

INTRODUCTION

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San Francisco Bay and Delta, one of the world's largest estuarine systems, profoundly influences and enhances the economic, climatic and aesthetic quality of the surrounding urban-suburban region to the great benefit of its 5 million inhabitants. With its strategic location on the coast of central California and its huge natural harbor, San Francisco Bay serves as a major center for commerce and industry and as a gateway to the Far East. Its Mediterranean climate and beautiful setting attract people from around the world both to visit and to establish residence. The estuarine system itself is a natural habitat for fish and wildlife and as such provides abundant quantities of edible fish and shellfish and supports a wide variety of water-oriented recreation.

With the progress of its energetic urban-suburban society, however, have come major changes to the estuarine system. The Bay and Delta have been heavily modified by man since the arrival of the Argonauts in the mid-19th century. As the margins have been filled and diked, the overall size of the Bay and Delta has greatly shrunk. The result has been the loss of wildlife habitats and a reduction of tide-related flushing, which in turn has led to progressive deterioration of the quality of Bay waters. Water-quality degradation from wastes discharged by a rapidly growing population has undoubtedly altered the indigenous ecosystem. Unfortunately, growing demands to reduce or eliminate waste discharges have been accompanied by the reduction, through massive diversions of river inflow, of the ability of the system to flush itself naturally.

In response to environmental concerns during the last few decades, legislative committees have agreed that this estuarine system should be protected against further indiscriminate and unrestrained exploitation. These committees and subsequent Federal and State legislation have mandated that sound plans for long-term intelligent and rational management of this valuable resource be formulated and implemented. There is, unfortunately, little scientific data on which to base these plans. Our knowledge of the complex physical, chemical, biological, and sedimentological estuarine processes is relatively primitive. This is surprising, considering the importance and irreplaceable nature of the system, the magnitude and cost of the public works already built or in the planning stages, and the demands and standards imposed by environmental and regulatory agencies.

Our purpose in this volume is to summarize in individual chapters our knowledge of the natural processes that contribute to the maintenance of the estuary as we see it. These discussions include, of necessity, some emphasis on the influence of man. Half of the chapters were presented during the course of a symposium, sponsored by the Pacific Section of the American Society of Limnology and Oceanography, held at San Francisco State University, 13 June 1977. Because of the enthusiasm generated by this symposium, papers covering additional topics were solicited for inclusion in this enlarged volume.

We attempted to be as comprehensive as possible, bringing together reports dealing with the many interrelated aspects of estuarine research ongoing in San Francisco Bay and Delta. The chapters vary in their content: some are summaries of established published and unpublished work, others are syntheses of our knowledge of a given topic, and still others are research papers reporting results of promising ongoing research. It is our hope that this volume will serve as a timely and useful reference for those planning and conducting estuarine research and as a status report for legislators, planners and coastal-zone managers.

This contribution is the work of many dedicated persons. I thank the contributors, who

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