Prepared for presentation at the 3rd Common Property Conference of the International Association for the Study of Common Property, Session on Economic Perspectives on Income Inequality, Resource Degradation, & Common Property, Washington, D. C. September 17-20, 1992. Incomplete Draft (September 17, 1992). Do not Quote or Cite, Comments Desperately Needed.

INSTITUTIONS FOR ASSURING OUR COMMON FUTURE

by

Richard B. Norgaard
Energy and Resources Program, Room 100, Bldg. T-4
University of California at Berkeley 94720

There has been a rich interplay between economic theory and the interpretation of institutions to manage resources held in common. Economic models readily show how, in the absence of common property institutions, the individualist behavior associated with private property and markets leads to the inefficient use of resources held in common. Anthropologists, political scientists, and sociologists are well aware that market failure, or Garrett Hardin's "Tragedy of the Commons", does not occur to the extent social norms for the use of the commons guide individual behavior. The very existence of institutions for managing the commons is also readily explained by economic reasoning. If resources are being used inefficiently due to inadequate institutions, all can be made better off by adopting better institutions. Similarly, the empirical work addressing common property has expanded the range of understanding in economics of the diverse and innovative ways societies organize to manage commons.

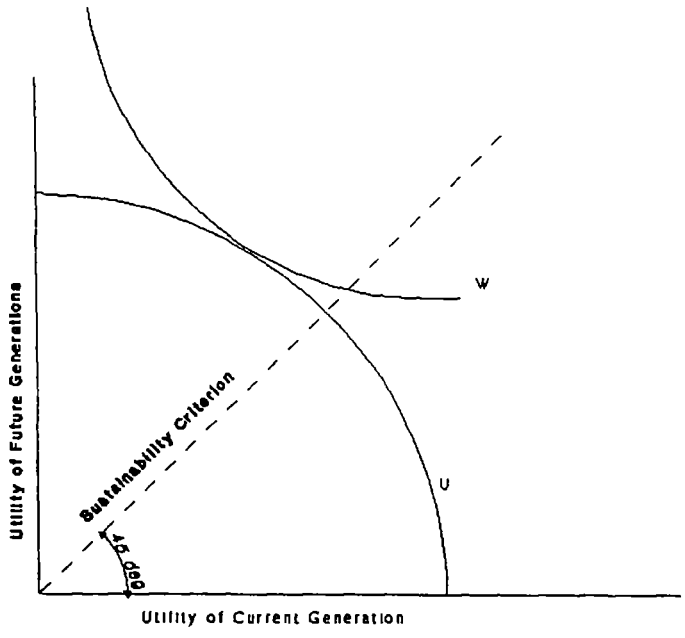
The richness of the feedbacks between economic theory and the interpretation of commons institutions by other social scientists has been seriously limited, however, because economists have misframed the future. Economic theory admits many possible efficient allocations of resources depending upon how property rights are assigned. In practice, however, even economic theorists have derived simply one efficient allocation, the one associated with the current distribution of property rights. With respect to the use of resources over time, economists have implicitly assumed that the current generation never reconsiders the rights of future generations to resources. The term "rights" itself, of course, is burdened with cultural and operational significance. Thus, in more general terms, the issue is that economists have not elaborated their

theory with respect to changes in rights, social obligations, or other manifestations of caring for others. Anthropologists and sociologists, meanwhile, have observed behavior among and recounted explanations given by traditional and modern peoples which clearly imply current generations have obligations to and other means of caring for future generations. Political scientists studying modern environmental politics observe the same phenomena. Commons institutions exist and are modified both to manage resources efficiently for the current generation and to fulfill obligations to future generations. And yet economic theory as commonly elaborated and practiced has only addressed the former. This paper will stress economic efficiency, intergenerational equity, and institutions for managing common interests over generations, but the theoretical and institutional implications for intergroup equity or any other social objective are analogous. In this sense, this essay parallels and complements much of the thinking of Daniel Bromley (1989, 1990).

