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### **Sustainability in the Balance: Issues in Sustainable Agriculture**

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Expanding the Definition of Sustainable Agriculture

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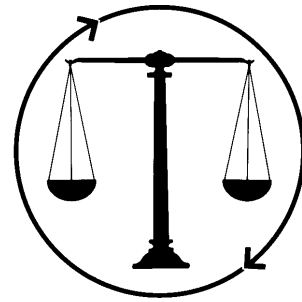
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# SUSTAINABILITY IN THE BALANCE

## EXPANDING THE DEFINITION OF SUSTAINABLE AGRICULTURE

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### *Introduction*

The long-term sustainability of agricultural systems concerns diverse groups of people. They emphasize different aspects of sustainability, from land stewardship and family farms, to low external-input methods and food safety. Often there are two different themes: sustainability defined primarily in terms of resource conservation and profitability, and sustainability defined in terms of pressing social problems in the food and agriculture system. Each of these perspectives has been illustrated by William Lockeretz<sup>1</sup> and Miguel Altieri.<sup>2</sup> In his review article on sustainability, Lockeretz documented primarily production-oriented components of sustainability. Altieri, on the other hand, has pointed out that concentration on only the technological aspects of sustainability results in, among other things, failure to distill the root causes of nonsustainability in agriculture. While sustainability efforts need to address both social and technical issues, they frequently overemphasize the technical, a problem we see originating in the way sustainability is often defined. Our purpose in this paper is to discuss concerns about current sustainability definitions and suggest a definition based upon a broader perspective.

### *Why Continue to Discuss Definition?*

Among those working in sustainability there is often a feeling that we need to devote less time to talking about the meaning of sustainable agriculture and more time to implementing it. While this is an understandable position, especially for those directly involved in production agriculture, it also expresses a

contradiction. How can we form an improved agricultural system if it has not yet been clearly conceptualized? Lockeretz<sup>1</sup> queries, "Isn't something backwards here?" and shows that, although there is a surge of interest in agricultural sustainability, "even its most basic ideas remain to be worked out." There is no generally accepted set of goals for sustainable agriculture, and little agreement even on what and who it is we intend to sustain.<sup>3</sup> Is it possible, for example, to both sustain production levels and preserve the natural environment? Who should we work to sustain – farmers, consumers, future generations – or should all of them be our priorities? Can we truly sustain one group without considering others? Without clarifying these goals the necessary changes in cultural, infrastructural, technological, and political arenas are difficult to negotiate. If we want sustainable agriculture to pursue a path differentiable from that of conventional agriculture, we need to explicitly state and gain some consensus on these goals. A clear, comprehensive definition of sustainability forms the necessary theoretical foundation for articulating sustainability goals and objectives.

### *Current Definitions of Sustainability*

The emergence of agricultural sustainability reflects many people's dissatisfaction with conventional agricultural priorities, especially the extent to which short-term economic goals have been emphasized over environmental and social goals. In response, a number of agricultural sustainability concepts have been developed under the terms "alternative," "regen-

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erative,” “organic,” “low-input,” and “sustainable.” In this paper we refer to those definitions most commonly espoused in the agricultural research community, definitions which are predominant in the literature and are used as the basis of sustainability programs. We examine what priorities these definitions embody, how these priorities relate to those expressed in conventional agriculture, and how developing sustainability would benefit by broadening these priorities.

