 Upland Southeast Asia – an overview

According to Sunderlin (2004), about one third of the population (80 million out of 200 million people) in the Mekong region -including Cambodia, Lao PDR, Vietnam, Myanmar and Thailand- is poor. The livelihoods of the rural poor intensely depend on forest resources to meet their subsistence needs. Even though there has been very little research on the poverty alleviation potential of community-based forestry management (CBFM) in Southeast Asia so far, it is seen as a way to improve the poor’s livelihoods - if supported by policy change (Sunderlin 2004:2).

Fox and Vogler (2005) summarize the results of eight case studies from Thailand, Yunnan (China), Vietnam, Cambodia and Lao PDR. Research results revealed that land cover has persisted stable and swidden cultivation has remained the dominant land-use practice during the last 50 years. Even though “every country in the region has attempted to “control” swidden cultivation through policies that include banning shifting cultivation, declaring forest reserves from which people are excluded, resettling people into lowlands, and introducing settled agriculture either in situ or in a new location” (Fox and Vogler 2005:401). Fox and Vogler (2005) pinpoint two factors that will increasingly affect land-use systems in future. Besides national land tenure policies, market pressures will force farmers to deal with new and different forms of agriculture and at the same time hamper them to maintain their traditional practices. Swidden cultivation is performed mainly by poor smallholders in Southeast Asia. Here, the explanatory approach considering poverty as a causal factor of land use change and agricultural expansion appears most useful.

Geist and Lambin (2001, cited in Fox and Vogler 2005:402) conducted a meta-analysis of 152 sub-national cases of tropical deforestation, 55 of these were from Asia. A major result of their study was that the proximate causes and drivers of land cover change cannot be reduced to a single variable or to even a few variables. This implies that blue-print policy strategies are doomed to fail. Findings of Geist and Lambin were confirmed by results of Fox and Vogler, who found that agricultural

expansion played a role often in connection with other characteristics of the physical environment (62.5%), and infrastructure extensions (37.5%). According to Geist and Lambin, 88% of the cases were driven by multifactorial causes, with economic factors playing a major role (81%), followed by policy and institutional (63%), technological (59%), socio-political or cultural (56%), and demographic factors (51%).

Finally, Geist and Lambin found that 82% of their 55 case studies from Asia involved some form of agriculture-wood connection, a result that presumably reflects case studies from Lao PDR, Indonesia and other areas with a wood industry. According to FAO (2007:21), most Southeast Asian countries have updated their forestry policies in the past 15 years, creating a legal basis to implement sustainable forest management. However, national statistics on income, employment and production of the forestry sector only focus on the formal sector, while data on the informal sector is still lacking. First of all, the dependents of the informal sector are usually poor and therefore lack the necessary resources to practice sustainable forest management. Secondly, they often do not possess land and/or forest rights, which make the collection of wood and other forest products 'illegal' as well as it boosts unsustainable resource use. Hence, improvements in the informal sector are crucial to promote sustainable forest management.

On top of everything, large-scale illegal logging, which is (amongst others) enabled through corrupt government officials and high ranking members of the military, leads to a continuous decline of primary forests⁶. While destroying the livelihoods of the rural poor, the benefits of the illegal transactions are shared between logging companies and government officials⁷. The above presented facts suggest that the third explanatory approach plays an important role as well.

4.2 Cambodia and Lao PDR

According to Braeutigam (2003:1), the governments of Cambodia and Lao PDR give high priority to poverty reduction and sustainable economic growth by placing emphasis on community-based approaches. Both countries went through a period of authoritarian rule. Although Cambodia has twice the number of people than Lao PDR, the poverty characteristics are similar. In the Human Development Report (HDR) 2007/2008 Cambodia and Lao PDR are ranked 131 and 130 respectively, out of 177 countries (UNDP 2007). Like in other Southeast Asian countries, the majority of the people in Cambodia and Lao PDR are living in rural areas and their subsistence economy depends on natural resources, including forest products. In contrast to Cambodia, the population of Lao PDR is much more diverse and the natural frame conditions differ as well. Steep slopes characterize main parts of Lao PDR, whereas the Cambodian landscape is dominated by floodplains.

In Lao PDR, CBFM mainly concentrates on production forests and benefit sharing arrangements for village's access to a portion of timber wealth. There are also some reforestation efforts included. Unlike in Cambodia, central authorities have a

⁶ "In 2001, Cambodia, Laos, Thailand and Vietnam all supported the East Asia Forest Law Enforcement and Governance (FLEG) Bali declaration, committing countries to take action against illegal logging and trade in illegally-sourced timber. (...) Nevertheless, illegal logging and timber smuggling continues to thrive the Mekong region, with the forests of Laos being especially targeted by neighbouring Vietnam and Thailand" (EIA and Telapak 2008:3).

⁷ For more details on 'illegal logging' please refer to EIA and Telapak (2008) and FAO (2007). WWF (2008) analyses (beside others) the role of Southeast Asia and China concerning illegal wood for the European market.

strong role in promoting and administering community forestry, with support from a limited number of international organizations and [non-governmental organizations] NGOs (Braeutigam 2003:2). Sokh and Lida (2001) as well as Sunderlin (2004) state that the development of CBFM in Cambodia is affected by various obstacles, including unclear and insecure tenure rights, lack of land use planning and benefit sharing arrangements. Extension for CBFM is fragmented and limited in scale and many ongoing projects lack proper evaluation or monitoring. Hence, the support of foreign donors and NGOs is considered crucial due to weak government financial resources, institutional and personal capacity. Braeutigam (2003) also identified the lack of capacity in government services as one of the main obstacles for a successful implementation of the national community forestry program in Lao PDR and Cambodia.

