





*Protecting*  
**BIODIVERSITY** *and*  
**ECOSYSTEM SERVICES**  
*on Private Land*

A Comparison of Three  
US Policies

*The federal government uses a range of carrots and sticks to encourage farmers and developers to supply healthy ecosystems on their land.*

**Margaret A. Walls** and **Anne Riddle** report  
*on the mixed results.*

**W**ith about 60 percent of land in the United States under private ownership, engaging so many diverse landowners to protect their forests, marshlands, grasslands, and other natural areas—and the animals that live in those landscapes—can pose a significant challenge for federal regulators. Conserving these plant and animal species, however, provides the biodiversity necessary for the healthy functioning of ecosystems that, in turn, generates numerous benefits to society—from recreation to flood protection to clean air. Often incentives do not exist for private landowners to conserve and provide these benefits, which are not valued in markets.

The federal government uses a wide range of approaches to encouraging the development of ecosystem services on private land. To learn what works best, we compared three important programs: the Endangered Species Act, a strict command-and-control regulation; the

important lands for protection. By contrast, the Endangered Species Act creates perverse incentives for private landowners to preemptively reduce habitat to avoid burdensome requirements of the law. Wetlands mitigation banking, described later, is the closest option to a true payment-for-ecosystem services approach, but it has been plagued with difficult monitoring problems.

### **The Endangered Species Act**

Signed into law 40 years ago, the Endangered Species Act prohibits landowners from modifying properties designated as critical habitat for threatened species unless they create a habitat conservation plan and obtain a special permit from the federal government. Studies have shown that the critical habitat designation has a negative effect on property sales and property values, providing a strong incentive for landowners to avoid it.

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voluntary Conservation Reserve Program, which compensates landowners for protecting property from agricultural uses; and Section 404 of the Clean Water Act, which prohibits damage to wetlands unless individuals or firms buy credits that fund the creation or protection of equivalent wetlands elsewhere.

Research by economists suggests that the Conservation Reserve Program has been successful at protecting ecosystem services on privately owned farmland—and has done so in a relatively cost-effective way because it creates financial incentives for landowners to set aside ecologically

In North Carolina, for example, researchers Dean Lueck and Jeffrey Michael found that some forest landowners in the 1990s preemptively harvested timber on their land to reduce the habitat of the endangered red-cockaded woodpecker. Other studies have documented that the mere listing of a species can discourage private landowners from participating in conservation efforts. For example, property owners within range of habitat of the endangered Preble's meadow jumping mouse revealed in surveys by Santa Clara University psychologist Amara Brook and colleagues that they often would refuse to give biologists



permission to conduct research on their land.

Perhaps as a result, the benefits of the law are murky. Since the law's enactment in 1973, fewer than 50 of the nearly 2,000 species listed as endangered or threatened have been removed from the list. Law professor Jonathan Adler of Case Western Reserve University reports that as of July 2008, the Fish and Wildlife Service (which administers the Endangered Species Act in conjunction with the National Oceanic and Atmospheric Administration) could identify only 21 species recoveries, as some of the delistings are due to data errors or extinctions. No one has attributed any species recoveries directly to the regulation of habitats on private land.

### **The Conservation Reserve Program**

Many experts have pointed out that the essential flaw in the Endangered Species Act is that it penalizes landowners—rather than rewards them—for having critical habitat on their lands. In contrast, the Conservation Reserve Program, signed into law in 1985 as part of the Food Security Act, pays farmers to implement approved conservation practices and retire agricultural land that provides ecosystem services.

The Conservation Reserve Program is by far the largest federal conservation program. At nearly \$2 billion per year, it accounts for approximately one-third of all land conservation spending by the federal government. In 2009, 32 million acres of land were enrolled in the program, approximately 8 percent of all cropland in the United States.

Farmers voluntarily enroll parcels of land in this program by submitting proposals to engage in a set of proposed conservation practices. Government agents score the offers based on an index of environmental benefits and costs. In contrast to the destructive preemptive practices documented in response to the Endangered Species Act, farmers interested in the Conservation Reserve Program plant trees and wildlife cover in order to increase the likelihood that their bids will be accepted.