Although sustainability definitions include a range of environmental, economic, and social characteristics, most focus somewhat narrowly on environment, resource conservation, productivity, and farm- and firm-level profitability. Charles Francis<sup>4</sup> defines sustainable agriculture as a “management strategy” whose goal is to reduce input costs, minimize environmental damage, and provide production and profit over time. The National Research Council<sup>5</sup> defines alternative agriculture as food or fiber production which employs ecological production strategies to reduce inputs and environmental damage while promoting profitable, efficient, long-term production. For Richard Harwood<sup>6</sup> the three principles for sustainable agriculture are: “the interrelatedness of all parts of a farming system, including the farmer and his family; the importance of the many biological balances in the system; the need to maximize use of material and practices that disrupt those relationships.” According to Vernon Ruttan<sup>7</sup> enhanced productivity must be a key factor in any sustainability definition. Rod MacRae, Stuart Hill, John Henning, and Guy Mehuys<sup>8</sup> adopt a sustainability definition which emphasizes environmentally sound production practices. They note that sustainable agriculture today is characterized mainly by products and practices which minimize environmental degradation, although they also point out the potential to move beyond this restrictive application. In his review of sustainable agriculture definitions, Lockeretz<sup>1</sup> stresses agronomic considerations although he does note the connection between changing production practices and associated socioeconomic transformations.

Sustainability definitions such as the above focus on environmental conservation which is to be achieved through changing farm production practices without reducing farmers’ profits. They challenge some but not all of the assumptions that underlie agriculture’s nonsustainable aspects, generally neglecting questions

of equity or social justice, or devoting little specific language to it. Altieri,<sup>2</sup> for one, has challenged the narrowness of these approaches and their implicit assumption that taking care of the environmental, production, and economic aspects of sustainability automatically takes care of social aspects: “Intrinsic to these [agroecology] projects is the conviction that, as long as the proposed systems benefit the environment and are profitable, sustainability will eventually be achieved and all people will benefit.” Altieri has noted that without intervention on policy, research, and other levels, the more appropriate technology developing in the name of sustainability will merely perpetuate and enhance the current differentiation between those members of society who benefit from agriculture and those who do not. Furthermore, the technology itself will not be developed and used unless we address the cultural, infrastructural, and political factors which shape how it is designed and implemented. These factors include scientific paradigms, fiscal policy, international trade, domestic commodity programs, and consumer preferences.

### *Conventional Agricultural Priorities*

Pursuing the dialogue on sustainability is essential in order to make visible the often invisible assumptions and priorities which have governed agricultural research, policy, and business decisions leading to nonsustainable systems. Many of these assumptions and priorities also influence sustainable agriculture programs. Such an examination is critical if we are to avoid reproducing the problems engendered by conventional decision-making processes in the research, education, policy, and business institutions which determine agriculture.

Kenneth Dahlberg<sup>9</sup> notes that assumptions and biases which may occlude the development of sustainable agriculture concepts include: separating ourselves from nature and viewing it as something which must be dominated; measuring progress in increasing applications of science and technology; emphasizing technology and formal social institutions over natural systems and less formal aspects of society; and failing to see how human societies fit into and are dependent upon larger natural systems. We would add to Dahlberg’s list the tendency to overlook the needs of human beings who are separated from us, whether it be by distance, by socioeconomic status, or by time

(future generations). These types of assumptions govern how we understand the world and have been institutionalized in educational and research programs. MacRae et al.<sup>8</sup> note that many characteristics of the research process responsible for conventional agriculture's great productivity create obstacles to developing sustainable agriculture. Among these are overreliance on reductionism and quantification, scientists' belief in objective "truth," and the divorce of research from its potential social consequences (that is, that the potential consequences of research should not determine whether the research is undertaken). Along with Patricia Allen<sup>10</sup> those authors also cite obstacles posed by a peer review system and publishing process which tend to reward individual "isolated" achievement while discouraging long-range interdisciplinary work and innovative ideas. This is aggravated by research funding from private sources, which encourages research on technology development rather than social analysis.

The same assumptions and biases which govern research and education are also embedded in much of U.S. agricultural policy. They are expressed primarily as short-term economic considerations such as maximizing production, minimizing production costs and consumer prices, and maximizing the market share of certain agricultural commodities. These priorities have largely been those of the agricultural sector, and not necessarily those that are best for society at large.<sup>11</sup>

### *Limiting Assumptions*

To address these types of whole-system issues we believe that sustainable agriculture concepts must go beyond placing top priority on environment and production practices and give greater emphasis to social issues. Current definitions are often based on two assumptions that we believe to be problematic: 1) that the farm is the primary locus for achieving agricultural sustainability and 2) that short-term microeconomic profitability is paramount.

