

United States: Examples of Agro-environmental Practices for Economic and Environmental Sustainability

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ABSTRACT

In the United States, as in other countries, farmers are implementing agro-environmental practices depending on the sensitivity of their lands and economic imperatives. These measures are applied on a voluntary and individual basis by farmers in the Mississippi River Basin - one of the U.S. main corn and soy producing area, whereas, by contrast, they are mandatory in the Chesapeake Bay, near the East Coast - a region very much affected by discharges resulting from agricultural, industrial and urban activities.

In some cases, agro-environmental actions have been made mandatory by the federal government for environmental protection purposes, but most often economic considerations are the origin of voluntary approaches: for instance the soy industry has developed its own sustainability system, creating a sustainability assurance protocol for production practices, under the supervision of the services of the Department of Agriculture (USDA). This is in response to requests for guarantees of sustainability coming from their overseas customers particularly those in livestock and poultry production.

Other approaches to the certification of sustainable production practices are being implemented in highly environmentally-sensitive countries across the globe. More and more U.S. farmers are participating in voluntary approaches aiming to improve the economic and environmental sustainability of their production. But above all, they see this as a way to ensure the future of their own farms, mainly family farms inherited from previous generations and which they want to leave to future generations in the best possible condition.

THE CHESAPEAKE BAY AND THE MISSISSIPPI RIVER BASIN

In the United States, farm operations in sensitive areas such as the Mississippi River Basin¹ or the Chesapeake Bay² are using an array of agro-environmental practices, based on the incentives provided by the Natural Resources Conservation Service (NRCS) of the United States Department of Agriculture (USDA).

The Mississippi River Basin

A program called the Mississippi River Basin Healthy Watersheds Initiative, led by the NRCS, covers 12 States: Arkansas, Kentucky, Illinois, Indiana, Iowa, Louisiana, Minnesota, Mississippi, Missouri, Ohio, Tennessee, and Wisconsin. The federal government has contributed to this program, launched in 2009, with \$80 million per year since 2010. In this very large region, the aim is to implement voluntary conservation practices and systems in order to avoid, or control and trap nutrient (fertilizer) runoff and to improve wildlife habitat while maintaining agricultural productivity. The area essentially consists of the vast agricultural plains of the corn and soybean belt, a part of the very fertile Midwest. The Mississippi River flows from the north of the U.S., southwards through the Midwest states, before emptying into the Gulf of Mexico. It is an essential waterway for US agricultural exports (especially corn and soy), but it also acts as a 'drain' for agricultural runoff (particularly nitrates) and eroded soil which has caused an hypoxic³ (i.e. oxygen-depleted) zone in the Gulf of Mexico.

The primary goals of such programs are to reduce nitrate runoff and soil erosion. Pesticide residues are not identified as being an issue in the region. Soil erosion remains a very sensitive issue in the United States, where the Dust Bowl⁴ of the 1930s has left its mark. In the midst of an economic recession in the 1930s, a decade of severe droughts hit the semi-arid Great Plains in the heart of the United States (Texas, Oklahoma, Kansas, Colorado, New Mexico) where intensive cropping combined with inadequate cultivation methods (plowing of soils that were vulnerable to erosion) led to the formation of giant dust storms. A number of measures have been taken since then to prevent similar environmental disasters from occurring again, based on practices including water management and low- or no-tillage of the soil.

The farmers participating in erosion control programs use practices such as low-till, in particular vertical tillage which is often mentioned, no-till or strip-till, intercropping (radishes, oats, rye, ray-grass), improved input management (precision application of fertilizer, dates and areas of nitrogen applications). On a side note, winter cover crops are either destroyed by frost, or by herbicides, a practice allowed in the USA, but not in France where such crops have to be destroyed mechanically. This region uses short crop rotation (corn-soybean) and the reintroduction of intercropping is therefore a way of achieving longer crop rotation and crop diversification. Wheat or oats have not been used in crop rotation for several years for reasons of economic profitability: their yields and prices have made them increasingly less attractive for producers, to the benefit of corn and soybeans.

¹ http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS//nrcs143_008142.pdf

² http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/va/home/?cid=nrcs142p2_018880

³ http://toxics.usgs.gov/hypoxia/hypoxic_zone.html

⁴ <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/?cid=stelprdb1041684>

Another practice is the use of bioreactors, which are wood-chip filled trenches that collect runoff from the drainage system, and filter nitrates from the water by converting them to N₂ with the help of microorganisms. Lastly, soil and crop analyses are performed regularly in order to optimize fertilizer doses.

