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SUSTAINABILITY: THE PARADIGMATIC CHALLENGE TO AGRICULTURAL ECONOMICS

by

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ABSTRACT

The agricultural economics profession needs a broader and more robust philosophical basis to meet the challenge of sustainable development. First, sustainability can easily be understood as an issue of intergenerational equity, as a redistribution of rights or a transfer of assets to future generations which redefines the efficient allocation of resources. Economists have distorted the sustainability discourse with efficiency arguments which implicitly assume current generations hold all rights to resources. Second, economists have assumed that the patterns of thinking of ecology and the values they complement and economic thinking and the values it complements will merge into a coherent, logical argument. Different patterns of thinking really are different and inherently shed light on different aspects of the complex world in which we live. Conceptual monism within economics impedes the participatory resolutions between economic thinking and ecological and other ways of understanding that are sorely needed. Third, how development unfolded, including its presumed unsustainability, reflects how people understood the possibilities for economic development and acted upon their understandings. Economists need a supplementary model for the past and the future in which patterns of thinking themselves are endogenous. Thus the paradigmatic expansion I propose for the profession broadens neoclassical thinking to its own full conceptual base once again, is more receptive to other patterns of thinking, and furthermore strategically incorporates at least one additional pattern.

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INTRODUCTION

Western and westernized societies -- whether capitalist or socialist, democratic or authoritarian -- increasingly sanctioned technocrats during the 19th and early 20th centuries to combine shared values, beliefs, and knowledge and act on behalf of the public. This authorization of agricultural scientists, engineers, foresters, and planners was rooted in a common vision of progress and a common faith in how Western science and technology could accelerate development (Comte, 1948). During the 20th century the sanction was increasingly extended to economists (Pechman, 1989), and after World War II carried them, naively to be sure, to the head of the global pursuit for economic progress (Lasch, 1991; Nelson, 1991). How history unfolded was a product of a myriad of different factors in different places, but economists assumed the burden of trying to guide, explain, and rationalize development. In the process, economics acquired a conventional wisdom.

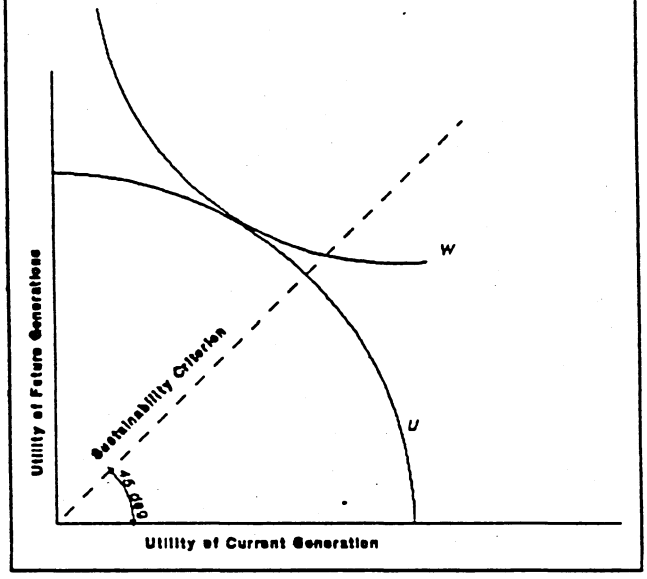
The international discourse on sustainable development challenges the shared assumptions, understandings, and rationalizations accumulated among economists during the second half of this century. Neither defensive arguments nor modest accommodations serve the profession well. The discourse is incorporating and going beyond the technological optimism and technocratic progressivism of economists and other key historic players while incorporating and transforming the environmental pessimism, preservationist inclinations, cultural survivalism, and participatory approaches of new players (Colby, 1990). To reestablish a constructive role in development discourse, economists will need to assume a philosophical base adequate to encompass the broad and changing patterns of thinking and new linkages to action. Consider the following complementary directions in which economics might move.

THE RIGHTS OF FUTURE GENERATIONS

First, the international discourse on the sustainability of development is primarily concerned with a) the rights of future generations to the services of natural and human-produced assets and b) whether existing formal and informal institutions which affect the transfer of assets to future generations are adequate to assure the quality of life in the long-run. This neoclassical framing contests implicit premises of economics as now practiced. A less than generous interpretation is that existing reasoning and practice tacitly assume that current generations hold all rights to assets and should efficiently exploit them. A more generous interpretation might be that existing reasoning and practice assume that the mechanisms affecting the maintenance and transfer of assets to future generations both are working optimally and are unaffected by current economic decisions. If this were the case, intergenerational equity need not be considered. This more generous interpretation, however, is not supported by current theoretical elaborations, conceptual discussions in the academic literature, or the reasoning employed in justifying practice. On the contrary, questions of intergenerational equity have frequently been obliquely pursued as problems of market failures. While environmental externalities are surely important, solving them could either improve or worsen distributional inequities.

