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by

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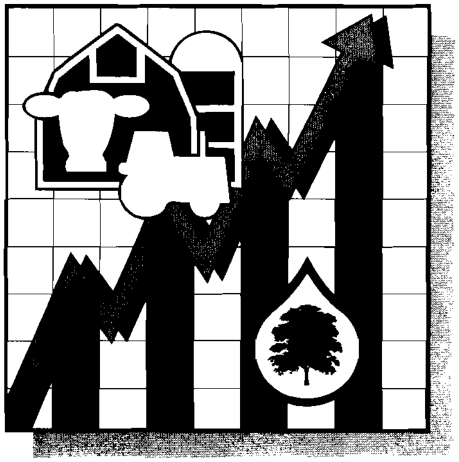


Will Business-Led Environmental Initiatives Grow in Agriculture?

by Sandra S. Batie and David E. Ervin

This article was stimulated by a 1997 American Agricultural Economics Association annual meeting preconference designed by Batie and Ervin. The authors felt that there was considerable interest and activity in business-led environmental management (also called corporate environmental management)—but most of the interest was found outside of the agricultural sector and the profession. The conference was a means to investigate the extent, motivation, and consequences of business-led pollution prevention activities. The DuPont and the Stahlbush Island Farms examples used in this article were drawn from discussions that took place at the conference and which were published in the proceedings. In the article, the authors draw lessons for agriculture informed by the experiences of nonagricultural businesses. They identify and distill from these experiences the major roles for the public sector to enable agricultural business-led initiatives to flourish and to be successful.

Consider the following two real-world cases: E.I. DuPont de Nemours and Company, Inc. (DuPont) and Stahlbush Island Farms. DuPont is now implementing its vision of sustainable growth with a goal of zero emissions and waste. This commitment has led DuPont to improve efficiency of material use, energy use, and water use; to recycle; to make safer products and processes; and to reduce the impact of their total system on the environment, while creating more value for their customers and stockholders.

Stahlbush Island Farms decreased synthetic pesticide use by about 85 percent and significantly reduced synthetic nitrogen fertilizer use over the last decade, yet raised yields and increased profit. Simultaneously, surface runoff and groundwater leaching of nutrients and pesticides have declined under an integrated system of crop rotations, cover crops, composting, and other soil quality improvements guided by advanced management information systems. Water is used a minimum of three times in a state-of-the-art food processing system, and processing waste is composted and returned to the soil. Stahlbush's sales of organic and other "sustainable agriculture" products now reach markets in forty states and fourteen countries. The operation was selected as Oregon's "Agricultural Processor of the Year" in 1992.

Both of these cases illustrate business-led initiatives in environmental management; numerous other cases tell similar stories and may offer a glimpse of the leading edge of environmental management in agriculture. These initiatives have occurred when many past government agro-environmental programs, despite progress on soil erosion and wildlife issues, seem to have, at least partially, failed. No matter how much we fine-tune public approaches, such as targeting land retirement, their cost-effectiveness, reach, and longevity are limited by information and budgets available to program staff. More lasting remedies to agro-environmental problems may result if business acumen and incentive were to be harnessed to lessen information and budget constraints. However, a better understanding of the capacity and limitations of business-led initiatives is necessary to design the proper balance of private and public responsibilities.

Business-led environmental initiatives can work

Business-led environmental initiatives appear to stem from two main forces: (1) a desire to lower costs and improve profits while achieving or exceeding environmental regulatory compliance (i.e., compliance-push forces) and/or (2) a desire to respond to consumer demands for more environmentally friendly processes and products (i.e., demand-pull forces). In response to the first force (compliance-push), many firms no longer rely on minimal compliance with environmental regulations and no longer resist regulatory agencies; rather, they tend to build relationships with regulators, analyze the firm's total processes with respect to the environment, and see environmental management as an essential competitive aspect of their firm's strategic approach. Ultimately, these firms perceive pollution as a flaw in their overall product or process design. As a result, they focus less on pollution abatement and more on system redesign for pollution prevention.