In Lao PDR, land use planning (LUP) and land allocation (LA) are closely tied to CBFM. The goal of the nationwide LUP/LA process is to provide tenure security for rural households, to encourage private investments to reduce shifting cultivation by promotion of sedentarized land uses, and to conserve forest resources (Braeutigam 2003:48). Due to some errors in implementation, “LUP/LA often does not lead to the redistribution of land to disadvantaged groups and has caused partially negative impacts on the livelihood of rural communities, especially ethnic minorities, by reducing their agricultural production area” (Braeutigam 2003:49). According to Chamberlain (2002:1), one of the major causes of poverty in Lao PDR was shown to be relocation and the implementation of the Land-Forest Allocation program, which deprived some people of their land and customary land use practices. Similar results are presented by Lestrelin et al. (2005), who conducted a study in Ban Lak Sip, a mountainous village in the north of Lao PDR. Although the proximate causes of degradation in this village are current agronomic practices, the major cause of land degradation has been a farming-system change, induced by the imposition of national resettlement and land reclassification policies. Accordingly, the policies, whose major task was to protect the environment and to conserve land resources, have in fact artificially decreased agricultural land availability and made farming practices unsustainable under current conditions. This conclusion is consistent with the work of Fox (2000) who outlined the role of government in encouraging high-density settlements under conditions where maintenance of long fallow periods is impossible and shifting cultivation is unsustainable.

Other examples for (rather unsuccessful) projects in LAO PDR are the FOMACOP project (cf. Sunderlin 2004) as well as the SUFORD project⁸, which was subsequently initiated by The World Bank and the Finnish Government after FOMACOP collapsed. According to Lang (2006), the World Wide Fund For Nature (WWF) and the Tropical Forest Trust (TFT) supported the Forest Stewardship Council (FSC) certification and when SmartWood issued an FSC certificate for almost 50,000 hectares of village forestry, it was celebrated as “a giant step forward for sustainable forestry and conservation in the region” Lang (2006). According to Lang (2008), an internal project report revealed that “certified logging operations were not carried out in accordance with the management plans”. Neither were the trees marked properly at any of the inspected locations (forest, landing, mill), nor was the logging crew possessing tree maps, safety equipment or protective gear (Lang 2006).

⁸ Link: <http://dof.maf.gov.la/suford/> (accessed September 2008)

An actual report from Hmong National Development, Inc. (HND) (2008), verifies that “illegal logging in LAO PDR is causing severe environmental and human destruction”. According to HND (2008) “illegal logging (is operated) by military-owned companies of the Socialist Republic of Vietnam (SRV) in Laos, in cooperation with Lao military officials”. (...) “The issue of systemic corruption (...) is helping to drive this trade and is costing the lives of thousands of innocent Hmong women and children who are being driven off their mountains and homelands by the Lao and Vietnamese military”. Currently, some 15,000 Hmong and Laotians are trapped in the key logging areas. Earlier this year, Vaughn Vang (cited in HND 2008) stated: "Helicopter gunships are circling and attacking the Laotian and Hmong people hiding in the jungle and mountains; the Vietnamese troops are working to assist the brutal Lao military forces engaged in these war crimes and crimes against humanity, which includes surrounding and seeking to starve these people to death". After harvesting, the lion’s share of the illegal timber and logs are transported to Vietnam and made into furniture for foreign markets⁹.

Following Mongabay¹⁰, illegal logging is also blamed for much of the forest loss in Cambodia, which has one of the world’s worst deforestation rates. “Since 1970, Cambodia's primary rainforest cover decreased from over 70 percent to 3.1 percent today. Worse, deforestation rates in Cambodia continue to accelerate”. In order to finance their engagement in the civil war (1970s to the mid 1990s), the Cambodian government exported mostly to Japan and Vietnam, while the three guerrilla groups sent logs to Thailand. “Illegal logging continues today despite further bans and restrictions-the government appears to have little control over the corrupt forestry sector”.

In summary, the case studies from Lao PDR and Cambodia provide evidence for the “governance approach”. Extensive policy failure, including corruption, weak government financial resources, institutional and personal capacity led to large-scale deforestation. Consequently, the ethnic minorities have to bear the burden to make their livelihoods in even-more degraded areas. These worsened preconditions lead to further unsustainable development, which can then be explained by the “population approach”.