A simple overlapping generations model demonstrates that efficient levels of consumption and investment and their associated prices, including the rate of interest, are a function of how income from rights to natural and other assets is distributed across generations (Howarth and Norgaard, 1990; Norgaard and Howarth, 1991). This "finding" is conceptually elementary yet at odds with existing theoretical elaborations and understandings of agricultural, development, environmental, forestry, and resource economics. The relation between the intertemporal allocative efficiency and the intergenerational distribution of resource and environmental rights is illustrated in Figure 1 (Bator, 1957). Every point on the utility frontier results from an efficient allocation of resources associated with different distributions of resource rights between generations. Where a society is located on utility frontier is determined by the initial distribution of rights to productive assets, including natural assets. While efficiency is important in that it puts society on the utility frontier, the sustainability of development depends on whether a society is above the 45° line. Even inefficient solutions can be sustainable. In the absence of a social welfare function to determine the optimum point, the tenor of the development discourse indicates that sustainability is a minimum criterion on which there is broad consensus.

Figure 3.1



Since Harold Hotelling's formulation of 1931, economists have pondered how stock, exhaustible, or depletable, resources should be used over time. With the energy crisis of 1973/4, economists renewed their attention to the intertemporal allocation of exhaustible resources. Students of resource economics are now well aware of the "Hotelling Rule" that the rent from a stock resource being exploited "optimally" increases at the rate of interest. While the literature repeatedly refers to optimal paths of extraction, the paths explored to date have been merely the efficient path associated with the existing intergenerational distribution of rights to resources. If rights are redistributed across generations, the efficient path changes (Howarth and Norgaard, 1990). Similarly, the literature in environmental economics identifies the conditions under which it is "socially" efficient to exploit a species to extinction. If, however, society *a priori* decides that future generations have a right to roughly the current diversity of species, the efficient allocation would only rarely lead to extinction.

Methods for valuing non-market environmental services are quite well developed and, when applied, frequently show that non-market goods and services have considerable value. Including non-market environmental values in benefit-cost analyses can shift the efficient

path of resource use towards the future. But as a general means for assuring resources for future generations, expanding economic analysis to incorporate how this generation values non-market goods and services will not necessarily result in their being saved for future generations. Ultimately, we are concerned with maintaining natural assets for future generations because we sense that they will need these assets, not because we somehow value them. The rights of future generations can be thought of as politically determined constraints to economic optimization and as such should not be economically valued.

No doubt there exists an economist who has never experienced the slightest moral qualm over discounting the benefits to be received and the costs to be borne by future generations. The academic literature and discussions within development agencies, however, reflect considerable unease (Markandya and Pearce, 1988). With lower discount rates, it appears more investments in renewable resources and a larger stock of renewables would be justified. Similarly, it appears on preliminary analysis that lower rates of discount favor using stock resources more slowly. Thus many see a strong link between the rate of discount, the conservation of resources, and hence the sustainability of development. But by reframing questions of the future in terms of the intergenerational distribution of rights to natural and other assets, the case for using lower discount rates to protect future generations becomes moot. When the rights to assets are redistributed between generations, the investment opportunities for and savings of current generations, and hence the interest rate, change accordingly. The interest rate may increase or decrease, but this is unimportant for it is simply an equilibrating price. What is important is the particular ways consumption, savings, and investment change in order to assure real assets back the rights of future generations.

Several conclusions from this reframing are important. First, with redistribution there is a change in the types of investments that the current generation undertakes to meet its own commodity time preference. For these investments, the values placed on future consumption are appropriately discounted. Second, in order to meet the rights of coming generations to real assets, the current generation might invest. The returns over time from such investments facilitate attaining the objective of transferring assets to match the rights of future generations. The fact that investments can yield a return is important and helps determine the most cost-effective way of meeting the objective. But the benefits that accrue to future generations from investments undertaken to assure their rights cannot be measured by current preferences nor should they be discounted. For exactly the same reasons, when a development decision imposes on the rights of future generations, the costs of assuring those rights by other means must be deducted from the benefits of the project (Mikesell, 1991). The optimal portfolio of investments (and disinvestments) to meet the rights of future generations is determined according to the cost-effectiveness of alternative combinations of ways of sustaining their rights over time. This framing resolves some of the key, long-standing ethical dilemmas of usury (Norgaard and Howarth, 1991).

Efficiency with "trickle ahead" is no more suitable as an operating norm for development thinking than is efficiency with "trickle down". Incorporating questions of intergenera-

tional equity into the neoclassical framework opens economics up to the future and resolves many of the conflicts between earlier economic reasoning and environmental reasoning.

