The Effects of Ecological Changes in South Florida: Are These Problems for Restoration?

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The goal of the landmark Everglades Restoration Act, signed by President Clinton on December 11, 2000, is to restore the nationally significant and unique natural resources of the Florida Everglades ecosystem. The gradual decline in water flow over the past 50 years has caused significant changes in ecosystem habitats. By returning at least 50% of historic water flow through South Florida, the Comprehensive Everglades Restoration Plan (CERP) aims to reverse the course of declining health of the ecosystem and reestablish the biological diversity of the Everglades. To meet these targets, it is imperative to understand how the habitats have changed and the rate at which the changes have occurred.

Over the past few decades, short-lived isotopes (^{7}Be, ^{210}Pb, and ^{137}Cs) have been used extensively to define the rates of habitat changes. In a 10-year study, short-lived isotopes were used to establish historical records and baseline information at 102 sites in the southern Everglades and Florida Bay. The most profound discovery was the recognition of distinct habitat changes in the lakes and mud islands along the northern boundary of the bay. Prior to 1950, the bay floor was rock: a hardbottom habitat. Beginning around 1950, concurrent with decrease in freshwater flow, the environment changed from estuarine to marine. With this shift, marine carbonate sediment began to accumulate, creating a soft-bottom ecosystem. In addition, because of the subsurface geology of South Florida and the nuances of the short-lived isotope systematics, it was determined that subsurface freshwater retreat had coincided with the estuarine-to-marine change.

The increasingly marine nature of the bay due to decreased freshwater influx also affected the central part of the bay by increasing production of carbonate sediment. Sediment accreted to the mud islands, extending tidal flats. As a result, passes between islands were closed. The effect was restricted circulation.

In the southern bay, the sediment accumulation record showed that deposition was not as affected by the change in hydrology but was controlled by variations in progressive sea-level rise. The sea-level record at Key West shows that sea-level rise has not been constant but has varied with periods of relatively rapid rise followed by periods of no change. On the leeward side of mud banks within Florida Bay, the variations in sea level result in shifts in sediment accumulation rates from an increased rate during rising sea level to a decreased rate during stable periods.