ESTUARIES: A NEGLECTED RESOURCE COMPLEX

By Dr. Stanley A. Cain*

You are familiar with our estuaries--where fresh and salt water intermingle--and you know that they have been largely neglected. This is attested by your efforts to preserve some of them in a natural state. I wish, therefore, to emphasize the other words of the title, that estuaries are natural resource complexes. The key word is "complex."

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In general we have tended to think of natural resources as single entities: coal, petroleum, copper ore; air, water, and soil; crop plant and livestock varieties; ducks, deer, bass and other fish and wildlife species; lumber, paper pulp, and other forest products; land as open space, building lots, and sites for roads and airports.

We know that things, conditions, and natural processes in the environment are counted as resources when we have the capability of turning them to human use or meaning.

We are only beginning to learn that our taking from nature, gradually or suddenly, affects nature more than by simple subtraction, and that the byproducts and wastes of our actions, when added to the environment, do something more than simple addition.

Long before man's arrival on this earth, the elements of nature were in constant interaction. This interaction continues, but on a distorted basis, for man has entered the picture. He adds here, subtracts there. He diverts, changes, improves, destroys. Individually, a man's effect on nature's rhythm may be minor. Collectively, however, it can and often is catastrophic.

Let us look at these facts:

. . . Resources interact with nature
. . . Men can and do use resources in wid ly different ways
. . . Resources are extremely complex, e isting in mixtures and blends

Man, individually and collectively, change an ingredient here, alters a cycle there--and it is clear that the concoction he has cooked up is far different from what nature would b otherwise. The result often becomes unpalatable--in fact sometimes downright poisonous--to him and certainly to nature.

The interference with the complexities of nature can be illustrated by considering our forest, grasslands, and deserts; our oceans, lakes, and streams.

Remarkable World of Estuaries

And estuaries are outstanding examples of such complexes. Here the fresh waters o streams meet the salt waters of the sea, bound on the landward side by the limit of tidal and wave influences and seaward by off shore bars and open ocean. Everywhere within, it is a maze of stream and tidal chan nels, bottoms of peat and muck, silt and sand and patches, islands, and peninsulas of mar and salt-tolerant brush.

Estuaries are a happy land, rich in the nutrients of the continent itself, stirred by the forces of nature like the soup of a Frenc chef; the home of myriad forms of life from bacteria and protozoans to grasses and marc mals; the nursery, resting place, and refuge of countless species whose urges cause them to migrate or to seek varying habitats for youth, maturity, and old age.

And estuaries are an unhappy land becaus of pollution, dredging, and filling, and a

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Fig. 1 - An estuary in Florida's Everglades National Park. (Photo by M. Woodbridge Williams, National Park Service)

of [illegible] things that man does to alter and dee[illegible]y them.

[illegible]ery day there are more of us with concer[illegible]or the quality of the environment and the[illegible]y that we manage our natural resources. W[illegible]ve been labeled. We are the "conservat[illegible]sts." It is a good label in many ways, bu[illegible]s not a precise one because of the very co[illegible]exities I have mentioned and because co[illegible]rvation has become a movement.

[illegible]e most popular movements, conservati[illegible]as had its slogan makers. James Bryant[illegible]onant, when President of Harvard University, said in a baccalaureate address in 19[illegible]

"Slogans are both exciting and comforting, but they are powerful opiates for the conscience. . . . Some of mankind's most terrible misdeeds have been committed under the spell of certain magic words or phrases."

In the resources field, "multiple use" has been one such rallying cry. Only a few months ago the President of a State Chamber of Commerce, in arguing against a suggestion that polluters be taxed, said that pollution of a stream was one of its multiple uses.

Definitions in the conservation field, as in other movements, become catch-words that do do not really define but only express general and pious notions. One of the oldest goes like this: Conservation is the use and management of natural resources for the greatest good of the most people over the longest time. This is is frequently abridged to: Conservation is the wise use of natural resources.

There is an easily recognized good intention in the language of these definitions. The meaning does not have to withstand economic or political analysis as long as a problem remains generalized. One does not, as a conservationist, have to determine what is the "greatest good" in terms of alternate "goods" or of various possible combinations of consequences of actions that may be more or less "good." One does not have to decide whether what is deemed "good" by most people does in fact produce a social cost for all people, a

personal loss for some people, or a combination. A concern for the future, which is having something "good" over the longest time, does not necessarily help solve an immediate problem. All such questions remain open, as they do when we say that conservation is wise use of natural resources, because the slogan does not tell us what wisdom is.

