



By Robert N. Stavins

## Ongoing Drivers of Wetlands Depletion

Private land-use decisions can be affected dramatically by public investments in highways, waterways, flood control, or other infrastructure. The large movement of jobs from central cities to suburbs in the postwar United States and the destruction of Amazon rain forests have occurred with major public investment in supporting infrastructure. Private land-use decisions can generate major environmental and social externalities — or, in common language, unintended consequences.

In an analysis that appeared in 1990 in the *American Economic Review*, Adam Jaffe of Brandies University and I demonstrated that the depletion of forested wetlands in the Mississippi Valley — an important environmental problem and a North American precursor to the loss of South American rain forests — was exacerbated by federal water-project investments, despite explicit federal policy to protect wetlands. That analysis is as germane today as it was when it first appeared.

Forested wetlands are among the world's most productive ecosystems, providing improved water quality, erosion control, floodwater storage, timber, wildlife habitat, and recreational opportunities. Their depletion is a serious problem.

The largest remaining wetland habitat in the continental United States is the bottomland hardwood forest of the Lower Mississippi Alluvial Plain.

Originally covering 26 million acres in seven states, this resource was reduced to about 12 million acres by 1937. By 1990, another 7 million acres had been cleared, primarily for conversion to cropland.

The owner of a wetland parcel faces an economic decision involving revenues from the parcel in its natural state (primarily from timber), costs of conversion (the cost of clearing the land minus the resulting forestry windfall), and expected revenues from agriculture. Agricultural revenues depend on prices, yields, and, significantly, the drainage and flooding frequency of the land. Needless to say, landowners typically do not consider the positive environmental externalities generated by wetlands; thus conversion may occur more often than is socially optimal.

Such externalities are the motivation for federal policy aimed at protecting wetlands, as embodied in the Clean Water Act. Nevertheless, the federal government has engaged in major public investment activities, in the form of Army Corps of Engineers and Soil Conservation Service flood-control and drainage projects, which appear to make agriculture more attractive and thereby encourage wetland depletion. The significance of this effect had long been disputed by the agencies which construct and maintain these projects; they attributed the extensive conversion exclusively to rising agricultural prices.

In an econometric analysis of data from Arkansas, Mississippi, and Louisiana, from 1935 to 1984, Jaffe and I sought to sort out the effects of federal projects and other economic forces. We discovered that these public investments were a very substantial factor causing conversion of wetlands to agriculture, with between 30 and 50 percent of the total wetland depletion over those five decades due to the federal projects.

More broadly, four conclusions emerged from our analysis. First, landowners had responded to economic incentives in their land-use decisions.

Second, construction of federal flood-control and drainage projects caused a higher rate of conversion of forested wetlands to croplands than would have occurred in the absence of projects, leading to the depletion of an additional 1.25 million acres of wetlands. Third, federal projects had this impact because they made agriculture feasible on land where it had previously been infeasible, and because, on average, they improved the quality of feasible land. Fourth, adjustment of land use to economic conditions was gradual.

The analysis highlighted a striking inconsistency in the federal government's approach to wetlands. In articulated policies, laws, and regulations, the government recognized the positive externalities associated with some wetlands, with the Bush I administration first enunciating a “no net loss of wet-

lands” policy. But public investments in wetlands — in the form of flood-control and drainage projects — had created major incentives to convert these areas to alter-

native uses. The government had been working at cross-purposes.

The conclusion that major public infrastructure investments affect private land-use decisions (thereby often generating negative externalities) may not be a surprise to some readers, but it was the 1990 analysis described here that first provided rigorous evidence which contrasted sharply with the accepted wisdom among policy makers.

As wetlands, tropical rain forests, barrier islands, and other sensitive environmental areas become more scarce, their marginal social value rises. If induced land-use changes are not considered, the country will engage in more and more public investment programs whose net social benefits are negative.

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