

DETERMINATION OF LAND LOSS RATES IN COASTAL LOUISIANA

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ABSTRACT

Coastal Louisiana contains 40% of the nations wetlands. These wetlands are the direct result of repeated shifts in the course of the Mississippi River over the past 7000 years. The resulting landscape is a complex network of abandoned distributaries and beach ridges separated by marshlands. Until the early 1900s there was an overall net increase in the size of the Louisiana coastal plain. Since then, this trend of landbuilding has reversed and coastal Louisiana is losing land at a high rate. Causes for this loss include, but are not limited to, geologic factors such as faulting, subsidence, depth to Pleistocene, geomorphology, differences in the engineering properties of the various environments of deposition, sediment age, and hydrologic setting. Manmade factors responsible for land loss such as dredging of location canals and navigational waterways, as well as levee construction, also account for a significant portion of the total land loss.

In 1987, the U.S. Army Engineer District, New Orleans and the U.S. Army Engineer Waterways Experiment Station began a study to determine the rate and location of land loss in coastal Louisiana by documenting on maps the land loss that has occurred during each of three successive time intervals beginning in the 1930s. The time intervals mapped were 1930s to 1956–58, 1956–58 to 1974, and 1974 to 1983. The study area is contained on 62, 15-minute US Geological Survey quadrangle maps covering coastal Louisiana. Land loss mapping was accomplished by comparing the three vintages of aerial photography to a 1930's base map and delineating the change in land/water area. The completed land loss maps were optically scanned and the data processed by a computer program to determine the number of square miles of land loss for each time period and category. These values were used to construct a land loss rate curve for each individual quadrangle in the study area as well as one for the entire coastal plain.

General land loss trends identified from the individual rate curves for each quadrangle are shown in Figure 1. These trends were determined by comparing land loss rates between the second time period (1956–58 to 1974) and the third period (1974–1983). Land loss rates were determined to be increasing if the rate increased by more than 10 percent from the previous period. Similarly, the trend was said to be decreasing if the rate decreased by more than 10 percent from the previous period. If the change in the land loss rate was less than or equal to 10 percent then the trend was considered to be unchanged. A 10 percent change was arbitrarily selected as the amount of change necessary to be significant. As shown in Figure 1, land loss rate trends vary significantly throughout coastal Louisiana. This variability reflects differences in the geologic settings of individual quadrangles as well as difference in the factors responsible for land loss.

A regional land loss rate curve was constructed for the entire coastal plain by combining the data from the individual quadrangles (Fig. 2). Each point on the curve is plotted at the average of the chronological mid-points of all the individual time intervals for each time period. The rate shown on the curve represents the average annual loss in square miles per year for each time interval. The land loss rate has decreased from an average yearly rate of 41.88 sq. mi. for the period 1956–58 to 1974 to 30.71 sq. mi. for the 1974–1983 period. No attempt was made to extrapolate the data. At the present time another data point representing the land loss rate from 1983–1990 is being added to the curve to determine whether the trend of a decreasing regional land loss rate is continuing.

