

# National Estuarine Pollution Study

EUGENE T. JENSEN

*Office of Estuarine Studies  
Federal Water Pollution Control Administration  
Washington, D. C.*

## Abstract

The Clean Water Restoration Act of 1966 directed that the Secretary of the Interior make a comprehensive study of the effects of pollution on the beneficial uses of the estuaries. The Act directed further that the report of the study, to be submitted to the Congress in November 1969, include recommendations for a "comprehensive national program for the preservation, study, use and development of estuaries of the Nation, and the respective responsibilities which should be assumed by Federal, State and local governments and by public and private interests." The Federal Water Pollution Control Administration has established an Office of Estuarine Studies to carry out this Congressional directive.

This paper will describe the methods to be used in the conduct of the study and will stress the need for effective input from the interested institutions and organizations. Input for the project will be obtained through direct consultation with interested agencies including other agencies of the Department of the Interior, other Federal Departments, State and Interstate organizations and institutions, national organizations and individuals. Public hearings will probably be held in each coastal State to help assure opportunities for communications. Contracts will be used to support studies in socio-economic values, ecology, research needs and specific pollution problems. Some supplemental investigations will be undertaken by the Federal Water Pollution Control Administration.

THERE HAS BEEN a growing awareness in recent years of the unusual values of estuaries. This awareness is reflected in several recent actions of the Congress as, for example, the estuarine amendment to the Federal Water Pollution Control Act contained in the Clean Water Restoration Act of 1966 and the hearings on H.R. 25. The scientific and engineering societies have also stressed this value in the Conference on Estuaries supported by the American Association for the Advancement of the Sciences, the Symposium on Estuarine Fisheries presented at the 94th annual meeting of the American Fisheries Society and the National Symposium on Estuarine Pollution supported by the American Society for Civil Engineering. The California State Legislature's establishment of the San Francisco Bay Conservation and Development Commission demonstrates this interest at the State level. Also, innumerable papers have been presented at recent meetings of various technical societies and conservation organizations. Collectively these actions demonstrate the growing public awareness of the great values of the estuaries and of the strong economic and social ties between these land-water systems and nearby communities.

The Congress in 1966 passed landmark legislation directing the Secretary of the Interior to undertake a major study of the values of estuaries to our Nation and to recommend to the Congress a system for the preservation, use, development and conservation of these areas. The text of the appropriate section of the Clean Water Restoration Act follows this paper.

Section 5(g) of the Clean Water Restoration Act of 1966 (P.L. 89-753) directs that a comprehensive study be made of the effects of pollution and of various use trends on beneficial uses of the estuaries. The Act instructed that the project be undertaken by the Secretary of the Interior in cooperation with the Secretary of the Army, the Secretary of Agriculture, the Water Resources Council, and with other Federal, State, interstate, and local agencies, private organizations, institutions and individuals. In short, Congress has directed that the broadest possible public base be obtained to support the final recommendations of the report.

For purposes of the Act the terms "estuary" and "estuarine zone" were defined as follows: "Estuarine zone" means an environmental system consisting of an estuary and those transitional areas which are consistently influenced or affected by water from an estuary, such as, but not limited to, salt marshes, coastal and intertidal areas, bays, harbors, lagoons, inshore waters and channels. The term "estuary" means all or part of the mouth of a navigable or interstate river, stream, or other body of water having unimpaired natural connections with open sea and within which the sea water is measurably diluted with fresh water derived from land drainage. There have been extended scientific discussions as to the proper definition of the term "estuary." A strong argument can be made for new language to properly define the complex land-water-interface system now described as an "estuary" or "estuarine zone." Certainly the estuary is much more than water. It is much more than land. It is, in fact, a combined interacting system of land and water, and of the plants, animals, minerals and energy sources which are associated with these combined physical resources.