EXPANDING THE ECONOMIC FRAMING OF THE FUTURE

The relation between allocative efficiency and the intergenerational distribution of resource and environmental rights is illustrated in Figure 1 (see Bator, 1957). The utility or welfare possibility frontier **U** indicates the highest utility possible for people in each future generation given the utility of people in the current generation and vice versa. Each point on this frontier results from an efficient allocation of resources between uses associated with different distributions of resource rights between generations. Clearly, there are many possible efficient allocations. If a society is so fortunate to have an efficient economy, the position where it is located on **U** is determined by the initial distribution of rights to productive assets, including natural assets. While each point on **U** is efficient, the socially optimal point occurs at the tangency with the social welfare function **W**, the highest level of welfare that can be reached given the utility possibility frontier. Figure 1 presents the issues in as simple a form as possible. The relationships between the distribution of rights or obligations have been more fully elaborated with simulation models of overlapping generations (Howarth, 1990; Howarth and Norgaard, 1990; Norgaard, 1992; and Norgaard and Howarth, 1991). While these mathematical models are also gross simplifications, they very nicely illustrate that sustainability is a matter of equity not efficiency. All of the inefficient points above the 45° line are still sustainable.

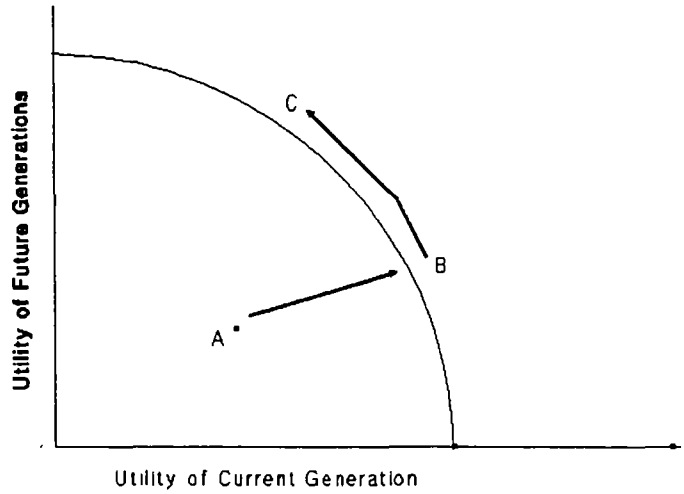
Figure 1. A utility possibility frontier between generations with a social welfare function and a sustainability criterion.



The environmental, resource, and development economic literature to date, even the most recent literature on sustainability, draws on models and reasoning that are inappropriate for addressing intergenerational equity. The emphasis of this literature is on institutions for internalizing externalities, institutions which move the economy from a position such as that at Point A in Figure 2 and move it toward and maintain it in a position such as Point B. Institutions to improve efficiency move the economy toward **U**, the utility possibility frontier. However, a society which accepts the obligation of sustaining itself over generations must operate above the 45° line in Figure 1. To assure sustainability, each generation must transfer sufficient assets to the next generation so that the next generation is as well off as it is. Assuring intergenerational equity requires institutions which move the economy from a position such as Point B in Figure 2 and maintain it in a position such as Point C. Institutions which affect intergenerational equity move the economy roughly in parallel with **U**. By ignoring intergenerational transfers, the existing arguments of natural resource and environmental economists are implicitly assuming that the existing institutions for distributing rights between generations are not being questioned and do not need to be explained.

Resource economists have developed an extensive literature on the "optimal" exploitation of stock resources over time (Devarajan and Fisher, 1981) based on the model of Harold Hotelling (1931). The foregoing model shows that what economists have called "optimal" is simply the efficient solution based on the current distribution of rights between generations or obligations by one generation for the next (Howarth and Norgaard, 1990). The efficient use of

Figure 2. Efficiency institutions move the economy toward the frontier, as from Points A to B. Transfer institutions move the economy parallel to the frontier, as from Points B to C.



resources over time is different at Point B and at Point C. Environmental economists have similarly developed an extensive literature on the valuation of non-market environmental services (Recent Summary Article?). The values derived in this literature also assume the current distribution of rights between generations or obligations by one generation for the next. Environmental valuation as now practiced implicitly assumes that society is not considering whether it prefers to be at a position such as Point B or than Point C. Wholly new values for environmental services result at each point on the utility possibility frontier (Norgaard, 1992; Howarth and Norgaard, 1992).

