Preface

The following study was a collaborative effort between a team of Thai and international researchers to study the problem of shrimp farm expansion and mangrove loss in Thailand. To our knowledge, this is the first comprehensive study of economic, ecological and social causes and consequences of shrimp farm expansion and the corresponding impacts on coastal mangroves in any country of the world.

Such study is long overdue. In recent decades scientists, mainly ecologists, have been alerting the global community to the problem of mangrove deforestation in tropical regions. The main activity thought to be responsible for the conversion of mangroves is the expansion of shrimp aquaculture production. In turn, the widespread destruction of mangrove ecosystems has entailed the loss of important ecological resources and services, including the role of mangroves in stabilizing shorelines, as storm barriers and as breeding grounds and nurseries for offshore fisheries.

However, mangrove deforestation due to shrimp farm expansion is not just an ecological problem but also an economic one. Shrimp aquaculture is a very profitable financial investment and generates substantial export earnings. This is particularly welcomed in developing countries. For example, Thailand is currently the world's leading exporter of cultured shrimp, which generates annually US\$1–2 billion in foreign exchange. On the other hand, the loss of mangroves and other external costs, such as the release of untreated wastewater, generate substantial environmental damages. The financial gains to private investors, as well as the export earnings to the country, may therefore over-state the economic gains from shrimp farming.

Mangrove loss is also a social problem. In many tropical countries, and certainly in Thailand, a significant number of local communities in coastal areas have always lived and thrived among the mangrove forests. The resources and ecological functions of these forests are not only valuable to the economic livelihoods of many communities but are also important to their culture and social institutions. It is these communities that bear the burden of the ecological, economic and social consequences of the widespread loss of mangrove forests due to shrimp farm expansion.

The following study was conducted from July 1999 to January 2002, funded by the Population, Consumption and Environment Initiative of the Program on Global Security and Sustainability, of the John D. and Catherine

T. MacArthur Foundation. The research involved both an international collaborative effort and interdisciplinary cooperation. There were many ways in which we could have approached this task. In the end, we decided on a two-dimensional approach. The first dimension involved providing some idea of the problems posed by shrimp farm expansion and mangroves loss at the global, national and local level. The second dimension was to go beyond just an economic analysis of these problems to provide some indication of the ecological and social aspects as well. With these two dimensions in mind, we structured the chapters of the study in the following way.

Chapter 1 provides an overview of the global problem of mangrove loss, as well as an empirical analysis of a cross-section of 89 countries containing mangroves to assess the extent to which mangrove deforestation worldwide is associated with expansion of aquaculture production and primary sector (agricultural) activities more generally.

Part I of this study focuses on shrimp farm expansion and mangrove conversion at the national level in Thailand. As noted in Chapter 2, in Thailand the loss of mangrove forests has meant the subsequent decline of important ecological services, especially to local coastal communities. Chapter 3 provides an overview of the scale of mangrove loss as well as shrimp farm expansion in Thailand over the past 35 years, with emphasis on the recent trends since 1989. To shed light on the role of the profitability of shrimp farming, as well as other economic factors, in determining both mangrove deforestation and shrimp farm expansion in Thailand over the critical 1979–96 period, Chapter 4 provides an in-depth empirical analysis of mangrove conversion in Thailand's 21 coastal provinces.

Part II switches the focus to detailed analyses of shrimp farm expansion, mangrove conversion and the resulting impacts on local communities in four representative case study sites, two from Nakhon Si Thammarat Province on the Gulf of Thailand and two from Phang-nga Province on the Andaman Sea coast. Chapter 5 provides the ecological, historical and social background to the four case study sites. Chapter 6 analyzes more extensively the consumption behavior of households in the four case representative village sites, and in particular the dependence of household income and consumption on local mangroves. Both Chapters 6 and 7 examine whether the degree of mangrove dependency of households in the case study sites influenced their willingness to participate in mangrove conservation, such as replanting activities. Chapter 8 investigates the extent to which the degree of the dependence of a household on local mangroves for income, as well as the loss of that forest, may affect the household's decision to seek outside employment. Chapter 9 examines more broadly the development of shrimp farming in Muang and Pak Panang Districts, Nakhon Si Thammarat Province and Takua Thung and Muang Districts, Phang-nga Province, utilizing surveys of representative samples of

shrimp farmers from these two districts. Chapter 10 is an institutional analysis of the willingness and capability of stakeholders, consisting of both governmental officials and local communities, in effectively conserving the mangrove forests in the vicinity of the four case study sites. The chapter also examines whether appropriate laws and policies exist to provide the right incentives and an effective system of checks and balances for mangrove conservation and sustainable management. Finally, if there is to be a change in governmental policy towards mangrove management, then the impetus for this policy change may arise from the recognition that the economic benefits of mangroves to local communities may be substantial, and could possibly even outweigh the returns to intensive shrimp farming that lead to mangrove conversion. To address this issue, Chapter 11 assesses the local economic benefits of mangroves and compares them to the net returns from converting the mangroves to shrimp farming, using the example of Tha Po Village, Kanjanadit District, Surat Thanni Province on the Gulf of Thailand.

Part III provides the conclusion of this study on mangrove conversion and shrimp farming in Thailand. Chapter 12 summarizes the main findings of the study, and offers a number of policy recommendations for improving the institutional and incentives framework for managing this problem. We also examine the implications of our conclusions and policy recommendations for other countries promoting the rapid development of their shrimp aquaculture industry.

Finally, the editors and chapters authors who participated in this study would like to express our appreciation to a number of institutions and individuals who assisted us in our work. As mentioned above, the study was made possible through funding by the Population, Consumption and Environment Initiative of the John D. and Catherine T. MacArthur Foundation (Grant #98-55147-GSS). We would like to express our gratitude to the MacArthur Foundation and the PCE Initiative Director, Dr Anu Kumar, for their support.

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Map of Thailand indicating Phang-nga and Nakhon Si Thammarat provinces