Some firms motivated by compliance-push forces, such as DuPont, have also found that the presumed trade-off between profits and environmental quality does not always apply. Instead, by innovating and redesigning their products, processes, corporate culture, and organizational strategy, these firms have been able to improve environmental performance and add to profits. These improved profits are sometimes referred to as "innovation offsets" because they result from technological changes to reduce pollution which also reduce production costs (and/or improve productivity) and thereby "offset" the costs of compliance. The necessary technological innovation is pursued when firms take a dynamic investment perspective rather than presume a static trade-off between profits and environmental quality. Satisfying or exceeding environmental requirements will also reduce a firm's transaction costs with the regulatory agency and may pre-empt tighter standards.

Other firms, such as Stahlbush, in response to the second force, demand-pull, have found growing markets for so-called "green products" such as "sustainable agriculture" products. Developments, such as eco-labeling, are underway in several food and fiber markets, and have permitted consumers to express their willingness to pay for environmental attributes of a product or its production process. Many of these efforts focus more on "delighting" the firms' customers than on offsetting any costs of regulatory compliance. However, the end result can be similar: the firms find profitable ways of reaching environmental goals.

Will the DuPont and the Stahlbush stories be replicated throughout the country? Will the next generation of agro-environmental management be led by farmers, ranchers, and agri-businesses? Perhaps. But for this change to occur, the appropriate incentives must be in place. Without these incentives, business actions will tend to protect only some parts of the environment. For example, in the absence of compliance-push forces, it is difficult to envision how markets for fisheries in the Chesapeake Bay could induce farmers in Pennsylvania and Virginia to alter their fertilizer and manure practices which contribute to nutrient pollution.

There are important and necessary roles for the public sector in providing the appropriate incentives for business-led environmental management. These include

- setting clear environmental objectives and granting flexibility to producers to meet these objectives;
- building management skills for operating dynamic, integrated systems;
- lessening transition costs of adopting the new production and marketing systems; and
- stimulating research and technology development for environmental public goods.

Setting clear environmental objectives and granting flexibility to producers

Despite over sixty years of conservation and environmental programs for U.S. agriculture, few agro-environmental objectives and performance standards apply. This inattention to specific environmental targets stands in stark contrast to other industries. With few exceptions, goals for air, land, and water quality have been applied to firms in nonagricultural sectors. Controlling the level of sulfur dioxide and nitrous oxide concentrations to meet human health criteria in urban airsheds is a prime example.

Such goals and standards are almost absent in agriculture. Instead, mostly voluntary programs of education, technical advice, and financial assistance have been used to entice farmers to adopt technology-based practices or retire land vulnerable to damage. Examples include cost-sharing for the construction of wastewater holding ponds (of adequate size and specified materials) to control manure discharges from large livestock operations, or rental payments to temporarily set aside cropland prone to excessive erosion with the Conservation Reserve Program. The objectives guiding these programs have been largely couched in terms of the use of certain management technologies or in achieving a given level of land retirement, not in terms of achieving ambient environmental conditions. Some direct controls exist, such as restrictions on certain pesticide use and the drainage or filling of wetlands, but they largely preclude certain practices rather than aim to achieve particular environmental objectives.

This voluntary-payment approach was born in the Great Depression when broad public support existed to transfer resources to financially strapped farmers. Adroit political power by agricultural interest groups and a sympathetic public have sustained the approach, despite the evolution of different environmental management programs for other sectors.

