Marsh Management Plans in Practice: Do They Work in Coastal Louisiana, USA?

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ABSTRACT / Louisiana's coastal wetlands represent about 41% of the nation's total and are extensively managed for fish, fur, and waterfowl. Marsh management plans (MMPs) are currently used to avoid potential user conflicts and are believed to be a best management practice for specific management goals. In this article, we define MMPs and examine their variety, history, impacts, and future.

A MMP is an organized written plan submitted to state and federal permitting agencies for approval and whose purpose is to regulate wetland habitat quantity and quality (control land loss and enhance productivity). MMPs are usually implemented by making structural modifications in the marsh, primarily by using a variety of water control structures in levees to impound or semi-impound managed areas. It appears that MMPs using impoundments are only marginally successful in achieving and often contradict management goals. Although 20% of coastal Louisiana may be in MMPs by the year 2000, conflict resolution of public and private goals is compromised by a surfeit of opinion and dearth of data and experience. Based on interpretation of these results, we believe the next phase of management should include scientific studies of actual impacts, utilization of post-construction monitoring data, inventory of existing MMPs, development of new techniques, and determination of cumulative impacts.

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formation, stability, and decline, as well as wetland functions. We then discuss wetland management goals, which are generally to regulate land loss, water, and plant and animal distribution and abundance. Finally, we focus on the formal MMP submitted in state and federal permit applications, including the history of MMPs, specific examples emphasizing the Chenier Plain, impacts, and results. Recommendations and cautionary summaries are included.

Wetland Formation and Loss in Coastal Louisiana

Louisiana's $1.8 \times 10^6$ ha of coastal wetlands are formed from the deltaic and marginal deltaic (chenier) plains of the Mississippi and Atchafalaya Rivers (Figure 1). The current geologic conditions in the coastal zone reflect the 16 major deltaic episodes of alternating growth and decay that occurred over the past 6000 years prior to the emerging Atchafalaya River Delta (reviews of the modern history of the Louisiana coast are available; for example, Price 1954, Fisk 1960, Frazier 1967, Coleman 1976, Turner 1985). During these cycles, sediment sorting, dewatering, compaction, and consolidation resulted in wetland areas of greater and lesser susceptibility to subsidence and land loss. Until recently, biological and physical factors have been nearly in balance along the Louisiana coast, resulting in net wetland gain with episodes of localized wetland loss. Currently, however, the sediment deposited by riverine systems or accumulated by biological processes appears to be less than necessary to match sea level rise, subsidence, and land loss (Turner 1985, Walker and others 1987). The overall land loss rate is about 0.8% annually (130 km²/year), and is increasing geometrically with time (Gagliano and others 1981, Turner 1985, Walker and others 1987). Virtually all occurs as wetland loss. Recent studies have shown that accelerated losses in these areas may be caused in part by direct human environmental alterations resulting in hydrologic modifications, including oil and gas canal dredging, spoil banks, and levees, which restrict or eliminate regular overbank flooding (Davis 1973, Gosselink and others 1979, Craig and others 1980, Turner and others 1982, Turner 1985, Day and others 1986).

Marsh Management Plans

It was not until the early 1970s that wetland management and coastal land loss in Louisiana began to receive special attention by researchers and public officials. During the past 15 years, the investigation of Louisiana's coastal wetland ecosystem has increased, and state officials have developed and proposed actions designed to reduce land loss and its impacts on coastal resources (Spicer and others unpublished). These actions include construction of controlled freshwater diversions along the Mississippi River, regulation of dredge and fill activities, creative use of dredge spoil to create impoundments, and enhancing land building in the Atchafalaya River Delta (Day and Craig 1982, Day and others 1986, Spicer and others unpublished).

The use of impoundments is becoming increasingly popular with coastal landowners. These projects attempt to reduce saltwater intrusion and the conversion of land to open water (land loss), improve vegetation and fish and wildlife habitats, and support mineral exploration, or urbanization. These projects have traditionally involved the installation of levees, earthen plugs, weirs, flap-gates, and other structures aimed at controlling water level in management areas.

Some other structural components used in marsh management include backfilling canals, shoreline stabilization techniques, and semi-impoundments. For this report, the term impounded means enclosed parcel of land or water rather than a strict hydrologic reference to a confined body of water. A marsh that is completely or partially hydrologically isolated from the surrounding ecosystem, either naturally or by artificial leveeing, is considered impounded. Other, nonstructural marsh management practices include marsh burning, aquatic weed control, and revegetation of marsh by planting (Spicer and others unpublished). Weirs and other water control structures may inhibit land loss and increase wildlife and fish habitat by reducing saltwater intrusion and stabilizing water levels within the management area (Davidson and Chabreck 1983, Day and others 1986). Negative impacts encountered in structural marsh management practices, particularly in impounded marshes, include the exclusion of some species of vegetation, fish, and wildlife, alteration of hydrologic regimes and nutrient cycles, reduction of public access and rights of way, and restriction of estuarine organism movement (Spicer and others unpublished). Land loss may increase as well (Turner and Neill 1983, Day and others 1986).

Guidelines and Permitting in Louisiana

Legislative Authority

Because of the potential impacts of individual or corporate entities on public resources, local/state/federal regulatory authorities currently require permits for implementation of MMPs in the Louisiana coastal...