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# SUSTAINABILITY: OBSERVATIONS, EXPECTATIONS AND POLICY IMPLICATIONS

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The end of this decade could reveal that two major revolutions occurred in American agriculture, industrialization and sustainability. Both would have important implications for farmers and ranchers, and anyone touched by the production, processing or marketing of their products. Their impacts, however, will depend on their extent, their interaction, public preferences and the associated public policies. What seems inevitable today may change tomorrow. Policies could be implemented in the future to curb industrialization if it competes with sustainability, or perhaps the terms sustainability and industrialization won't have much meaning by the year 2000.

We explore the concept of sustainable agriculture (SA) in light of industrialization. We are neither supporters or opponents of SA, but we do see a disturbing lack of understanding about what the term means, and consequently, what its contributions have been. While the goals of sustainability are laudable, the term SA is only the most recent catch-all phrase to address externality problems in agriculture (Hoag and Skold). Like other terms which proceeded it, the term SA is not likely to endure. The issues and concerns of its proponents are too diverse and intractable to unify. However, new terms or phrases will arise, because the concerns bundled in SA are important, and they will persist. It is in the definitions of SA that people express their concerns about agriculture. And it is these concerns that need to be addressed, whether it be through SA, the latest catch phrase, or through narrower, more targeted programs.

We will attempt to persuade the reader that the worthy goals of SA can be and are better accomplished through other, more problem-specific programs and policies. Furthermore, industrialization will play a part in addressing many of these issues. SA's search for its identity has left an awareness about some problems which may need to be addressed, but the market will deal with many of these without the need of government policies. If and where the market fails to ensure the level of sustainability that the public demands, policies may be required. The trick comes in knowing when market signals are not correctly reflecting society preferences.

## What is Sustainability?

A sensible place to begin an exploration of SA is in its definition. Unfortunately, this is problematic. Hundreds, perhaps thousands, of definitions have been written, but they vary significantly (Gold). Some, try to be very *specific*, emphasizing a particular agenda or concern, such as environmental conservation (U.S. Department of Agriculture), use of regenerative inputs (Rodale), rural economic health, family farms, or economic health and the ability to feed the world (DowElanco). A second, *all-inclusive*, approach is to incorporate everything into one list, as the following definition from the Food, Agriculture, Conservation and Trade Act of 1990 (Section 1603, Title XVI) demonstrates:

> an integrated system of plant and animal production practices having a site-specific application that will, over the long-term: (1) satisfy human food and fiber needs; (2) enhance environmental quality and the natural resource base upon which the agricultural economy depends; (3) make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls; (4) sustain the economic viability of farm operations; and (5) enhance the quality of life for farmers and society as a whole.

The third approach to define sustainability is *holistic*. A widely quoted definition given in 1987 by the World Commission on Environment and Development is that, "the needs of the present are met without compromising the ability of future generations to meet their own needs." Very similar definitions have been expressed by Dicks and Victor and adopted at the 1992 United Nations Conference on the Environment and Development in Rio de Janiero.

There are many definitions of SA. Therefore, *anyone* can say they are sustainable, and *everyone* does. A farmer that pollutes may believe he is sustainable, because it is the only way to continue his livelihood. His actions, however, are not sustainable to an environmentalist. From their unique perspectives, each is correct in thinking they are sustainable and that the other person is not. Through all of this confusion, we believe the central issues of SA are either intratemporal or intertemporal externalities associated with current patterns of input and resource use. It is easy to confuse even these two categories, however. For example, the poor of today may not think that intertemporal reallocations to future generations are sustainable, and intratemporal reallocations from poor American farmers to help the farmers of other countries is widely unpopular with American farmers

## Is SA Sustainable?

It is clear that SA has not been successful at establishing an operating definition which encompasses the activities of all of its proponents (Nagy; Schuh and Archibald; Helmers and Hoag), but is it important to have a precise definition of SA? The answer is yes. Effective policy cannot be made if there is no agreement about how to differentiate between farming systems that are sustainable and those that are not (Hoag, Weber and Duffy). By what yardstick is progress measured?