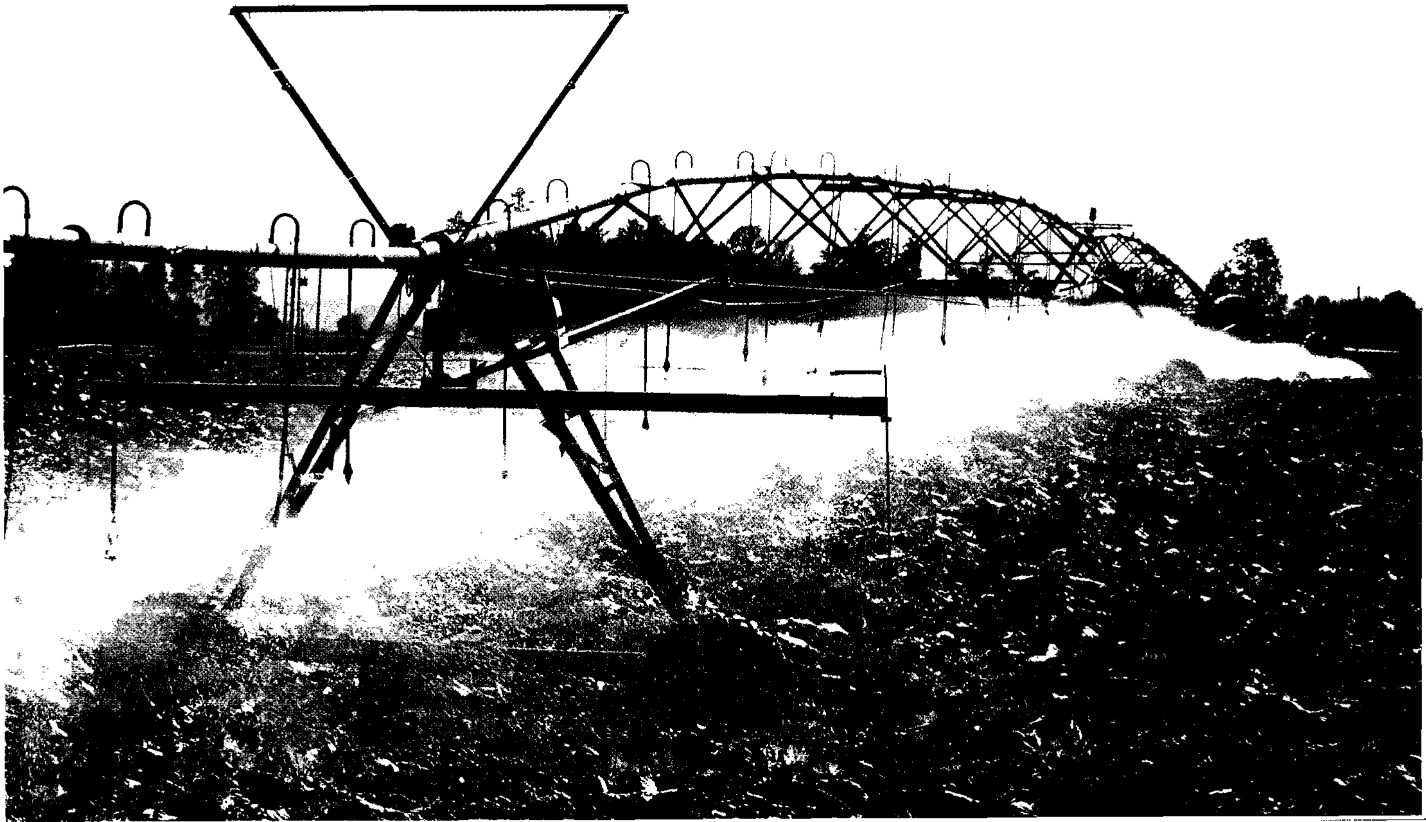
More than politics has hampered the establishment of explicit objectives and performance standards for agriculture. The science and technology necessary to identify the causes of water, air, and land pollution from such a large number of diverse farm production systems spread over almost half of the U.S. land base have been slow in developing. However, considerable progress has been made of late with the development of geographic information systems and improved understanding of source-pollution-damage linkages. Major assessments of agro-environmental linkages have concluded that information exists to improve the precision of problem identification and better target damage reduction or benefit enhancement as the case may be (NRC, OTA, USDA-ERS).

There is nothing inherent about voluntary, incentive-based approaches to suggest that they cannot improve agro-environmental problems. However, after evaluating several major programs in the United States and Europe, Davies and Mazurek conclude that clear, specific, and measurable objectives are crucial to the success of voluntary, incentive-based approaches. The authors stress that there is no way to avoid the need to legislate improvements in environmental policy. Without the certainty and incentives provided by those statutes, less than full progress on the agro-environmental problems should be expected. However, legislation can ensure that objectives are established through an open process that includes the views of all key stakeholders.

There is no doubt that setting and enforcing broad performance standards will involve considerable cost. But the potential long-term net benefits for the industry, consumers of environmental services, and taxpayers will otherwise go unrealized. Furthermore, without performance standards the resolution of complex issues associated with cross-boundary state and national environmental issues—such as hypoxic conditions in the Gulf of Mexico—will remain elusive. The absence of environmental objectives and performance standards has profound implications for the design of business-led environmental initiatives.