Five years after the program's implementation, Economic Research Service researchers Edwin Young and Tim Osborn estimated the program had provided surface water quality improvements and habitat conservation on the order of \$5 billion to \$10 billion. The Conservation Reserve Program is generally credited with being the single most important factor in the recovery of many North American waterfowl populations, and

in 1999 Peter Feather and colleagues at the Economic Research Service concluded that the program generated recreational benefits of \$555 billion annually.

### **The Clean Water Act**

Officially established in 1995, the wetlands mitigation banking program of the Clean Water Act takes the idea of paying for ecosystem services one step further. Whereas payments in the Conservation Reserve

tion bank for a purchase, the bank quantifies the wetland functions or acres restored or created in the transaction and calculates the value of the credits needed. The permit holder then purchases the appropriate number of credits from the bank. After the transaction, the bank becomes the party responsible for meeting requirements under the law concerning long-term management of the land, site protection, and defense of easements.

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Program come from the government, the banking program sets up a true market for ecosystem services with exchanges between private agents that lead to land conservation.

Section 404 of the Clean Water Act prohibits the discharge of dredge or fill materials into any US waters unless permitted by the Army Corps of Engineers. For every authorized discharge, the permit holder must avoid and minimize (to the greatest extent practicable) any adverse impacts to wetlands, streams, and other aquatic resources. If impacts are unavoidable, compensatory mitigation is required—that is, replacement of the lost wetland and its associated functions.

As an alternative to undertaking their own mitigation, permit holders can purchase offsets from a wetlands mitigation “bank”—a wetland that a government agency, corporation, individual, or nonprofit organization has restored, established, enhanced, or preserved and then set aside to compensate for future conversions of wetlands for development activities. When the permit holder approaches the mitiga-

The market-based nature of wetlands mitigation banks gives them great appeal, and they have become a mainstream way to meet the requirements of the Clean Water Act. Compared with on-site mitigation, or even mitigation off-site through individual one-on-one transactions with landowners, purchases from an established wetlands bank may be easier and have lower transaction costs. And by generating competition and bargaining in market exchanges, the market in wetlands credits should help to bring down the costs of meeting the Clean Water Act's Section 404 requirements.

Unfortunately, the wetlands mitigation program has failed to live up to its promise. The program is plagued by unfinished and substandard projects, and studies have found that only about 20 percent of sites met the ecological equivalent of the displaced wetland. In some locations, banks are not meeting the definition of wetlands but rather are just general conservation areas. Of the true wetlands held by banks, many have been found to be in poor condition.

Even with these setbacks, the program is protecting more wetlands than would be achieved with no policy at all. However, the benefits of wetlands are highly site-specific, making it difficult to conduct an overarching benefit–cost analysis of the wetlands mitigation banking program. Whether these benefits exceed the costs is unclear.

### **Conservation Banks and Green Infrastructure**

“Conservation banks”—natural lands set aside to protect rare habitat and support endangered species—were established to operate the same way as the wetlands mitigation banks, but for the purpose of meeting the habitat requirements under the Endangered Species Act. This idea is still in its infancy. However, in an era of strained public budgets, the conservation banking idea and market-based approaches to conservation in general may have great appeal. Many communities are facing high costs to meet the US Environmental Protection Agency’s Total Maximum Daily Load restrictions on nitrogen, phosphorus, and sediment pollutants in local streams and rivers, for example. Municipal stormwater systems and combined sewer–stormwater systems are expected to need significant and costly upgrades to meet the requirements. Protection of drinking water supplies in some cities is also a major concern. Green infrastructure investments focused on land conservation (such as protecting land around a watershed to provide natural water filtration) may prove to be viable and low-cost options for attaining some of these environmental objectives. Similar green options for flood protection (such as protecting from development natural areas that can hold rainwater overflows) have been advocated as well. Many communities are also realizing the recreational, aesthetic, and habitat cobenefits provided by natural lands.

The wetlands mitigation bank experience highlights an important lesson as regulators consider new conservation programs focused on ecosystem services: it is often difficult to accurately measure, monitor, and enforce these programs in a way that optimally provides these nonmarket goods and services. Still, there is cause for optimism. The Conservation Reserve Program has been successful at protecting ecosystem services on privately owned farmland, and it is doing so in a relatively low-cost manner. Questions remain about the program—whether an improved design could increase net benefits and how demand for biofuels may lead to reductions in the amount of land in the program—but it still remains one of the better-designed ecosystem services programs in the United States. ●

#### **FURTHER READING**

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