The legislation is explicit in directing that the study include such factors as fish and wildlife, recreation, water supply and water power, demographic trends, the exploitation of mineral resources and fossil fuels, land and industrial development, navigation, flood and erosion control, and other uses of estuaries and estuarine zones. In the conduct of this study the Secretary is directed to assemble, coordinate, and organize all existing pertinent information on the Nation's estuaries and estuarine zones; carry out supplemental investigations in representative estuaries; and to identify problems and areas in need of further research and study. In general, Congress has recognized that an enormous body of technical literature already exists and that our immediate efforts should be directed toward organizing and analyzing this wealth of information.

Finally, the Act directs that the Secretary submit the report to the Congress within three years after enactment, i.e. by November 1969. This report is to include recommendations for a comprehensive program for preservation, use and development of estuaries, and is to give appropriate consideration to the respective responsibilities of Federal, State and local governments, and of public and private interests. In developing these recommendations the Secretary is directed to include an analysis of the economic and social significance of estuaries and of the effects of pollution on beneficial uses, and a discussion of economic, social and ecological trends in estuarine zones. Copies of the report are to be made available to all interested parties.

The broad language of the estuarine study directive provides an unparalleled opportunity for agencies, organizations and individuals to contribute to the development of a rational estuarine management plan which can be recommended to the Congress for its consideration. Certainly the scientists can make

a positive contribution to the development of a system to assure that our unique estuarine resources are preserved and utilized as a national heritage.

To meet the November 1969 deadline the Federal Water Pollution Control Administration must complete the assembly of a major portion of the necessary data by January 1969. Preliminary working data from Federal and State agencies and from other interested organizations should be available by January 1968.

Assistant Secretary of the Interior, Frank C. Di Luzio, speaking before the National Symposium on Estuarine Pollution at Stanford University on August 23, 1967, said, "We will not wait until 1969 to use facts gathered in the study. By the end of the first year of the study we hope to be able to identify our most threatened estuaries and to recommend immediate action by Congress or Federal agencies to halt destruction."

A series of working hypotheses has been adopted as a framework for this study, based on personal knowledge and experience; information presented at hearings on H.R. 25; information presented at recent estuarine conferences; current literature; and individual discussions with persons broadly experienced in estuarine management and use.

- (1) *Estuaries have high economic and social values.* Studies conducted by Florida State University of the oyster resources of Apalachicola Bay, and by the University of Rhode Island of Narragansett Bay have helped to confirm the high economic values of the estuaries, particularly to the adjacent communities. Social values are somewhat difficult to describe but are in general reflected in such slogans as "Chesapeake Bay, Land of Pleasant Living" and in the advertisement of the North Carolina Department of Conservation and Development in the Wall Street Journal, September 6, 1967. The ad stated in part "and should you tire of fishing there are miles and miles of clean uncrowded beaches to explore or relax on. Plus vast rivers and sounds for boating. So if you are looking for a good place to mix business and pleasure, the State of North Carolina is a great place to do it."
- (2) *Optimum public return depends upon water quality and land-use.* These two elements must be controlled jointly and in harmony if optimum public return is to be obtained. The Water Quality Standards provisions of the Federal Water Pollution Control Act which are currently being implemented, represent a great forward step in the control of water quality. The need to control land-use and physical modification of estuarine systems is also adequately documented.
- (3) *There will be an increasing demand for multiple use.* Industry is growing in size, in complexity and in individual plant sizes. The population is growing in number, in mobility, and in the amount of available free time. Inevitably there will be conflicts in use demands, and inevitably we must apply maximum multiple use concepts.
- (4) *There will be a continuing need for an articulated research program.* It is most unlikely that we will, in the foreseeable future, reach a point where we no longer need research on our estuarine resources—unless we fail in our efforts to preserve and protect this resource. Research must be concerned equally with both hard and soft sciences and with the legal constraints placed upon management practices. We must be