Table 9: Overview over policy measures and its effects in Lao PDR and Cambodia

Case	Major problems	Policy measures	Effects on		
			Economy	Ecology	Poverty
Lao PDR, Cambodia	<ul style="list-style-type: none"> ▪ Land de-generation ▪ Enlargement of protected areas at expense of smallholders ▪ Lack of tenure rights ▪ Illegal logging ▪ Corruption 	<ul style="list-style-type: none"> ▪ National resettlement and land reallocation policies ▪ Community - based forest and land management ▪ Enlargement of protected areas 	<ul style="list-style-type: none"> ▪ Agricultural production area ↓ ▪ Forest area ↓ ▪ (illegal) timber export ↑ 	<ul style="list-style-type: none"> ▪ Degeneration of agricultural & forest area ↑ 	<ul style="list-style-type: none"> ▪ Increased (esp. for ethnic minorities in target areas for illegal logging)

⁹ For more detailed information please refer to literature listed in footnote ‘3’

¹⁰ This paragraph is based on <http://rainforests.mongabay.com/20cambodia.htm> (accessed September 2008)

4.3 Vietnam

Despite the achievements of the ‘doi moi’ reform process, which was launched in 1986, Vietnam is still among the poorest countries in the world, with 28.9 per cent (50.9 per cent in 2003) of the total population (85 million in 2004) living below the national poverty line (UNDP 2007a). In the HDR 2007/2008 Vietnam is ranked 105 out of 177 countries. This development reflects the country’s successful reforms to reduce poverty. However, while the deltas documented rapid improvements, the Central Highlands and Northern Uplands have experienced a slower economic growth. Especially the mountainous, rural areas of Northern Vietnam are underdeveloped and the poverty rate in this region was still 68 per cent in 2002, which is the highest in Vietnam (World Bank 2003). The area is mainly inhabited by “socially and politically marginalized ethnic minorities” (Pandey et al. 2006:2). Deforestation, soil erosion, and loss of biodiversity are apparent signs of poverty and environmental degradation, which are both, interrelated and widespread (ADB 2002, Gomiero et al. 2000, Sunderlin and Thu Ba 2005, and World Bank 1998, all cited in Pham 2005: 4). Consequently, Vietnam’s government is promoting policies to advance forest protection, sedentarization of shifting cultivators, assignment of land-use rights to farmers, and the provision of economic assistance to poor farmers. One example is the implementation of the so-called ‘Program 135’, which “aimed at improving the economic well-being of the poor and ethnic minorities in remote areas that have not benefited directly from the market-driven growth of the national economy” (Pandey et al. 2006:16). In addition to a reduced logging quota and a log export ban, the Vietnamese government expanded timber plantations to supply raw material. Nevertheless, “Vietnam has an unenviable track record when it comes to dealing in stolen timber”. While importing illegal timber from Cambodia in the late 1990s and from Indonesia in 2003, “Vietnam is now exploiting the forests of neighbouring Laos”¹¹ (EIA and Telapak 2008:1).

Pham’s research analyzes land use changes in the Son La Province of Northern Vietnam, a mountainous region with severe poverty and environmental problems (Pham 2005), and their impacts on agricultural and economic growth, the environment, and in particular forest loss and forest degradation, and poverty. Pham combines commune-level data for the entire Son La Province with remote-sensing data in a geo-referenced information system. According to Pham and Zeller (2006), agricultural growth, in general, and expansion of crop production and the introduction of high-yielding rice and maize varieties, in particular, contributed significantly to the enhancement of food security. However, agricultural expansion and intensification was undertaken on fragile hillsides, often as a result of encroachment into previously forested areas. This development led to massive forest losses during the 1980s and early 1990s. In response to this, the Government of Vietnam initiated a major reforestation program during the 1990s. The environmental degradation through forest loss, soil degradation, and biodiversity loss may contribute to future losses in agricultural productivity in Son La Province. The results by Pham (2005) suggest a potential “downward spiral” situation: agricultural growth – environmental deterioration – decline of agricultural productivity and food insecurity.

Müller and Zeller (2002) conducted research in two districts in the southeastern part of Vietnam’s Dak Lak province, which has a tight forest cover of

¹¹ Beside Vietnam, traders from Thailand and Singapore were identified to export illegal logs from Laos. Cambodia and Burma are also exploited to secure timber supplies for Thailand, Vietnam and China. For more details please refer to EIA and Telapak (2008).

52 %, compared to 33 % in the overall country (General Statistical Office 2001, cited in Müller and Zeller 2002:2). Agriculture is the main income source, paddy is the most important crop and the degrees of market integration differ significantly between villages and ethnic groups. According to the authors, “permanent conversion of primary forest into agricultural land was hardly observed and, if so, it took place between Liberation Day and 1990, the key period of the government resettlement programs” (Müller and Zeller 2002:13-14). During the last decade, traditionally practiced shifting cultivation almost entirely disappeared, while agricultural production became more locationally concentrated with potential environmental benefits for preserving the integrity of ecosystems and endangered species populations. The presented data revealed that forest regeneration at the expense of agricultural area predominantly occurs near ethnic villages, which are usually closer to forested and grass areas and further away from all-year roads and political centers. The increase in forest cover over the last decade despite the observed population growth does not correspond to the widely stated positive correlation between higher population density and lower forest cover. In summary, Müller and Zeller (2002) showed that a combination of the right policy instruments and investments in infrastructure (e.g. improved access to roads, markets, and services) can facilitate agricultural intensification without adverse consequences for forest resources. However, the presented results are based on two purposely selected districts and are not representative of the entire province or country. In other areas of the central highlands, deforestation continued due to expansion of cash crops, e.g. coffee and pepper.

