

UNDERSTANDING BARRIERS TO AGRICULTURAL CONSERVATION  
PRACTICE ADOPTION

Professional Paper

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## **Introduction**

It's widely acknowledged that conventional agriculture production consumes large amounts of resources and is often associated with negative externalities like soil erosion and soil quality degradation, water pollution, and detrimental impacts on biodiversity. According to the EPA's 2000 National Water Quality Inventory, a majority of states report agricultural nonpoint source pollution as the leading source of water quality impacts on surveyed rivers and lakes, the second largest source of impairments to wetlands, and a major contributor to contamination of surveyed estuaries and ground water (U.S. EPA, 2000). As society has become more aware of these and other environmental issues, a movement toward more sustainable agricultural systems has emerged. With this movement comes increasing pressure on agricultural producers to adopt agricultural conservation practices due to government regulations, their own environmental concerns, private industry standards, and increasing consumer awareness and interest in agricultural practices. Addressing these factors while sustaining a profitable operation can be difficult, and while many producers have been proactive in implementing conservation practices, significant barriers to adoption exist. For those working with landowners and producers to address conservation objectives, including university extension agents, local conservation districts, Natural Resources Conservation Service (NRCS) employees, agribusiness industry representatives and others, understanding these barriers is important when providing education, advice, and technical assistance. This paper seeks to elucidate the adoption barriers most commonly cited in published studies as well as strategies recommended by farmers, researchers, and others to overcome barriers, disseminate useful information, implement practices, and meet conservation goals.

### **Key barriers**

Many studies have been conducted to assess the factors that influence farmers in their decisions to adopt or not adopt sustainable production practices. Much of the literature reviewed in this paper examines the adoption of specific sustainable and agricultural conservation practices including reduced tillage, cover cropping, vegetated stream buffers, erosion controls, and fertilizer and pesticide management. While most of these studies tend to be location, practice, or producer-group specific, similar barriers and influencing factors are noted within several of them. Frequently cited barriers to adoption that are common to many practices, locations, and producer groups include economic factors, land tenure, compatibility with current operations, [lack of] knowledge and management skills, access to information, and a general lack of awareness of conservation issues, practices, and programs available to assist with implementation.

### **Economic barriers**

Economic factors may possibly present the most significant barriers to adoption. After all, many farmers view economic sustainability as the predominant component of sustainable agriculture (Drost et al., 1996). According to a survey of farmers and change agents (individuals in regular contact with farmers regarding conservation and sustainable agriculture) conducted by the Southern Sustainable Agriculture Research and Extension Program (SARE), economic barriers are the most frequently cited factors influencing the adoption of sustainable practices (Fazio et al., 2008). These barriers often include costs associated with transitioning to new practices, farmers' precarious financial situations, risk and uncertainty of adopting sustainable practices, and the deferment of benefits that characterize many sustainable practices (Fazio et al., 2008).

Implementing conservation practices often involves significant costs to a farm operation, such as specialized equipment or additional labor. Many new practices do not always yield immediate economic results to outweigh initial costs and are therefore not implemented readily or frequently. On the other hand, some conservation practices do yield more short-term economic benefits in their overall reduction of time, labor and/or machinery costs. For instance, due to reduced labor and equipment requirements, practices like conservation tillage are often more profitable in the short term for many producers and are more likely to be implemented (Rahm, 1984).

Correspondingly to delayed economic benefits, many conservation practices do not produce immediate environmental and natural resource benefits. Upon implementing a practice, it may take a few years for a farmer to see environmental improvements on their farm such as improved soil and water quality or reduced erosion. Producers may find it difficult to make a financial investment in a new practice when both the economic and ecological benefits associated with the practice are delayed. Nowak et al. (1997) found that when considering new practices, farmers are much more likely to adopt practices with direct and immediate impacts that increase crop yields and productivity and respond to market demands than those that protect the environment over longer periods of time.

