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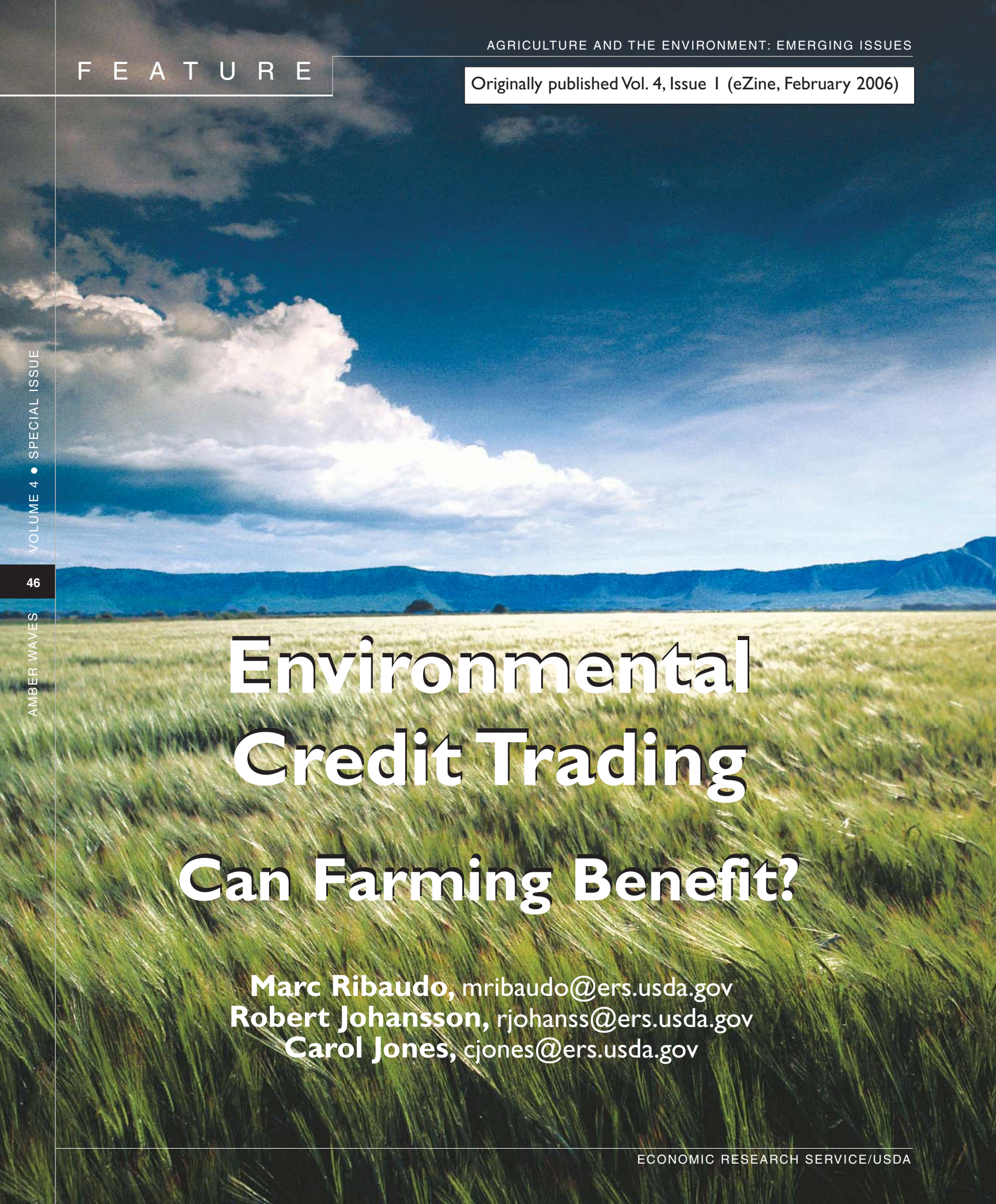

Environmental Credit Trading

Can Farming Benefit?