Economists have long recognized the apparent perversity of discounting the benefits received and costs borne in the future (Ramsey, 1928; Markandya and Pearce, 1988) and derived numerous arguments for using lower discount rates in order to protect future generations. Discounting is used in efficiency decisions. While the impacts on future generations of resource use, valuation, and discounting have been addressed, each of these literatures have been developed around partial equilibrium models in which the distribution of rights between generations is taken as given. A decision to move from a position such as Point B to one such as Point C is an equity decision. Our models show that by choosing to move from Point B to Point C, the discount rate for efficiency calculations becomes lower (Howarth and Norgaard, 1990 and 1992). The existing literature on resource and environmental economics, in short, has been about making markets work better, moving economies to the efficiency frontier, not about for whom should markets work. Elaborating the neoclassical model with respect to intergenerational equity reframes the classic issues in resource and environmental economics -- the use of re-

sources over time, the valuation of non-market environmental services, and discounting the future. This expansion of the economic framing of the future affects the methodologies developed in these subdisciplines (Norgaard, 1992).

This expansion of the economic framing of the future also affects how the profession should interact with politics (Norgaard and Howarth, 1993). When economists came to power in national governments and international agencies after World War II (Pechman, 1989), they assumed the burden of informing the political process of which projects were efficient and assumed the task of efficiently carrying out the intentions of legislative bodies (Nelson, 1987). To function as econocrats, they needed single answers, the efficient solution indicated by the current distribution of rights, not the array of efficient solutions generated by all possible distributions of rights. In the expanded framing, economists need to interact with politics, indicating political options on efficiency frontiers rather than the point represented by the current distribution, and letting legislative bodies pick where on the frontier society would prefer to be. Legislative bodies, in effect, serve the role of the social welfare function in Figure 1.

This reframing shows that economic reasoning must always work hand in hand with equity reasoning. And equity reasoning is embedded in politics and culture. The narrow efficiency framing has been promoted as a means of providing objective advice to politics. The broader framing shows that the narrow framing has simply promoted existing power relations. The narrow framing has also been used to provide objective, a-cultural, explanations of institutions. In the narrow framing, institutions which survive must promote efficiency, but efficiency for whom or with respect to what objectives are not specified. The broader framing puts economics back within the interplay of cultural processes through which rights, obligations, relations, and social objectives are constantly reforming.

The issue for this paper is how this expansion of the economic framing of the future affects our interpretation of institutions to manage common property and how the transformation of these institutions may have affected sustainability. Economic theory heretofore has emphasized efficiency and consequently enriched our interpretation of institutions which move societies toward the utility or efficiency frontier. At the same time, institutions, perhaps the same, perhaps complementary, have moved societies along or maintained them at specific points on

this frontier. Our interpretations of commons institutions and our understanding of the history of their transformation should build from this broader foundation.

