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Mangrove Dynamics and Management in North Brazil

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Foreword

Sheltered coastal marine and estuarine areas in the tropics are the sites of mangrove communities: highly productive systems that provide a variety of essential ecosystem services, including (1) processing of organic matter transported in run-off waters, (2) coastal protection against erosion, and (3) reproduction sites for a large array of marine and estuarine fauna. Scientific studies of mangrove ecosystems throughout the world have a long history, and as a result, we understand much of their ecology and physiology.

Presently, those systems are heavily impacted by human activities that have surpassed their tolerance limit. The impact derives from the increasing size of coastal cities and expansion of port services, and the large amount of human and industrial waste dumped into the rivers that feed coastal ecosystems with fresh water. Furthermore, the impact of sea level rise has to be included in the analyses of stability and maintenance of mangrove ecosystems.

The biotic productivity of mangroves provide food and other resources to the human populations that inhabit or make use of them. Intensity of human use is also increasing, approaching in some cases the limits of biological resources renewal. In order to develop sensible and effective management strategies leading to conservation of mangroves ecosystems services and maintain their productive capacity, it is necessary to integrate the local human populations depending on mangrove ecosystems for their subsistence.

Integrative studies of tropical ecosystems are essential to achieve conceptual advances in the understanding of their structure and function and to prepare for the impact of global change on ecosystems services. However, they constitute a technical and organizational challenge. Projects of this type need to be planned at a large scale and to develop over several years in order to produce meaningful and reliable results.

The study of coastal systems is particularly demanding within this context as they involve not only the complexities of natural systems but also a vast range of human interactions. Coastal regions are historically preferential sites for human occupation, and tend to be heavily populated, constituting the center of vigorous

economic activities. As a result, coastal ecosystems are also strongly impacted, being in many cases irretrievably destroyed.

The MADAM project was conceptualized as such an endeavor on one of the largest continuous mangrove areas in the world, the Amazonian ecoregion located in the tropical eastern South American coast, comprising an area of more than 23,000 km^2 (Sullivan Sealy and Bustamante 1999). It became a success story regarding the scale of the coordination required, its multidisciplinary and transdisciplinary character, and the integration of natural and social sciences, which produced a functional picture of the mangrove ecosystems in the coast of Pará State in Brazil. It has also been a model of how to develop international cooperative projects, in this case the cooperation of Brazil and Germany, leading to a productive and long-lasting investment in development of human resources.

The MADAM project has produced a large body of scientific information, as shown in the syntheses included in this book, but the most important result has been the sizable number of students influenced and educated within the project in both countries. In addition, and no less important, there has been the educational impact of the project on the local populations in many places along the Caeté River, where the project was centered for more than 10 years.

Beyond the scientific results, this book also provides information, guidelines, and examples on how to organize and develop multidisciplinary, international projects that lead to sensible and reliable management approaches for coastal systems conservation and ecologically sound use.

E. Medina

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Part VII Mangroves and People

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