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Sustainable Land Use and Rural Development in Southeast Asia: Innovations and Policies for Mountainous Areas

Holger L. Fröhlich, Pepijn Schreinemachers, Karl Stahr, and Gerhard Clemens, eds.

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There is no promising way of sustainably farming sloping land in a market-oriented economy. Farmers are usually required to offer competitive prices and quality of agricultural products in order to survive in the market. That forces them to increase agricultural production, which in turn leaves them no choice apart from sedentary agriculture and land use intensification. Changes in farming system and land use usually entail degradation of sloping land, because in arable land the outflows of soil, its nutritional content, and water exceed their inflows. Preventing or mitigating land degradation, along with keeping products competitive, is the central problem in agricultural development. Although the issue seems to be straightforward, several factors—from a range of ecological to cultural settings—are intricately tangled. This is likely to be one of the reasons why many agricultural development projects have not been as successful as expected. This volume is a result of the Uplands Program, which is an agricultural development project in northern Thailand and northern Vietnam to help solve the problem.

The objectives of this volume as outlined in Chapter 1 are as follows: first, to investigate drivers, consequences, and challenges of change mainly in land use and agricultural intensification; second, to describe how technology-based innovation processes can address the challenges; and third, to describe how knowledge creation can support changes in policies and institutions. The volume is divided into four parts, an introduction followed by one part for each of the objectives: Part 1, "Overview and Synthesis"; Part 2, "Environmental and Social Challenges"; Part 3, "Technology-Based Innovation Processes"; and Part 4, "Policies and Institutional Innovations."

This project assumes that four drivers of change from traditional swidden cultivation to permanent field cultivation, mainly cash crops, are: economic development, policy change, introduction of new technologies, and population growth. As a result, as discussed in Part 2, mainly due to annual cash crop cultivation, soil erosion increases and pesticide-contaminated water runs off to

the valley bottom (Chapters 3 and 4). In other words, sloping land is becoming a region where crops do not grow, and the watershed is getting to be contaminated by pesticide. To keep the soil environment usable as arable land, appropriate soil management is necessary. So, Karl Stahr *et al.* examine methodologies for making soil maps at a low cost (Chapter 2). Camille Saint-Macary *et al.* confirm that poverty is associated with land degradation since poor people have limited capital to invest in long-term soil conservation (Chapter 5). In Part 3, techniques of appropriate water use in sloping land cultivation (Chapter 6), effective cropping systems for soil conservation (Chapter 7), and profitability improvement in aquaculture carried out at the bottom of the valley (Chapter 8) are examined. The authors conclude that, technically speaking, there is potential to improve the farming system on sloping land in a way that is compatible with soil conservation and an increase in income. In Part 4, the authors examine and develop numerical models that may be helpful in predicting farmers' responses to a decline in soil fertility and/or conservation activities (Chapter 10). In development studies and agricultural development research, the participatory approach has been thought to be a better way to transfer scientific knowledge and techniques to farmers than the top-down approach. However, the participatory approach has not worked as well as expected, and it is now widely recognized that the approach is inappropriate in some cases. In Chapter 9 Andreas Neef *et al.* analyze the failures of the participatory approach in Southeast Asia. Chapter 11 shows that an agricultural extension network is more responsive to the diverse needs of farmers than top-down extension. Although commercialization of agricultural products and agricultural intensification have increased farm productivity and farm income, farming in the uplands is getting to be unsustainable in the long term. The government needs to support upland farmers by making policies to mitigate risks stemming from changes in agriculture (Chapter 12).

Based on the facts outlined in each chapter, the editors conclude the following (p. 22): first, intensified land use systems in mountainous areas are characterized by substantial inefficiencies; second, various technological and social innovations are available to address certain challenges, but adaptation rates remain low; third, innovation processes are more successful when using, instead of a conventional top-down approach, a participatory approach that takes into account diversity in the demand for innovations and allows people to test innovations and adapt them to their needs; and fourth, as poor farm households face difficulties in benefiting from the agricultural commercialization process, it remains important for governments to implement policies promoting market development with programs that give targeted support to poor households.

We learn from this volume that smallholders living in mountainous regions still face difficulties participating in a market economy despite various technological innovations. In a subsistence economy, farming on sloping land could have been developed in order to conserve the environment and secure livelihoods such as nomadism, shifting cultivation, and other subsistence-oriented farming systems found in Asia, Africa, and South America. However, in countries where most people live in a market economy, it is not rare for mountainous regions to be evacuated and arable

land abandoned, as in the Pyrenees and Japan. People from mountainous regions often prefer to move to the lowlands and urban areas. In economically advanced countries, mountainous regions have become unfavorable places to live. It is uncertain whether mountainous areas in Southeast Asia remain places where people still choose to make a living when innovative technologies are available. Although agricultural development projects play a vital role in increasing the sustainability of land use in the mountains, we should recognize that sustainable land use does not necessarily mean sustainability of rural livelihood.

Most of the chapters mention that education for farmers is a prerequisite for adapting innovative technologies. Transferring scientific knowledge is vital for proper use of the technologies. For example, as mentioned in Chapters 3 and 4, it is important to learn about the effects of pesticide use on the environment and people's health. Even though education is unquestionably important for proper use of technologies, it might not be the only reason why adaptation rates remain low. Even if the participatory approach is used and farmers correctly understand the benefits brought about by technology, they are bound to consider their labor and capital availability, risks stemming from the technology, ease of local government procedures, market potential, etc., and then make a decision on whether to adopt, defer, or reject the technology. Rapid adoption of technology may not necessarily be the best answer for them. If a participatory approach can allow farmers to make their own decision on technology, even if that turns out to have an unsatisfactory result for rural developers and other involved actors, that would be a distinct difference from the top-down approach that farmers often have to give in to.

Risk aversion and mitigation might be central to the stability of a farmer's livelihood. Chapters 3, 4, 5, 8, and 9 describe a range of risks—from those familiar to farmers, such as floods, to new ones that accompany the introduction of new technologies, such as pesticides, and also the market economy. For risks stemming from the market economy, such as fluctuations of crop price, Saint-Macary *et al.* (Chapter 5) describe household strategies to diversify the income portfolio, as seen in other parts of the world such as Africa and South America. In addition, the contributors claim that risk aversion strategies prevent farmers from taking on challenges. Along with Manfred Zeller *et al.* (Chapter 12), they claim that government support for mitigating a range of risks associated with the market economy is essential. Although both household strategies and public services are key components of the challenges faced by farmers, the lack of analysis of informal networks may rankle among readers familiar with the rural situation in Southeast Asia. Sharing risks through the informal network plays a role in livelihoods and also migration. It would be good to have some studies on how the network has been changing—reflected in changes in social, economic, and ecological settings—and how the network influences development activities.

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