The SA movement has lacked focus because it has tried to be inclusive of too many decision makers and too many goals, often regardless of their scientific basis. Consider the following comments in a 1994 letter from the president and executive director of a leading SA support group called the Henry A. Wallace Institute for Alternative Agriculture (Heller and Youngberg, p. 2):

> We were troubled by the ambiguity which continued to surround the concept of agricultural sustainability. Sadly, from our vantage point, after nearly 10 years of awareness-building regarding its importance, little if any progress had been made toward specifying the empirical content and characteristics of a sustainable agriculture, or operational means needed to achieve those ends....it is not enough to proclaim that a sustainable agriculture be productive, economically-viable, environmentally-sound, and socially-just. Such proclamations, made routinely in 1994...provide little policy guidance."

*Is SA sustainable?* Given its past, we believe that the answer to this question is no. The term SA introduces more confusion than communication. As Solow said about sustainability (p. 179), "the less you know about it, the better it sounds." And as indicated above by the Wallace Institute, experience has indeed lead to disillusionment. We think that there are at least four inherent problems that make SA unsustainable:

- Conflicting objectives;
- Competing decision makers;
- Lack of information;
- Increasing specialization.

## Conflicting Objectives

The objectives cited in the various definitions of SA, no matter how desirable, cannot all be achieved at one time. In cases which involve decisions, trade-offs will be unavoidable (Skold). Profits will have to be

traded against the environment or one environmental goal, such as soil conservation, may come at the expense of another, such as reduced chemical use. True, profits will sometimes rise with environmental enhancements. Nevertheless, win-win situations, where two or more concerns are improved and none are made worse off, are not the problem. It is when trade-offs occur that society is not clear about its objectives. How much tax money or how big a sacrifice in profits is justified to purchase wildlife habitat or clean water? Who should pay for a public good that is desired by only one element of the population? Which is more important to control, soil erosion or chemical leaching into groundwater? Society has not been forced to address these trade-offs, because SA leaves the impression that a solution has been found.

### Competing Decision Makers

The second conflict is between decision makers. Boundaries on time, space and culture determine, to a large extent, what is and what is not sustainable (Hoag, Weber, and Duffy). To a farmer, sustainability means farm survival. One farm's survival may be at odds, however, with economic efficiency and community objectives. Likewise, the sustainability of a community may be insignificant in the federal landscape. *Sustainability is in the eyes of the decision maker*. For this reason, society has failed to value trade-offs; it has too many decision makers. Trade-offs imply gainers and losers. It is doubtful that the losers in any action will think it is sustainable.

### Lack of Information

The third reason the use of the term SA will diminish is due to a lack of information. Confusing or unclear information can exasperate already diverse viewpoints. Consider the case of pesticides. There is little agreement about whether they help (Avery) or degrade (Rodale) the environment and pose risks to human health. Consequently, there is division about their role in helping the environment. Should the government provide information and let the market sort out consumer preferences, or should pesticides be more heavily regulated?

### Increased Specialization

The fourth and final problem has to do with diversification. Sustainability is often associated with diversified systems (Rodale), but the economy in our society is moving increasingly toward specialization. Since SA is so loosely defined, it is not necessarily contrary to specialization. Technology can be the driving force behind "systems," as has occurred in improved technologies for crop rotations and the use of animal manures. Even the

Wallace Institute letter acknowledges that it is unclear whether technology supports agricultural sustainability (Heller and Youngberg, p.3). Nevertheless, a clear trend toward specialization (Drabenstott) seems, on the surface, to challenge the systems banner that many SA advocates fly.

## Why the Interest in Sustainability?

If the term SA is merely a passing fad, why has it generated so much interest? We believe it is because SA has been very successful at problem identification. SA's articulation of concerns about environmental degradation, the disappearance of the "classical" family farm, and the decline of rural communities, to name a few, have touched a sensitive nerve of society. Everyone must be for SA. After all, it promises to fix everything bad about agriculture, without having to give up anything. However, SA's inability to achieve a consensus about a prioritization of goals, its failure to accept that there may have to be trade-offs between goals, and its sometimes willingness to accept less than scientific approaches and results, has contributed to its limited success.