This opening, however, also reorients economics and politics. Historically economists have assumed the mandate of informing the political process as to which choices are efficient and of helping implement legislation efficiently. This perspective portrays politics as a black box that cannot choose without the help of economists and cannot implement without the help of economists while never indicating what politics does do. Several economists are arguing that questions of sustainability lie beyond economics. Pearce (Markandya and Pearce, 1988; Pearce and Turner, 1990) and Daly (Daly and Cobb, 1989) argue that environmental constraints on economic optimization are necessary to achieve sustainability. Such formulations, however, beg the question of how the constraints are determined and chosen. I argue that economists need to explicitly recognize that sustainability is an equity question being debated in various moral discourses utilizing ecological reasoning and that sustainability will be chosen through politics. Economists in this framing can inform the political process of the impacts of different equity decisions and the most cost effective ways of reaching them. Economics can interact with moral discourse, environmental lines of reasoning, and the political process but cannot "rationalize" them. This brings us to the second point.

CONCEPTUAL PLURALISM

Second, the methodological premises on which economists base their role in society have become dysfunctional. Economics needs methodological foundations which complement how science works in society. History has not unfolded in accordance with Auguste Comte's positivistic, deterministic, methodological vision -- the Newtonian view that underlay technocratic progressivism. The methodological questions raised and answers suggested by Karl Popper in the 1920s are awash in a sea of other issues which philosophers no longer pretend they can part and walk through to the safety of a promised land (Rorty, 1979).

Two things have changed. First, we now know that different patterns of thinking are inherently different. Neoclassical market economics is an atomistic-mechanistic model which views systems as consisting of parts and relations between the parts which do not change. Evolutionary thinking looks at systems as undergoing changes in their parts and relations. One cannot have it both ways. More importantly, economic thinking inherently gives value to *things*, the more the better, while evolutionary thinking inherently values the *diversity* that sustains change. The discord between the two secular religions -- environmentalism and economism -- are rooted in just such irreconcilable differences.

Environmental systems can be thought of as consisting of biological systems of interacting living organisms and physical systems made up of hydrological cycles, climate systems, etc. The two broad types of systems, of course, also interact. Biological environmental scientists have multiple ways of simplifying the complexity of living systems into formal, tractable models -- population dynamics, energetics, food webs, biogeochemical cycles, spe-

cies coevolution, communities, hierarchy theory, succession, light patch dynamics, and many others. Similarly, physical environmental scientists have alternative ways of looking at different types of interrelated phenomena. While individual natural scientists specialize in one or two approaches for their own research and no doubt wish that other patterns of thinking would merge with their own, they are conceptual pluralists in practice, eclectically drawing on a variety of patterns of thinking to understand natural phenomena. Natural scientists, however, still suffer from conceptual monism themselves because of past philosophical traditions (Norgaard, 1989).

The understanding of complex environmental problems on which social decisions are based requires some sort of a resolution of these logically conflicting ways of understanding the parts. The resolution can be thought of as taking place through a social process of discourses within academe, between scientists in academe, public agencies, and non-governmental organizations, and among scientists and the public at large. In many cases, little consensus is reached on the key characteristics of the system that has gone astray. Rather, agreement is frequently reached on the existence and general nature of problems and on the boundaries of solution sets. Economists could contribute much more effectively to the social process of reaching environmental understanding if they were not conceptual monists, if they knew that the environmental scientists who reach conclusions contrary to economic reasoning were probably arguing logically along a pattern of thinking that does not merge with economic reasoning.

More broadly, if economists hold to the methodological belief that knowledge is accumulating to one congruent understanding, economists will continue to miss the insights provided by incongruent ways of knowing. Multiple insights guard against mistaken action based on one perspective on the complexities of the world around us. This does not mean "anything goes". We must still insist that arguments be logical; we simply cannot insist that different logical arguments merge within the guise of a higher, more inclusive logic. The collective understanding necessary for collective action is reached through discourse, finding common ground, agreeing on critical issues, and compromise. It is a social process thoroughly intertwined with what Western culture has thought could be understood separately as politics. Economists would be more effective participants in the social process of understanding and formulating solutions if they received specific training in alternative patterns of thinking, in how they are used in the other sciences, and in how they inherently favor different values. If economists hold to the belief that knowledge consists of universal laws with universal applicability and the public keeps economists in positions of authority, we will apply use our knowledge accordingly and destroy the diversity in the cultural and ecological systems we are trying to sustain (Norgaard, 1990).

