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F.V. Wulff L.A. Rahm P. Larsson (Eds.)

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# A Systems Analysis of the Baltic Sea

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With 151 Figures, 6 in Color, and 60 Tables



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# Preface

During recent decades, it has become apparent that human influences on aquatic ecosystems are no longer restricted to freshwater and marine coastal regions, but are affecting entire seas like the Baltic and Mediterranean. Widespread anoxia in deep water and sediments, increased sedimentation and massive plankton blooms are some effects caused by large-scale processes.

Eutrophication, caused by increased inputs of nutrient or organic matter to the sea, is the ultimate process behind many of these changes. Other effects, like disturbed reproduction in marine mammals and predatory birds, are caused by toxic substances. An important group of these compounds are the persistent organic pollutants (POP), like PCBs, DDTs and HCHs. The effects of nutrients and POP have been documented on a long time scale in the Baltic Sea, not only locally, but also in the large, open sea areas.

Nutrients and POP have at least one factor in common. In order to take measures, it is vital to identify the sources and transportation pathways. Budget calculations and identification of the important physical and biogeochemical pathways that control the observed distributions of nutrients and some selected toxic compounds have also been the prime objectives of the studies presented in this book. Many of the articles presented here stem from studies funded by the Swedish Environmental Protection Agency in a project called "Large-scale Environmental Effects and Ecological Processes in the Baltic Sea". Additional funding agencies in Sweden and from the European Union, which are acknowledged in the separate chapters of the book, have also contributed.

We have deliberately not described in detail the effects of eutrophication and persistent toxic pollutants on the biota in the Baltic. They are well known, at least qualitatively. Less is known quantitatively about the underlying causes behind the changes that have occurred. This book is highly interdisciplinary and uses a systems approach for analysing and describing this ecosystem. Budgets and dynamic simulation models in the book are supplemented by extensive reviews, where our understanding is

validated against the extensive field studies available for this, maybe, most intensively studied marine area in the world.

We hope that this book will serve as a valuable reference as well as provide an understanding of the large-scale dynamics of the Baltic Sea. Hopefully, our scientific approach will be valuable to researchers challenged with understanding the causes behind changes that have occurred in other marine ecosystems.

December 2000

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