#### *Farm-centric Focus*

Major institutions promulgating "sustainable" agriculture often focus on the farm level rather than on the whole system. This is clear from the priorities of the U.S. Department of Agriculture's Low Input Sustainable Agriculture (LISA) program. LISA focused

on "low input technologies [which] provide opportunities to reduce the farmer's dependence on certain kinds of purchased inputs in ways that increase profits, reduce environmental hazards, and ensure a more sustainable agriculture for generations to come."<sup>12</sup> As these priorities demonstrate, agriculture is often thought of almost purely in terms of farms and farmers, a perspective traceable to the period in which most Americans were involved in farm production but which no longer reflects agriculture's true scope. Even though the on-farm transformation of resources into food and fiber is a core process of the food and agriculture system, it is but one of many components. The system includes not only generating agricultural products, but also distributing those products and the infrastructure which affects production and distribution at regional, national, and global levels. Interactions among the larger environmental, social, and economic systems in which agriculture is situated directly influence agricultural production and distribution. The following briefly describes how these larger systems affect agriculture yet remain unaccounted for in many sustainable agriculture programs.

### *The Environmental Context*

Agricultural practices ranging from the development of irrigation projects to the use of agrichemicals have often had negative environmental impacts such as wildlife kills, pesticide residues in drinking water, soil erosion, groundwater depletion, and salinization. Substituting environmentally sound inputs for those which are damaging is an important step in addressing these problems. But ecological sustainability requires intensive management and substantial knowledge of ecological processes which go far beyond substitution<sup>13</sup> and cannot be achieved merely by substituting inputs. Such substitutions need to account for their complex and long-term ecological consequences. Otherwise they may engender secondary and perhaps more serious problems in the same way that conventional solutions frequently have been shown to do. Viewing agricultural systems as true ecosystems can serve as a model for bringing the whole-systems perspective to bear on social and economic issues as well.

Instead, however, sustainability programs often take conventional approaches to solving these problems by changing the production practices which are

directly at fault without addressing the total ecosystem context of either the problems or the alternative production practices which show promise as solutions. An example is the current emphasis on input substitution. Most projects funded by the USDA Low-Input Sustainable Agriculture (LISA) program in its first two years, for instance, explore how inputs which cause environmental damage or incur expensive costs for the farmer can be replaced with more environmentally or economically benign inputs (e.g., studies on the use of soil solarization as a replacement for methyl bromide fumigation in strawberries and on the use of cover crops to control erosion and lessen fertilizer inputs). In most cases single components of farming systems are being analyzed and little attempt is made to place these analyses in the context of whole agroecosystems.

### The Social Context

Agriculture both affects and is affected by the larger society. Farmer production decisions, for example, determine the diversity and quality of foods available to consumers, and farm size and technologies have been associated with the economic and social vigor of rural communities.<sup>14</sup> At the same time, society determines what is possible at the farm level. Farmers lose valuable farmland when encroaching urbanization creates zoning problems, inflates land values, and generates urban pollution which lowers crop productivity.

Production decisions are heavily influenced by consumer decisions. A recent example is farmers' voluntary discontinuation of Alar on apples. Although farmers continued to endorse the safety of Alar, they realized that this position was untenable in the face of consumer concerns.

The international scope of agriculture also plays an important role. Social and economic conditions in other countries and global food supplies can greatly affect the viability of farming in local regions, as evidenced when the world grain shortages of the 1970s led to enormous expansion in U.S. grain production. When foreign demand for U.S. grain subsequently declined, many American farmers' incomes fell, often to the point where debts incurred to expand production could not be paid, and major social and economic dislocations in the grain belt occurred.

Efforts in sustainable agriculture are not unlike those of their conventional counterparts in that they tend to serve certain clientele selectively and generally do not evaluate the social consequences of the technologies that sustainable agriculture encourages. For example, organic farming strategies are often supported because they are environmentally sound, and in terms of the prices organic foods command, are profitable for farmers. An unintended and unaddressed social consequence of this is that people with low incomes often cannot afford organic products and thus are denied access to food containing fewer pesticide residues.