There is an element of utopianism in conservation at the slogan level and I think in actuality.

Our awakened devotion to natural beauty and a society's greatness has Olympian aspects. That the gods differed on Olympus is not entirely beside the point!

As soon as we move from Olympian words and sloganeering words to action, when we move from being conservationists to being conservators, we enter a more complex and difficult world where good will is not enough and where there are "good wills" on a conflict course. And we move from philosophic heights to dollar-and-cents facts. And the dollars are not all-out theoretical to your concern for the protection of salt marshes.

Let us look at some of the estuarine valu that are being destroyed. A salt marsh in Massachusetts--that is, a healthy one--ca produce a harvestable crop of protein-ric seafood worth $300 an acre annually. This about equal to the fish farm ponds of the M dle West, and both far exceed the productio of the best cattlelands of the western gras lands.

Estuaries Important to Commercial Fishermen

During a recent 10-year period along th North Atlantic coast, commercial finfish lan ings averaged 1.6 billion pounds, and shell fish landings were 107 million pounds, for monetary value of about $90 million. A lar percentage of these fisheries depends on e tuaries because the species spend at least part of their life in them. This is clear fo shellfish and crustacea. It is probably less well known for many species of finfish. Me

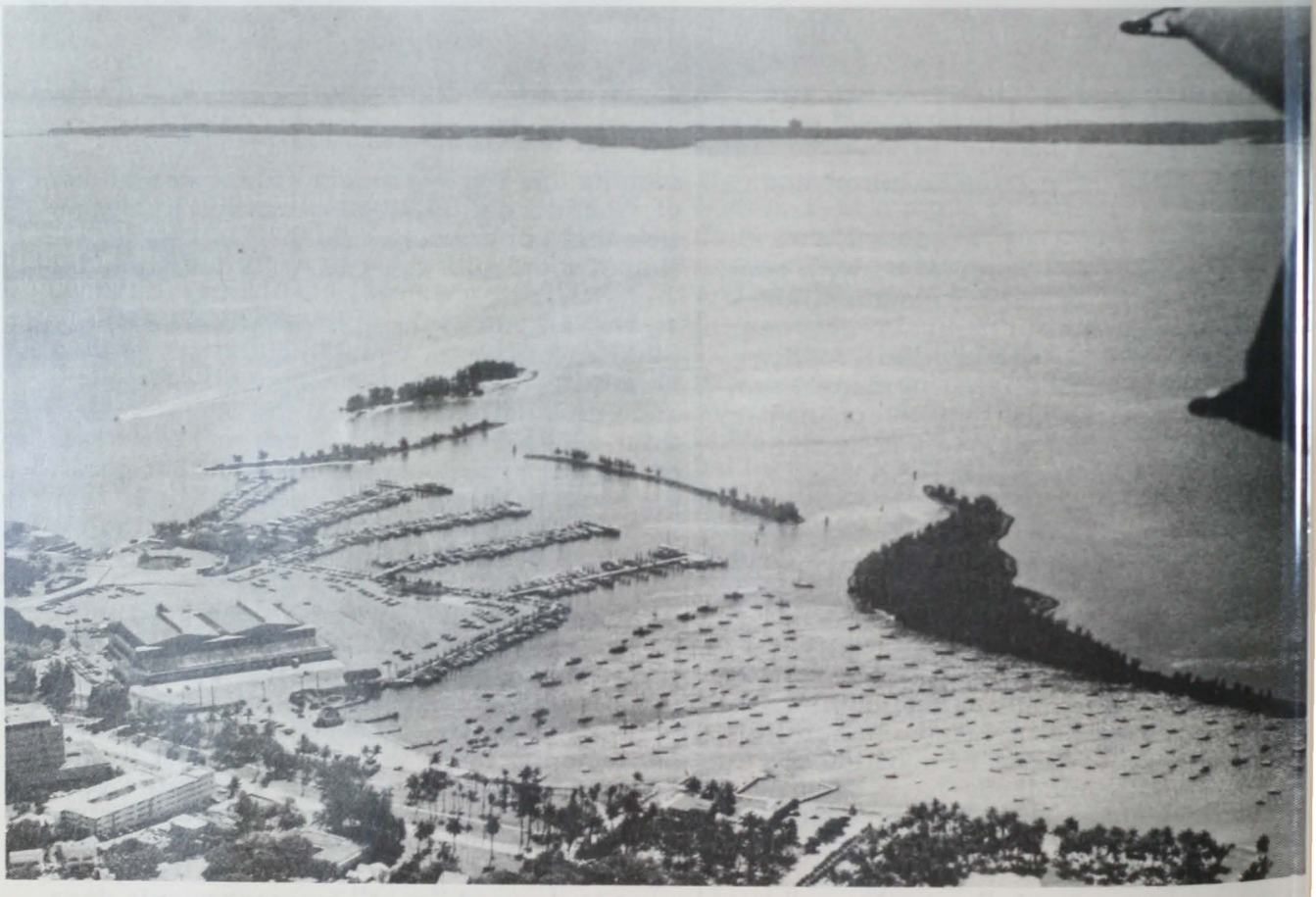

Fig. 2 - Estuaries like this are being destroyed along the coastline of the United States.

ha sea herring, summer flounder, and wh g spawn offshore and later move to in- sh and estuarine waters. Anadromous fis the North Atlantic coast such a ale- wi merican shad, and striped bass move th the estuaries to fresh water to spawn.

king at the broader picture, we find th a recent typical year the seafood land- in the Atlantic coast were 2.2 billion po ; of the Gulf coast, 1.4 billion; and of th cific coast (exclusive of Hawaii), 1.1 bi pounds. The total was 4.7 billion po , worth $362 million.

sume, the impressive point is that about two-thirds of both the catch and the landed value of this seafood is absolutely dependent upon estuaries.

Then there is the sport fishing interest. At present one of my associates in Washington is vacationing on the Atlantic coast. I asked if he was going fishing. The answer was, "night and day."

As long ago as 1960 it was reported that along the Atlantic coast over three million fishermen spent more than one-third billion

Fig. 3 - Jones Beach on Long Island is part of area threatened by industry, booming population, and pollution. (Photo by Jones Beach State Park Commission.)

his is not impressive for a nation with a s national product of more than $700 bil- and it is not close to the domestic raw rials values of forest products, miner- and agriculture. It does not state the e added to round-fish by processing, ng, and marketing. But considering our for protein-rich foods and the fact that port about two-thirds of what we con-