The decision to implement new practices is also closely tied to a farmer's financial capacity. A majority of studies that have investigated the impact of income, gross income and farm profitability on adoption revealed a positive correlation with conservation practice adoption (Knowler and Bradshaw, 2007). Producers with above average incomes, larger farms, and high gross sales have been found to be more apt to adopt agricultural best management practices (USDA NRCS, 2005), likely because they have the capacity to invest in new practices and the

ability to weather any potential losses or delayed benefits associated with a practice.

Risk and uncertainty has a major impact on all farmers' decision-making processes, and perceived or real risks are often correlated with adopting new or unfamiliar practices. The perception that a farmer may lose money if he or she invests in a new practice is a significant barrier to adoption. In addition, a producer may view a government supported conservation program as risky because of up front costs and potential cash flow issues while awaiting a government reimbursement or cost-share payment (USDA NRCS, 2005). A literature review compiled by Baumgart-Getz et al. (2012), however, revealed that more recent studies have shown that over time and as many agricultural best management practices have become more widely used, the perceived risk of adoption has diminished somewhat.

### **Land tenure**

Land tenure is another important factor influencing the conservation practice adoption decision-making process. In the current conventional agricultural industry, many farmers have had to increase production and farm more land in order to remain profitable, which has resulted in many farmers renting more land than they own. Land tenants are generally less willing and/or able to implement conservation practices due to lease terms and arrangements and the timing of practice results or benefits. Considering that 43% of all farmland in the U.S. was managed by tenants as of 2007 (USDA, 2009), this factor has a significant impact on the amount of land farmed utilizing conservation practices.

Often landlord-tenant relationships involve short-term leases that discourage tenants from installing and maintaining conservation practices (USDA NRCS, 2005). Many government-supported conservation programs require long-term commitments from land managers, which tenants may simply not be able to guarantee. Considering the inherent risks associated with

farming, in addition to tenuous, year-to-year or short-term lease agreements, it may not make sense for a producer to implement a practice that may take years to result in benefits.

Lease arrangements may also influence a tenants' conservation decisions. For example, share-renters may have an additional incentive, relative to cash-renters, to adopt conservation practices that increase use of inputs for which they bear only a share of the cost (Soule et al., 2000). In addition, landlords tend to participate more actively in the management of farms rented under share leases, creating an arrangement under which implementing a conservation practice may be more feasible for both parties (Soule et al., 2000).

The timing of benefits resulting from conservation practice implementation is another factor impacting adoption on rented lands. Although share-renters are more likely than cash-renters to implement practices with short-term results like conservation tillage, both cash-renters and share renters have been found to be less likely than owner-operators to adopt practices that lead to soil and nutrient runoff reductions over longer time periods, such as grassed waterways and contour farming (Soule et al., 2000). This has been illustrated in wheat production where 45 percent of owned acres receive cost share to install terraces versus only 23 percent of rented acres, 81 percent of owned acres receive cost share for filter strips versus 37 percent for rented acres, and 73 percent of owned acres receive cost share for riparian buffers versus 13 percent for rented acres (American Farmland Trust, 2013).

### **Compatibility with current operations**

Farmers are typically unwilling to adopt practices that are not compatible with their current production systems (Nowak, 1991). Increased labor and time requirements, the need for additional equipment, current crop rotation systems, market constraints, and site specifics (including climate, terrain, soil type, weed and pest pressure) are factors that may impact

compatibility. For example, a study of Idaho farmers showed that those who did not adopt erosion control practices were more likely to adopt a practice that was perceived to be compatible with their existing rotation than they were if they had to change their rotation pattern to accommodate the practice (Miranowski, 1982). At the same time, however, site-specific environmental concerns and operational goals can attribute to adoption of practices that aren't necessarily compatible with operations, but essential to maintain viability. For instance, landowners usually respond to on-farm soil erosion issues, because serious soil loss can result in loss of crop productivity, loss of income and reduction of property value (Napier, 2000). The desire to protect the future productivity and value of cropland and the value of natural resources is a strong motivator in many adoption decisions.