### The Economic Context

Agriculture's reciprocal relationship with the overall economy is clear. The agricultural industry is a significant portion of the nation's economy: in 1984 about 20 percent of U.S. jobs were in some aspect of food and fiber production, distribution, or service<sup>15</sup> and these workers and their industries contributed 18 percent of the gross national product.

The importance and volatility of food prices have made most governments reluctant to let market forces alone set these prices. Thus, a host of institutional measures have been implemented to address agricultural prices in order to manage their effects on consumer welfare, public coffers, farmer income, foreign exchange, food security, nutrition, and food distribution. Such policies include commodity programs, water and reclamation programs, import/export policies, and research and extension programs. Larger economic factors indirectly affect the agricultural system, factors such as interest rates, trade policy and negotiations, the exchange value of the U.S. dollar, and environmental regulations.

In the context of these economic policies, agriculture is subject to nonagricultural constraints and conditions, a fact acknowledged broadly in the literature of both conventional and sustainable agriculture. Yet most research and extension programs in both conventional and sustainable agriculture do not recognize or address these macrofactors. Sustainable agriculture efforts generally concentrate on environmentally sound farm-level technologies which are economically profitable for farmers to adopt. Less commonly do such efforts address how the technologies they generate will affect or be affected by larger economic concerns in the long run.

### Short-term Profitability

A second assumption behind many sustainable agriculture definitions, that short-term profitability is of ultimate importance, is also common. This is a central tenet of LISA, forming the first of its ten Guiding Principles: "If a method of farming is not profitable, it cannot be sustainable."<sup>12</sup> This is problematic, particularly since there is little acknowledgement that profitability is determined by policies, fiscal procedures, and business structures that can obstruct sustainability. We recognize that short-term profitability is important in commercial agricultural systems; clearly, if growers are to adopt sustainable agricultural practices, these must be profitable in the short run as well as the long run. The problem lies in pursuit of short-run profitability at the expense of environmental and social goals. In conventional agriculture, the drive to maximize short-term profit has meant that many pressing problems have been ignored or exacerbated. Natural resources have often been treated as expendable commodities (although they cannot be produced as commodities), and agriculture has functioned more for financial gain than for human need. The social costs of production have generally been neglected: chronic hunger, inequitable economic returns and unsafe working conditions for farm labor, possible negative health effects related to nutrition and agrichemical use, and the decline of socioeconomic conditions in rural communities associated with large-scale industrial agriculture. Subsuming social goals to economic goals may easily be reproduced in sustainability programs unless sustainability concepts address the fact that profitability and social goals are often not compatible in current economic systems.

### *Expanding the Concept of Agricultural Sustainability*

A useful concept of agricultural sustainability needs not only to acknowledge social issues as priorities equivalent to those of production, environment, and economics, but to recognize the need for balance among those disparate but highly interactive elements which comprise agriculture. Toward this, we offer the following perspective: A sustainable food and agriculture system is one which is environmentally sound, economically viable, socially responsible, nonexploitative, and which serves as the foundation for future

generations. It must be approached through an interdisciplinary focus which addresses the many interrelated parts of the entire food and agriculture system, at local, regional, national, and international levels. Essential to this perspective is recognition of the whole-systems nature of agriculture; the idea that sustainability must be extended not only through time, but throughout the globe as well, valuing the welfare of not only future generations, but of all people now living and of all species of the biosphere.

### Moving Beyond the Farm and Microeconomics

This sustainability concept moves beyond emphasis of farm-level practices and microeconomic profitability to that of the entire agricultural system and its total clientele. Richard Lowrance, Paul Hendrix, and Eugene Odum<sup>16</sup> describe a model which approximates a whole-systems approach. They see four different loci or subsystems of sustainability: 1) farm fields where agronomic factors are paramount; 2) the farm unit wherein microeconomic concerns are primary; 3) the regional physical environment where ecological factors are central; and 4) national and international economies where macroeconomic issues are most important. Their model demonstrates that focusing on only one level of the agricultural system neglects others that are equally essential. A whole-systems perspective fosters an understanding of complex interactions and their diverse ramifications throughout agriculture and the systems with which it articulates.

