

ENVIRONMENTAL SERVICES MARKETS IN AGRICULTURE



Environmental goods and services are the benefits society obtains from the environment and ecosystems, both natural and managed, such as water filtration, flood control, provision of habitat, carbon storage, and many others.

Farmer participation in providing these types of goods and services began in earnest in the 1990s with the development of watershed approaches incorporating nutrient credit trading and wetlands mitigation banking, as well as the more recent development of voluntary carbon credit markets. These efforts have triggered further interest in the possibility of developing market and trading opportunities for farmers and landowners as a source of environmental offsets. These services would be in addition to the food and fiber services traditionally supplied by the agriculture and forestry sectors.

In the United States, Congress is expressing growing interest in developing such market-based approaches to complement existing federally supported programs that promote conservation in the farm and forestry sectors, as well as to complement existing and/or emerging environmental regulations or natural resource requirements that may affect the agriculture and forestry sectors.

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What Are Environmental Services Markets?

Environmental goods and services are the benefits society obtains from the environment and ecosystems, both natural and managed, such as water filtration, flood control, provision of habitat, carbon storage, and many others (Table 1).[1] In most cases, these constitute “free services” since landowners and managers are not compensated in the marketplace. However, as many such services have become degraded over time, there is growing recognition that they should be sustained or substituted by market capital, similar to investing in water treatment plants and engineered flood control systems. One solution would be to create markets, often developed through regulation, so that providers of environmental services can be compensated in private markets for the services they provide. This could offer a potential business opportunity to the farm and forest sectors, which may be able to provide for such services and participate in the market, for example, by creating, restoring, preserving function and value in a natural resources area, or by capturing and storing carbon before gases that contribute to global climate change are released into the atmosphere. These services would be in addition to the food and fiber services traditionally supplied by the agriculture and forestry sectors.

The market for environmental goods and services involving the agricultural and forestry sectors began mostly through various pilot programs starting in the 1990s. The development of voluntary carbon credit markets and watershed approaches incorporating nutrient credit trading, along with wetlands mitigation banking, have involved the farm and forestry sectors. These programs provide a market for farmers to sell carbon or nutrient farm-based offsets to emitters/dischargers that are looking to buy offsets to mitigate their own emissions/discharges. These efforts have triggered interest in other types of tradeable permits and credits, including habitat credit trading and other types of conservation banking. The United States Department of Agricultural (USDA) identifies environmental markets with relevance to the agriculture and forestry sectors to include water quality, air quality, wetlands, endangered species, greenhouse gases, and developmental rights.[2] Often the impetus for these efforts may be linked to a “regulatory driver” specific to an actual or anticipated environmental regulation or natural resource requirement, such as requirements in the Clean Water Act (CWA), Endangered Species Act (ESA), or other state or local regulation (see Table 1). Other incentives may include market drivers that make trading environmental services financially attractive, or the desire to cultivate community goodwill.

Farmer participation in voluntary carbon credit trading programs has been growing rapidly, and currently involves an estimated 4,000 farmers across 25-30 states covering more than 4 million acres.[3] The two largest programs providing for farm-based offsets are programs operated by the

Iowa Farm Bureau and the North Dakota Farmers Union; other similar programs are operated by the Illinois Conservation and Climate Initiative, the Environmental Credit Corporation (based in Indiana), the Upper Columbia Resource Conservation and Development Council (Northwest), and Terrapass (based in California).[4] These programs cover some or all aspects of the following types of carbon capture and storage activities: sustainable agriculture practices (such as conservation tillage, grass seedlings); planting of unharvested grasslands; tree-plantings; methane capture/ biogas production with manure digesters; wind, solar, or other renewable energy use; controlled grasslands or pasture management; and forestrestoration.