Objectives and standards need not equate with "command and control" regulations that dictate required farming practices. Although there may be situations where extreme public health risks or highly toxic pesticides require the use of such regulation, in most cases there are good technical and economic reasons to avoid "command and control" regulations. In these more usual types of agro-environmental problems, flexible incentives may

Water is used a minimum of three times in Stahlbush's innovative processing system.



suffice for agricultural firms to meet environmental objectives (Batie and Ervin). The term "flexible incentives" refers to environmental management tools that specify "what" targets are to be achieved, but allow choices as to responses, or exactly "how" the targets will be achieved.

Without clear, specific, and measurable objectives, it becomes virtually impossible to implement a system of flexible incentives. The strength of relying more on business insight, ingenuity, and innovation to fashion low-cost solutions vanishes unless clear signals about the desired direction can be defined. The lack of clear signals is one reason why we have seen so little private innovation in solving agro-environmental problems.

Build management skills for integrated systems

If more responsibility for achieving market and environmental objectives is shifted to farms and agribusinesses, the value of management that helps meet those objectives will rise. More proficient managers will find the lower cost and/or higher-valued ways of satisfying both objectives.

What public and private institutions are in place to deliver the needed human capital? The Extension system has far fewer people than in earlier times and is perceived by many to be incapable of educating about frontier production and marketing opportunities in many areas. Recognizing the limits of Extension resources, what can government agency education and technical assistance programs for conservation and environmental management, such as those of the Natural Resources Conservation Service (NRCS), accomplish? Their strength has arguably been in technology and practices rather than management, although recent NRCS reforms have encouraged more attention to management skills.

Private advisory firms increasingly provide joint production and environmental management services that augment the operator's capacity to achieve the dual objectives. These private firms may well enjoy a comparative advantage over their public counterparts in supplying the specific human capital necessary to meet environmental requirements and to discover profitable green markets for specific farms and their unique human and natural resources. However, there is a paucity of accessible education and accreditation programs for private advisors. Furthermore, it is difficult for producers to judge the skills and advice from these advisors—suggesting a possible role for public institutions to accredit private advisors.

Reduce transition costs

Firms that redesign their production and marketing systems to improve economic and environmental performances incur rransition costs. These expenses may include obtaining access to valid and useful knowledge, short-run reductions in productivity until the system is refined, installation of new equipment, acquisition of management expertise, and other requirements. For example, some Florida dairy farmers, forced to meet tighter phosphorus emission standards, invested large sums in new production facilities that eventually improved productivity and lowered emissions (Boggess, Johns, and Meline). DuPont's "Zero Discharge" program led to systems re-engineering which increased short-run costs but ultimately enhanced long-run profits via more efficient input use and new products made from recycled wastes. Stahlbush Island Farms' ten-year investment in switching from conventional to sustainable production systems has been rewarded by increased profits.

Two themes run through these case stories:

1. The shifts in production and marketing systems start with substantial investments in human, physical, and/or environmental capital.
2. Learning and adaptive management can substantially influence the trajectories of costs and returns.

These themes imply that the appropriate economic model to understand such stories is dynamic, with uncertain costs and returns that can be shifted down and up through learning. Economic analyses of environmental management systems often adopt static models and fixed costs and returns. Such static analyses can be misleading, because they do not account for learning that pushes the production and marketing frontiers out or that pulls per unit costs down. The cases mentioned above could well have been judged unprofitable or with excessive risk from the short-run perspective when, instead, they have apparently led simultaneously to more economically viable and environmentally beneficial operations. Costs were incurred in making the transition, as for any investment, but the longer-run returns have tended to outweigh those expenses.

No doubt many of the more visible cases such as Stahlbush Island Farms include top managers and therefore are not reflective of all operators. Thus the question becomes, How can the transition costs be lowered so that shifts to more profitable and more environmentally valuable production and marketing systems be accelerated and more broadly pursued? The rationale for enhancing adoption above the rate that private markets would generate is based on the public good benefits of many environmental improvements.

While no single solution will apply to all situations, at least two strategies can be envisioned. The first would offer education and technical assistance to upgrade operators' and advisors' skills for dealing with the dynamic and uncertain situations. An example may be conducting training workshops in integrated pest management for producers and consultants to lower the perceived risks of reducing pesticide applications. Unfortunately, the public institutions for delivering such training, such as Extension and NRCS, have either suffered declining fortunes of late or have focused more on technologies than on management training.

