Chapter 16
Agricultural Policy Choices
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Now, even more than in the past, American agricultural policy must balance national interests in agricultural production with fundamental interests in environmental health. Rapidly emerging opportunities for biofuels production and pressing demands by America’s global trading partners, along with increasing societal attention to both the taxpayer costs and environmental effects of American agricultural policy, create momentum for policy change. In this book, integrated assessments at two scales, the Mississippi River Basin (MRB; Chapter 15) and second-order Iowa agricultural watersheds within the MRB (Chapter 14), suggest that improved policies could alleviate hypoxia of the Gulf of Mexico, as well as a wide range of environmental and societal impacts of agriculture in the Corn Belt. In addition, federal agricultural support that aims to achieve environmental benefits complements world trade objectives (Chapter 3). In this chapter, we discuss how federal agricultural policy could respond to these demands and opportunities for change.

Implications for Landscape Change: Integrated Assessments at Two Scales

Across the MRB, nutrients coming from agricultural land uses are the chief cause of Gulf hypoxia, and Corn Belt watersheds are the leading contributors to nitrogen loading of the Gulf (Chapter 15; Color Figure 52). Changed agricultural practices, enterprises, and landscape patterns could reduce nutrient losses and ameliorate a wide range of
environmental problems, including downstream flooding, impoverished biodiversity, climate change, and disappearing rural communities and institutions (Day et al. 2005a; Chapter 3, this volume). Solutions to these related environmental and social problems require a long-term, basinwide approach that links changes in Corn Belt agricultural landscapes to local benefits (such as enhancing quality of life in the Corn Belt), as well as to benefits further downstream (such as reducing hypoxia and helping to protect floodplain cities; Day et al. 2005b). Results of the integrated assessments at both scales suggest that enormous environmental benefits can be gained by employing conservation successes of past and current federal agricultural policy, allowing those successes to be adapted to evolving goals, and also considering new ideas like those included in the Corn Belt futures.

Landscape changes have been recommended for the entire MRB (Chapter 15), but for these changes to be effectively implemented, they must be adopted by individual farmers at the local scale, like the Iowa study watersheds described in Part 2 of this book. Assessments at both scales are necessary for making informed real-world judgments about policy, and both scales help point the way to the ultimate test of agricultural policy: choices made by farm operators and producers. Particularly in light of the local watershed focus of the Conservation Security Program (CSP, described in Chapter 3), the local watershed scale of the Corn Belt futures provides a more realistic frame for policy analysis than either political boundaries or farmed parcels alone. How recommended changes fit into agricultural enterprises, landscape patterns, and resource characteristics; how they respond to market and technological opportunities; how they affect farmer costs
and incomes; and how they affect local quality of life will all influence farmers’ decisions to adopt these practices. Examining how specific landscapes could actually change at the local watershed scale helps farmers and policymakers get a sense of these decisive characteristics.

The Corn Belt watershed alternative futures that are detailed in this book are intended to be guiding examples of how the types of practices recommended for the entire MRB could change agricultural landscapes. These landscape changes could yield broad societal benefits and ecosystem services, such as enhanced water quality, reduced flooding, greater biodiversity, healthier rural communities, and more desirable landscapes—all while protecting farmers’ livelihoods (Chapter 14). Furthermore, the integrated assessment for the entire MRB (Chapter 15) suggests that combinations of practices such as those in the alternative futures could effectively address hypoxia as well. Finally, interviews with Iowa farmers suggest that they recognize these innovative practices as best for the future of the people of Iowa, as long as policy allows farmers’ incomes to be unaffected by the new practices (Chapter 6).

Neither of the specific Iowa study watersheds is “typical” of the MRB. But because very few (if any) watersheds across the nation represent an “average,” the consistent results from the integrated assessment for the two very different Iowa watersheds—as well as results of subsequent, analogous studies of other Corn Belt watersheds at similar scales (Boody et al. 2005; Burkart et al. 2005)—suggest that the Corn Belt futures may offer ideas that could also be useful elsewhere.
The two Iowa study watersheds are very different in their soils and geomorphology. Their integrated assessment results, however, showed both watersheds realizing gains in water quality and farmers’ perceptions under Scenario 2, and similarly improving water quality, flood reduction, overall biodiversity, and farmers’ perceptions under Scenario 3 (Chapter 14). Results for the two watersheds were notably different only in their return to land (RTL) revenue: The flat landscape of the Walnut Creek watershed realized greater returns under Scenario 1, while the rolling landscape of the Buck Creek watershed realized greater returns under Scenario 3 (Chapter 5). Because neither corn nor perennial crop biofuel markets were included in the RTL models, estimated financial return results could change as biomass energy technologies emerge (Schnepf 2006).