The past land use changes in the Northern Highlands can be best explained by the population approach (at least during the 1990s) and later – with improvements in market access- by the market-based approach. Smallholders are here the major agents of land use change and agricultural expansion. In the Central Highlands, coffee and pepper plantations were also set up by external investors, including the local political elite, infringing on customary land use rights of indigenous ethnic groups. In the Central Highlands of Vietnam, the agricultural expansion is caused by a multitude of causal factors that can find their basis in all three explanatory approaches.

Table 10: Overview over policy measures and its effects in Vietnam

Case	Major problems	Policy measures	Effects on		
			Economy	Ecology	Poverty
Vietnam	<ul style="list-style-type: none"> ▪ Poverty, food insecurity ▪ Shifting cultivation, agriculture with low productivity ▪ Deforestation 	<ul style="list-style-type: none"> ▪ Reforestation ▪ Massive infrastructure investments (roads, irrigation, etc.) ▪ Agric. intensification & commercialization ▪ Dissemination of high-yielding varieties 	<ul style="list-style-type: none"> ▪ Agricultural productivity ↑ (only short-term?) ▪ Smallholder income ↑ ▪ Export of wooden furniture ↑, but no economic benefit for ethnic minorities 	<ul style="list-style-type: none"> ▪ Soil degeneration ↑ ▪ Forest cover ↑ (=plantation forest, not primary forest) ▪ Biodiversity ↓ 	<ul style="list-style-type: none"> ▪ Poverty rates ↓ ▪ Food insecurity ↓

4.4 Indonesia

The data for the case studies from Indonesia¹², based on Birner et al. (2002, 2006), Maertens et al. (2006), Schwarze and Zeller (2005), and van Rheenen et al. (2003), were collected in villages near the Lore Lindu National Park in Central Sulawesi, Indonesia. The park is located in an ecological and socio-cultural divers region and was, due to its rich biodiversity and high endemism, declared a World Heritage Site by UNESCO (Birner and Mappatoba, 2002:10). The National Park's administration, in collaboration with different NGOs, played a pioneering role in promoting negotiated community agreements on conservation, which strive for dealing with major hazards of the National Park.

Following Birner et al. (2006), biological diversity is still rapidly declining and encroachment of protected areas for agricultural production continues to be a major problem. Consequently, conservation organizations demand an expansion of protected areas, as well as a better enforcement of regulations in already existing protected areas. These strategies are likely to increase conflicts with local communities, who will lose income and development opportunities due to restrictions on farming and livestock keeping in protected areas. Birner et al. (2006:11) identified three major issues concerning the encroachment of protected areas: (1) population density in the area, (2) the availability of suitable land inside the park, and (3) customary rights. Another important issue, which was previously addressed by Chomitz and Grey 1996 and Cropper et al. 2001, is avoiding the creation of pull factors, e.g. connecting protected areas and parks by roads. Birner et al. (2006:12) conclude that "strengthening law enforcement without at the same time reducing the need for encroachment created by poverty will not be a viable policy option".

Birner and Mappatoba (2002) highlight the potential of CBFM agreements for improving nature conversation and rural development in the region, as they are negotiated at the local level und thus take the specific ecological, socio-economic and cultural conditions into account. Due to their voluntary character, they can reduce conflicts and problems of state regulations. However, the overall success of the implementation is influenced by the ideals and opinions of both, the facilitating organizations and the village leaders responsible for the implementation on the local level. Hence, the "problem of unequal power relations and conflicts of interest within the villages may well jeopardize the deliberation process. The role of intermediaries, or representatives, should, therefore, be considered carefully". Birner and Mappatoba (2002:13). In addition, the different organizations could combine their strengths (e.g. advocacy of community rights and empowerment, providing development services) by better coordinating their activities.

Focusing on constraints, Birner and Mappatoba (2002:25-26) found that "80 per cent of the respondents mentioned at least one problem, which the national park causes for them or their community". About half of the respondents addressed future land scarcity for their children due to park protection. Furthermore, land with traditional property rights was located inside the park and while the agreement allowed them to collect certain non-timber forest products, it did not allow them to use their traditional land for agricultural purposes. Finally, the loss of income provided by rattan collection was listed as third most important problem.

Similar results are presented by Schwarze et al. (2007), who analyse the importance of forest products, especially for the rural poor. It was found that poor

¹² In the HDR 2007/2008 Indonesia is ranked 107 out of 177 countries.

households depend most on income from forest products. Consequently, “any improvements in law enforcement concerning the collection of forest products within the national park will hit the poorest households hardest” Schwarze et al. (2007:221). The study presents different policy options to reduce the collection of forest products and, at the same time, improve the livelihood of the poorest households, including e.g. better access to primary education as well as the construction and improvement of irrigated rice-fields for the poorest households in order to improve the nutrition status of the family. Furthermore the rice can be sold on the market to gain additional income.

