WETLAND LOSS IN THE DELTA PLAIN
OF THE MISSISSIPPI RIVER

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Introduction

The vast delta plain of coastal Louisiana is a product of 7000 years of Mississippi River delta building. Land was built as a result of sediment deposition in the vicinity of active outlets of the Mississippi River during an interval of sea level stability. Through periodic upstream diversions, the river has constructed a complex delta plain. Each diversion has initiated a cyclic episode of delta growth followed by an interval of breakup and decline with waxing and waning of river outflow and sediment deposition. The net result has been a gradual progradation of the delta plain.

These processes have resulted in an extensive coastal lowland characterized by a skeleton of alluvial natural-levee ridges along active and abandoned distributaries, an outer fringe of sandy barrier islands and Gulf beaches, and vast areas of interdistributary swamps, marshes, lakes, and bays (figure 2-1).

The extent and character of the deltaic coast, as well as the cycle of delta building and the environmental succession it drives, have resulted in a bounty of renewable resources. The magnitude and importance of these values, related primarily to fish, wildlife, and recreational resources, have been well documented (Chabreck 1973; Day et al. 1979; Frugé and Ruelle 1980; Lindall et al. 1972; Perret et al. 1971; U.S. Fish and Wildlife Service 1981), and need not be repeated here, though it is noteworthy that they do represent a resource of national importance.

Two aspects of deltaic processes are vital to maintenance of the system and its high level of productivity. The first is their ability to build new land through sediment deposition in the vicinity of active distributary outlets. The second is their ability to continue to build up the land mass through overbank sedimentation and accumulation of organic sediments such as peat and shell deposits.

The distribution of wetland vegetation in the delta plain is controlled by such factors as elevation, drainage, soil type, hydroperiod, and salinity. It is well recognized, however, that salinity is a critical factor. Marsh plants, for example, are mapped as vegetative types whose zonation is based primarily on average salinity conditions (figure 2-1). In general, there is a broad landward-to-seaward zonation from fresh through intermediate and brackish to

saline marshes. The main exception is an "island" of fresh and intermediate marsh in the active birdfoot delta area where conditions are predominantly fresh throughout the year.

This zonation of marshes reflects a gradual dilution of inland freshwater runoff by saline Gulf tidal inflow. Fresh water is presently derived largely from local precipitation and runoff, but under natural conditions was supplemented by overbank floodwaters from the Mississippi River. Fresh water moved seaward through an intricate network of tidally influenced, backswamp drainage streams. Marine water was introduced to marsh systems through relatively shallow tidal streams and inlets between barrier islands.

In modern years, hydrologic conditions in the delta plain have changed greatly, and in most areas there has been accelerated saltwater intrusion via an extensive, deep, Gulf-to-interior-canal network. This has caused major changes in the distribution of wetland vegetation. In general, there has been a landward shift in marsh zones; that is, saline marshes have displaced brackish marshes, and brackish marshes have displaced intermediate marshes. However, even slight salinity increases will kill freshwater swamps and marshes, and in many places these habitat types have reverted to barren mudflats or open water.

**Rates of Wetland Loss**

Since the reversal of the long-term trend of land building in the late 19th century, land loss has increased steadily and geometrically. Data from a 1970 study show a land loss rate of 6.7 mi²/yr in 1913 and a rate of 15.8 mi²/yr in 1946 (Gagliano and van Beek 1970). During 1955-78 413,000 ac of land were lost in the area studied, from 3,646,000 to 3,233,000 ac, representing a land loss rate of 28.1 mi²/yr for 1967, the chronological mid-point (Wicker et al. 1980a, 1980b). Regression analysis and graphic display make a geometric curve apparent (figure 2-2). Based on that analysis, the projected land loss rate for 1980 is approximately 39.4 mi²/yr.

The severity of the land loss is perhaps best shown in cartographic form (figure 2-3). By assigning to the center points of each topographic quadrangle within the study area the respective value of average annual land acreage lost for 1955-78 (based on unpublished data generated for the U.S. Fish and Wildlife Service), a contouring of "iso-loss" lines is made possible.

Four parishes in particular appear to have very severe land-loss problems: Lafourche, St. Bernard, Terrebonne, and Plaquemines. Based on a conservative arithmetic projection of the calculated 1980 loss rate, the land masses of these parishes will either be greatly reduced or will totally erode away within relatively short periods of time as follows:
A great natural catastrophe is occurring in the delta plain of coastal Louisiana. During 1980, approximately 25,000 ac of resource-rich coastal lowlands eroded away, and the loss will be even higher in succeeding years. In the last 80 years, over 800,000 ac of land have been lost; approximately 58% of this loss occurred in the last 25 years. This trend will probably never reverse itself, but measures such as freshwater diversion and controlled subdelta growth can be taken to at least slow down Louisiana's accelerating coastal land loss.

<table>
<thead>
<tr>
<th>Parish</th>
<th>Remaining Land (in acres)</th>
<th>1980 Projected Loss Rate (in acres)</th>
<th>Life Expectancy (in years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lafourche</td>
<td>650,541</td>
<td>3,179</td>
<td>205</td>
</tr>
<tr>
<td>St. Bernard</td>
<td>257,816</td>
<td>1,695</td>
<td>152</td>
</tr>
<tr>
<td>Terrebonne</td>
<td>699,782</td>
<td>6,851</td>
<td>102</td>
</tr>
<tr>
<td>Plaquemines</td>
<td>457,523</td>
<td>8,831</td>
<td>52</td>
</tr>
</tbody>
</table>
Figure 2-1. Zonation of wetland types in the Mississippi River delta plain in 1978 (from Chabreck and Linscombe 1978).

Figure 2-2. Acceleration of land loss rates in the Mississippi River deltaic plain (from Gagliano et al. 1981).
Figure 2-3. Variation in land loss rates within the Mississippi River deltaic plain (from Gagliano et al. 1981).