Table 1. Possible Range of Services and Regulatory Driver

Tradeable Resource/Credit (Type of Service)	Regulatory Driver
Wetland, stream, aquifer recharge, forests, buffers, stormwater controls, habitat/biodiversity (e.g, habitat creation/preservation; water filtration; flood control and protection; water/air pollution controls; runoff reduction)	Federal and/or state
Nutrients (e.g, runoff reduction; water pollution controls)	State
Carbon/greenhouse gas (e.g., capture, storage/sequestration, methane destruction; air pollution controls)	State (and possibly federal)
Renewable energy (e.g., biofuel generation; fuel substitution)	State
Water and development rights (e.g., alternative land and natural resource preservation; habitat creation/preservation; aesthetic value; recreational use)	State, county, or local

Source: CRS, information from American Farmland Trust and World Resources Institute.

In 2007, about 300 farmers were participating in water quality trading programs across six states.[5] These include initiatives such as those by the Southern Minnesota Beet Sugar Cooperative, the Grassland Areas Farmers (California), the Rahr Malting Company (Minnesota), the Great Miami River Watershed (Ohio), and the Red Cedar River (Wisconsin), among others. These programs cover some or all of the following types of nutrient runoff reduction activities: cover cropping; reduced fertilizer use; conservation tillage; tree-plantings; buffers; drainage management; and wetlands mitigation trading.[6] Most water quality trading programs were initiated at the local or state level, often involving the U.S. Environmental Protection Agency (EPA). In 2006, EPA and USDA’s Natural Resources Conservation Service (NRCS)

signed a partnership agreement to establish uniform trading standards, along with supporting other collaborative efforts.[7]

The U.S. Fish and Wildlife Service, USDA's NRCS, and the Association of Fish and Wildlife Agencies signed a partnership agreement in April 2007 to promote habitat credits that could offer incentives to landowners who preserve and enhance the habitat of endangered or at-risk species. Among the stated objectives of this agreement is to develop and adopt common definitions, standards, and measurement protocols.[8] Habitat credits or "conservation banking" act like a savings account, where credits are earned for land preservation of habitat and credits can then be sold to land use industries or others who are required to mitigate the loss of habitat under the ESA and other laws that restrict or prohibit development. This is conceptually similar to wetlands and stream mitigation banking, which allows for compensation of adverse impacts of development activities ("compensatory mitigation") to wetlands, streams, wildlife refuges, or other aquatic resources. Such allowances, whether through wetlands or conservation banking, typically involve creating, restoring, enhancing, or preserving function and value in a natural resources area, often within the context of meeting a federal, state, or local regulatory requirement.

The participation of agriculture and forestry in emerging environmental services markets is gaining wide support within the farm community and its supporting organizations and agencies, as well as among the regulatory agencies and some environmental groups.[9]

The enacted 2008 farm bill (P.L. 110-246, the Food, Conservation, and Energy Act of 2008) contains a new conservation provision that seeks to facilitate the participation of farmers and landowners in environmental services markets by directing USDA to develop technical guidelines for measuring farm- and forestry-based environmental services. This provision focuses first on carbon storage and indirectly references various agriculture and forestry provisions in some legislative initiatives that are being considered as part of the broader climate change debate, which have highlighted the perceived need for uniform standards and ways of measuring emissions reduction and increases in carbon storage in the agriculture and forestry sectors. These types of provisions could expand the scope of existing land-based conservation programs and facilitate the development of private-sector markets for a range of environmental goods and services from farmers and landowners.

Benefits and Barriers

The development of market-based approaches has been widely touted as a possible source of additional farm income, whether through the sale of tradeable credits or from other types of payments, such as recreational use or hunting fees. This could offset or partially offset the costs of pollution abatement incurred by farmers who make environmental improvements on their

farmlands. In some cases, adopting alternative production practices could also result in on-farm cost savings, such as the use of renewable fuel generated on-farm. Market-based approaches are also often viewed as encompassing broader societal benefits by complementing existing farm conservation programs and evolving regulatory approaches intended to address environmental improvements in the farm and forestry sectors.