SEVEN GENERATIONS

The Iroquois Indians are said to have been conscious of seven generations into the future as they made environmental and other decisions. Such a consciousness and whatever institutions maintained and implemented it are so different from modern consciousness and institutions that the very term "seven generations" has come to symbolize for me and a great many others a key aspect of the unsustainability, both environmentally and culturally, of modern life. The Cayapo of Amazonia manage forest land and species over much longer time periods than westernized colonists, the people of East Kalimantan plant durian trees on abandoning land in the swidden cycle and maintain community rights to those trees even after other communities have begun to use the land, and systems of tree rights generally among non-westernized peoples offer a rich source for the study of how common property is managed over time. Protecting the well-being of future generations must be a common responsibility. One's great-great-grandchildren have seven sets of other great-great-grandparents in approximately one's own generation besides oneself and one's spouse. One never knows, however, who those other fourteen people are likely to be (Marglin, 1963; Daly and Cobb, 1989). Furthermore, even if one could enter into an agreement with the other great-great-grandparents, there are numerous relatives in between who must carry out the agreement. Thus it is very difficult to assure the well-being of one's offspring unless the entire community is playing by a set of rules to achieve the desired outcome. Patrilineal, matrilineal, and other rules of inheritance, dowry practices, responsibilities to train youth, and diverse other practices and obligations affect the transfer of assets. The concerns, consciousness, and institutions which have supported the maintenance of resources and their transfer to the next generation maintain a society at a point such as Point C in Figure 2 rather than, for example, at Point B. While field social scientists have long documented the intricacies of such resource management institutions, explicitly acknowledging how they transfer resource rights over generations, the economic theory by which they have tried to explain institutions has emphasized efficiency independently of the transfer and other objectives for which institutions evolved.

One can well imagine a variety of circumstances in which institutions to achieve the common objective of sustainability might emerge in a society. First, societies which faced few long-term resource constraints did not need to be concerned with future generations, or at least each generation did not have to worry about transferring sufficient natural assets to the next generation. With low population levels and abundant resources such as, for example, buffalo which roamed vast areas, the need to assure buffalo for future generations may have been quite low. Buffalo, of course, were notoriously difficult to manage in any case. Even so, the Plains Indians may well have seen themselves in a reciprocal relation with buffalo which moderated their exploitation in spite of relative abundance. Other resources may have been constraints, such as flint for arrowheads and cutting implements. The point here is that for an economic explanation of institutions to assure the management and transfer of natural assets to subsequent generations, the asset must in some sense be scarce and manageable.

Where natural assets are scarce, institutional mechanisms are needed for determining the extent to which the asset is consumed and the extent to which it is conserved and managed so that it is available for the future. Again, the presumption of economic theory as it has been elaborated to date is that either no such institution is needed or that the institutions which exist distribute rights in the best possible way. Figures 1 and 2, however, illustrate that efficiency does not assure sustainability. A society might efficiently consume everything in the current generation or efficiently consume and transfer assets to the next generation. Either the current individuals' decisions have to be constrained by the rights of future generations, by an objective of transferring natural assets to future generations, or by some other form of caring for the future, or the society will operate below the sustainability threshold. Economists may again argue that it is because individuals care about the well-being of their children that in their personal decision-making they conserve for the future. And to some extent they will. But by economists' own reasoning, it would be irrational to save for one's great-great-grandchildren since their well-being depends on the decisions of 7 other sets of unidentifiable great-great-grandparents and numerous relatives in between. Thus one can argue that societies would rationally collectively devise appropriate intergenerational commons institutions or that societies which did not devise or happen upon them have long since disappeared.

Institutions which affect the transfer of assets to future generations likely consist of a

plethora of interactive forms working in conjunction with additional institutions to achieve other objectives. While some of the functions which transfer institutions must fulfill can be outlined, I cannot identify and give examples of the many forms they might take. I can counter, however, the existing tendency to explain the initiation and maintenance of institutions simply on the grounds that they make societies more efficient. Efficiency can only be measured with respect to how well different goals are being met. Institutions for assuring the goal of sustainability in particular must arise out of concerns with equity, a willingness to reduce one's own well-being in conjunction with people in similar circumstances in order to improve the well-being of others. At the same time, some institutions will accomplish distributional objectives better than other institutions. The forms of institutions affect how close a society is to its efficiency frontier. And one would expect that institutions that move societies toward the frontier, given the mix of goals being met, would be preferred. Conversely, however, a society may prefer less efficient forms of institutions if they move the economy closer to a preferred mix of objectives.