The alternative futures do provide insight on landscape changes (and related environmental effects) that could occur with stronger biofuel markets, however. For example, biofuel markets drove predictions that acres planted in corn in the US would increase by 15 percent between 2006 and 2007 (NASS 2007). Similarly, Scenario 1 assumes that all highly productive soil is cultivated, taking land out of perennial cover and increasing land in corn or soybeans by about 8% in flat Walnut Creek watershed and by about 38% in the more erodible rolling landscape of Buck Creek watershed (see Chapter 7, Table 7-1 and 7-2). On the other hand, Scenarios 2 and 3 assume increases in perennial herbaceous cover of at least 300 percent in both watersheds (see Chapter 7, Table 7-1 and 7-2), changes that might be similar to what would occur if cellulosic ethanol production became technologically practical. Integrated assessments of the
alternative futures, in one sense, suggest how different approaches to biofuel generation could have different environmental effects.

Based on the integrated assessment of the MRB, alternative policy strategies for reducing nitrogen loading to the Gulf of Mexico could be implemented using the types of practices and landscape patterns shown in the Corn Belt futures (summarized in Table 4-1 and Table 4-2 in Chapter 4, and modeled in Chapter 7). Key basinwide strategies that could be implemented in local Corn Belt watersheds are described in Chapter 15 and summarized here:

1. *Changes in farming practices*, including reduced fertilizer use, precision agriculture, and crop pattern and enterprise changes. Such modifications could reduce the nitrate-nitrogen that reaches streams and rivers in the MRB by 20 percent (Mitsch et al. 1999). Each of the Corn Belt futures incorporates changes to reduce nitrogen in surface and groundwater by employing precision agriculture (in all scenarios) and/or by targeting an increased area in perennial cover (in Scenarios 2 and 3). In Scenario 2, increased perennial cover is achieved by incentivizing mixed-grain/rotational-grazing livestock operations (Color Figure 17). In Scenario 3, perennial cover is augmented by working lands very differently—by employing perennial strip intercropping of working lands (with rotations of conventional crops such as corn and soybeans and permanent perennial crop strips, which could be marketed as native plant seed or biomass; Color Figures 18 and 19).
2. *Creation and restoration of wetlands and riparian forests* located between farmlands and adjacent ditches, streams, and rivers. As described in Chapter 15, restoring 1 to 5 million acres (4,000 to 20,000 km²) of wetlands in the MRB may be a cost-effective approach to reducing nitrogen loading to the Gulf, particularly when other benefits of wetlands are included. This approach is included in different forms in alternative Scenarios 2 and 3 (Part 2). Under Scenario 2, a network of detention wetlands, filter and infiltration strips, and tile drainage discharge ponds is woven into a matrix of cultivated land and pasture (Color Figure 10). In Scenario 3, large permanent bioreserves remove some tile drainage to restore wetlands, prairie, and riparian habitats; they also infiltrate and detain storm water and retain nitrogen (Color Figures 12 and 15). Scenarios 2 and 3 are similar in that both feature broad filter buffer strips for all perennial streams; buffer strips extend 49 feet (15 m) from the stream bank in Scenario 2 (Color Figures 6, 10, 40 and 41) and 98 feet (30 m) from the stream bank in Scenario 3 (Color Figures 7, 12, 42, and 43). Both scenarios also feature extensive areas of riparian forest within the buffer strip, with the forest extending into upland wooded pastures in Scenario 2 and riparian forest bioreserves being established in Scenario 3. As the biodiversity assessments of the Corn Belt futures (Chapters 8–13) demonstrate, these connected wetland systems also create significantly improved habitats.

3. *Diversion of rivers into adjacent constructed and restored wetlands* all along the river courses. Buffer width is extended up to 196 feet (60 m) to accommodate extensive off-channel storage in stream floodplains in Scenario 2. Under
Scenario 3, restoring indigenous floodplain ecosystems and upstream wetland ecosystems within selected bioreserves (Color Figure 15) results in similar ecosystem services (Chapter 7).

The alternative futures also demonstrate how adopting time-tested soil and water conservation practices more comprehensively (in all scenarios); increasing perennial cover, especially on erodible soils and stream buffer strips (in Scenarios 2 and 3; Color Figures 40–43); and enhancing storm-water detention and encouraging infiltration upstream (in Scenario 2) could contribute to reducing nutrient loads across the entire MRB. Field-calibrated Soil and Water Assessment Tool (SWAT) models for the two Iowa study watersheds forecast that using combinations of these familiar and innovative farming practices could decrease median nitrate loads in Scenarios 2 and 3 anywhere from 57 to 70 percent over six years (Chapter 7).