The last case study is based on Rosyadi et al. (2005), who examine the challenges of implementing devolution policies at the local level in Banyumas district, Central Java Province. Rosyadi et al. (2005) analyze a reforestation project called *tumpangsari* program which allows farmers to cultivate crops on government-owned forest land during the first years after establishing a forest plantation. As in previous case studies, the boosting role of NGOs (e.g. in mobilizing village communities and creating political capital) and international donor organizations (to *promote devolution*) could be demonstrated. The organizations openly criticized corruption, collusion, and nepotism which finally helped to approve the villagers’ CBFM plan (Rosyadi et al. 2005:22). Furthermore, Rosyadi et al. (2005:22) pointed out, “that the local government did not receive substantial financial resources from the forestry operations”. In summary, Rosyadi et al. (2005:25) shows that devolution policies have the potential to decreased deforestation “by reducing the incentives for villagers to participate in illegal logging networks and by empowering those villagers who are concerned about the environmental damage caused by illegal logging”.

In contrast, Casson and Obidzinski (2002) and McCarthy (2000b, both cited in Rosyadi et al. 2005:22) present examples from Kalimantan and South Aceh respectively, where illegal logging is still common among local authorities as it guarantees substantial contributions to the government budgets.

According to Larsen (2002:1)¹³, “illegal logging alone has destroyed 10 million hectares of Indonesia's rich forests”, extensive floods “killed hundreds of people, destroyed thousands of homes, and damaged thousands of hectares of rice paddy fields”. Nevertheless, illegal logging is still widespread, providing Indonesia (beside China) top ranking positions among Southeast Asian countries e.g. for illegal wood imports into the European Union (cf. WWF 2008:16). According to EIA and Telapak (2008:11), a “clampdown on illegal logging in Indonesia in 2005 made it difficult (...) to obtain logs directly from the country”. Thus, companies “arranged for logs to be smuggled from Indonesia to Malaysia and then exported to Vietnam”. Furthermore, false documents are arranged to ‘certify’ its Malaysian origin (EIA and Telapak 2008:11).

The above presented case studies show that the governance approach – by strengthening community organizations controlling agricultural expansion, logging – can make important contributions. Nevertheless, as illegal corruption is still widespread in many parts of Indonesia further action is needed.

¹³ Following Larsen (2002), Indonesia's situation is not unique. The Philippines once held 16 million hectares of forests but is now down to less than 700,000 hectares. In 1989, Thailand banned the logging of natural forests in direct response to devastating floods and landslides that had taken 400 lives. Massive flooding of China's Yangtze River in 1998, which was linked to the removal of 85 per cent of the upper river basin's original tree cover, propelled China to issue a ban on logging in the upper reaches of the Yangtze and Yellow Rivers and to begin a reforestation campaign.

Table 11: Overview over policy measures and its effects in Indonesia

Case	Major problems	Policy measures	Economy	Effects on Ecology	Poverty
Indonesia	<ul style="list-style-type: none"> ▪ Food insecurity & poverty ▪ Violation of customary land rights ▪ Investments in roads / transmigration near protected areas ▪ External investors (Bugis as migrants into protected areas), illegal logging firms / plantations in Kalimantan/ Sumatra/Java ▪ Corruption 	<ul style="list-style-type: none"> ▪ Agricultural development programs & agreements with local communities ▪ Devolution policies (local level) & trad. <i>tumpanghari</i> program ▪ Community conservation agreements ▪ Strengthening voice of community organizations 	<ul style="list-style-type: none"> ▪ Agricultural production area ↑ on new forest plantations 	<ul style="list-style-type: none"> ▪ Illegal logging ↓ (only in protected areas) 	<ul style="list-style-type: none"> ▪ Poorest people depend most on forest products → have to go to other villages for rattan collection

5. Summary

Based on the critical triangle of rural development, we distinguished three explanatory approaches to land use change and agricultural and rural development. The population approach considers poverty and food insecurity as the major impetus for land use change. The market-based approach places the emphasis in the role of markets and land-saving technology in boosting agricultural incomes and reducing poverty. The governance approach focuses on political and institutional factors that govern the allocation of land and the expansion of land use driven mainly by external investors, be they migrant smallholders, such as found in Central Sulawesi, or national or foreign companies setting up plantations and infringing upon customary land rights of indigenous people.

The review of trends regarding the critical triangle of rural development for upland areas in selected countries of Southeast Asia shows mixed results. Overall, economic growth and agricultural development benefited smallholders in many countries (especially in Thailand and Vietnam). However, these economic gains with respect to agricultural productivity and incomes can be also short-lived if looming environmental problems are not addressed more effectively in the future. For example, the agricultural expansion on hillsides in northern Vietnam comes at a massive degradation of soils and forests. Moreover, a number of countries suffer from weak governance, providing possibilities for illegal logging and land acquisition at the expense of the environment and poor smallholders and ethnic minorities.

In the extremely diverse cultural, socio-economic and agro-ecological conditions prevailing in the uplands of Southeast Asia reforms and policies need to be designed to properly take into account and address the major underlying factors of agricultural and rural development. We find evidence that all three explanatory

approaches to sustainable agricultural and rural development in the uplands of Southeast Asia are useful in assessing underlying determinants of development that then eventually can be addressed by specific policy instruments. Therefore, depending on the specific conditions of development in a certain upland region, policy instruments may have to be geared primarily to deal with population pressure, poverty and food insecurity, they may have to focus on market access and mechanisms, or they may need to address governance failures. This implies that there will not be a blue-print recipe for rural development policy but that the policy instruments and their mix ought to address the underlying causes of unsustainable development.