TASKS OF ASSET TRANSFER INSTITUTIONS

Economists think of development as a process of accumulating productive capacity, and for this reason, the tasks of capital markets are well recognized in the process of development. Capital markets connect lenders and borrowers, provide price signals to equilibrate their changing opportunities and perceptions, and facilitate risk spreading by allowing lenders to participate in multiple projects. The tasks of asset transfer institutions deserve similar elaboration.

In the best tradition of economics (McCloskey, 1985), let me introduce the tasks through a simple parable. Imagine a society of near subsistence farmers with rights to land. Parents can improve the quality of the land they transfer to their children by planting trees. Some of the returns from investing in trees are enjoyed by the parents, others go to their children. Whether consumption is foregone and investments are made to increase the parents' welfare or to meet the parents' objective with respect to a transfer to their children would be difficult to distinguish. Wealth, of course, does not simply accumulate continuously. Some parents choose to cut trees and transfer less to their children than they had themselves received from their own parents. Natural disasters and war set the process back periodically. And the total amount that

can be accumulated at any given time is limited by the cultural knowledge, technologies, and nature of cooperation in the society.

An additional element needs to be introduced into the parable. Parents might save in order to invest in more saws or perhaps a bigger saw with which they could more easily harvest their trees. Note that saws as capital are rather different than trees. Saws provide a return by reducing natural tree capital. The parents might choose to reduce their consumption in early time periods to invest in saws in order to have more consumption in later time periods, but they would be less likely to invest in more saw-capital if they were interested in accumulating assets to transfer to their children and their children's children. Most importantly, parents know whether they are investing in trees or in saws and can readily monitor the effects of their choices on their cumulative assets.

The features which institutions must have to assure that sufficient assets are transferred to the next generation to assure sustainability will fall into the categories of information, contractual, and enforcement. First, the task of maintaining and adjusting a social contract will be easier if the people are already organized as a community in order to meet various other objectives as well. This is not simply a minor assumption to initiate the analysis. The loss of community has been a primary feature of modernity and quite likely a part of the explanation for the emergence of unsustainability. Next, the community as a whole needs to assure the transfer of sufficient assets. It is not necessary for each individual farm family to transfer sufficient assets so long as the community does. It seems very likely, however, that the difficulties of collecting information on the total amount transferred and the difficulties of arriving at and maintaining a contract would be greatly reduced if the burden is predominantly borne by individuals through rules of individual responsibility. This conclusion, of course, follows to a considerable extent from the presumption of property rights with which the parable started. With less or no private ownership, individual responsibility would probably be relied on less. In any case, the second task of institutions to assure sustainability is the collection and processing of information about the stock of assets being maintained for transfer.

Note that the existence of two types of assets, both trees and saws, considerably complicates the problem of collecting and processing information. The next generation will not be very well off if it receives all trees and no saws and will be in dire straights indeed if it receives

all saws and no trees. Assets need to be transferred in the right proportions. In a small, relatively self-sufficient community, changes in trees and saws can be readily observed. In a complex, interconnected global economy such as we have today, such information on the mix of assets, let alone the complementarity of the mix, is much harder to obtain.

The third task is enforcement. Again, in a relatively small, self-sufficient community, enforcement can occur through direct observation and social pressure. In a complex, global society, especially one with great inequalities, enforcement becomes more difficult.

MARKETS, FOSSIL-FUEL TECHNOLOGIES, AND SUSTAINABILITY

Western style development -- whether capitalist, socialist, or mixed -- distances actors from their actions, and in particular distances savers from their investments, through complex, roundabout chains of markets and/or planning and control systems (Giddens, 1990). To continue the parable, imagine that our once nearly isolated, nearly self-sufficient community is connected to a larger community by the construction of roads and the expansion of markets. This opens up a whole host of new opportunities. People in the community, for example, might specialize by selling their trees and investing in the production of saws. Such decisions will be made in the context of factor, commodity, and financial market signals. Social scientists are formally documenting how colonization followed by efforts at Western style development broke down the traditional mechanisms of managing resources and hastened that the new institutions which replaced the earlier ones hastened the rates of exploitation, assuring that there would be less to transfer. Colonial and later national governments assumed central control over forest resources in particular, both opening them up to commercial exploitation for national and international markets and closing them down to use by local peoples. The introduction of market incentives into village life shifted the incentive from savings in the form of land maintenance and improvement to savings in the form of monetary assets and educating one's children (Shiva, 1988; Worster, 1988; Guha, 1990).