**Context for Policy Change**

Neither the integrated assessments of the MRB nor the Corn Belt futures determine what policy expenditures might be required to achieve the recommended changes. At both scales, though, continued federal involvement to inform and incentivize farmers’ land management choices is assumed to be in the broad public interest. In addition, increasing the proportion of federal agricultural expenditures dedicated to achieving environmental benefits is strongly implied. To assess environmental benefits, the Corn Belt study explicitly described the alternative policy scenarios (Chapter 4, Table 4-1) as holding average farm net income constant under widely differing policy scenarios. Scenario 1 continues current practices and trends, leading to larger, fewer farms;
threatened biodiversity; and dwindling rural communities (Color Figures 38 and 39). Scenario 2 includes a level of mixed-grain/livestock activity that has not been the trend in the recent past (Color Figures 40 and 41). The resulting pastoral landscape supports a plausible assumption that the broader public would appreciate the landscape as an amenity. Implied labor demands of mixed-grain/livestock enterprises support a plausible assumption that farm size, scale, and degree of specialization would increase less dramatically in Scenario 2 than in either Scenario 1 or 3, keeping more farmers on the land. Scenario 3 encompasses the greatest innovation in practices to enhance the environmental benefits of reduced nutrient loss and increased habitat (Color Figures 42 and 43). Its dramatically increased biodiversity and varied landscape pattern support the plausible assumption that the broader public would perceive the agricultural landscape as an amenity—with larger numbers of nonfarmers living in rural areas of the Corn Belt to stabilize small-town services and institutions. At the same time, Scenario 3 reasonably assumes that these societal benefits could be achieved even if farm structure continues to follow current trends toward larger, fewer farms.

Changing current trends in agricultural policy would clearly be difficult. A major attempt to do so on a national scale in the early 1980’s may have slowed previous trends, but did not stop most of them. In 1981, Secretary of Agriculture Robert Bergland publicized existing trends and their probable consequences, and suggested alternative policies to mitigate such trends as concentration and changing structure of ownership and control (USDA 1981). Interest in these issues subsequently diminished, though, and no policies to change these trends were implemented. Today, subsidies to crop production
remain a foundation of commodity production systems, even as environmental benefits, global trade mandates, domestic spending priorities, and the varied perceptions and concerns of the American public, rural communities, and farmers have begun to align themselves to point toward new policy directions. Some states, such as Iowa, Nebraska, and California, are working to realign agricultural policy priorities within their states. Directing policy trends to achieve broad societal benefits may require a convergence of interests and awareness to recognize the possibilities for a very different future.

**Policy Change and Environmental Benefits in Future Agricultural Policy**

Several important assumptions suggest how environmental benefits might be achieved in the next farm bill. Debate on future farm bills will include vigorous discussion of conservation and environmental programs. Changes in Congress could change the tenor of the debate about conservation and the environment, but sentiment may remain strong for retaining the basic structure of existing conservation programs, in which participation is voluntary, technical assistance is provided, and participants receive incentives. Hanrahan and Zinn (2005) suggest that the World Trade Organization (WTO) designation of allowable green box support for agriculture, which has been important to evolving policy in America’s Organization for Economic Cooperation and Development (OECD) partner nations in Europe and elsewhere (Chapter 3), could be a factor that moves American policy toward a goal of obtaining greater environmental benefits from public investment in farm programs. Even though agreement has not been reached on what is meant by green box payments or on the political/environmental objectives of existing conservation programs (USDA NRCS 2006), fitting farm programs into the
framework of trade negotiations will undoubtedly be increasingly important in years to come.

Past trade negotiations and farm bill legislative processes, however, teach us that policy decisions about environmental benefits from agriculture are incontrovertibly bound to decisions about commodity programs. Conventional practices for commodity production have had indisputable environmental effects (Chapters 2 and 3), and past farm policy has invested in commodity programs to a greater degree than in agricultural conservation. In the past, intensity and single-mindedness have carried the day for commodity programs against concerns of consumers, environmentalists, and others (Schertz and Doering 1999).

By increasing returns to farmers, commodity programs can increase the profitability of more intensive production as well as production on more marginal lands. High prices for commodities, like the record corn prices logged in the spring of 2007, can do the same, and both have the capacity to increase environmental damage from soil erosion and nutrient loss. Although the magnitude of these effects is uncertain, a low cost of nitrogen relative to the price of corn does increase the economic amount of nitrogen farmers might apply and vice versa.

For example, from 2004 to 2006, corn prices were low, and near the end of the two-year period, fertilizer prices increased tremendously, dampening any increase in nitrogen use. This changed starting in September 2006 when the projections of demand for corn for ethanol production resulted in an increase in the price of corn of over 50 percent during harvest. This price increase was an unprecedented event. The acreage shift
estimated to accommodate the increased corn demand was more than 12 million acres (4.9 million hectares) of additional corn with about 7 million acres (2.9 million hectares) coming from lands where soybeans are currently grown (NASS 2007). In addition, a portion of the increased acreage came from existing grasslands or conservation acres. Ultimately, acres planted in corn were predicted to increase by 15 percent between 2006 and 2007, and these additional acres were likely to have a greater environmental impact than the average of existing corn acres. New acres planted to corn may till more marginal soils, and the loss of some soybean rotations, with corn following corn instead of a corn/soybean rotation, requires more fertilizer and more erosive tillage systems to maintain yields (Vyn 2007).

With profits enhanced or ensured by commodity programs, production has also extended into or intensified on marginal lands with related environmental costs. Expansion of wheat production in the West, encouraged by the disaster payments program of the late 1970s, is a classic example. In the more recent past, new soybean price supports along with new technology for soybean production with minimum tillage drove the loss of prairie in the Dakotas.