The details may be at the heart of its failure, but they also tell policy makers many important things about how people want agriculture to change. It is here that SA has made its largest contribution. The details tell of issues and problems that people perceive in agriculture. Havlin (p. 66) offers a list of such problems that is common throughout the literature. These include:

1. "Natural resources are being degraded in quantity and/or quality at a rate that will significantly compromise resource availability to future generations;

2. Waste products of human activity are accumulating to levels which compromise future use of the environment;

3. The variability in biological systems and, thus, biological stability, is being reduced at a rate that threatens nonhuman life and future of the biosphere;

4. Present societal arrangements often produce social problems related to overcrowding, stress, pollution, etc.;

5. The current policy and program infrastructure may not provide sufficient means to protect the environment, natural resources and biological diversity;

6. Agricultural sustainability is continually challenged by an(sic) increasing demand for food supply associated with continued population growth."

These issues, and many others, have driven many people to conclude that the current system of agricultural production, processing, distribution and marketing is not sustainable.

Havlin also offered a list of resulting goals to address these problems that includes: ecological, biological, economical, resources, survival and social needs. Three themes that can be seen throughout various attempts to define the goals of SA are that a system must be economical, environmentally sensitive, and socially just (e.g. Heller and Youngberg; CAST). We reiterate: SA is too amorphous to address all of these goals, but its concepts should be investigated and pursued where appropriate, on an individual or more limited basis. This view was supported by many participants at a recent conference on SA (CAST), and is implied by the Heller and Youngberg letter, which cites numerous examples of individual successes at addressing problems in agriculture, while at the same time expressing disappointment with the overall progress of SA.

## Industrialization and Sustainability

Industrialization is "the increasing consolidation and integration among the stages of the food and fiber system" (Council on Food, Agriculture and Resource Economics, p. 1). According to Drabenstott, industrialization is occurring because consumers are more demanding, and because producers have a "panoply of new technology and management tools that enable food to be engineered—from the farm to the dinner table" (p. 14). One of the most important forces driving industrialization is increased technology. Drabenstott identifies two sources of technology that have been important in recent years, biotechnology and information technology.

Industrialization is a product of the market system. Sustainable agriculture is an institutional goal aimed at addressing market failures, some of which result from industrialization (Skold). Industrialization is associated with production specialization; SA promotes production diversity. Industrialization is a threat to the traditional structure of agriculture; SA seeks to retain that structure. Industrialization results from the pursuit of economic efficiency; SA places emphasis on environmental and resource protection. Generally, since the market drives industrialization, policies may be used to limit its undesirable outcomes. These policies, which have the effect of suppressing industrialization, promote SA.

Industrialization is a clear competitor to SA in many cases. However, that competition does not necessarily pit sustainability against nonsustainability. Technology can make a contribution toward long-run sustainability. It does not require social equity or environmental protection, but neither does it

automatically conflict with these objectives. SA and technology each try to sustain our ability to meet future needs. Over time, if society is not careful, the quantity of resources can be consumed at a rate greater than investment, or the quality of the resource stock can be degraded. In essence, society can consume its capital rather than reinvesting it. SA seeks to preserve our resource base, so this does not occur. Technology, however, raises our ability to produce goods and services with the same amount of inputs. Therefore, SA seeks, in spirit, to preserve resources in order to maintain production. Technology increases output for any given level of input. Each intends to make society better able to meet its needs in the future.

Economists have a long history of not being able to account for the future impact of technology on economic potentials (Robinson). Nevertheless, we will sustain our ability to meet future needs, as required by the broad definition of SA, as long as we leave behind substitute technologies or resources for future generations. In his efforts to examine generational equity and optimal growth, Solow carefully argues that one generation does not owe any particular resource to future generations in order leave them as well off as we are; only that we leave them with the same means to make themselves as well off. He also asserts that one generation cannot paralyze itself with inaction, worrying about whether we are over-consuming. People 100 years ago, he argues, could not have envisioned what we have today, and it could be argued that they left us more than enough since we have a better life-style. "You choose policies to avoid potentially catastrophic errors, if you can. You insure wherever you can, but that's it" (p. 182).