The fact that couples share their great-great-grandchildren with seven other unidentifiable couples makes commons institutions necessary. The geographical scale and extent of resource and technological complexities also affect the success of institutions. These dimensions can best be explored by considering why the global market institutions by which resource use is now

governed have not been effective for assuring the transfer of assets to future generations. In modern societies, transfers of real assets in terms of land, housing, and factories still constitute a significant portion of the total, but individuals are increasingly trying to meet their transfer objectives through financial claims to assets or through the state. Can financial markets and state-managed transfer mechanisms in modern societies serve the dual role of allocating savings to enhance the utility of current generations given their consumption time preferences and of allocating their savings to meet their transfer objectives as well? Parents investing in financial markets basically only see interest rates, not whether real assets actually still exist to transfer to their children. One might argue that the value of a corporation's stock would decline as it cuts its trees, but corporations can and do move on to other forests to deplete. No one sees the global picture like the stylized farmers in the parable. The problem is not simply that we cannot count the trees, but that we cannot assess the importance of biological diversity, cannot foresee new technologies which might provide access to new resources, and have less influence on the tastes of the next generation then ever before. The discourse on sustainability is about the global picture in all of its dimensions. Even if all parents individually realize they are investing in saws which are deforesting on net, they may continue to do so if they have no alternative but to hope that the returns from their investment can be reinvested again to the benefit of their children even if they can see that all in the further future are losing on net.

Economists frequently argue that as particular resources become relatively scarce, their prices will rise, signalling consumers to use less and informing investors to invest in their regeneration or the production of substitutes. There is no doubt that markets provide very rapid, strong signals. The question is whether they are correct in the sense that they will lead society to its objectives. In the case of natural resources, whether or not markets function efficiently depends on resource allocators having a global overview of resource availability, technology, and future demand. But as noted in the first section, the efficient price paths explored theoretically in the literature to date assumes the current distribution of rights between generations. Whether prices signal scarcity correctly, in short, depends on whether distributive institutions are in place and functioning according to society's distributive desires. How investors might foresee future demand given that they are both investing to meet their own commodity time preference and investing to transfer to future generations, thereby changing future demand, pre-

sents an interesting dilemma. Obviously for these reasons, as well as those identified earlier (Norgaard, 1990), one cannot determine whether resources are becoming more scarce simply by looking at prices.

Nevertheless, one might still argue that those who are especially concerned about the welfare of their children can invest directly in and hold natural resources themselves. Those who are more worried can take care of their own children, and if their worries are justified, their children will be wealthy indeed. Private markets will still work so long as some people are concerned, and these people will demonstrate how others should best behave. In response to this position, however, it is clear that individuals cannot directly own the diverse different types of resources from around the world on which modern life depends, to say nothing of also having sufficient control of the technologies and organizations necessary to combine them into products. While we think of capitalism as a system which promotes individualism, in fact markets and planning agencies mask our fates and those of our children in highly interconnected, complex webs over which we have no control. This interconnectedness is compounded by the transition from renewable energy sources to fossil fuels and to an array of technologies driven by fossil fuels which both support and are supported by highly interconnected factor and product markets. The use of fossil fuels, furthermore, is closely associated with the environmental interconnectedness of human activities, from the local to the global, and the difficulties of managing these interconnections. All of this speaks to the need for collective institutions, from the local to the global, to monitor and maintain the stock of natural and complementary assets.