Budget limitations will undoubtedly be even more important in future farm bill discussions. In the past, under tight budgets, conservation programs suffered more cuts than commodity programs, and this continued into 2006 (Chite 2005). For example, appropriations for the CSP have repeatedly been reduced from authorized levels, in part to pay for disaster relief (Zinn and Cowan 2006). Although the CSP was intended for national implementation, budget limitations and the reallocation of CSP funds to
commodity-related programs resulted in implementation of the CSP being delayed by more than two years after the 2002 farm bill passed. By 2006, with a total of three CSP sign-ups in the 282 agricultural watersheds eligible nationally, 15.8 million acres (6.3 million hectares) of working farmland had been enrolled in the CSP (Color Figure 29; Cowan 2006). This is less than half the area enrolled under the Conservation Reserve Program (CRP; about 36 million acres (14.5 million hectares)). Another 1 million acres (0.4 million hectares) are in the Conservation Reserve Enhancement Program (CREP) and the CRP Wetlands Program combined nationally (Zinn and Cowan 2006), with an additional 1.6 million acres (0.6 million hectares) in the Wetlands Reserve Program (WRP; Hanrahan and Zinn 2005). To date, more than twice as much land has been taken out of production and placed in all types of agricultural reserves than the area enrolled in the CSP working lands program. The CSP working lands approach is of particular interest because it is highly consistent with the agricultural practices and patterns included in Scenarios 2 and 3 (Part 2), and the changed agricultural practices described in the MRB integrated assessment (Chapter 15).

Traditionally, the trade-off between production policy and the price of conservation has been important to the overall cost of U.S. agricultural policy (Claassen 2006b). When the market price of commodities has been low and farm incomes have been supported by government payments, higher crop support payments have required larger conservation budgets so that conservation could be bought away from production. If biofuel production results in continuing high commodity prices above the level of government price supports, however, market prices will bid land away from conservation or, at least,
reduce the attractiveness of conservation practices on the land. One potential offset of this could occur if commodity prices remain high when the next farm bill is written into law. If this occurs, the savings from reduced commodity payments while prices are high might be directed toward conservation programs, and if conservation program payments are high enough, conservation would be able to bid successfully against high market prices.

WTO-mandated restrictions on commodity programs (Chapter 3) may provoke interest in enhancing conservation programs (Hanrahan and Zinn 2005; USDA NRCS 2006). Under current WTO rules, this would be the case even with the failure of the Doha Round, and it could open the way for considering some of the future scenarios and environmentally beneficial practices described in Part 2 of this book. Currently the WTO clearly allows general service expenditures (such as research and extension), and land retirement by placing land in reserves such as the CRP or the bioreserves in Scenario 3—if land retirement is not tied to a specific commodity or used to compensate farmers specifically for loss of income from complying with environmental programs (USDA NRCS 2006). Decoupled income support, such as the direct payments that were tried under the 1996 farm bill (known as the “Freedom to Farm Act”), are also acceptable. Cross-compliance requirements, like measures to achieve environmental benefits being implemented under the European Union’s (EU) Common Agricultural Policy 2000 (CAP 2000) reforms, can be tied to payments as long as they do not violate the decoupled income support rule of the WTO’s predecessor, the 1997 General Agreement on Tariffs and Trade (GATT).
Under CAP 2000, European farmers choose from a menu of practices to achieve environmental benefits. Although to date, U.S. policymakers have not embraced “multifunctional” agricultural landscape benefits as defined by the EU, this approach is only one way that U.S. policy could achieve the environmental benefits. As the MRB and Corn Belt futures integrated assessments suggest, modifications to current conservation programs and rules, as well as related federal policies, could also achieve significant environmental benefits. If WTO negotiations seriously affect U.S. agricultural policy, farmers could embrace increased support for environmental benefits as they face mandated declines in commodity supports.

Adapting Current Policy: Moving toward Visible Change

Current conservation programs and rules, modified in concert with commodity-related programs, could help achieve the environmental results called for by the MRB integrated assessment and demonstrated in Scenarios 2 and 3. Conservation and commodity programs may appear to be independent aspects of agricultural policy, but they actually have competed with each other in farmers’ land rent decisions; in congressional appropriations (Womach et al. 2006); and, to some degree, in their effects on environmental quality (Lubowski et al. 2006). If future commodity policies elevate the importance of environmental benefits, several characteristics of current conservation policy (described in the sections that follow) can be instrumental.
**Conservation on Working Lands and Retired Lands**

Similar to current federal conservation programs, the Corn Belt scenarios described in Chapter 4 include both working lands programs and land retirement programs. Under current policies, commodity programs affect both types of conservation programs—working lands programs need to incorporate production activities as influenced by commodity programs, and land retirement programs like the CRP need to provide farmers benefits beyond what they would receive if their land were in production with commodity programs. The CRP has amply demonstrated that land retirement can enhance soil conservation, water quality, and habitat (Chapter 3). Among the future scenarios, Scenario 3 includes a more predictable and enduring land retirement program, in the form of bioreserves that are permanently allocated to ecosystem restoration as habitat by public land purchase.