- concerned with providing physical facilities as well as with specific programs and projects.
- (5) *Management will require a partnership of Federal, State and local government.* Local communities are most directly affected by decisions on estuarine use. On the other hand, local decisions may be strongly influenced by local pressures and may not give adequate weight to the regional or national values of these water areas. For example, the estuaries of the Gulf of Mexico are an important link in the life cycle of the shrimp—a food which is sold and enjoyed throughout the Nation. It is quite evident that the Federal-State-local partnership has a place in estuarine management partnership applied so successfully to our forest resources.
  - (6) *Estuaries must be considered in relation to their immediately tributary watersheds and to the continental shelf.* Water in an estuary, and at times the sediments and pollutants, is derived both from the watersheds and from the adjacent ocean areas. In turn, the waters moving from the estuaries into the ocean may influence the ocean resources. There is no simple mechanism or reason to consider the estuary as entirely separate from either the oceans or the rivers. Yet it is equally important to recognize the estuary as neither ocean nor river and to acknowledge these restrictions in our management approach.

Fulfillment of the legislative responsibilities will require the assembly and organization of data covering a wide range of scientific and geographic areas. For example:

- (1) Descriptive information on the extent of the resource. Specifically we shall need information on the numbers of estuaries, on the present quality of the water, on the use of both the estuary itself and the immediately adjacent land areas, and on the institutional controls which are currently exercised; for example, is an estuary intercounty, interstate or international?
- (2) The effects of pollution or modifications of the estuary on the beneficial uses thereof.
- (3) The extent to which various industrial, power generation and population trends effect pollution. For example, the current revolution in the power generating industry has the technical capability of increasing water temperatures in even relatively large estuaries to a point which may interfere significantly with other beneficial uses. This development simply reflects the ability to construct extremely large power stations and to transmit electricity over great distances.
- (4) We must have information on the effects of pollution on both the economic and social values of the estuary. The previously mentioned Florida State University study of the Apalachicola oyster industry is an excellent example of the community return that can come from effective waste treatment.
- (5) Finally, and probably most important, we shall need to have the views and opinions of a great many organizations and people on our future research and study needs and on the institutional systems which we might recommend to the Congress for adoption as a basis for the future management of the resources.

Data required for the project can be obtained through three distinct channels—consultation, contracts and field studies.

Agencies of the Federal and State governments, private organizations and many individuals have a great stock of knowledge of present estuarine problems. Their views on management techniques are needed. To provide the mechanisms for obtaining this information the Secretary of the Interior has informed the heads of the other interested departments and independent agencies of the project and has asked their cooperation in collecting the necessary information. All have responded, and arrangements are going forward whereby they will provide the Federal Water Pollution Control Administration with information from their files which will be useful to the report. The Secretary has also written to the Governors of the coastal States and Territories, informing them of the project and requesting their assistance in the study. The Governors have, with one exception, responded and have designated their agency representatives to work with the Federal Water Pollution Control Administration. The Secretary was careful to point out to the States that the study deals with the broadest aspects of estuarine utilization and is not concerned solely with pollution problems.

Private organizations including conservation entities, industrial organizations such as the National Security Industrial Association, and special interest groups such as the General Federation of Women's Clubs have been informed of the project and their advice and counsel solicited. Already we have received favorable and very useful replies from several of these. The Act directed that individuals also be given an opportunity to participate in this project. Public meetings to be held in the coastal States and Territories will probably be chaired jointly by State and Federal agencies and will give individuals, local organizations and institutions an opportunity to present data and ideas.

Contracts will be negotiated with Universities, private industries and Government agencies to develop information in such areas as socio-economics, ecology, sedimentation, legal constraints and system analysis. Three such contracts were negotiated during the past fiscal year and others have been proposed for the current fiscal year. However, the budget process is not moving on schedule and it is difficult to predict the final outcome for FY-1968. We do not expect to be able to undertake a substantial number of direct field studies of estuarine utilization problems. Such projects should ordinarily extend over a substantially longer time than is available for this project.

Finally, we anticipate making maximum use of the data already available through the many field studies which have been undertaken by the Federal Water Pollution Control Administration, State agencies and others who are intimately involved in estuarine resources use.