There is nothing in the nature of market economies *per se* which guarantees that investors seeking to accumulate assets will not deplete the natural capital they would choose to transfer to their children if they could monitor and guide the global situation. This argument addresses the same issues as those who are concerned that natural assets and their depletion do not appear in the system of national accounts (Ahmad, El Serafy, and Lutz, 1989). Their concern is that planners and/or the electorate who guide the economy ought to know through the accounting system how development decisions made in the recent past actually affect options for the future. If they do not, then the current generation could be living well at the expense of future generations about whose welfare they are really concerned. The two arguments can be thought of as market and planning "duals" of each other. In unguided economies, failure to

meet distributive objectives could stem from specialization and trade combined with the difficulty of achieving two objectives, meeting one's own commodity time preferences and meeting one's intergenerational distributive objectives through a single institution, the market, with basically a single signal. Similarly, in guided economies, planners can just as likely overinvest in "saws" and underinvest in "trees" if they only look at returns on investments and fail to monitor the mix of the stock of assets.

DISTRIBUTIVE FAILURE AND THE EMERGENCE OF UNSUSTAINABILITY

The expansion of markets through specialization and exchange can lead to efficiency gains, the much heralded gains from trade. At the same time, however, expanding the scope of the market can also introduce new and greater market failures by further distancing people from the consequences of their actions, increasing the information, contractual, and enforcement costs of institutions to internalize the externalities of markets with greater scope (Norgaard, forthcoming). The current negotiations to "free" trade in North America and around the globe have been prolonged by the difficulties of making new international agreements to cover the expanded context of environmental problems. And to the extent that externality resolving institutions have not expanded in scope and adjusted as fast as trading patterns, resources and environmental services have been used inefficiently.

Distributive failure occurs to the extent that societies are not initiating and maintaining institutions to effectively achieve their distributive objectives as well as they could. When markets expand in scope, distributive institutions must also expand in scope to be similarly effective. And while it is easy to imagine how traditional, relatively self-sufficient communities evolved distributive institutions to assure sustainability, in modern increasingly interconnected societies, the need for such institutions has barely been acknowledged. Yosemite and Yellowstone were protected because no one thought progress would replace them, but beyond aesthetic treasures, natural assets have been presumed to be replaceable. Hence, as markets expanded in scope and community distributive institutions became obsolete, current well-being quite likely increased in part through the reduction in future well-being. In the context of Figure 2, such a transition can be described as a movement from a position such as Point C toward a position such as Point B. The increased well-being of current generations may very well be coming at

the expense of future generations through the erosion without replacement of institutions to protect future generations occurring through the expansion of trade and the increasing complexity of our interconnectedness.

CONCLUSIONS

This essay redirects and expands the feedbacks between economic theory and the study of institutions to reach common interests. Sustainability is a matter of achieving intergenerational equity through transfers to future generations. Sustainability is not a matter of achieving efficiency given the existing intergenerational distribution of assets as assumed by economic theorists to date. Intergenerational equity, furthermore, is a common good requiring commons institutions for its achievement. Thus, first and most obviously, to attain sustainability, institutions to facilitate intergenerational transfers of assets need to be in place. Second, markets themselves are insufficient institutions for this purpose. Third, to maintain the conditions for sustainability, institutions to facilitate intergenerational equity must adopt to increases in the scope of markets. There is considerable evidence that local institutions were destroyed while global institutions have yet to be put in place. This means that the increases in the well-being of current and earlier generations may have come in part through the erosion of commons institutions to achieve intergenerational transfers resulting from the expansion of the market. Fourth, to maintain the conditions for sustainability, commons institutions to facilitate intergenerational transfers must also adopt to the increasingly complex interconnectedness associated with modern technologies and the resources they access. Again, there is little evidence that institutions have responded accordingly. The reframing suggests research needs to be directed to 1) which institutions have facilitated intergenerational transfers, 2) the extent to which these institutions have been effective in the face of broader markets and more complex interconnections between people and resources, 3) the extent to which new institutions have evolved to adapt to broader markets and complex interactions, and 4) the identification of additional institutions needed to assure sustainability.