This understanding is at the root of sustainability. Vernon Ruttan<sup>17</sup> describes an ever-widening comprehension of "whole system" as he delineates three waves of social concerns which have arisen about natural resource availability, environmental change, and human well-being. In the late 1940s and early 1950s the first wave focused on whether resources such as land, water, and energy were sufficient to sustain economic growth. The second wave, in the late 1960s and early 1970s, focused on the effect of growth-generated pollution on the environment (asbestos, pesticides, smog, radioactive wastes). The most recent concerns, manifest since the mid-1980s, also center on adverse environmental effects, but the key distinction is the transnational issues such as global warming, ozone depletion, and acid rain.

As agriculture and its impacts become increasingly globalized, the need for a whole-systems perspective,

particularly in terms of decision-making, become increasingly critical. Dahlberg<sup>9</sup> observes that although the impacts of modern industrial society are global, the data and analytical tools we use to assess those impacts are limited by national, disciplinary, or sectoral boundaries. Our educational and research institutions tend to mirror this shortcoming,<sup>8</sup> with the result that the larger system contexts of research questions are infrequently investigated and poorly understood. Difficulties in apprehending and resolving problems whose constituents are grounded in several interrelated systems are compounded by the international community's disparate, competitive political and economic systems. Nations act to promote their own priorities but affect, often negatively, globally shared resources and globally interdependent societies. Although nations and other sociopolitical groups generate impacts beyond their borders, they are generally incapable or unwilling to assess and react equitably (in international terms) to the results of their actions. Pierre Crosson and Norman Rosenberg<sup>18</sup> note the inadequacy of information feedback about significant environmental problems in modern societies, an inadequacy which characterizes feedback about social problems as well. Accounting for the system-wide implications of local actions should be a primary objective for sustainable agricultural systems. The tools to facilitate such an accounting can only be developed within a whole-systems perspective.

### Including Equity

The definition of sustainability offered here places a priority on broad-based equity considerations. We believe it is inadequate to exclude social justice as a priority and that there is an ethical requirement for greater equity in the agricultural system. Some have combined concern for how we treat the environment with how we treat our fellow human beings.<sup>19, 20, 21, 22</sup> For those focusing on the latter, it is essential to look beyond sustaining our environmental and economic ability to produce agricultural goods. It is equally important to ensure that those goods are produced and distributed in an equitable manner. A concern with this human values aspect of agriculture involves a sweeping rather than localized concept of who constitutes "us." Typically, resource conservation is discussed in terms of its implications for farmers' profitability or our descendants' food-producing capabili-

ties. The sustainability definition offered in this paper does not limit equity considerations to these groups. A concern with equitable social relations in agriculture requires defining "us" in terms of all fellow humans – not only farmers and future generations, but also farmworkers, consumers, nonfarm rural residents, Third World urban poor, and others. Sustainability in this sense is framed in terms of both intergenerational and intragenerational equity. Thus, issues such as farmworker rights and inner-city hunger are as central as issues of soil erosion and groundwater contamination to the goals of agricultural sustainability.

One of the most profound challenges facing agriculture is creating a decision-making process which will fairly resolve equity issues. Such a process must assess competing interests; evaluate agriculture's costs and benefits, and the recipients of each; decide fairly what the compromises must be; recognize and encourage shared goals and common ground. In most discussions of sustainability either environmental quality or social justice issues are emphasized, but neither can be supported wholly at the expense of the other. Nourishing humans, ensuring social justice, and providing a reasonable quality of life cannot be accomplished if agriculture's resource base and environmental constraints are neglected. Likewise, few would argue that environmental considerations should be pursued at the expense of satisfying basic human needs. An equitable agricultural system must foster a decision-making process which is truly democratic, one which identifies not only what the costs and benefits are but how to distribute them fairly among all sectors of society.