### **Knowledge and management skills**

Several studies have determined that a perceived or actual lack of knowledge and management skills can present significant barriers to conservation practice adoption. Many practices require knowledge and understanding of a farm's complex biological resources in addition to knowledge of practices that can help address soil and water resource issues. Some farmers simply feel unable to adopt certain sustainable practices because they lack the management skills necessary to implement and maintain them (Nowak, 1991). Likewise, on a study of conservation tillage adoption, results indicated that as producers feel they have more relevant management skills the probability they will use conservation tillage increases (Westra and Olson, 1997).

### **Information**

Implementing any new or unfamiliar practice requires gathering information on the subject to begin the process. Many studies have recognized access to information as a key

variable that directly correlates with adoption. Researchers and those who regularly interact with farmers concerning conservation and sustainable agriculture can either help or hinder the information dissemination and knowledge creation process. For instance, the aforementioned SARE survey of farmers and change agents found significant barriers present in the management of the existing conservation practice information, the lack of technical assistance in some areas, lack of expertise of information sources, disagreement about benefits of sustainable practices among those disseminating information, and confusing information due to the influence of corporations (Fazio et al., 2008). Nowak (1991) also found that farmers often perceive extension and government personnel to lack technical knowledge in helping a farmer adopt a sustainable practice, or feel that professional support in their area is simply unavailable. Better availability and more effective dissemination of conservation and sustainable agriculture information is essential to overcoming the information barrier and speeding adoption.

### **Awareness**

Commonly cited awareness barriers involve farmers' awareness or understanding of the on-site and off-site causes and consequences of their farming practices, the short- and long-term benefits of conservation, and the types and sources of available assistance (USDA NRCS, 2005). Of these factors, Baumgart-Getz et al. (2012) determined that across several adoption studies, awareness of programs available to assist with the implementation of best management practices was more of an influencing factor than simple environmental awareness, awareness of site-specific issues, or of sustainable techniques. Assistance and cost-share programs are often the best way to help a farmer try a new practice. If a farmer is unaware of these existing opportunities, they'll be less likely to adopt conservation practices.

### **Strategies to address barriers**

Understanding common barriers to conservation practice adoption is an important part of promoting and implementing practices among producers to realize on and off-farm conservation goals, but barriers will not be common across all producers and locations. Assessing landowner and site-specific concerns is certainly an essential part of the process. Although effective strategies for overcoming these concerns will also vary, upon review of the adoption literature, several methods and suggestions have been proposed by researchers, farmers, and change agents for disseminating information and interacting with producers in efforts to promote adoption of conservation practices. These strategies include financial incentives, participatory learning opportunities, farmer-to-farmer education, and a focus on training and partnerships among change agents.

### **Financial incentives**

In overcoming economic barriers, financial incentives are certainly effective and can be the most influential means of encouraging producers to adopt conservation practices. Financial incentives can help reduce the risk of adopting a new or unfamiliar practice, providing farmers with an opportunity to experiment without sacrificing profitability. In order for the practice to be continued and implementation to result in environmental improvements, however, the practice needs to prove economical for the producer beyond terms of the cost-share. With this factor in mind, it can be argued that one-time government financial support doesn't truly solve soil and water resource issues (Nowak, 2009).

Many studies conclude that financial incentives for conservation should be a priority for policymakers drafting agriculture legislation. In more recent decades, progressive suggestions recommend coupling conservation practices and crop support programs. Although conservation

funding has been cut significantly in the recently passed 2014 Farm Bill, the bill does include an agreement requiring farmers to engage in conservation compliance practices in order to receive federal crop insurance support, a measure agreed upon by both conservation and agriculture organizations. Although many farms are already in compliance with existing conservation plans, this requirement may result in more farmers being exposed to conservation practices, and environmental improvements in critical areas.