Federal Water Pollution Control Administration initiated the estuarine project in March of this year with establishment of its Office of Estuarine Studies. Several months were utilized in developing an approach to the problem and obtaining the necessary project clearances with the organization. Other agencies and organizations were informed of the types of information needed, and data have now started to flow. A series of contracts dealing with the socio-economic studies has been negotiated and other project proposals have been developed. The Federal Water Pollution Control Administration Regional Offices have initiated the collection of data for the National Estuarine Inventory. The project is therefore essentially on schedule at the present time.

There are evident relationships between the project and the Gulf and Caribbean Fisheries Institute and its members.

- (1) Most members of the Gulf and Caribbean Fisheries Institute are directly involved in some aspect of estuarine management or resource utilization, either in government or industry. In these capacities they will have many opportunities to inform the Federal Water Pollution Control Administration of available information. Comments and ideas may be submitted directly through appropriate agency channels, or through public meetings which will probably be held in the various coastal States.
- (2) The Institute may wish to establish a working committee to develop specific recommendations to the Federal Water Pollution Control Administration, particularly with respect to management systems and to research and study needs.

Congress has provided marine scientists an unparalleled opportunity to contribute to the development of a national estuarine management program. It is our responsibility, both as an organization and as individuals to respond to this challenge. If we do not respond or if we do not respond adequately, the Nation will have been deprived of a valuable source of technical advice, and the professional societies will have failed in one of their most important objectives.

The Clean Water Restoration Act of 1966 (PL 89-753) amends Section 5 of the Federal Water Pollution Control Act in order to improve and make it more effective. The text of PL 89-753 follows:

"(b) Section 5 of such Act is amended by adding at the end thereof the following new subsections:

"(g) (1) The Secretary shall, in cooperation with the Secretary of the Army, the Secretary of Agriculture, the Water Resources Council, and with other appropriate Federal, State, interstate, or local public bodies and private organizations, institutions, and individuals, conduct and promote, and encourage contributions to, a comprehensive study of the effects of pollution, including sedimentation, in the estuaries and estuarine zones of the United States on fish and wildlife, on sport and commercial fishing, on recreation, on water supply and water power, and on other beneficial purposes. Such study shall also consider the effect of demographic trends, the exploitation of mineral resources and fossil fuels, land and industrial development, navigation, flood and erosion control, and other uses of estuaries and estuarine zones upon the pollution of the waters therein.

"(2) In conducting the above study, the Secretary shall assemble, coordinate, and organize all existing pertinent information on the Nation's estuaries and estuarine zones; carry out a program of investigations and surveys to supplement existing information in representative estuaries and estuarine zones; and identify the problems and areas where further research and study are required.

"(3) The Secretary shall submit to the Congress a final report of the study authorized by this subsection not later than three years after the date of enactment of this subsection. Copies of the report shall be made available to all interested parties, public and private. The report shall include, but not be limited to—

"(A) an analysis of the importance of estuaries to the economic and social well-being of the people of the United States and of the effects of pollution upon the use and enjoyment of such estuaries;

"(B) a discussion of the major economic, social, and ecological trends occurring in the estuarine zones of the Nation;

"(C) recommendations for a comprehensive national program for the preservation, study, use, and development of estuaries of the Nation, and the respective responsibilities which should be assumed by Federal, State, and local governments and by public and private interests.

"(4) There is authorized to be appropriated the sum of \$1,000,000 per fiscal year for the fiscal years ending June 30, 1967, June 30, 1968, and June 30, 1969, to carry out the purposes of this subsection.

"(5) For the purpose of this subsection, the term 'estuarine zones' means an environmental system consisting of an estuary and those transitional areas which are consistently influenced or affected by water from an estuary such as, but not limited to, salt marshes, coastal and intertidal areas, bays, harbors, lagoons, inshore waters, and channels, and the term 'estuary' means all or part of the mouth of a navigable or interstate river or stream or other body of water having unimpaired natural connection with open sea and within which the sea water is measurably diluted with fresh water derived from land drainage."