Keeping land in retirement or adding additional acres to such programs can be difficult when commodity prices or price supports are high. In 2007, a large number of acres are scheduled to come out of the CRP, making it a critical year for CRP lands. To meet administrative needs, in 2005 the U.S. Department of Agriculture (USDA) began re-enrolling land from this cohort that had high environmental value. As a result, 80 percent of these acres were re-enrolled when corn prices were at $2/bushel. This success in re-enrollment would not have been possible after the market price of corn exceeded $3/bushel in the fall of 2006, reaching $4/bushel by early in 2007. An important question is whether, in the future, the federal government allows enrolled acres to come out of the
various land retirement programs in order to reduce higher commodity prices, which are of concern to livestock producers and the biofuels industry.

**Compliance Monitoring**

Compared with land retirement, working lands programs, which include environmentally beneficial landscape patterns and management regimes within fields of commodity production, have less proven broad environmental benefits. As a result, some of these lands may require more intensive monitoring to ensure compliance. Reduced, selective use of nitrogen fertilizer inputs (Chapter 15) is a powerful example of working lands conservation, which the alternative Corn Belt futures achieved by somewhat different combinations of precision farming and reduced area in row crops. Reducing fertilizer applications on existing field patterns could cumulatively lead to significant reductions of nitrogen loading to the Gulf of Mexico (Chapter 15), but this would be considerably more difficult to monitor than the visible landscape patterns of land retirement or working lands programs that employ small patches of perennial cover, wetlands, or riparian buffers in a row crop matrix. Some working land programs that are straightforward to visually monitor, such as the adoption of contour farming or reduced tillage methods, may deliver environmental benefits such as sediment reduction and carbon sequestration, at lower unit cost than land retirement (Feng et al. 2005). The perennial strip intercropping pervasively employed in Scenario 3 is an example of a directly visible working lands practice that could have multiple benefits, improving water quality, habitat, and carbon sequestration. In the end, because land retirement and working lands programs may be more effective in somewhat different situations,
combining both types of programs may be most cost-effective for achieving multiple benefits (Feng and Kling 2005). Monitoring will be critically important in accomplishing these goals. In addition, monitoring will play a key role in adequate adaptive management to ensure program success (Cox 2006).

**Cross-Compliance**

In the past, cross-compliance set a basic conservation standard that producers were required to meet to receive production subsidies (Chapter 3). A modified approach could again become an important conservation tool for working lands. Although the presumption of a required environmental standard is stronger in Europe than in the United States today—given the extra leverage of Europe’s higher agricultural subsidies—U.S. conservation programs could be more effective if there were an easily monitored minimum standard requiring all farmers to meet fundamental societal obligations for environmental stewardship (GAO 2003). Much like under the CSP, operators themselves would first have to meet the basic minimum standard on their farms, and then, under a voluntary system, they might be further rewarded for achieving even greater levels of conservation.

**Rules and Regulations**

In the past, the lack of strict policy and program definitions has given USDA professionals and state conservationists latitude to make judgments about what improvements fit local conditions. An effective political opposition ultimately resisted more specific rules when conservation compliance was adopted as part of the 1985 farm law; farmers who were out of compliance were held up as symbols of unjust government
interference by various farm and property rights groups. Consequently, the overall environmental effect of cross-compliance as it was applied after 1985 was limited. Yet many actions that could advance the environmental benefits of U.S. agricultural policy will require more rather than less specificity about practices implemented and standards met, along with performance monitoring, especially on working lands (Cox 2006). For this reason, there may be some advantage in working lands programs that produce visible changes in landscape patterns, and are consequently more easily monitored using the remote sensing technology that the USDA has employed for decades as part of the commodity programs. Several features of Scenarios 2 and 3 would produce such visible changes—the continuous cover of filter strips, pasture, and hay in Scenario 2; the perennial strips in Scenario 3; and the wetlands and stream buffers in both scenarios.