USDA reports that there are several existing barriers that may prevent the development of environmental goods and services markets involving the farm and forestry sectors.[10] These include but may not be limited to:

- uncertainty quantifying, measuring, and valuing credits;
- low demand for or discounted value of credits from agricultural sources because of uncertainty about the measurement and value of these credits;
- low participation in the farm and forestry sectors due to uncertainty over the value of environmental credits compared to the cost of pollution abatement;
- reluctance by farmers and landowners to participate in a regulatory-based program;
- small quantity of benefits that can be provided by individual farmers or landowners;
- high transaction costs;
- performance risks and liability;
- lack of information about program benefits and how to participate;
- lack of monitoring and enforcement; and
- uncertainty about whether conservation and environmental improvements that were initially funded through other publicly funded programs, such as cost-share programs administered by USDA, will be allowed to be traded.

Some Considerations

Among the principal questions regarding the inclusion of these provisions is whether the agriculture and forestry sectors can effectively provide environmental goods and services along with the more traditional food, fiber, and other services these sectors already provide.

- **Standards-setting process/implementation.** How will USDA implement its new farm bill directive for establishing uniform standards, accounting procedures, protocols, and registries for quantifying farm- and forestry-based environmental services? Can USDA accomplish its task using available agency resources?
- **Jurisdictional issues.** What are the advantages of establishing USDA as the lead role? What lead role will USDA play, given the mostly regulatory authority and statutory obligations of

other likely participating federal agencies? Might putting USDA as the lead create conflict of interest as both the regulator and promoter of standards? Are there other jurisdictional issues, such that this provision needs to be referred to other authorizing congressional committees? How might existing state and local programs implemented by other agencies be affected? How will the collaborative effort between USDA and the other participating federal agencies be put into practice? How will disagreements be addressed and resolved among all federal partners?

- **Consistency with existing regulatory authorities.** Would the agreed-upon decisions and standards resulting from such an effort be binding among all federal agencies? What assurances are there that these decisions would not override the authorizing legislation regulating water and air quality, and wildlife habitat? Would regulatory agencies with authorizing legislation have the flexibility to not adopt the standards authorized by the board or other collaborative process, if they violate the individual agencies' authorizing statutes, or contain regulations, such as measurement protocols? What are the possible implications if these decisions and standards are inconsistent with other existing regulatory guidelines and authorities?
- **Consistency with possible future authorities and initiatives.** Would such a standard-setting framework and the agreed-upon standards be consistent with, or readily adapted to, other possible future regulatory initiatives, such as those involving climate change? If possible future climate change initiatives do not provide for carbon offsets and credits from the agriculture and forestry sector, would the agreed-upon standards be enforceable within the existing voluntary carbon market? What are the potential implications if these decisions and standards are inconsistent with other possible forthcoming regulatory guidelines and authorities?
- **Standards.** Will uniform standards be national, regional, local, or site-specific in scope? How will uniform standards address differences within different production areas, types of resources, and ecosystems? Will established protocols and management practices take into account these differences? Will these standards consist of an assigned value? Given the wide range in the types of environmental services, how will outcomes or benefits be measured and expressed as standards? Will there be penalties for noncompliance?
- **Federal versus marketplace functions.** What roles should government agencies play in actually establishing environmental services markets involving agriculture and forestry? What roles would be strictly within the purview of the private-sector and independent credit markets? Is there a federal role beyond developing the reporting and credit registries that would require the board to act as intermediary between sellers and buyers? Who would be responsible for oversight

of third party verification and certification, and for assigning market value to tradable credits within an environmental services market? Would the federal agencies play a role in market oversight, enforcement, risk management, and capital investment? What other types of federal assistance may be needed to further facilitate the development of environmental services markets involving agriculture and forestry?

- **Market barriers.** How effectively do the current proposals address the types of barriers that have been identified by USDA and others that may prevent the development of environmental goods and services markets involving the farm and forestry sectors?
- **Possible unintended consequences.** Might establishing a market-based approach shift governmental and/or industry priorities away from addressing more serious environmental problems by allowing some industrial facilities to buy relatively lower-cost farm-based carbon credits rather than pay for on-site pollution abatement at the facility? Might a market-based program shift USDA resources away from established farm conservation programs?

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