A successful policy strategy therefore often will combine specific policy measures from the three explanatory approaches, and may address – depending on the specific conditions – governance and market access issues as well as the poverty/food security nexus. Hence, a combination of policy instruments that derive their justification from all three explanatory approaches may often prove most successful. For example, the population approach stresses investment in human capital and in smallholder upland agriculture using improved agricultural research. The market-based approach utilizes the benefits of increased market access and commercialization for reduction of poverty and diversification of the rural economy. And the governance approach stresses the role of community-based organizations, civic institutions, and decentralized decision-making in addressing the issues of collusion and corruption among the powerful elites.

Bibliography

- ADB (2000). Environments in transition: Cambodia, Lao PDR, Thailand, Viet Nam. Programs Department (West). Manila, PH: Asian Development Bank.
- Adams, W.M., Aveling, R., Brockington, D., Dickson, B., Elliott, J., Hutton, J., Roe, D., Vira, B. and W. Wolmer (2004). Biodiversity conservation and the eradication of poverty. *Science* 306, pp. 1146-1149.
- Birner, R. and M. Mappatoba (2002). Community agreements on conservation in central Sulawesi: A Coase solution to externalities or a case of empowered deliberative democracy? *STORMA discussion paper series, No. 3*. Göttingen, DE: Georg-August-Universität.
- Birner, R., Maertens, M., and M. Zeller (2006). Need, greed or customary rights – which factors explain the encroachment of protected areas? Empirical evidence from a protected area in Sulawesi, Indonesia. Contributed paper presented at the 26th Conference of the International Association of Agricultural Economists (IAAE) in Brisbane, Queensland, Australia, August 12-18, 2006.
- Braeutigam, D. (2003). Community based forest management in Cambodia and Laos: Frame conditions, selected examples and implications. Working Paper 03. Consultancy Report. Phnom Penh: MRC-GTZ Cooperation Programme, Agricultural, Irrigation and Forestry Programme; Watershed Management Component.
- Coxhead, I. (2003). Development and the environment in Asia. *Asian-Pacific Economic Literature*, Vol. 17 (1), pp. 22-54.
- Environmental Investigation Agency (EIA) and Telapak (2008). Borderlines. Vietnam's booming furniture industry and timber smuggling in the Mekong region. <http://www.eia-international.org/files/reports/160-1.pdf> (accessed August 2008)
- Fisher, R.J. (2000). Poverty Alleviation and Forests: Experiences from Asia. Paper prepared for Workshop 'Forest ecospace, biodiversity and environmental security', 5 October 2000, Amman, Jordan. Pre-congress workshop. IUCN World Conservation Congress 2000.
- Food and Agriculture Organization of the United Nations (FAO) (2007). State of the World's Forests 2007. Rome, IT: FAO.
- Food and Agriculture Organization of the United Nations (FAO) (2005). Global forest resources assessment update 2005: Terms and definitions. Forest Resources Assessment Programme, Working Paper 83/E. Rome, IT: FAO - Forestry Department.
- Food and Agriculture Organization of the United Nations (FAO) (2000). Land resource potential and constraints at regional and country levels. World Soil Resources Report No. 90. Rome, IT: FAO.
- Fox, J. and J.B. Vogler (2005). Land-use and land-cover change in Montane Mainland Southeast Asia. *Environmental Management*, Vol. 36 (3), pp. 394-403.
- Gomez, A.A. and Gomez, K.A. (1983). Multiple cropping in the humid tropics of Asia. International Development Research Centre, Ottawa, Canada. *Cited in:* Ranaweera, N.F.C. (1993). Upland agriculture in Asia: How sustainable is it?

- In: Bottema, J.W. Taco ; Stoltz, D.R. (Eds). Upland Agriculture in Asia. Proceedings of a Workshop Held in Bogor, Indonesia April 6-8, 1993. CGPRT No. 30. Bogor, ID: CAPSA. <http://www.uncapsa.org/publication/cg30.pdf> (accessed April 2007).
- Giampietro, M. (1997). Socioeconomic pressure, demographic pressure, environmental loading and technological changes in agriculture. *Agriculture, Ecosystems and Environment* 65, pp. 201-229.
- Gilmour, D., Malla, Y., and M. Nurse (2004). Linkages between community forestry and poverty. Bangkok, TH: Regional Community Forestry Training Center for Asia and the Pacific (RECOFTC).
- Garrity, D. P. (1993). Sustainable land-use systems for sloping uplands in Southeast Asia. *In: Technologies for sustainable agriculture in the tropics*. Madison, US: American Society of Agronomy.
- Hardaker, J.B., Fleming, E.M. and Tin Hta Nu (1993). Economic Aspects of Environmentally Endangered Upland Farming Systems in the Asia-Pacific Region. *In: Bottema, J.W. Taco ; Stoltz, D.R. (eds). Upland Agriculture in Asia. Proceedings of a Workshop Held in Bogor, Indonesia April 6-8, 1993. CGPRT No. 30. Bogor, ID: CAPSA. <http://www.uncapsa.org/publication/cg30.pdf> (accessed April 2007).*
- Hasel, K. (1985): Forstgeschichte. Ein Grundriß für Studium und Praxis. Hamburg/Berlin, DE: Paul Parey.
- Hazell, P. and E. Lutz (1998). Integrating environmental and sustainability concerns into rural development policies. *In: Lutz E. (ed), Agriculture and the environment: Perspectives on sustainable rural development. A World Bank Symposium*. Washington, DC, US: The World Bank, pp. 9–21.
- Heidhues, F. and B. Rerkasem (2006). IRRI's Upland Rice Research. External Assessment, http://www.sciencecouncil.cgiar.org/meetings/meeting/SC5/Item_12_IRRI_Upland_Rice_Review.pdf (accessed February 2007).
- Heidhues, F. and J. Pape (2007). Introduction, in: Heidhues, F., Herrmann, L., Neef, A., Neidhart, S., Pape, J., Sruamsiri, P., Thu, D.C., and A. Valle Zárate (eds) (2007). Sustainable land use in mountainous regions of Southeast Asia. Berlin, Heidelberg, New York, DE: Springer.
- Hmong National Development, Inc. (HND) (2008). (PressZoom) - Washington, D.C., August 28, 2008. Link: http://presszoom.com/story_145827.html (accessed August 2008)
- Kaimowitz, D. and A. Angelsen (1998). Economic models of deforestation: A review. Bogor, ID: Centre for International Forestry Research (CIFOR).
- Lang, C. (2006). Laos: FSC certified timber is illegal. http://www.illegal-logging.info/item_single.php?item=news&item_id=1683&approach_id=1 (accessed September 2008)
- Larsen, J. (2002). High price of illegal logging. <http://www.peopleandplanet.net/doc.php?id=1715> (accessed September 2008)
- Lefroy, R.D.B., Bechstedt, H.-D., and M. Rais (2000). Indicators for sustainable land management based on farmer surveys in Vietnam, Indonesia, and Thailand. *Agriculture, Ecosystems and Environment* 81, pp. 137-146.