**Targeting**

Targeting has been favored and employed in a variety of ways to make conservation efforts more effective. Numerous studies have repeatedly demonstrated its cost-effectiveness (see, for example, Claassen 2006b). Traditional U.S. policy, however, has achieved dual goals of conservation and cash disbursement to rural areas by subsidizing conservation practices that are broadly distributed across the entire nation’s agricultural areas. For example, the CRP was first administered so as to reduce production and help farmers and landlords during the farm financial crisis of the 1980s. Initially, the program was targeted only to highly erodible lands, but after 1990 the Environmental Benefits Index (EBI) was used to target a wider range of environmental benefits over a broader geographic area (Feng et al. 2003).
Both recommendations for the MRB (Chapter 15) and all the Corn Belt scenarios (Chapter 4) employ targeting on working lands. For example, all the Corn Belt scenarios target streams for buffers of various dimensions; Scenarios 2 and 3 target perennial agricultural land covers to more erodible lands; Scenario 2 targets wetlands, drainage outlets, and floodplains for detention of runoff to meet water quality goals; and Scenario 3 targets working lands that connect stream corridors and bioreserves for perennial strip intercropping and organic practices (Color Figures 38–43). Analogous to the expansion of CRP targeting after 1990, Scenario 3 targets some land retirement purchases for bioreserves to soils and landscape locations that previously supported these indigenous ecosystems (Color Figures 12 and 15). And the working lands farming practices Scenario 3 targets with a goal of connecting the reserves and stream corridors further enhance habitat values (Color Figures 42–43). These connections create a more widely distributed range of geographic targets under Scenario 3 than under Scenario 2. In both scenarios, the riparian and wetland areas recommended to reduce delivery of nitrogen to the Gulf of Mexico (Chapter 15) would be a target of conservation spending. Different benefits are obtained when programs are targeted on specific priorities. Targeting with higher priority for nutrient reduction would increase the opportunity to achieve that goal.

Performance Standards

Most agricultural conservation programs have relied on best management practices (BMPs) rather than performance standards. From a straightforward economic standpoint, performance standards are appealingly efficient because they make the objective itself the result to be measured. Economists agree with natural and physical scientists that
performance standards would be more effective and efficient than relying only on BMPs to achieve environmental benefits. With BMPs, a given practice is essentially assumed to yield a particular environmental result, and problems of measuring the effects of BMPs across large areas compound this problem. Particularly for diffuse, dynamic environmental benefits such as water quality and habitat, however, performance standards are difficult to measure efficiently and reliably in practice. For example, monitoring runoff from individual farms or small subwatersheds, as suggested in Scenario 2, could pose a considerable challenge in instrumentation or modeling. For practical implementation, selected characteristics of either Scenario 2 or 3 probably would need to be translated into a menu of BMPs, much as in CSP implementation today. The important question is: Can representative monitoring be undertaken in a cost-effective way that is sufficient to provide improved ground-truthing of expected outcomes for BMPs?

**Competitive Bidding**

Along with targeting and performance standards, carefully implemented competitive bidding could enhance the cost and environmental effectiveness of conservation programs (Claassen 2006b). Although the competitive bidding that was initially employed in early rounds of the CRP program was not demonstrably cost-effective, improved procedures brought about better outcomes later in the process. In the 2002 farm law, though, Congress specifically required that USDA avoid cost criteria.

The efficacy of competitive bidding depends on the structure of the bidding process and the knowledge held by the players. Competitive bidding may be more challenging
when funds must be spent within a short time and over a wide range of local conditions, but the potential for significant cost savings makes competitive bidding an important approach to consider in making large-scale conservation programs more cost-effective. When properly structured, bidding can be a low-cost way to obtain conservation benefits. Such a competitive bidding procedure for enrollment in conservation programs should factor in the environmental benefits of conservation practices, which could be modeled as described in Chapters 5–15, to help to establish a rational basis for evaluating comparable bids.

An example of a successful competitive bidding conservation program that encompasses many of the aspects of Scenarios 2 and 3 has been implemented in the province of Victoria, Australia. This program uses geographic information system (GIS) analysis of soil, habitat, and hydrology to determine suitability for program eligibility—much like the Corn Belt watershed futures were developed using GIS coverages of soil and land cover to determine future possible land covers and management practices. Environmental benefits that require management across property boundaries, such as connectivity for habitat restoration or salinity mitigation, are recognized. Farmers bid on implementation of environmentally beneficial practices in a blind process that prevents gaming and allows the government to achieve priority benefits at a fraction of the cost of an incentive program (Eigenram et al. 2006). This is only one example of a farm program that demonstrates that a competitive bidding program that achieves environmental benefits and supports farmers’ incomes is a realistic goal. With further innovation in U.S. agricultural policy, this goal could be reached in the United States as well.
Farmer Choices

Finally, we must recognize that the perceptions, values, and choices of farmers are fundamental to the effectiveness of farm programs. Farms, and the producers who make management decisions about them, are the decisive units in current conservation and commodity programs. Individual producers volunteer for conservation or commodity programs. Other land units, such as the watershed, may be critical to achieving environmental benefits, but the land and the producer who manages it is the practical, legal, and traditional unit for decisionmaking. This reflects a cultural and legal tradition in the United States with respect to property rights and the role of individuals in common concerns such as conservation. Compared with some other countries, the United States has a stronger orientation toward the individual operator and land owner.

The Corn Belt futures were evaluated in in-depth interviews with a small number of farmers who would have been knowledgeable about agriculture in the study watersheds (Chapter 6). These farmers perceived both Scenario 2 and Scenario 3 as being valuable for the future of the people of Iowa, given the assumption that none of the policy scenarios would affect their farm income (Chapter 6). For policymakers, determining which alternatives deliver wide societal and environmental benefits in a way that offers farmers adequate financial and personal rewards is crucial to successful change.