dollars on this type recreation. Considering the many other personal uses and pleasures of estuarine complexes, including waterfowl hunting, bird watching, and other forms of enjoyment of nature and beauty, and swimming, boating, and water-skiing in some cases, one wonders where the idea came from that estuaries are wastelands in need of "development."

That "development" is going forward rapidly is a fact we all know. That this development is beneficial to some individuals is also apparent. The real estate salesman and developer make a short-term profit. The firm that places a factory, a marina, or an oil refinery on filled estuarine land benefits. And so does the resident homeowner there, or the family with a vacation cottage. But these latter ones who came to the estuaries because they found them attractive, and whose single, filled building lot did no great damage, begin to suffer when shoulder-to-shoulder cottages form a seaside slum, when the industrial complexes pollute the water, and when the accumulated dredging and filling destroys the estuary itself. The costs and benefits of the long-run are quite a different matter from the initial short-term benefit. Only the real estate man and the developer appear to suffer no loss as they move from one transaction to the next. But the people are beginning to appreciate the costs and consequences of unplanned and unregulated development of estuaries.

Some States Act to Save Estuaries

Several recent actions by northeastern states are encouraging. You know them better than I, but I will mention some of them briefly.

Several towns in Massachusetts have passed laws prohibiting any use of marsh for building sites or other purposes which would destroy its biological and scenic val The Commonwealth enacted a law in 1963 regulating the dredging and filling of cert areas bordering on coastal waters, and in 1965 the Coastal Wetlands Preservation E was passed in an effort to afford permane protection to salt marshes.

New York amended its conservation lav in 1959 to provide for state assistance in preserving town and county wetlands, and give the Conservation Department power t issue permits to dredge and fill in navigab waters, except, unfortunately, for tidal wa ters of Nassau and Suffolk Counties.

Fig. 4 - Once a waterfowl marsh, it now is crowded with small homes.

Rhode Island's Green Acres program of 1965 and the Marshland Zoning Law of 1965 were designed to reduce the rate of destruction of coastal wetlands.

New Jersey, under its Green Acres program now owns or leases about 90,000 acres of wetlands.

Usually all the protective actions are being taken by towns, counties, and states. There are many bills before Congress. Some seek to provide the preservation of specific wetlands and to improve conditions on entire rivers. Another would provide for a nationwide study of coastal wetlands, looking toward a Federal system of preserved estuaries. All these moves are sparked by forward-looking individuals, in and out of government, and are based by groups of citizen activists and a growing mass of public opinion. Let us cross the continent for a look at one such recent action.