A second strategy could be pursued when education and technical assistance will not lower transition expense sufficiently, but the environmental public goods warrant some subsidy to induce wider use. This approach may be appropriate when upfront capital investments are necessary to shift production—operations such as installing fencing and watering facilities for rotational grazing systems that lower confined animal waste disposal problems but ultimately are profitable. For the second strategy, the newly created federal Environmental Quality Incentives Program (EQIP) appears well positioned to fill this need, but, to date, EQIP has little track record that it is serving this role.

For such subsidies to be meaningful, however, the activities funded must emanate from a whole farm plan that includes an environmental audit to discern which of the farm or firm production operations and procedures is creating agro-environmental problems. Such an audit may require the assistance of outside experts and should address key environmental performance areas such as the treatment and disposal of manure, emissions of dust to air, runoff to surface water, leaching to groundwater, energy use, noise, odors, resource depletion (water, soil, and habitat)—all across time and across space. Without such an audit, redesign of the farm system will probably not be as successful in achieving environmental goals as is possible and profitable. Using EQIP or other subsidies to support stand-alone technologies without the underpinning of a well-designed whole-farm plan based on an environmental audit could shift pollution from one medium to another or easily revert to merely "business as usual." "Business as usual" has not resulted in enough environmental quality improvement to be considered a "solution."

Stimulate research and technology development

One of the most underappreciated strategies to achieve lasting progress on agro-environmental objectives through business initiatives is research and development (R&D) policy. Arguably, the path of agriculture during the twentieth century has been influenced more by research and technology breakthroughs than by any other forces. First came mechanization, then the discovery of hybrid seeds, then the introduction of synthetic fertilizers and pesticides, and then biotechnology advances. Now, information management systems made possible by advanced electronic data-processing technology could permeate the agricultural landscape if their benefits rise or their costs fall sufficiently.

Basic discoveries and applied advances from both the public and private research systems have played key roles. Economic forces either pushed or pulled many of these technologies, a phenomenon explained by the theory of induced innovation. Under the induced innovation theory, R&D suppliers, whether public or private, respond to rising relative input prices, such as for land and water, by developing less-expensive substitutes that economize on the use of the more-expensive inputs. Examples include the development of pesticides to raise yields and substitute for more extensive use of land, and the evolution to more efficient irrigation technologies as the nonfarm competition for water drives water prices higher. The signals to innovate new technologies works most directly through private markets as suppliers work to capture the producer's willingness to pay for cost savings. However, the messages also reach the public agricultural research system as producers lobby government and university research administrators to help them respond to market opportunities or defend against unfavorable price and cost swings.

There are two reasons to doubt that agricultural R&D has been fully responsive to environmental management issues. First, incomplete or nonexistent markets for many environmental services hamper the effectiveness of price incentives to stimulate either private or public R&D. The missing markets for environmental services, such as clean water, cause external benefits that are not captured or external costs that are not paid by the sellers and buyers of agricultural products. Second, current agro-environmental programs rely largely on cost-sharing payments for existing technologies or best management practices (BMPs), an approach that does not effectively signal the need for new R&D (Ervin and Schmitz). Without such signals, the R&D responses may concentrate on remediation and pollution control rather than forward-looking investigations to prevent pollution or excessive natural resource degradation. Where agro-environmental regulations exist, such as for pesticides, both public and private R&D can be expected to lessen the costs of those regulations.

Despite the imperfections in R&D signals, "complementary technologies" that simultaneously enhance environmental conditions and maintain farm profit are expanding (OTA). A partial listing includes conservation tillage, soil nutrient testing, integrated pest management, rotational grazing, and organic production techniques. Others just emerging with unknown potential include precision farming and genetic engineering—both of which may transform agriculture as we know it.

Unfortunately each emerging complementary technology will likely fall far short of its potential under current R&D and agro-environmental policies. Why? Because all serious off-farm environmental effects of agriculture are not effectively internalized in private decisions, such as water pollution from nutrients. Also, voluntary-payment programs subsidize the use of existing technologies rather than stimulate targeted public or private R&D. The market and government failures create the need for agro-environmental policies that do stimulate appropriate R&D. How can that be accomplished? Primarily by setting clear, measurable environmental performance objectives and by developing significant incentives that reward progress toward those objectives.

