

A Biologist's Viewpoint of Man-made Changes in Estuaries

GEORGE W. ALLEN
Division of Seafoods
Alabama Department of Conservation
Dauphin Island, Alabama

Abstract

Marine biologists are constantly made aware of changes in the estuarine environment. Such changes are brought about by federal and municipal organizations, as well as private enterprises. The changes take place in many forms ranging from large scale canal construction and ship channels to multitudes of small developments such as real estate encroachment. Such changes are justified by the associated agencies or individuals by a number of reasons depending upon the interests of the group bringing about such changes. As of this date, federal and state agencies are cooperating with conservation groups to a great extent. The private corporations and persons, however, generally fail to consider the effect of their developments on marine resources. None of these environmental changes benefit estuarine production and in fact in most cases bring about additional destruction.

IF A MARINE BIOLOGIST is associated for any length of time with estuaries, he very soon becomes aware of estuarine encroachment. Much of this change is done overnight, or blossoms forth in the form of large projects which are obvious even to the casual observer. The estuarine manager soon becomes as adaptable to changes in his professional environment as does the flounder to the changes in its environment. Management plans that the estuarine conservationist may promulgate and carry half-way to their conclusion are stopped altogether because of a change in the estuarine area brought about by so called alterations of progress.

Alterations that can bring about the destruction of an area in relation to its production of marine fauna can come about by four principal activities. These activities can be classified as channel and stream flow diversion, industrial filling and encroachment, pollution of all sorts, and real estate development.

These alterations can be brought about by a number of agencies. Primarily they may be grouped into four categories. One of these categories would consist of federal agencies and their sub-divisions, such as the Corp of Engineers, the Bureau of Land Reclamation, the Department of Agriculture, and the Bureau of Public Roads. The other three responsible groups would be private industry, state and municipal governments, and real estate promoters.

Generally speaking, the projects undertaken by the federal agencies and their sub-divisions are of such magnitude that they are generally well advertised, and the public is aware of the project's objectives. Unfortunately, in the past the public has not been made aware of the secondary effects of these projects. It is unfortunately true that some of

these projects are not brought about by public demand for their primary objectives, but rather are instigated by the agencies, sold to the individuals affected by these projects, and then reported to have been brought about as a result of the public demand. This representation of the program has been so subtly brought about that even the local promoters will forget who sold them the idea of the project. Fortunately, certain legislation has recently been enacted by Congress which requires that conservation interests, as well as others, be considered in the overall planning. One of the weak points of this co-operative planning, however, is that the affected but secondary cooperative agencies are brought into the picture after the snowball of public opinion has started to build up size and momentum in favor of the project, without an understanding or knowledge of the secondary effects.

Usually, by the time public hearings are held on such projects, influential groups have committed themselves so strongly that they find it embarrassing to remove themselves from their original stand on the projects. Such a situation nearly always results, not in cooperative planning and consideration, but in a head-on collision of conflicting interests. One of the ways of eliminating this situation would be to notify cooperating agencies at the very beginning of the initial thinking on such projects. If done in this manner the agencies involved could very well work out a compatible solution in a technical, professional, and cooperative manner. This could well be done without the emotional outbursts of the parties interested in one side of the question or the other.

The industrial enterprises are usually found developing their programs with a great hue and cry about the labor payrolls that such developments will create and the transfiguration of a dismal marshland into a paradise of industrial production. Confidence is half the battle of successful salesmanship, but it is difficult for an estuarine biologist to sell the preservation of an estuarine area to a group of individuals from the state industrial board, the local chamber of commerce, and the league of municipalities. This is especially so after these persons have seen a thirty minute color movie showing the advantages of the Jones Brothers Pot and Pan Company. The thirty minutes were very likely filled with pictures of shining new automobiles in the factory parking lot, the great distribution of payroll income by housewives in mink stoles buying cabbage by the pound. After the movie, the local citizenry was very likely treated to an excellent dinner preceded by dry martinis. After all this, the state biologist, who is probably covered with mud up to his knees, and finished his lunch out of the brown paper sack, must stand there and convince this group of citizens that the empty marsh on the proposed plant site is worth saving. If this conservation salesman can be confident under these conditions he is indeed an optimist.

State and municipal governments generally bring about estuarine alterations through expansion of, or improvement of, the industrial waterfront or the development of large areas for municipal expansion. Such operations are usually at a level which can be affected by the opinions of conservation groups and other parties interested in the preservation of our natural resources. The solutions here are found in keeping such conservation groups well informed, well enough in advance, so the project has not developed to the point of no return.