Options for Future Agricultural Policy

We know that agricultural policy, technology, and markets have driven past changes in the Corn Belt, shaping landscape patterns, practices, and environmental and societal impacts (Chapter 2). To address the problem of hypoxia in the Gulf of Mexico, support
the restoration of Gulf coastal ecosystems, and create environmental benefits within the Corn Belt itself, several policy approaches are plausible. The integrated assessment of alternative future scenarios (Chapter 14) contributes greatly to envisioning aims for policy that have been recommended for the entire MRB (Chapter 15). These include changes in farming practices, networked wetland and riparian ecosystems, and off-channel storage of agricultural runoff. In fact, many of the pattern and practice ideas in the alternative futures could be recombined in different ways to achieve alternative policy aims, including different approaches to targeting and compliance. And as additional ideas for farm programs are generated, these can be assimilated into the landscape futures for assess their trade-offs. In addition, the broader environmental benefits accruing from the alternative scenarios could be accounted for in dollar terms. The futures approach allows site-specific examination of trade-offs and multiple benefits that extend beyond water quality to the other goals, such as the economic viability of farming.

Even though the alternative futures demonstrate how a different, local frame of analysis can be used to consider these trade-offs, they do not supply detailed road maps for policy implementation. If there were a road map, it would undoubtedly show several alternative paths—each suggesting different advantages and concerns about everything from farm income to time frames for adoption to public and political acceptability. As they stand, the futures challenge policymakers to develop alternative pathways for reaching desirable future landscapes characteristics. We describe several policy approaches in the list that follows (see Table 16-1 for a summary).
• **A direct buy-out of existing subsidies**, with producers receiving a large cash payment up front and foregoing the right to future farm program payments. Although this approach would require a huge initial cash expenditure by the government, it would return agriculture’s prices and resource use to free market forces. It could be a jarring change to rural economies, with rapid changes in land rents that could dramatically affect the financial planning and well-being of rural land owners. The societal pain associated with this change would very likely tempt Congress to institute commodity payments again later, repeating the experience that occurred when the 1996 farm law decoupled and gradually reduced subsidies from commodities (Chapter 3). This approach would, however, remove artificial incentives for increased production of commodities, even though it would not directly ameliorate the environmental impacts caused by some agricultural production practices.

• **Green conservation payments.** These jarring changes could be largely avoided if green conservation payments were offered instead of commodity payments as the primary means of government support for agriculture (American Farmland Trust 2006a). Properly structured to be easily monitored and have reliable effects, payments for green practices might be very positive for the environment and consistent with WTO definitions of allowable green box policy, as well as providing stable farm incomes. Payments could support the types of practices employed in Scenarios 2 and 3, and resulting gains in quality of life and environmental health could have ripple effects in related community and
econoﬁc beneﬁts. But existing WTO rules that prohibit compensating farmers for more than the cost of a conservation practice could limit this approach.

• *A market-based land retirement program* in which farmers agree to set aside increasing amounts of land for increased crop price guarantees. With this approach, low-quality land (often with environmental problems for agriculture) gets bid into short-term reserves and the most productive land (sometimes having fewer problems) remains in production. An obstacle to using this approach is that crop price guarantees are inconsistent with WTO mandates. In addition, short-term set-asides could achieve some water quality goals while they are being employed, but would not ensure reduced nitrogen ﬂows to the Gulf or enhanced biodiversity over the longer term. Market-based set-asides would bid in (or out) different pieces and types of land over time for different crops, depending on market prices. In the process, supply and demand would be adjusted. But short-term reserves may be particularly ineffective in ameliorating hypoxia, because of long time lags between reductions in nitrogen loading and reduced nitrogen ﬂows into surface waters (Chapter 15).

• A government-directed *supply control land retirement program*. Reminiscent of programs implemented under traditional USDA set-asides, these programs would require farmers to set aside a percentage of their cropland for a speciﬁc crop to get price guarantees for that crop. Traditionally, the Secretary of Agriculture made the determination about how much corn, wheat, or other cropland would be set aside before opening the program for enrollment. One criticism of this approach is that the secretary’s decision may not reﬂect good knowledge of
future weather or market decisions. On the other hand, in practice, farmers set aside their worst land, which served to protect such areas as farmed wetlands to some extent.

- **Income insurance.** Such an approach is best illustrated by the integrated farm revenue program suggested by the American Farmland Trust (AFT). These types of programs would create an income insurance that would protect farmers against drops in revenue rather than price as existing programs do. Farmers could continue to carry separate crop insurance for their own individual weather risk, but the government-supported income insurance would protect farmers against marketwide risks through a national revenue deficiency program. Such a program is seen as a less expensive way to offer basic income support to farmers. In addition, it would allow more expenditure on a possible companion program of green payments (American Farmland Trust 2006b). An essential point was highlighted by the AFT proposals—income is critical to conservation. Big Hugh Bennett, the first leader of the Soil Conservation Service, recognized that farmers in financial difficulty would mine the natural resources to survive. Adequate income was as critical to conservation in the 1930s as it is today.