- Lestrelin, G., Giordano, M., and B. Keohavong (2005). When “conservation” leads to land degradation: Lessons from Ban Lak Sip, Laos. Research Report 91. Colombo, LK: International Water Management Institute (IWMI).
- Maertens, M., Zeller, M., and R. Birner (2006). Sustainable agricultural intensification in forest frontier areas. *Agricultural Economics*, Vol. 34 (2), pp. 197-206.
- McIntosh, A. and G. Edwards-Jones (2000). Discounting the children’s future? Does the non-symmetrical depreciation of natural and human-made capital invalidate the assumption of substitutability in “weak” sustainability analysis? *Geophilos* 00(1). Internet version from www.AlastairMcIntosh.com (accessed in April 2007).
- Myers, N. (1988). Threatened Biotas: “Hot spots” in tropical forests. *The Environmentalist*, Vol. 8 (3), pp. 187-208.
- Myers, N., Mittermeier, R.A., Mittermeier, C.G., da Fonseca, G.A.B., and J. Kent (2000). Biodiversity hotspots for conservation priorities. *Nature*, Vol. 403 (6772), pp. 853-858.
- Müller, D. and M. Zeller (2002). Land use dynamics in the Central Highlands of Vietnam: A spatial model combining village survey data with satellite Pandey, S. (1996). Socioeconomic context and priorities for strategic research on Asian upland rice ecosystems. *In: Upland rice research in partnership. Discussion paper series no. 16.* Manila, PH: International Rice Research Institute (IRRI).
- Mutert, E. and T.H. Fairhurst (2002). Developments in rice production in Southeast Asia. *Better Crops International*. Vol 16, Special Supplement, pp. 12-17.
- Pandey, S. (2000). Technologies for the Southeast Asian Uplands. *In: Promoting Sustainable Development in Less-Favored Areas.* Pender, J. and P. Hazell (eds). 2020 Focus Brief No. 4. Washington DC, US: International Food Policy Research Institute (IFPRI).
- Pandey, S., Khiem, N.T., Waibel, H., and T.C. Thien (2006). Upland rice, household food security, and commercialization of upland agriculture in Vietnam. Los Banos, PH: International Rice Research Institute.
- Pham, M. C. (2005). Land-use change in the Northwestern uplands of Vietnam. Dissertation. Göttingen, DE: Georg-August Universität Göttingen.
- Pham, M. C., and M. Zeller (2006). Bringing space into land-use change models: A case study in the northwestern uplands of Vietnam. Selected paper presented at the International Symposium “Towards Sustainable Livelihoods in Mountainous Regions”. Chiang Mai, Thailand: Chiang Mai University, University of Hohenheim, and World Agroforestry Centre, March 7-9, 2006.
- Pezzey, J. (1992). Sustainable Development Concepts. An Economic Analysis. *World Bank Environment Paper No. 2.* Washington DC, US: The World Bank.
- Pretty, J.N. (1998). *Toward more conducive Policies for Sustainable Agriculture.* In: Lutz E. (ed), *Agriculture and the environment: Perspectives on sustainable rural development.* A World Bank Symposium. Washington DC, US: The World Bank, pp. 35-49.
- Ranaweera, N.F.C. (1993). Upland Agriculture in Asia: How Sustainable is it? In: Bottema, J.W. Taco ; Stoltz, D.R. (Eds). *Upland Agriculture in Asia.* Proceedings of a Workshop Held in Bogor, Indonesia April 6-8, 1993. CGPRT