Real-estate programs usually come about in an insidious manner whereby proposed developments are enlarged bit by bit until someone realizes that sizable areas have been engulfed in this manner. It is most difficult to convince a mayor or a councilman that restrictions should be placed on developments taking place or being proposed along some unattractive waterfront or marsh area. An increased population growth rate with its associated industrial potential and available capital is difficult for municipal officials to refuse, but this is what is promised by the real estate promoters in developing these areas. In most cases, the presence of such undeveloped waterfronts and marsh areas brought the initial development of these municipalities based on commercial fisheries, aquatic recreation, and water transportation.

Regardless of who brings about estuarine alterations, the results generally fall into clearly defined patterns.

Channel diversion causes hydrographic alterations of the areas. Flow pattern arrangement is nearly always changed. This results in the development of new ecological niches in various areas which are considerably changed from its former or unaltered state.

Industrial development and its associated damage is accomplished by the disposal of waste solids filling estuarine basins. Many of these solids are of such chemical composition that the material leaching therefrom makes the areas unsuitable for marine growth of any sort.

Pollution or an alteration of the pollution pattern is always associated with estuarine alterations. Channel development will produce either a wider distribution of pollutant materials into estuarine areas or may concentrate the material to the degree where it materially increases its harmful effects. In addition to this, any estuarine alteration will have some effect on the pollution problem of an area, be it in the form of bacterial, chemical, or physical change.

In certain areas of our seacoast, especially those of a typically estuarine type, the development of home sites and urban improvements is a most obvious alteration. Highly productive estuaries have been dredged and filled until they are actually out of existence. Piece by piece estuarine marshlands and embayments are being covered with concrete streets, Bermuda grass, and children's playgrounds. For all practical purposes existence of marine life in such former areas is prevented.

All of the above problems have been encountered by the marine biologist and the estuarine manager throughout the entire coastal area of the United States. The professionals in this field can quickly call to mind examples of the aforementioned projects wherever they may be working. To the non-professionals, however, specific instances and examples will point out what is being done by the various alteration agencies and what the results of such alterations have been. Perhaps the largest alteration as of this date has been done by the Army Engineers in the form of the Mississippi-Gulf Outlet Canal. While this project is one of the best illustrations of inter-agency planning to this date, it is also an illustration of what alterations can do in spite of such planning. This canal runs from the city of New Orleans in a straight line to Bretton Sound. This straight channel through the upper marshes has completely changed the east-west water distribution pattern in the Bretton Sound area. This in

turn has modified estuarine conditions in the marsh-land east of the Mississippi River to the extent that oyster production and oyster management have been completely altered.

In addition to this, the discharge of fresh water during flood periods into the Bretton Sound area has changed the water chemistry to the extent that the effects can be seen on oyster growth and production. Conversely, salt water intrusion into the New Orleans area has been such that oyster production has developed in the pumping station of metropolitan New Orleans. This oyster production was one of the secondary effects, not anticipated by the planners.

In Texas, the Bureau of Land Reclamation intends to impound and divert fresh water from all of the rivers of Eastern Texas flowing into the Gulf. This water is to be transferred to arid regions of western Texas. At one time this project threatened to completely cut off all fresh water into the eastern Texas estuarine complex. This would have completely destroyed the estuarine resources of the Sabine, Galveston, Matagorda, Aransas, and San Antonio Bay areas. This program was progressing with very little publicity until certain conservation interests became aware of its impact on the coastal fisheries effort. The sounding of alarm which was raised as a result of this information caused a complete review of the project and an alteration of planning.

Department of Agriculture projects may not take place directly within the estuarine area, but the results of these projects on certain watersheds can be felt within the estuarine complex. In Alabama the watershed drainage project of the Bon Secour River is believed by estuarine conservation agencies to have a definite effect on oyster production in the Bon Secour area. As a result of this project, the increased drainage rate of lands heavily treated by organic pesticides will be discharged directly onto highly productive oyster reefs in this area. The Department of Agriculture claims a cost benefit figure to the farmer of around \$32,000. The oyster beds affected produce over a million dollars a year of oysters. While neither side has come to any concrete conclusion as to the disposition of this project, it does not seem reasonable to gamble an increase of \$32,000 in an already profitable farming enterprise, as opposed to a million dollar total loss in quality oyster production.

Throughout the United States, the increased construction of interstate highways and the straight line method of location is bringing about a greatly increased number of coastal inter-state highways. With this construction, comes the bridging and filling across many of our estuaries. Two new highways are being built across the Mobile delta complex at this time. In both cases, strong efforts were made by conservation agencies which have resulted in the elimination of filling of road beds and the substitution thereof by high piling structures. These will not impede the natural flow of water, whereas highway fills would have created huge settling basins where areas of high estuarine production now exists.

