GALVESTON BAY

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In spite of all the abuses to which Galveston Bay has been subjected, it is still the most productive area of the Texas coast line. But Galveston Bay has been sorely damaged, and it is still too soon to learn if the injuries will prove to be irreversible.

To understand the coastal bays of Texas, it is necessary to know a little of their history. Fifteen thousand years ago the world was locked in the grip of the glaciers, and so much of the world's supply of water was tied up in these sheets of ice that sea level fell some 300 or 400 feet. That would have placed the Texas coast line 50 to 100 miles seaward of its present position.

Rainfall was greater during those glacial times and the ancient Sabine, Trinity, Brazos, Colorado, Nueces, and Rio Grande rivers were larger than today and were better able to erode their channels into deep and narrow canyons.

By 10,000 years ago the glaciers were rapidly receding, and by 5,000 years ago sea level had returned to its present stand. The rising sea flooded into the canyons of the lower river valleys, and for a time the Texas coast line must have resembled the fjord topography of Norway. These long and narrow bays were the beginning of the present major bays of the Texas Coast.

As soon as the bays were formed, however, they began acting as sediment traps for the rivers. The sediment load that a stream can carry is determined by its velocity, and as soon as the turbidwater of a river enters calmer bay water, a delta deposit begins to form at the head of the bay.

Wind and wave action have also played an important role in shaping the bays. Erosion at the margin has gradually widened the bays and contributed much of the sediment that has filled the former deep and narrow central channels.

Wind and wave action offshore added still another important contribution to the coast line. About 3500 years ago a shallow bar, two or three miles offshore and parallel to the coast, began to form. It was composed mostly of sand, and it slowly emerged from the water. It continued to grow seaward, as well as in height, and it formed a continuous chain of barrier islands separated from the mainland by long and narrow lagoons. East and West Galveston Bays are the lagoons formed by Bolivar Peninsula and Galveston Island.

At one time, then, each of the major Texas rivers emptied into a large bay which had its axis at right angles to the coast line. A series of barrier islands parallel to the coast produced a more or less continous lagoon which crossed the transverse bays at their lower ends. Galveston Bay still conforms to this configuration, although the Sabine River to the east and the Brazos River to the southwest have brought down enough silt to fill most of their original bay and lagoon systems.

The Trinity River has built a small delta across the upper end of Galveston Bay, but the San Jacinto River and Buffalo Bayou were not forming a delta, even before the ship channel was dredged in their lower course. In the undisturbed sequence of events, Galveston Bay should persist as a productive estuarine environment for many thousands of years.

An estuary is the place where the waters of the land meet the waters of the sea. It is often a difficult environment for plants and animals, because it is subject to such a wide range in the temperature and salinity of its waters. But for those species which can tolerate these extremes, an estuary periodically provides the necessary conditions for almost unlimited production.

The estuary, through the runoff of the streams emptying into it, is constantly being supplied with nitrates, phosphates, and all the other required nutrients for plant growth. The estuary concentrates and holds these minerals, rather than dispersing them as occurs in the open sea. In the shallow water of the estuary the sun warms the water and provides the necessary energy for photosynthesis, the real source of practically all human food.

Plant growth, and photosynthesis, are quite different when aquatic crops are compared to crops grown on land. Practically all of the plants a farmer knows are the flowering and seed bearing plants, but only the algae grow in significant usable quantities in the estuaries and in the sea. To make things worse, so far as harvesting this aquatic crop is concerned, most of the algae are the microscopically small diatoms that hang suspended in the water.

Because of the small size of the diatoms, only very small animals, or larger animals with an effective sieve apparatus, can harvest them. The food chain in an estuary is generally based on a standing crop of diatoms being eaten by small shrimp-like crustaceans called Copepods. The copepods are in turn eaten by small fish, and these are eaten by larger fish. At each link in this food chain, however, 90% of the original nutrient material produced by the diatoms is lost - only 10% is converted into the tissues of the animal eating it. For example, it takes 1000 pounds of diatoms to produce 100 pounds of copepods. These in turn can be converted into 10 pounds of menhaden, and ultimately into 1 pound of trout or redfish. How could a farmer survive if he had to supply 1000 pounds of grain to produce 1 pound of beef or pork?

These are the biological facts of Galveston Bay. It is an extraordinarily productive bay because of the fertile soil in its watershed. It is large enough so that in spite of occasional flood or drouth, there is always a large region in which the fresh and salt waters combine to provide the optimum salinity for estuarine production. The shallow flats which form the margin of the bay are the sheltered nursery grounds for the young and larval stages of shrimp, crabs, and fish.

The monotony of the flat bottom in the deeper waters is broken by mounds and ridges of living oyster reefs. The flow of water is accelerated as it passes over these reefs, and the turbulence maintains the productive diatoms in suspension, and also aids in the transfer of oxygen into the water.

In the deeper and calmer water between the reefs all the debris from the production in the upper water layer slowly settles to the bottom. Here it is carefully sorted from the sand and clay by the white and brown shrimp which invade the bays each year to feed and grow on the bounty of diatom creativity.

What I have described is Galveston Bay as it once was. Desecration of the environment began, however, as soon as towns began to spring up on its borders. Industrial and organic pollution have now produced a heavy black sludge that floors most of the upper bay, in places to a depth of 2 feet. Of course all bottom productivity in these areas is destroyed, and no one knows whether it can ever be restored.

Seventy five years ago a hide and tallow plant was operated at San Leon on the west side of Galveston Bay. Most of the cattle for the plant were driven across the Bay from Smith's Point. They walked across on an almost unbroken chain of oyster reefs that were exposed at low tide. Shortly after that the shell dredgers moved in and you know where those reefs and many others are today.

Most recently, a new hazard has threatened Galveston Bay. The shallow flats that are the prime nursery grounds for most of the commercially important species are being drained and filled for housing developments. Galveston Bay has not yet lost many of its flats in this manner, but the trend has begun. It could be controlled now before we are in the position of Florida and many of the other eastern states where the loss has passed the point of no return.

I read in the paper this morning that President Johnson is asking for $1.2 billion dollars for conservation. I would like to suggest that much can be done, and Galveston Bay could be started on its road to recovery now, without any Federal Program or Federal Tax Dollars. I would like to request that the following steps be considered:

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1. All of the political bodies that border Galveston Bay and its tributaries must agree on a unified program for improving sewage treatment facilities. Only when the sewage problem is improved can effective pressure be placed on industries to solve their waste problems.
2. Shell dredging should be restricted or stopped entirely until a long-term assessment of their damage to the ecology of the Bay can be determined. It took 10,000 years for the shell reefs to form and they are being destroyed in a lifetime. The value of the live oyster has been neglected in Texas. The State even took the name "Oyster" out of its "Game and Fish Commission" a few years ago. But the oyster is perhaps our best marine asset. It feeds directly on diatoms and is 100 times more efficient in converting plants into usable human food than the trout or redfish.
3. A program to limit the encroachment of housing developments on the bay flats should be enacted.
4. The State of Texas should reestablish the "Game, Fish, and Oyster Commission" and separate it from the "Parks Commission". The functions are different and the training for their personnel are different. The "Game, Fish, and Oyster Commission" should try to hire the best qualified men in their field, and give them the authority to perform their duties effectively, and without political control.

I sincerely believe that the best thing that could happen for Galveston Bay would be a well-paid, non-political, professionally trained staff of marine scientists with authority to control the commercial exploitation of the Bay's many resources for the benefit of the greatest number of citizens, rather than a chosen few.