Lessons for agriculture

In many businesses, we are witnessing a search for pollution prevention management strategies. These businesses are motivated by a variety of factors such as liability concerns, public image, cost-savings, consumer demands, pressure group demands, and the desire to reduce uncertainty. Businesses so motivated examine their whole production and distribution system with environmental audits, and they engage in strategies to increase resource productivity, to reduce material requirements, to recycle, and to "mine" their wastes for valuable products. Indeed, such environmental auditing and system redesign is now so common that it has its own field of investigation—*industrial ecology*—that focuses on resource productivity, materials cycle optimization, and waste minimization.

What lessons can be drawn for agro-environmental prevention from these businesses' experiences? Based on our research and the businesses' experiences, four lessons stand out. First, businesses want and need clear public environmental objectives on which to plan their management strategies. Most will not oppose objectives that are based on the best science and enjoy strong public support, but they resent moving targets. More than anything, uncertainty about the environmental objectives stymies business planning and investment to reaching the objectives cost effectively. Whenever science permits, these objectives should be specified in terms of environmental outcomes, such as water quality conditions. Government should refrain from specifying controls on production methods and give maximum flexibility to producers to innovate new ways to meet the targets.

Second, our observations and business testimony suggest that the most effective pollution prevention strategies require highly proficient managers. Top managers often find ways of conserving resources, particularly by reducing the water, fertilizers, pesticides, manures, and topsoil that run off or leach from fields. Hence, public or private investments in upgrading management will likely pay twin dividends: higher profits and lower pollution. Moreover, the return on such investments will likely grow over time as both competitiveness pressures and environmental standards for farming rise.

Third, implementing state-of-the-art environmental management systems requires investments in new information/audit systems, plant equipment, personnel, and, occasionally, marketing systems (to capitalize on green market opportunities). Many of these investment costs can be recouped through

Broccoli harvest at Stahlbush Island Farms, an organic and "sustainable agriculture" facility.

Dennis Wolverton

cost savings or increased prices. However, it is unlikely that private markets alone will reward enough producers and in sufficient amounts to make the kind of progress to reduce large-scale environmental problems desired by the public. Targeted education, technical, and financial assistance are needed to lower the costs for those cases.

Finally, the fundamental role of agricultural R&D in building more productive and environmentally protective (integrated) agricultural systems cannot be overemphasized. The record of the U.S. agricultural research system in enhancing productivity is the envy of the world. The "public good" benefit from that research can be expanded by more attention to environmental objectives. With more public investment, the cost of new integrated systems will fall, thus spreading their influence across the countryside.

The lessons from business environmental management can be applied to agro-environmental problems, and there is a role for flexible policy undergirded by clear environmental objectives in agriculture. However, there are gaps in information necessary for improved agro-environmental policy design.

Fortunately, the dynamic to fill these information gaps is created by the very agro-environmental policies that set clear environmental objectives and that grant flexibility to producers to meet these objectives. These same policies will create a demand for the necessary management skills to operate dynamic and integrated systems in decentralized markets and will stimulate research and technology development for environmental public goods. Still, implementation of a flexible agro-environmental policy may be hampered by information and management skill gaps for specific cases. As a result, some proxies may need to be used for exact performance standards (e.g., landscape conditions in lieu of ambient water quality standards) until information gaps close.

There appear to be strong economic and environmental rationales for designing a new, more flexible environmental policy for agriculture. Neither the trend of heightened global competition nor the public's demand for improved environmental quality gives any sign of abating. Indeed, both will likely intensify. Giving more responsibility and discretion to the private business sector to meet clear environmental objectives will be a significant departure from past approaches for agriculture. It requires new and different roles for research, education, and technical assistance and government payments to build human capital, innovate new systems, and lessen transition costs to accelerate their adoption. The end result may well be an agriculture that is both competitive and environmentally protecting. ■

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■ For more information

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This article is an abbreviated version of a similar titled article published in Business-led Initiatives in Environmental Management: The Next Generation of Policy? *(Batie, Ervin, and Schulz), which serves as an introduction to a series of related articles.*