Environmental shortcomings of the other approaches suggest serious consideration of a green payments program or an income deficiency program; in either approach funds currently directed toward commodity program payments would be redirected to encouraging conservation. This would be particularly appropriate when commodity prices are high and potential federal commodity payments would be minimal. With increased support for green payments, a wide array of environmental benefits could be
achieved on both retired lands and working lands, likely at overall expenditures less than those of current commodity programs. Land needing conservation activities could draw higher payments than received under current commodity programs, and some land that now receives commodity payments might receive lower conservation payments, depending on how the new programs were targeted. This new distribution could be politically controversial, despite the environmental and economic efficiencies it could create. Incorporating green payments for a wide range of environmentally beneficial activities on working lands, such as those described in Scenarios 2 and 3, could help to more evenly distribute overall farm income. Both the CRP and CSP have been distributed over wider areas when a fuller range of environmental benefits have been considered.

Designing Conservation Programs, Today and Tomorrow

Whether or not future farm laws are more favorable to conservation and the environment, the integrated assessment of the MRB and the alternative futures for local Corn Belt watersheds offer lessons for the design of existing and new conservation programs. Targeting that uses detailed geographic information to consider landscape characteristics and achieve enhanced habitat and water quality benefits and requires all program participants to meet some minimum stewardship standard; competitive bidding for program participation to achieve greater cost-efficiencies; performance standards translated into clearly visible BMPs that are practical to monitor and enforce—all of these could be integrated and acted on as part of the public’s investment in agriculture and the environment.
The integrated assessment of the MRB clearly shows that the environmental impacts of Corn Belt agriculture extend into communities, economies, and ecosystems far beyond the region. To a great degree, the solution to hypoxia of the Gulf of Mexico lies in changed Corn Belt farming practices. The scale of federal farm programs, in which the entire American public invests in the health of agriculture and expects that broader societal benefits accrue, is well suited to addressing such continental-scale challenges for the environment and the economy. In addition, America’s global trading partners are pushing for federal agricultural policy that would allow support of farmers and environmental benefits but would not allow support of commodity prices. If U.S. agricultural policy responds to these challenges with more substantial innovation, the recommendations for the MRB and for local Corn Belt watersheds hold promise that future agricultural landscapes and communities could be healthier and more desirable places to live. Furthermore, this book suggests many specific practices and policy options that could be combined in new ways to respond to policy needs.

We who have contributed to this book have been encouraged by the willingness of American farmers to innovate, the capability of American research institutions to bridge disciplinary barriers and conceive of new agricultural patterns and practices, and the responsiveness of American businesses to possibilities for technological innovation. Our enormous national propensity to innovate should be taken into account as policymakers consider what agricultural policy could achieve. Innovation will be required to ensure that the environment, rural communities, and agriculture advance together toward their long-term mutual benefit. If policy makes new gains toward joining these dimensions,
each essential to societal well-being, both the Corn Belt and the Gulf will be healthier as a result.

Table 16-1. Overview of Potential Federal Policy Approaches to Achieving Environmental Benefits

<table>
<thead>
<tr>
<th>Policy option</th>
<th>Advantages</th>
<th>Concerns</th>
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<tbody>
<tr>
<td>Direct buyout of existing commodity payments</td>
<td>Return agriculture to free market conditions</td>
<td>Large initial cost</td>
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<td></td>
<td></td>
<td>Does not directly address environmental impacts</td>
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<td></td>
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<td>Severe impact on land values</td>
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<td></td>
<td></td>
<td>Equity issues for landowners versus land tenants</td>
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<tr>
<td></td>
<td></td>
<td>Likelihood of substitute payments later</td>
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<tr>
<td>Market-based short-term land retirement</td>
<td>Some environmental benefits, for a limited time</td>
<td>May be inconsistent with WTO</td>
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<tr>
<td></td>
<td></td>
<td>Short-term set-asides may result in only limited environmental benefits</td>
</tr>
<tr>
<td>Supply control short-term land retirement</td>
<td>Some environmental benefits, for a limited time</td>
<td>May be inconsistent with WTO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Short-term set-asides may result in only limited environmental benefits</td>
</tr>
<tr>
<td>Substitution of green conservation payments for commodity payments</td>
<td>Return agriculture to free market conditions</td>
<td>Geographic redistribution of payments could be controversial</td>
</tr>
<tr>
<td></td>
<td>Environmental benefits at greater economic efficiency</td>
<td>Monitoring compliance with some practices is difficult</td>
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<tr>
<td></td>
<td>Consistent with WTO</td>
<td></td>
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<tr>
<td>Income insurance</td>
<td>Potentially less costly</td>
<td>Less generous than existing countercyclical support for some commodities</td>
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<tr>
<td></td>
<td>Frees funds for conservation</td>
<td></td>
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<tr>
<td></td>
<td>Less distorting because it is market-priced</td>
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