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Environmental regulations often require firms that emit pollutants to limit emissions to a set level or to install specific emission-reducing technologies. While fairly straightforward, this command-and-control approach can be costly both to the firms and to society. Firms with high costs of pollution reduction and those with low costs are required to meet the same requirements, which may waste resources. Environmental credit trading, an alternative to command-and-control regulations, is a market-based approach to comply with regulations that could achieve pollution abatement goals at lower costs to society. Environmental credit trading allows regulated firms to meet their obligations by purchasing pollution abatement services (credits) from lower-cost providers. For example, the 1990 Clean Air Act amendments established a trading program between power plants to cut sulfur dioxide (SO2) emissions by 50 percent from 1980 levels to control acid rain. The trading program has been a success, with emissions reductions exceeding the goal by 30 percent and annual cost savings estimated at $1 billion.

Trading programs have been created for environmental issues other than air quality, such as water quality, wetlands protection, and greenhouse gas emissions. Even though agriculture per se is not subject to most environmental regulations, farmers can participate in these credit trading programs by generating pollution-reduction credits and selling them to regulated firms. Farmers can benefit if the cost of generating credits is less than the price they command. Farmer participation in trading programs has been limited to date, but USDA has recently committed to promoting farmers' participation in trading programs. The success of these programs will rest on several key design elements and their ability to generate the economic incentives needed to encourage both the regulated firms and farmers to participate.

What Does It Take For Credit Trading To Succeed?

For a credit trading program to be successful, there needs to be a demand for credits as well as a supply of credits. Demand is generally created by a regulation or other cap on emissions or other activity that degrades the environment. In the case of water quality, the Total Maximum Daily Load provisions of the Clean Water Act set a discharge cap for point sources in impaired watersheds, creating a demand for pollution-reduction credits. Firms required to meet a discharge cap will be willing to pay for credits from other sources as long as the credits are less expensive than their own abatement costs. Forty trading programs have been established across the country for such pollutants as nitrogen, phosphorus, selenium, dissolved solids, and heavy metals.

In the case of carbon and other greenhouse gases, demand for credits in the U.S. originates with some local, State, and regional regulations (there are no Federal regulatory limits). Oregon was among the first States to impose a performance standard for power plants. Companies can either meet the standard with new technology and increased efficiency, or pay $0.85 per ton of excess carbon dioxide emissions, which the Oregon Climate Trust then pools to buy credits from emission reduction projects in the U.S. and abroad. Though demand for credits generally originates in regulations (rather than voluntary programs), some exceptions exist. The Chicago Climate Exchange (CCX), for example, is an experimental, voluntary cap-and-trade system in which over 40 firms participate (including Dupont, Ford, IBM, Dow Corning). The price on CCX in April 2006 was $2.75 per ton carbon dioxide (or $10 per ton carbon).

Wetland conversion is governed by a Federal "no-net-loss" policy that essentially functions like a cap. The policy requires that wetlands converted to other uses be offset by the creation or enhancement of other wetlands that "possess the physical, chemical and biological characteristics to support establishment of the desired aquatic resources and functions," according to Section 404 of the Clean Water Act. This policy effectively caps the supply of land for development in certain areas (e.g., in the construction of roads, housing developments, shopping malls). Wetland mitigation banks have been set up in many States to allow private developers to purchase wetland conversion rights (credits) from farmers, who have established or restored wetlands on their farms. Current values of wetlands banked can depend on their location and/or expected environmental benefits. For example, in Minnesota, the value of wetland credits to public transportation authorities ranged from $4,000 to $35,000 per acre, depending on proximity to the Twin Cities metro area.

The supply of credits comes from those who can produce credits at a cost lower than the expected market price for credits. Suppliers can be regulated sources that can produce credits at a lower cost than other regulated sources, or unregulated sources that by design are allowed to participate. Farmers can supply environmental credits by, for example, reducing the runoff of regulated pollutants, reducing greenhouse gases, or restoring wetlands (see box, "Farmers as Suppliers of Environmental Credits"). These actions are conditional on farmers providing environmental services at a lower cost than that of regulated firms in meeting pollution regulations. In addition to lowering the overall costs of meeting environmental goals, subsequent credit trading could provide financial opportunities for farmers and leverage private sector funds for conservation.

