Impacts of Global Change on Coastal Wetlands in the Mississippi River Delta

Abstract

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Coastal wetlands are subject to global change factors such as rising sea-level, climate change, and elevated atmospheric CO2. This presentation reviews how these factors may interact to influence habitat stability and persistence of coastal marshes under global change scenarios. To remain stable, marshes must maintain soil elevations relative to sea level, which is rising. Soil accretion occurs through both physical and biological processes. In sediment-deficient systems, accumulation of organic matter through plant production-decomposition processes is an important contribution to soil volume, allowing the marsh to build vertically. Thus, factors that influence plant processes (temperature, nutrients, CO2) have the potential to alter the contribution of organic matter to soils and hence to vertical accretion. In rapidly subsiding and sediment-deficient areas, such as the Mississippi River Delta, biophysical processes controlling soil elevations are key to countering submergence. Field studies in coastal wetlands have identified the plant root zone as a key stratum where vertical adjustment occurs. Greenhouse studies have quantified effects of flooding, salinity, nutrients, and elevated CO2 on plant production and contributions to soil expansion. The results suggest that as sea-level rises, biophysical processes and interactions with other global drivers (CO2) may aid in counterbalancing submergence of some coastal wetlands.