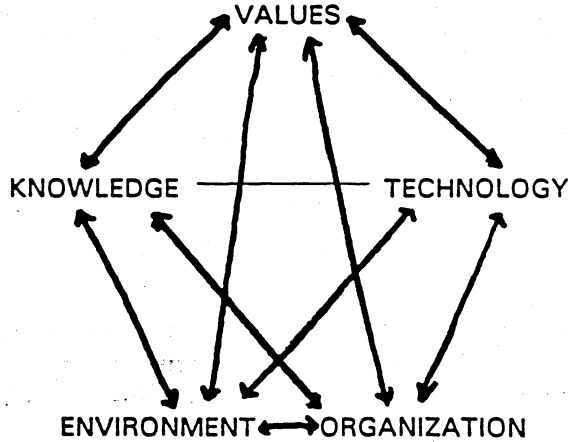
DEVELOPMENT AS SOCIAL SYSTEM AND ECOLOGICAL SYSTEM COEVOLUTION

Third, economists need a distinct alternative theoretical framework to acquire insights from which the neoclassical paradigm blinds us. With such a model economists could delib-

erately maintain conceptual pluralism within the discipline. It would be advantageous if patterns of thinking are endogenous to the model. If both the way we think and our ability to transform our environment unsustainably makes us unique among species, perhaps there is a correlation.

Consider thinking of development as a process of coevolution between knowledge, values, organization, technology, and the environment. Each subsystem is related to each of the others yet each is also changing and effecting change in others. Deliberate innovations, chance discoveries, and random changes occur in each subsystem which affect the distribution and qualities of components in each of the other subsystems. Whether new components prove fit depends on the characteristics of each of the subsystems at the time. With each subsystem putting selective pressure on each of the others, they coevolve in a manner whereby each reflects the other. Thus everything is coupled, yet everything is changing (Norgaard, 1988).

Though neoclassical models do not link technology to social organization, development economists are well aware of the connections from their own field experiences and those of others. A coevolutionary framework explains this linkage directly. A coevolutionary framework also helps emphasize that knowledge systems evolve with organizational systems, that much of what we know and even how we collectively know are a function, for example, of how we organize society into numerous fiefdoms of resource management agencies. It suggests that the evolution of economic systems has been affected by how we have thought about economic systems. A coevolutionary framework stresses that environmental systems have evolved along with people, including with how people know, what they value, how they are organized, and the tools they have available to them.



The coevolutionary framework provides its own insights into the nature of sustainability. While most societies coevolved with their ecosystems, modern societies are coevolving around the combustion of fossil hydrocarbons. This has driven a wedge between the coevolution of social and ecological systems (Norgaard, 1984). With modernization, capturing the energy of the sun through ecosystem management became increasingly unimportant as new technologies became ever more effective at tapping into the energy of coal and petroleum and using it in ever more novel ways. Social systems coevolved around the expanding means of exploiting hydrocarbons and only later adopted institutions to correct the damage this coevolution entailed for ecosystems. Hydrocarbons freed societies from immediate environmental constraints but not from the ultimate constraints of the atmosphere and oceans to absorb greenhouse gases or to the biosphere to withstand toxics. But having coevolved to a dead end, we are stuck with ways of knowing, organizing, valuing and doing things, with tightly intertwined roots of unsustainability. It is this dilemma which drives us to look to traditional peoples for "new" insights.

The coevolutionary framework contrasts sharply with the positivist, atomistic-mechanistic frame of neoclassical economics. A coevolutionary view assumes the nature of the parts in systems and relations between them change over time whereas atomistic-mechanistic models assume that parts and relations stay the same though their number and relative strengths can vary. In the coevolutionary view, how we know affects the types of social organization, technology, and values which prove fit. Everything is explained by everything else since each affected the evolution of the other. At the same time, in a coevolutionary model change is typically taking place. The coevolutionary model is useless for the sorts of predictions which Newtonian thinking does so precisely, but it helps explain why mechanistic predictions do not come true. Indeed, it helps explain why what seemed to have been key variables around which predictions were thought to be needed frequently turn out to be irrelevant. And yet the coevolutionary view does have design value. It highlights how the evolutionary process will have more potential and likely continue long into the future the greater the diversity. Whereas the neoclassical framework almost inherently assumes substitutability and favors efficiency, the coevolutionary framework assumes interconnectedness and inherently favors diversity. The neoclassical and coevolutionary frameworks highlight each other's nature, strengths, weaknesses, and appropriateness of use.

Conclusions

Railroad engineers plotted the paths of progress in North America during much of the 19th century while their European counterparts connected the frontiers of Africa, Asia and Latin America to the industrial world. Their field knowledge and vision of the future made them the experts who testified in legislatures and schemed in bureaucratic agencies. Their base of understanding, however, did not evolve as the future they envisioned and helped implement unfolded in unexpected ways. The future continues to unfold in ever more surprising ways. The international discourse on sustainable development challenges agricultural economists to adopt a broader, more robust, paradigmatic base. In this paper I have argued

for recasting how economics relates to the moral discourse on and politics of intergenerational equity, adopting conceptual pluralism, and acquiring some facility with alternative patterns of thinking. This would allow the profession to adapt to the surprises it helped create and prevent it from joining the railroad engineers.

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