- No. 30. Bogor, ID: CAPSA. <http://www.uncapsa.org/publication/cg30.pdf> (accessed April 2007).
- Reardon, T. and S.A. Vosti (1992). Issues in the analysis of the effects of policy on conservation and productivity at the household level in developing countries. *Quarterly Journal of International Agriculture* 31(4), pp. 380-396.
- Rosyadi, S., Birner R., and M. Zeller (2005). Creating political capital to promote devolution in the forestry sector - A case study of the forest communities in Banyumas district, Central Java, Indonesia. *Forest Policy and Economics*. Vol. 7, pp. 213-226.
- Schwarze, S. and M. Zeller (2005). Income diversification of rural households in Central Sulawesi, Indonesia. *Quarterly Journal of International Agriculture* 44(1), pp. 61-73.
- Schwarze, S., Schnippers, B., Weber, R., Faust, H., Wardhono, A., Zeller, M., and W. Kreisel (2007). Forest products and household incomes: Evidence from rural household living in the rainforest margins of Central Sulawesi. In: Tschardtke, T., Leuschner, C., Zeller M., Guhardja E., and A. Bidin (eds). The stability of tropical rainforest margins, linking ecological, economic and social constraints of land use and conservation. Berlin, DE: Springer Verlag, pp. 209-224.
- Serageldin, I. (1996). Sustainability and the Wealth of Nations: First Steps in an Ongoing Journey. *Environmentally Sustainable Development Studies and Monographs Series No.5*. Washington DC, US: World Bank.
- SFB 564 (1999). Nachhaltige Landnutzung und ländliche Entwicklung in Bergregionen Südostasiens. Neuantrag 1.7.200-30.6.2003. Stuttgart, DE: Universität Hohenheim.
- Snel, M. (2004). Poverty-conservation mapping applications. Discussion paper presented at IUCN World Conservation Congress, November 17-25 2004, Bangkok, Thailand.
http://www.povertymap.net/publications/doc/iucn_2004/report.cfm (accessed June 2008).
- Srivastava, J., Smith, N. and D.A. Forro (1998). Toward a Strategy for Mainstreaming Biodiversity in Agricultural Development. In: Lutz E. (ed), Agriculture and the environment: Perspectives on sustainable rural development. A World Bank Symposium. Washington DC, US: The World Bank, pp. 9–21.
- Sunderlin, W.D. (2004). Community forestry and poverty alleviation in Cambodia, Lao-PDR, and Vietnam: An agenda for research. Regional Consultation Workshop for ADB-RETA 6115, 1-2 September 2004.
- Tonneijck, F., Hengsdijk, H., and P.S. Bindraban (2006). Natural resource use by agricultural systems: linking biodiversity to poverty. Wageningen, NL: Plant Research International B.V.
- United Nations Department of Economics and Social Affairs (2005). Population, resources, environment and development database, 2005. New York, US: United Nations Department of Economics and Social Affairs.
<http://www.un.org/esa/population/publications/countryprofile/index.htm> (accessed April 2007).
- United Nations Development Programme (UNDP) (2007). “2007/2008 Human development index rankings”.
<http://hdr.undp.org/en/statistics/> (accessed April 2008).

- United Nations Development Programme (UNDP) (2007a). "HDR 2007/2008 – Country data sheet Viet Nam".
http://hdrstats.undp.org/countries/data_sheets/cty_ds_VNM.html (accessed January 2008).
- Van Rheenen, T., Elbel, C., Schwarze, S., Nuryartono, N., Zeller, M., and B. Sanim (2003). Encroachments in primary forests: Are they really driven by despair? *In*: Gerold, G., Fremerey, M. and E. Guhardja (eds.) (2003). Land use, nature conservation and the stability of rainforest margins in Southeast Asia. Berlin, DE: Springer Verlag, pp. 199-214.
- Von Uexkull, H.R. (1998). Constraints to agricultural production and food security in Asia: challenges and opportunities. *In*: Johnston, A.E. and J.K. Syers (1998). Nutrient management for sustainable crop production in Asia: Proceedings of an international conference held in Bali, Indonesia, 9-12 December 1996. Cambridge, UK: CAB International.
- Vosti, S.A. and T. Reardon (eds.) (1997). Sustainability, growth, and poverty alleviation: A policy and agroecological perspective. Baltimore and London, UK: John Hopkins University Press, pp. 1-15.
- World Commission on Environment and Development (WCED) (1987). Our Common Future. Oxford, GB: Oxford University Press.
- World Bank (2003). Vietnam Development Report 2004 – Poverty. Washington DC, US: The International Bank for Reconstruction and Development.
- World Bank (2006). World Development Indicators 2006. Washington DC, US: The International Bank for Reconstruction and Development.
- World Bank (2007). World Development Report 2008: Agriculture for Development. Washington DC, US: The International Bank for Reconstruction and Development.
- World Resources Institute (WRI) in collaboration with United Nations Development Programme, United Nations Environment Programme, and World Bank (2005). World Resources 2005: The Wealth of the Poor—Managing Ecosystems to Fight Poverty. Washington DC, US: WRI.
- World Wide Fund For Nature (WWF) (2008). Illegal wood for the European market. An analysis of the EU import and export of illegal wood and related products. http://assets.panda.org/downloads/illegal_wood_for_the_european_market_july_2008.pdf (accessed August 2008)

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