### **Participatory learning**

Many studies have suggested that a participatory approach to conservation practice education and information dissemination is better than the typical unidirectional method. In a study comparing lecture-type presentations with participatory learning, farmers reported that they learned more and felt that the information shared was more valuable when participatory learning strategies were utilized (Francis and Carter, 2001). Along with participatory research, these methods allow for information exchange and involving the farmers' perspectives, increasing the likelihood of success (Francis and Carter, 2001). NRCS also recommends forms of effective participatory learning including demonstrations, on-farm pilot projects and field tours to showcase practices (NRCS, 2005).

### **Farmer-to-farmer education**

Many farmers are more likely to trust the experiences of other farmers than the recommendations and advice of government agency personnel and university extension. Farmers frequently learn from each other and can have a significant influence on each other. By sharing information and collaborating, farmers are able to see successes of others and adopt practices tailored to their farm and operational goals. Baumgart-Getz et al. (2012) recommends a two-tiered approach to implementing conservation practices utilizing farmer-to-farmer information

dissemination; the first tier would have an implementation focus, targeting farmers most likely to adopt and the second tier would continue to increase individual capacity and awareness by using farmer networks to highlight the successes and benefits realized by early adopters. Along these lines, Nowak (2009) notes the successes of tillage clubs in the 1970s and pasture walks in the 1980s that involved groups of farmers and landowners working on effective solutions to resource concerns without the aid of government agencies. Nowak goes as far as to suggest paying landowners within watersheds a proportionate incentive for working together to solve local conservation problems. Other creative ways to promote farmer-to-farmer learning opportunities involve using extension and local conservation agencies to facilitate communication and organization of groups of local farmers, providing expertise when needed (Fazio et al., 2008).

### **Training and partnerships**

Understanding who farmers utilize as information sources and educating and partnering with those individuals and organizations can be a very effective way of disseminating conservation information and resources. These individuals and organizations include not just extension and government agencies, but agribusiness sales and service providers and certified crop advisors, from whom many farmers regularly seek advice. Some researchers advise providing more sustainable agriculture training and education to those going into agribusiness sales, like pesticide and fertilizer dealers, to aid in information dissemination and greater practice adoption (Gamon et al., 1994). In practice, partnering with these individuals has proven to be effective in the Sandusky River watershed in Ohio. The IPM Institute of North America, American Farmland Trust and others convened listening sessions with conservation professionals, agricultural retailers and producers within the watershed and determined that fertilizer dealerships and their affiliated certified crop advisors are in the best position in the

watershed to identify and reach out to farmers on critically undertreated acres and get conservation practices on their land (American Farmland Trust, 2013). Projects within the watershed resulting from these efforts are currently underway.

### **Conclusion**

As indicated in published literature, producers face many barriers and complex issues when contemplating conservation practice adoption. Economic considerations tend to play a very significant role in whether or not a producer will adopt a particular practice. Many of these economic factors are associated with the nature of today's conventional agriculture industry, which involves many farmers renting land, tenuous rental agreements, and cash flow and risk issues that may preclude a producer from implementing practices with delayed benefits. In addition to barriers associated with economics and land tenure, other notable factors influencing adoption involve compatibility with a producer's current operations, knowledge and management skill requirements, and information and awareness issues.

Not only is it important for conservation change agents to understand these barriers and influencing factors, but they must also recognize effective strategies for overcoming barriers and implementing practices appropriate for a farmer's land and operation. Financial incentives offer just one way to address the significant economic barriers to adoption. Government supported conservation programs can greatly help reduce the risk associated with adoption and implementation while introducing a producer to a new practice that they may continue into the future, especially if they realize economic or environmental benefits. Other effective solutions for addressing barriers include facilitating and encouraging participatory learning opportunities, farmer-to-farmer education, and developing creative partnerships with farmers and those with whom they regularly interact. Undoubtedly every producer faces different barriers and will be receptive to different forms of education, collaboration, and strategies for implementation, so

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assessing a producer or landowner's site-specific concerns and conservation goals is an essential part of the adoption process.

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