In response to a public need for a democratically constituted, politically responsible body to see that San Francisco Bay and its shoreline were analyzed, planned, and regulated, Senate Bill 309 was passed and approved by Governor Brown of California in June 1965, authorizing the San Francisco Bay Conservation and Development Commission. The Commission consists of representatives of Federal agencies, five State agencies, nine counties, three representatives of cities, and seven from the public at large. The Commission is charged with studying all aspects of the bay-area problem, including proposed uses, looking toward the preparation by 1969 of a comprehensive and enforceable plan for the conservation of the water of San Francisco Bay and the development of its shoreline. During the time of the study and preparation of the plan, the Commission is empowered to issue or deny permits, after public hearings, for any proposed project that involves dredging and filling.

The California Legislature found that the uncoordinated and haphazard way in which San Francisco Bay was being filled threatened the welfare of present and future residents. Furthermore, in the absence of such a Commission, there was no mechanism for evaluating the individual projects of cities and counties or of coordinating the actions of the several units of local government. The result was that navigation was being restricted, there was destruction of feeding and breeding habitat of fish and wildlife, and there were adverse effects on the quality of the water and even on the air.

Role of Corps of Engineers

Let us now look at the U. S. Army Corps of Engineers. The civil functions of the Department of the Army, acting through the Corps of Engineers, include the execution, operation, maintenance, and control of river and harbor and flood-control improvements authorized by law, and the administration of laws for the protection and preservation of navigation and navigable waters of the United States. In its brochure on permits for work in navigable waters, the Corps states clearly that "the decision as to whether a permit will be issued must rest primarily upon the effect of the proposed work on navigation....

"Whenever the waters of any stream or other body of water are proposed to be impounded, diverted, the channel deepened, or the stream or other body of water otherwise controlled or modified for any purpose whatever...the District Engineer will coordinate applications for permits to authorize such work with the Regional Director, U. S. Fish and Wildlife Service, and the head of the agency exercising administration over the fish and wildlife resources in the particular state wherein the proposed work will be performed to obtain their views with respect to the prevention of loss and damage to fish and wildlife resources. Should these agencies indicate that the proposed work will be harmful to fish and wildlife, their views will be made known to the applicant and an effort made to reach a compromise solution."

The Corps is not required to do anything about the recommendations of these agencies but consider them and transmit their views to the applicant.

One of the early Federal recognitions of the consequences for certain aquatic natural resource values by construction, such as dams, was a 1934 Act to promote the conservation of wildlife, fish and game. This Act was amended and strengthened in 1946, and further amended in 1958 when it was titled "The Fish and Wildlife Coordination Act." These actions resulted because of the adverse effects on fish and wildlife of the single-purpose water control and development works that were being built in rapid sequence.

Interior's River Basin Studies
Help Fish and Wildlife

Under this Act, it has been the responsibility of the River Basin Studies of the Bureau of Sport Fisheries and Wildlife of the Department of the Interior to investigate contemplated projects of the Army Corps of Engineers, the Bureau of Reclamation, and the Federal Power Commission. The River Basin Division advises the Federal agency planning to do the work or to issue a permit or license for such work as to whether there would be adverse effects on fish and wildlife resources and what should be done to avoid or mitigate losses and in some cases how biological resources might be enhanced. These other agencies do not have to follow the advice. They are merely required to consider it. The record may be uneven, but the situation is better than if the Coordination Act did not exist.

The record for the northeastern coast is worth looking at. The Bureau of Sport Fisheries and Wildlife reports each year on about 75 projects of the Corps of Engineers that are concerned with harbor improvement, beach erosion control, channel dredging, anchorages, and so forth. In addition, and probably of equal importance, the Corps issues permits for public and private work, such as building jetties, installing bulkheads, dredging, and filling. The Bureau of Sport Fisheries and Wildlife cooperates with the Bureau of Commercial Fisheries, also in Interior, when anadromous fish are concerned and when works affect estuaries. The states may also cooperate in reviewing proposals.

Between 1962 and 1965, the Bureau of Sport Fisheries and Wildlife reported on 24 dredge and fill projects in the New York City-Long Island area which it thought should be denied in the public interest. However, 16 of them were issued permits. The Bureau recommended that 35 other projects should receive permits only with restrictions designed to prevent or reduce loss to fish and wildlife. Twenty-one of these were issued without any restrictions.