Once a market has been established, the price for environmental credits could be determined by market-style trading

Farmers as Suppliers of Environmental Credits

By adopting certain types of conservation practices, farmers can become suppliers of environmental credits while reducing the negative environmental impacts of farming. Specifically, farmers can generate credits by undertaking measures to reduce pollutant runoff into water bodies, reduce greenhouse gas emissions, or restore wetland functions.

Reduce pollutant runoff—Point sources regulated by the Clean Water Act (CWA) discharge directly into water bodies from an identifiable location (e.g., end of pipe). Nonpoint sources, such as agricultural fields, generally do not discharge directly into water bodies from an identifiable location; runoff occurs in a more disperse manner above and below ground. Water quality trading allows a point-source discharger to meet CWA obligations by acquiring "credits" from other sources (point or nonpoint) that take measures to reduce the regulated pollutant. The Total Maximum Daily Load (TMDL) provision of the CWA prompted a recent surge in interest in point/nonpoint trading. Nutrients (nitrogen and phosphorus) are the predominant pollutants in point/nonpoint markets, since both point and nonpoint sources are major sources. Forty water quality trading programs have been started in the United States to date. Twenty-two allow trades with agricultural nonpoint sources. Most of these trading programs are for nutrient reductions, but others address selenium discharge, sedimentation, and water flow.

Reduce greenhouse gas emissions—Most proposed strategies to mitigate global climate change focus on reducing the dominant source of greenhouse gas (GHG) emissions to the atmosphere—combustion of fossil fuels, which releases carbon dioxide (about 80 percent of U.S. GHG emissions in 2001). But the agricultural and forestry sectors can provide low-cost alternatives to energy emission reductions by shifting land use to forestry or wetlands, or adopting best management practices such as conservation tillage. At this point, GHG trading is limited because the Federal regulatory program does not impose mandatory restrictions on GHG emissions.

Restore wetland functions—Wetlands are complex ecosystems, providing ecological, biological, and hydrologic goods and services. In the U.S., an estimated 100 million acres of wetlands (45 percent of the initial base) were converted between 1780 and 1990, mostly for agricultural production. Farmers can contribute to the "no-net-loss" goal by restoring some chemical and biological wetland functions on agricultural land.

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similar to a commodities exchange, if there are sufficient numbers of buyers and sellers. However, even with only a few buyers/sellers and prices set by a managing agency, program participants can still benefit, because the costs to comply with environmental regulations are allocated more efficiently. In Minnesota, the Rahr Malting Co. has achieved its discharge requirements through trades with only four farmers. Rahr purchased water quality credits for its new wastewater treatment plant by funding upstream reductions in nonpoint-source phosphorus discharges. The annualized cost of the trades was $2.10 per pound of phosphorus, but without the trade, it would have cost Rahr as much as $4-18 per pound of phosphorus to achieve its requirements.

For a successful trading program, the environmental equivalence between the location where a pollutant reduction is made and the location where that reduction is purchased or used must be established. For example, drained wetlands must be replaced with wetlands with equivalent wetland functions in order to comply with Section 404 of the Clean Water Act; otherwise, there will be a net loss in environmental quality. This is also the case with water quality trading. Credits produced by farmers implementing conservation practices should be assessed where a point source discharges (e.g., into a stream), not at the edge of the field. An exception is global pollutants. For example, the atmospheric concentration of greenhouse gases affects climate change, not the location of emissions or withdrawals of greenhouse gases (through carbon sequestration).

Willingness to participate is crucial. Those obligated to comply with an environmental restriction or cap must see an economic opportunity to reduce compliance costs by purchasing credits from others. Those offering credits must believe that they can produce credits at a cost less than the expected market price for credits. Environmental credit trading will be more likely when the economic opportunities are clear to all participants.

