NOAA COASTAL OCEAN PROGRAM
Decision Analysis Series No. 17

ERRATA SHEETS

Flux and Sources of Nutrients in the Mississippi-Atchafalya River Basin

Topic 3 Report for the Integrated Assessment on Hypoxia in the Gulf of Mexico

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May 1999

The following page provides a correction to Figure 4.4 replacing page 37

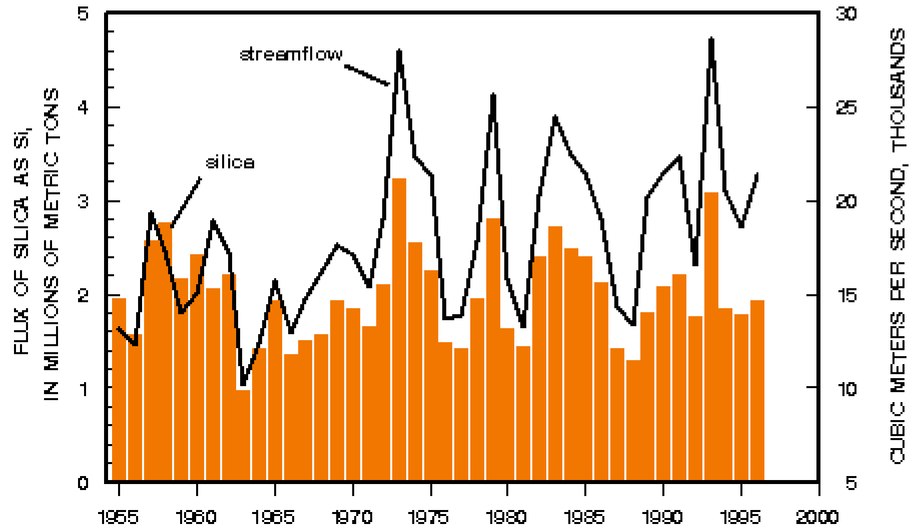

FIGURE 4.4. Annual flux of silica and mean annual streamflow from the Mississippi River Basin to the Gulf of Mexico.

4.2.1 Climate Effects on Nutrient Flux

The average annual streamflow increased significantly during 1955–97—the period that is the focus of this report. Streamflow was approximately 30% higher during 1980–96 than during 1955–70. A Kendall's tau test on the mean annual streamflow showed a statistically significant trend ($p = 0.001$) with a slope of 158 m^3/s/yr. Some of this increase is the result of long-term climatic variation, and some is driven by shorter-term climatic cycles. Baldwin and Lall (1999) analyzed streamflow from the Mississippi River at Clinton, Iowa, for 1874–96 and reported a long-term, U-shaped trend in average annual discharge, with the beginning and end experiencing high flows. The period 1955–96 showed a particularly large increase in flows. A 10-year Loess regression through the average annual discharge data showed decadal-scale trends. This value has a minimum of less than 1,132 cm in the late 1950s, and increases to over 1,700 cm by the late 1990s. The higher flows in the latter half of the century are attributed to increased precipitation throughout the year, particularly to warmer, wetter springs (Baldwin and Lall 1999). Angel and Huff (1995) analyzed frequency characteristics of rainfall in the MARB from records dating back to 1901, and found a 20% increase in the number of extreme one-day rainfall events.

The higher precipitation and streamflow in the later time period could influence nitrate flux in several ways. First, the volume of flow would be larger and more nitrate would be transported, unless concentrations decreased. Second, the higher precipitation could leach more accumulated nitrate from soils in the basin into tile drains and ditches, and would actually cause nitrate concentrations in streams to increase, as previously noted in section 3.1.1. Third, higher streamflow would decrease both the contact time of water in the river with bottom deposits and the rates of denitrification (Howarth et al. 1996). The combination of higher nitrate concentrations and higher streamflow, and possibly decreased denitrification during 1980–96, would produce significant increases in nitrate flux.