### *Institutional Change*

Many sustainability definitions, particularly those which guide applied sustainable agriculture programs, are based on the primacy of farm production and short-term profitability. As sustainable agriculture programs have increasingly been incorporated into long-established agricultural institutions they have manifested the largely unquestioned intellectual assumptions and infrastructural constraints which characterize their parent institutions. This is problematic because conventional agricultural institutions have fostered many technologies and policies counter to sustainable agriculture goals.<sup>23</sup> Such institutions have, for example, contributed to concentration within

agriculture; have not generally benefited agricultural labor; and have systematically failed to examine their impact on the environment, the structure of rural households and communities, and the consequences of rural resident displacement.<sup>24</sup> To situate new programs designed to address these problems within the framework which produced them is of questionable value unless steps are taken to change the nature of that framework, for it determines the way its researchers see the world, pose questions, and define problems.

When agriculture is viewed in a whole-systems context and sustainability is defined comprehensively, it is clear why the current popular focus on farm production practices is insufficient for achieving agricultural sustainability. Developing nonchemical pest management methods, for example, will effectively reduce pesticide use only if economic structures and policies encourage their adoption by farmers. More importantly, one cannot conclude that improved production practices will transform the agricultural system into one that meets all environmental, economic, and social sustainability goals. Social goals must be addressed explicitly. This is why production techniques such as organic farming, while a likely component of a sustainable food and agricultural system, cannot be thought of as synonymous with sustainable agriculture.

Given the conventional institutional context of most state and federal sustainable agriculture programs it is not surprising that they tend to focus research on conventional priorities such as production practices and efficiency and have not, for the most part, aggressively addressed social and economic issues. Sustainability priorities – and the definitions which embody them – must be expanded to encompass the many factors affecting production and distribution as well as the larger environmental, economic, and social systems within which agriculture functions. This has been the

focus of the Agroecology Program since its inception in 1982. Through conferences and publications\* we have worked to expand the discussion and practice of integrating these aspects of sustainability. Recently, the University of California Sustainable Agriculture Research and Education Program (UCSAREP) has broadened its agronomic focus to include social, economic, and policy issues. SAREP defines sustainable agriculture as integrating “...three main goals – environmental health, economic profitability, and social and economic equity.”<sup>25</sup> Their grant program, which encourages research and education on social, economic, and public policy issues affecting food and agriculture, could become a model for other sustainable agriculture programs such as LISA.

We believe that it is important to continue exploring the meaning of agricultural sustainability. Before an improved agricultural system can be developed the biases and structures that have led to agricultural problems must be closely examined and concrete goals articulated, based upon a broadened concept of agricultural sustainability. The concept of sustainability offered in this paper emphasizes that social goals are as important as environmental and economic goals, and widens the opportunity to move beyond the narrow agricultural priorities expressed in the past. It is based upon the whole-systems, interactive nature of all aspects of the agricultural system – that problems and their resolutions must be conceived not only in terms of their immediate time frames and local impacts, but just as importantly, in terms of their future time frames and their global impacts. It encourages emphasis on optimum production over maximum production, the long term along with the short term, the public's best interest over special interests, and the contextualization of disciplinary work within interdisciplinary frameworks. Our hope is that this definition helps advance the discussion on developing a food and agriculture system that is sustainable for everyone.

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\*For example, in 1990 we organized a working group session and conference, “Sustainable Agriculture: Balancing Social, Environmental, and Economic Concerns” and followed this up with an international symposium in 1991, “Varieties of Sustainability: Reflecting on Ethics, Environment, and Economic Equity.” Our issue paper series concentrates on the broad social aspects of developing sustainable food and agriculture systems, with titles such as *Sustainability in the Balance: Raising Fundamental Issues* and *What Do We Want to Sustain?: Developing a Comprehensive Vision of Sustainable Agriculture*. Our forthcoming edited volume, *Food for the Future: Conditions and Contradictions of Sustainability*, is an intensive treatment of the theoretical and practical issues involved.

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