The Chesapeake Bay

On the east coast of the United States, the Chesapeake Bay watershed is smaller than the Mississippi basin size and covers six states (Virginia, Delaware, Maryland, New York, Pennsylvania, West Virginia) and the District of Columbia. This region has a higher population density than the Mississippi River Basin, with industrial, recreational and aquaculture activities. Large quantities of nutrients (nitrates, phosphates) and sediments from farming, industrial and urban activities have degraded the quality of the Bay's waters, impacting wildlife and the quality of drinking water. Therefore the programs that have been put in place here are mandatory, receiving public resources from the federal level and from the relevant states.

Farmers in this region use the same cultivation practices as those in the Mississippi River Basin (simplified tillage, intercropping, and management of inputs) whereas yields are lower than in the Midwest Plains. Here, crop rotation is longer, with a wider range of grains, instead of the simple corn-soybean rotation; the yield differentials between these two crops and other grains is not as favorable compared to those in the Mississippi River Basin. Managing weeds and insect pests is therefore simpler.

Additional measures employed in the Chesapeake Bay include the planting of buffer zones to control runoff, restoration of wetlands, and management of livestock manure. Agriculture covers a third of the Bay's area, so cities and industries also have to take action in order to control the discharge of waste into water courses.

The measures implemented in the region are beginning to bear fruit. In fact, their impact has been measured and a document⁵ was published in December 2013, comparing the data collected from the Bay's farmers in 2006 and 2011. The report found a 57% reduction in the deep and surface erosion rates, and a 62% edge-of-field sediment loss reduction. Meanwhile, nitrogen losses into nearby waterways were cut by 12% and phosphorus losses by 45%. An infographic of all the results is available here: http://www.nrcs.usda.gov/Internet/FSE_MEDIA/stelprdb1240084.jpg

THE ECONOMIC BENEFITS OF SUSTAINABLE AGRICULTURAL PRACTICES

For the past several years, various systems have been implemented to ensure that sustainable production practices are used for oilseed products exported to Europe, mainly to alleviate the concerns of those who use and import these products about the impact of production on deforestation (oil palm in Indonesia and soybean in South America). The Round Table on Responsible Soy (RTRS)⁶ was created in 2006 as a result of these concerns. The RTRS brings together various stakeholders in the soy value chain, with a view to building a sustainability certification approach, essentially with social and environmental dimensions.

⁵ <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/?cid=stelprdb1240074>

⁶ <http://www.responsiblesoy.org/quienes-somos/miembros/?lang=en>

Brazil's producers are the most involved in the RTRS process. A similar approach is applied in the palm oil industry, with the Round Table on Sustainable Palm Oil (RSPO)⁷.

The United States being the global leader in soy production, exporting 60% of its production, the U.S. soy industry has also created a certification system for sustainable production. Currently, 95% of producers participate in the program, with more than 10% of them audited every year by the USDA bodies.

The global demand for soybeans and soy products is on the increase, especially with the development of livestock and poultry production in emerging economies. Brazil and Argentina are the United States' main competitors on the global soy market, while the largest soybean importers are China and the European Union. In this context, trade issues are of considerable importance.

The U.S. soy sustainability assurance protocol covers the following criteria:

- biodiversity and carbon-into-soil sequestration: soybeans must not be produced on highly diverse grassland, wetlands, forested land, peat land, primary forest, protected areas...
- production practice controls: GPS-based precision farming, crop rotation, soil erosion control with low-till or no-till practices (soil erosion per ton of soybeans produced has been cut by 66% since 1980)...
- public and labor health: the standards of the U.S. Environmental Protection Agency (EPA) regarding pesticide use, international equitable work standards, Safe Drinking Water Act and Clean Air Act, must be met...
- continuous improvement of production practices and environmental protection: participation in soil conservation programs (Conservation Reserve Program, Conservation Stewardship Program, Environmental Quality Incentive Program...), use of waterways and rail for transportation, in order to cut down greenhouse gas emissions (today these modes of transport account for 91% of the soy volumes exported from the United States).

The U.S. soy farmers, who participate in this approach, carry out self-assessments every year and they provide their audit documents to the Department of Agriculture. The Department of Agriculture's Natural Resources Conservation Service (USDA / NRCS) audits between 8% and 11% of the producers. The performance indicators used are environmental and socioeconomic indicators to measure the outcomes of agricultural production in the United States, and the lifecycle impact analysis of soybean and soy products (meal and oil) production. Economic sustainability is the topmost priority of the U.S. soy industry, and environmental sustainability comes second.

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⁷ <http://www.rspo.org/certification>

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