

PREFACE

Irreversible changes to regional biogeophysical processes and biogeochemistry, and terrestrial and marine ecosystem functioning brought about by increases in population, intensified land use, urbanization, industrialization and economic development may have global as well as regional consequences. Similarly, global changes have a significant impact on sustainable development at both regional and national levels.

The Earth System Science Partnership has recently identified Integrated Regional Studies as an important component of global change research. These studies are designed to contribute sound scientific understanding to support sustainable development at the regional level. They will assess the influence of regional processes on the Earth System functioning and vice-versa, and integrate the natural and social sciences. The regional studies must have relevance for people living in the regions and provide for the sustainable development of atmospheric, marine, terrestrial and human resources of the countries in the regions. The Integrated Regional Studies will include vulnerability analyses, identification of risks and the syndromes of environmental degradation which are crucial for sustainable development.

The key issues will include considerations of what the region will be like in ~50 years' time and the consequences of global changes for the region. The studies will consider (i) major demographic, socio-economic, and institutional drivers for change, including urbanization and industrialization, energy production and biomass burning, land use change and water resources harvesting, (ii) effects on regional and atmospheric composition, the regional water cycle and coastal systems, and local ecosystem structure and function, (iii) impacts on biogeochemical cycles and the physical climate system, and (iv) impacts of global and other feedback effects on the regional life support system, including food supply, water resources and health.

A regional approach to research is also important from an Earth system science perspective, because changes in regional biophysical, biogeochemical and anthropogenic components may produce considerable different consequences for the Earth system at the global scale. Regions are not closed systems and thus the linkages between regional changes and earth system are crucial. Regions may function as choke or switch points and small changes in a critical region may lead to profound changes in the ways in which the earth system operates.

The region of monsoon Asia has been identified as one of the priorities for an Integrated Regional Study by the Earth System Science Partnership. To provide the knowledge base of such a study, the global change System for Analysis, Research and Training (START) in collaboration with the Scientific Committee on Problems of the Environment (SCOPE)/ICSU has developed a rapid assessment project to evaluate the progress of global change research in the Asian region. The project systematically reviewed current knowledge regarding regional aspects of global change, in order to highlight gaps in knowledge and uncertainties, and define research priorities for the regional study. This book presents part of the results of that study. It provides a state-of-the-art summary of what we already know, and serves as a basis for identifying knowledge gaps that require study, including critical field experiments.

The book follows SCOPE's Rapid Assessment Project approach. Background chapters were prepared by experts from the region, then circulated within the author group and peer-reviewed in advance of a Dahlem-type workshop held in Hangzhou, China. During the workshop, groups examined crosscutting issues, and identified future research needs. This book is published as the first in a series of rapid assessments of global change research in Asia. The aim is to make sure that recent advances in the field of regional change are summarized, and their possible significance in understanding problems and potential solutions are discussed.

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