Whereas in New York State only 37 percent of the cases heeded the recommendations, in New England the recommendations to protect fish and wildlife were effective in 70 percent of the cases.

The Northeast Region of the Bureau of Sport Fisheries and Wildlife surveyed the tidal marshes from Delaware to Maine in 1954, 1959, and again in 1964. During the first five-year period, 23,500 acres of tid marshes were lost to "progress," and du the last five years the loss was 21,500 ac About one-third of the lost acreage is fro harbor and channel dredging, resulting pr cipally from the deposit of the spoil on va able marshes. About one-fourth of the lo acreage is from filling for housing. The damage from the latter source is greater than it seems because the fill material ge erally is obtained from the marshes, usu doubling the acreage destroyed because o slow recovery of the dredge bottom.

No Federal Authority Over Local Actions

For those concerned about protecting t estuarine natural resource complex, one the serious questions is the lack of Feder authority over the actions of cities, counti and states.

For a long time it has been clearly a pu lic necessity that the Federal Government have control of navigable waters, and the Army Corps of Engineers has had such au thority, but for navigation only.

Many persons believe that there is pub need for controls that would protect other uses of the resources of estuarine comple The fact that the deposit of spoil from the Corps' proper harbor and channel dredgi works often is destructive to fish and wil habitat may not be so much a lack of conc for these natural resources values as it i the Corps' imperative to work as econom ly as possible. It follows, in the view of m of us, that the benefit-cost calculations th lead to spoil dumping in objectionable pla are too narrow. The economic considera should, I would say must, include all soci costs--the cost of those uses impaired an the cost of potential benefits foregone.

It is my view, and I admit a personal bi based on my experiences and understandi that the Department of the Interior should have equal authority with the Corps of Eng neers regarding construction and other wo that affect estuaries. The public interest navigation has long been protected by the F eral Government. We have been tardy in r ognizing other estuarine values, including commercial and sport fisheries, wildlife, natural beauty.

are now approaching the problem of quality. The 1965 Act creating the Federal Water Pollution Control Administration the direct result of a general recognition that connecting waters of streams and estuarine mouths where they reach the sea cannot be cleaned up and kept clean by the States and local governments.

Dirty water is all-pervasive in its effects on habitat and human uses of estuarine resources, and the pollution control effort is a great step forward, as was the navigation need which resulted in legislation. As I have indicated, estuaries are a resource complex even further in need of governmental attention.

I believe that Interior is the appropriate agency for broad responsibility for the quality of the environment, as has been attested by the transfer this year of the Water Pollution Control Administration to it, for the reason that Interior is becoming generally recognized as the lead agency with responsibility for the use and management of natural resources in the Nation as a whole. Other agencies have, and should continue to have, certain responsibilities for natural resources, but Interior is across-the-board in its responsibilities.

I do not wish to leave you with the impression that the Corps of Engineers is indifferent to values beyond its immediate charge. Many of its achievements stand as models of conservation. Indeed, if it were not for many of these multi-purpose beneficial works we would be beset with more floods, we would be deficient in power-production capability, and the arteries of commerce would be restricted.

What I do wish to impart is this: every passing day sees our resources becoming more vulnerable to the pressures of man and machine. To me, and to countless others who feel they have a responsibility to nature and, in turn, to men of this generation and others to come, progress cannot be counted solely in terms of dollars, a building lot dredged from the bottom of an estuary, or something chopped off here and added there.

We cannot alter the face of the earth with impunity. We must, if we are to endure and enjoy our resources to the utmost, strike a balance with nature. If we do not, we inevitably will degenerate into a has-been nation with an overdrawn account in the bank of beauty and quality.

MANUAL DISTRESS SIGNALING FOR SMALL BOATS

A boatman is never without a daylight distress signal as long as he can use his arms. A small craft operator can indicate to passing vessels or searching aircraft that he is in distress by outstretching his arms to each side slowly raising and lowering them. The use of this manual distress signal by all boatmen is encouraged by the U. S. Coast Guard and was emphasized in a recent press release issued by that agency.

This distinctive signal will not be easily confused with the friendly wave so often used by boatmen as a courteous gesture, the Coast Guard states. The visibility of the signal can be improved by holding in each hand a handkerchief, towel, shirt, or other eye catcher.

Other practical signals for small craft include continuous sounding of the fog horn, flares, smoke signals making orange-colored smoke, and the spoken word "Mayday" over radiotelephone.