The increased migration of industry to the south, with especial concentration in coastal areas, has brought about industrial development in areas formerly considered as estuarine in nature. Available water supplies, cheap water transportation, and access to the sea have caused the concentration of industrial plants.

In Alabama, a bay known as Polecat Bay has been completely destroyed by the disposal of waste bauxite ore from an aluminum plant. Although other areas were available for this disposal, it was nevertheless dumped into an area which formerly produced food for water fowl and security as a nursery grounds for shrimp and other marine species.

For some time it has been obvious that those of us in the field of estuarine management have been encountering difficulties in the promotion and sale of our product. Perhaps we should review our efforts and see where we have failed in so many cases. It is true that many of our programs have met resistance in the form of large financing which is available to our opponents, and it is also true that the biggest point that these opponents make is that progress must continue. These are difficult arguments to work against, but obviously they have been more successful than their true merit deserves. The French have a saying that "to make an omelet, you must break eggs", but it is a shame that our valuable estuarine areas must be the eggs for the omelet of so-called progress.

In the past the estuarine manager has had to concentrate most of his effort toward the improvement of existing resources. In the future, it appears that the manager will have to expend more and more effort in preventing the destruction of the existing resources.

Many of us who have been active in the programs of water quality control are coming to the conclusion that we acted very much like the opposition and therefore created as many enemies as we promoted friends. I believe most of us in the early stages of pollution control were guilty of wholesale condemnation of industry as one of the two principal pollutant agencies. In doing this, we condemned the majority of the industrial effort for a problem they did not create. By necessity all industry rallied and worked together in certain areas to protect the good of their common name. If we had pointed out that only a small percentage of industry was polluting, the innocent members of that group would have been on our side. Instead, we were carried away with the enthusiasm of the moment, and promptly stepped on everyone's industrial toes.

In protecting our estuarine areas we must not be carried away, as we were in the past, on the industrial pollution program. Cooperative team effort can only be possible where mutual understanding and consideration of the other fellow's difficulties is as real as is the knowledge of our own problem. The important link in our missing argument appears to be the true evaluation of the estuary. The present standard appears to be around twenty four dollars worth of product per acre, per year, with no development effort. Many of us feel that this is an unreal value and is nowhere near the correct appraisal. The dynamics of estuarine areas are so complex that the changes in one segment will have an effect on another, and this in most cases is difficult to predict. To estimate damage because of a single project, and to confine this estimate to that particular area, is incorrect. The filling of Polecat Bay with bauxite ore physically eliminated the Bay, but the results of the leaching of this material in the downstream areas below the Bay are most difficult to ascertain. There is no doubt but that commercial fishing five or six miles downstream from this site has been reduced and practically eliminated. What percentage of this elimination is due to the presence of the materials in solution coming from this industrial fill has not been determined. Certainly, some

value must be placed on the damaging effect of this residue. It is not believed that any estuarine alteration has brought about the improvement and enhancement of any estuary as a producer of marine life. It appears to the estuarine interests that we are continually fighting a battle for estuarine survival. In the past we have been necessarily satisfied with a compromise. Even with the compromise we are losing estuarine environments. Unfortunately, there is only a specific amount of estuarine areas remaining while opposed to this is an apparently inexhaustible supply of population increase and industrial development into the coastal fringes of our country. While we must agree that most of these projects do have certain tangible benefits to the welfare of our people, there comes a point where the benefit ratio does not equal estuarine value. The value of our estuaries will increase in direct proportion to their destruction by so-called improvements. Many of us feel that this point has now been reached. While compromise and cooperation sound very logical and indicative of the intelligence of the people involved, we must not compromise our estuaries out of existence.

To view this problem in a realistic light, we must admit that at the present time we are in most cases out-financed and snowed under by the opposition. What we need is a marshalling of interested conservation minded people and making them aware of the situation that exists at the present time. Once they are aware of this problem, we must keep them abreast of the current situation. Miamians successfully objected to the installation of a petroleum refinery in Biscayne Bay by these methods. In the Mobile Bay area conservationists won the argument of road fills versus piling construction. In both cases, it was proven that the overwhelming objections of the conservation minded interests were enough to withhold destruction by development in these areas. What has proven to be true in these cases can be true in others. It is believed we should use such methods, as well as any others at our disposal, if we believe any man-made environmental change will bring about an unjustified reduction of the estuarine areas.
