

# Wetland Loss and Land Subsidence Related to Hydrocarbon Production, South-Central Louisiana

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Extensive wetland losses have occurred in coastal Louisiana during the last half century, with estimated rates as high as 75 to 100 km<sup>2</sup>/yr. Analysis of historic aerial photographs and satellite images suggests that the most rapid wetland loss and collapse of the delta plain occurred during the late 1960s and 1970s. Since 1956, the emergent land area at five wetland-loss hotspots in the Terrebonne-Lafourche region of the Mississippi River delta plain has, on average, decreased by 45 to 50%.

Formerly emergent marshes at the wetland-loss hotspots are now submerged beneath water that averages 0.5 to 1.0 m deep. Correlation of the shallow subsurface stratigraphy shows that land subsidence has been the primary physical process contributing to wetland loss. Subsequent erosion of the submerged delta-plain marsh has been relatively minor at most of the hotspots.

The widespread and nearly simultaneous collapse of marshes across the Mississippi delta plain appears to be an unprecedented event in the recent geological record. Average historical rates of subsidence, determined from analysis of leveling surveys conducted by the National Geodetic Survey between 1965 and 1993, range from 8 to 12 mm/yr. In contrast, average rates of subsidence inferred from radiocarbon dates range from 1 to 5 mm/yr over the last 5000 years.

Surface and subsurface data strongly indicate that the rapid subsidence and associated wetland loss were largely induced by the production of hydrocarbons and associated formation water. The areas of greatest wetland loss and highest subsidence rates show good spatial correlation with the location of large oil and gas fields; and the period of most rapid wetland loss (late 1960s to 1970s) is nearly coincident with the timing of peak oil and gas production. The most recent rates of wetland loss are substantially lower than the peak rates, which is also consistent with significantly lower rates of fluid production.