BIBLIOGRAPHY

Ahmad, Yusuf, Salah El Serafy, and Ernst Lutz. 1989. Environmental Accounting for Sustainable Development. World Bank. Washington, D. C.

Bator, Francis. 1957. The Simple Analytics of Welfare Maximization. American Economic Review 47:22-59.

Blaikie, Piers and Harold Brookfield. 1987. Land Degradation and Society. Metheun. London.

Bromley, Daniel W. 1989. Economic Interests and Institutions: The Conceptual Foundations of Public Policy. Oxford. Blackwell.

Bromley, Daniel W. 1990. The Ideology of Efficiency: Searching for a Theory of Policy Analysis. Journal of Environmental Economics and Management 19(1):86-107.

Daly, Herman E. and John B. Cobb, Jr. 1989. For the Common Good: Redirecting the Economy Toward Community, the Environment, and a Sustainable Future. Boston. Beacon Press.

Devarajan, Shantayanan and Anthony C. Fisher. 1981. Hotelling's "Economics of Exhaustible Resources": Fifty Years Later. Journal of Economic Literature XIX:65-73.

Giddens, Anthony. 1990. The Consequences of Modernity. Stanford University Press. Stanford, California.

Guha, Ramadchandra. 1990. The Unquiet Woods: Ecological Change and Peasant Resistance in the Himalaya. Berkeley. University of California.

Hotelling, Harold. 1931. The Economics of Exhaustible Resources. Journal of Political Economy 39:137-175.

Howarth, Richard B. 1990. Economic Theory, Natural Resources, and Intergenerational Equity. Phd Thesis. Energy and Resources Program, University of California at Berkeley.

Howarth, Richard B. and Richard B. Norgaard 1990. Intergenerational Resource Rights, Efficiency, and Social Optimality. Land Economics 66(1):1-11.

Howarth, Richard B. and Richard B. Norgaard. 1992. Environmental Valuation Under Sustainability. American Economic Review 82:473-477.

Marglin, Stephen A. 1963. The Social Rate of Discount and the Optimal Rate of Investment. Quarterly Journal of Economics 77:95-111.

Markandya, Anil and David Pearce. 1988. Environmental Considerations and the Choice of the

Discount Rate in Developing Countries. Environment Department Working Paper no. 3. Washington D. C. World Bank.

McCloskey, Donald N. 1985. The Rhetoric of Economics. Madison. University of Wisconsin Press.

Nelson, Robert. H. 1987. The Economics Profession and Public Policy. Journal of Economic Literature XXV(1):49-91.

Norgaard, Richard B. 1990. Economic Indicators of Resource Scarcity: A Critical Essay. Journal of Environmental Economics and Management 18:19-25.

Norgaard, Richard B. 1992. Sustainability and the Economics of Assuring Assets for Future Generations. Policy Research Working Paper 832. The World Bank. Washington, D. C.

Norgaard, Richard B. forthcoming. The Coevolution of Economic and Environmental Systems and the Emergence of Unsustainability. (Paper presented at the American Economic Association Annual Meetings, January 1992, New Orleans and forthcoming in a book on evolutionary thinking in economics edited by Richard W. England).

Norgaard, Richard B. and Richard B. Howarth. 1991. Sustainability and Discounting the Future. In R. Costanza (ed), Ecological Economics: The Science and Management of Sustainability, Columbia University Press. New York.

Norgaard, Richard B. and Richard B. Howarth. 1993. The Rights of Future Generations and the Role of Benefit-Cost Analysis in the Policy Process. Policy Sciences forthcoming.

Pechman, Joseph A. (ed). 1989. The Role of Economists in Government: An International Perspective. New York University Press. New York.

Ramsay, Frank P. 1928. A Mathematical Theory of Saving. Economic Journal 38:543-559.

Worster, Donald (ed). 1988. The Ends of the Earth: Perspectives on Modern Environmental History. Cambridge University Press. Cambridge.