Finally, it could be argued that technology does not account for the social and environmental elements of SA. This can be true if technology is left to proceed on its own. But there are many checks and balances. First, policy can be designed to encourage "appropriate" technologies. Technology may be driven by consumer demand, but it can also address its own failings when they appear. For example, when water quality became a highly public issue, scientists made tremendous strides in re-engineering chemicals which are more benign, applied at lower rates and less vulnerable to transport. Innovative rinsing technologies were introduced and quickly adopted to reduce pesticide contamination of wells. Integrated pest management practices provide a number of successes at reducing chemical use. The strategies may involve substituting information (e.g., pest scouting) for prophylactic treatments, development of pest resistant cultivars, adopting alternative cultural practices or implementation of biological controls. And many other examples can be cited (e.g. DowElanco).

It is not correct to say either that industrialization increases or reduces SA. For example, the impacts of the rapid adoption of confinement facilities

in the swine industry are not uniform. On one hand, the movement takes animals off farms, reduces diversification and hurts rural economies. On the other, it provides new opportunities in rural economies that stimulates jobs and helps the rural economy. Environmental impacts are also diverse. Odor is becoming an increasing complaint as confined operations are moved into new areas. However, large confinement facilities may have scale economies and greater technical feasibility for waste management.

## Implications for Agriculture and Policy

SA has been successful at increasing awareness among the scientific community and the general public about issues with which we should be concerned. However, SA has too often lacked focus, or it has tried to accommodate too many, and often conflicting, goals. Its policy achievements have been limited. Policies to address the goals of SA will have to be separated to be successful. SA cannot be the panacea for all the ills of American agriculture, and future policies should recognize four points.

1. Decisions are not difficult when practices result in both economic efficiency and environmental enhancement (win-win). Conflicts arise when solutions require decisions about trade-offs between production efficiency and equity, or profitability and environmental protection. Analyses are needed to more fully account for all costs of production, to link production response functions to environmental damage functions, for example (Schuh and Archibald). Methods are also needed to help policy makers evaluate and rank trade-offs when they occur.

2. Technology which leads to farm enlargement or industrialization may not be conducive to sustaining family farms and, perhaps, rural communities. Consumers and producers receive value from industrialization, but externalities may accrue to the community or the environment. Information about trade-offs between technology, and farm and community survival will result in better policies.

3. It is probably inefficient, at best, and likely infeasible, to design a policy which meets all the goals of SA; for example:

• If we want sustained and growing rural communities, policies which directly address rural development are more likely to be successful than trying to achieve rural development through SA. Our rural development colleagues tell us that a healthy, and even strengthened, value-added agriculture has only limited potential for rural development. Most believe that rural communities need to broaden their resource base beyond agriculture.

• If we want improved water quality, policies which directly address production practices which pose the greatest threat are likely to be more successful than SA production technologies designed to achieve a broad spectrum of benefits.

• If we want to sustain family farms, or preserve a particular structure for production agriculture, policies which directly address these goals will be more efficient than policies to promote a desired agricultural production system.

4. Industrialization does not necessarily conflict or compete with SA objectives. Industrialization is the result of market forces at work, and the market can respond to the goals of SA. And, it may happen that the goals of SA are best met through industrialization of some production processes. It is appropriate, however, to seek to understand the implications of each technical and structural change to the objectives of SA. Only with this knowledge can society make the decisions about the kind of agricultural sector it wants.

Each of the above are implicit calls for more information about the trade-offs underlying resource use. As public policy specialists, we need to work with our research colleagues and other suppliers of information for programs, and to develop understanding of the trade-offs and complementaries between the alternative policy goals. The desire to be holistic and system-wide must be weighed against our ability to analyze problems. We are not at the point where we can even evaluate the technical interactions of several options at once, let alone deal with diverging social interests. In short, *we need to specialize a bit more*. While this may not be a popular notion in this politically correct age, it is a practical one. Many solutions to environmental and other SA concerns have already come through advances in technology, and many more will arrive. This is not to say that lofty and loosely defined goals have no role in policy; only that smaller, specifically-targeted efforts are more likely to result in policies which address the concerns of society.

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