Some Obstacles Could Hinder Trading

Though opportunities to trade credits exist, very few farmers have taken advantage of them. Demand for credits from agricultural sources may be low because of uncertainty over the credits it can produce. Water quality is a good example. Much of agricultural pollution is considered nonpoint in nature. That is, many agricultural pollutants arrive via dispersed and unobservable transport mechanisms, whether through runoff, groundwater leaching, or the atmosphere. Therefore, it is difficult to predict with certainty the amount of discharge reduction (or production of credits) the implementation of management practices will produce at the point in the watershed where credits are measured. This may discourage demand for agricultural credits by regulated firms that are legally responsible for meeting discharge limits. Uncertainty could be reduced by more intensive monitoring, but that may be expensive. Such transaction costs could negate the benefits of trading. One reason why the SO2 trading program is so successful is that the cost of measuring emissions is low.

Uncertainty over the production of credits affects the supply side as well. Because of the nature of pollution from agriculture, and the need to assess credits at the point where regulated sources actually discharge, farmers may be unaware of the number of credits they can actually produce, or what price they should ask for them.

Farmers may also be reluctant to participate in a program that is partly regulatory, even with compensation. Some have suggested that farmers are afraid that information about their contributions to water quality and costs of pollution abatement on farms could eventually be used to develop regulations for agricultural pollution. In addition to farmer reluctance to participate in a regulatory program, uncertainty over the number of credits farmers produce and lack of enforcement of the environmental regulation have proved to be deterrents to trades.

Another supply-side issue is the treatment of credits generated on farms through publicly funded conservation programs such as the Conservation Reserve Program (CRP) and Environmental Quality Incentives Program (EQIP). Since credits from conservation programs are already partly or fully funded, some trading programs do not allow them to be traded. A farmer participating in a conservation program would have to implement additional conservation measures to participate in a trading program. This would raise the cost of credits, making them less attractive to those wishing to purchase credits.

USDA Can Facilitate Market-Based Stewardship

Under its new policy on market-based stewardship, USDA has committed to encourage participation by farmers in environmental credit markets. USDA has outlined three sets of actions that can help overcome some of the demand and supply side problems facing farmers' participation in trading programs. One action is to develop and evaluate the necessary tools and methods for estimating the environmental credits a farmer can produce. Accounting procedures for quantifying the environmental benefits of conservation practices are necessary in order to establish the environmental equivalence of credits and to reduce uncertainty.

USDA recently implemented the Conservation Effects Assessment Program to quantify the impact of conservation practices on water quality and other resources at the watershed scale. This pro-

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gram will standardize approaches for estimating the value of environmental goods and services generated by conservation systems. In addition, USDA's Agricultural Research Service has implemented a national program on global climate change and is conducting research on carbon sequestration of different cropping systems. USDA has also developed new accounting rules and guidelines for reporting greenhouse gas emissions and carbon sequestration as part of the U.S. Department of Energy Section 1605(b) Voluntary Greenhouse Gas Reporting Registry. The revised program enables agricultural and forest landowners to quantify and maintain records of actions that reduce greenhouse gas.

Another action is to educate farmers on the potential benefits of participating in trading programs. USDA's promotion of trading could alleviate farmer uneasiness about dealing with regulatory agencies. USDA's Conservation Innovation Grants were initiated as a component of the 2002 Farm Act provisions for the Environmental Quality Incentives Program. In 2004 and 2005, seven different projects received over $4.1 million to establish credit trading programs to improve water quality, establish wildlife habitat, and sequester carbon. Information developed by these programs could help USDA provide outreach, education, technology transfer, and partnership-building activities to facilitate credit markets. This information, coupled with education of farmers about the economic opportunities of selling credits and technical/financial assistance for establishing credit generating activities, could reduce farmer concerns about trading with regulated sources and alleviate some of agriculture's own environmental impacts.

USDA's credit trading policy also calls for cooperation with other agencies to remove programmatic barriers to farmer participation. One such barrier is the treatment of credits produced through conservation programs such as EQIP, CRP, or the Grassland Reserve Program. Creating synergies between program-generated credits and newly tradable credits could benefit both agriculture and regulated sources.

This article is drawn from . . .

Economics of Water Quality Protection from Nonpoint Sources: Theory and Practice, by Marc O. Ribaudo, Richard D. Horan, and Mark E. Smith. AER-782, USDA, Economic Research Service, November, 1999, available at www.ers.usda.gov/publications/aer782/

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