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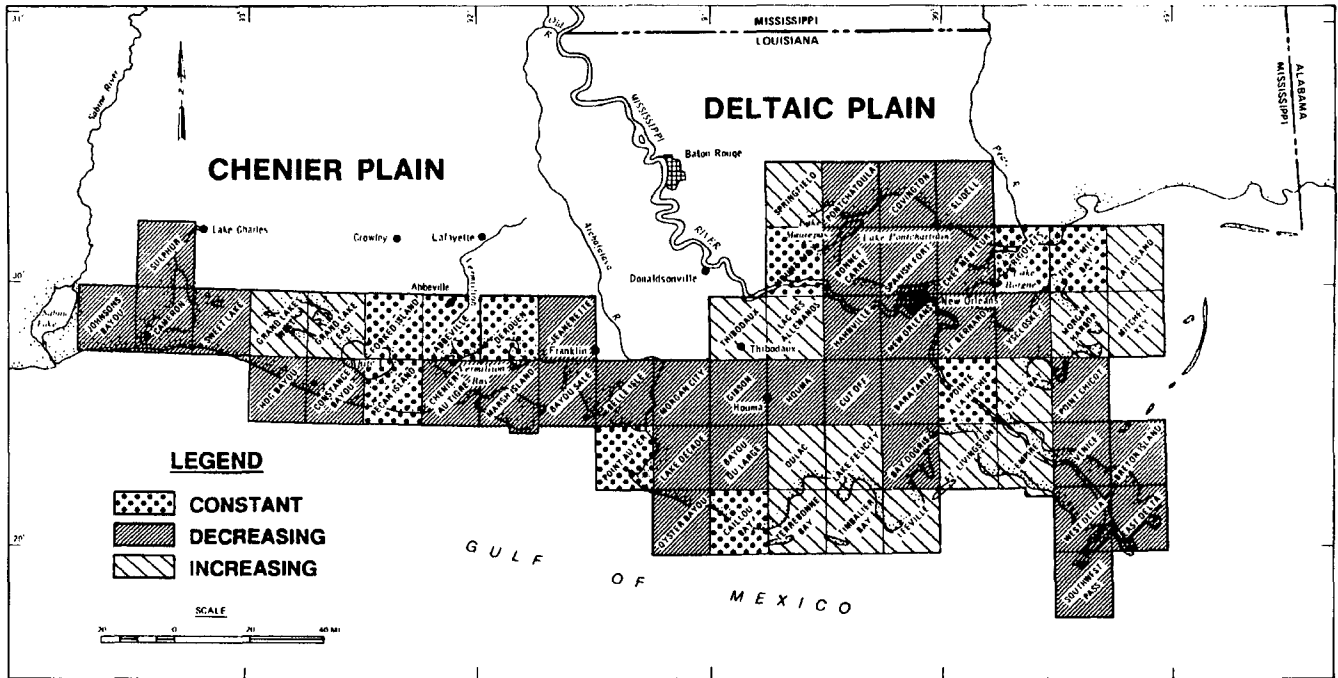


Figure 1. General land loss rate trends determined from individual rate curves.

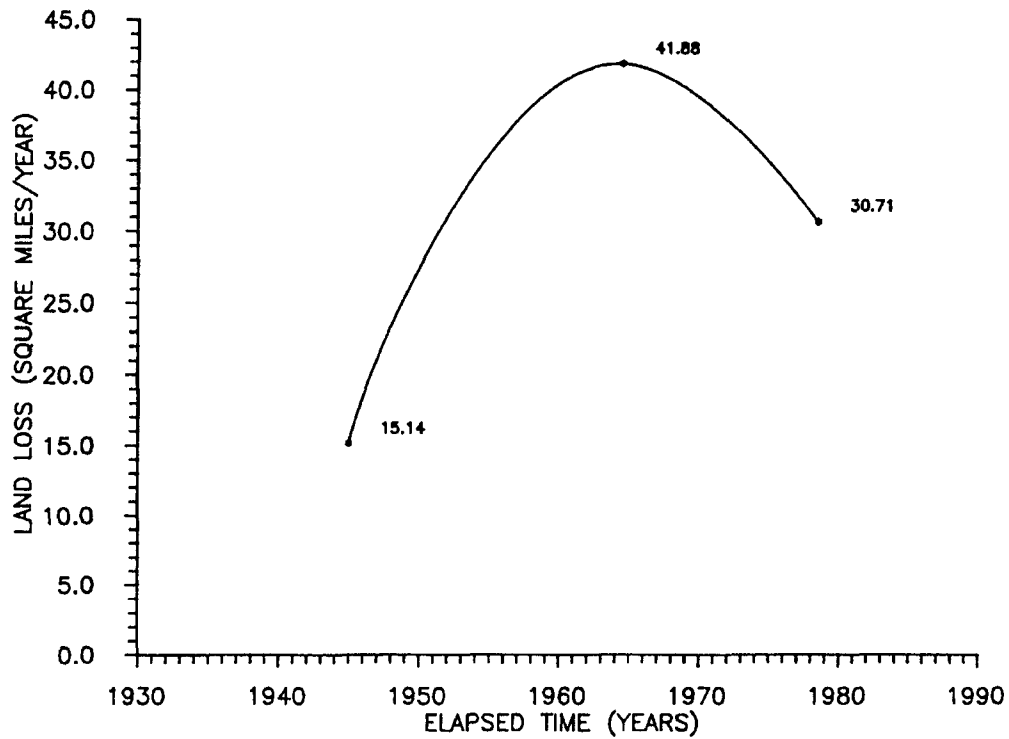


Figure 2. Composite land loss rate curve for entire Louisiana Coastal Plain