Sustainable Decisionmaking: The State of the Art from an Economics Perspective

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Abstract

Government, corporate and other decision makers are more and more often being urged to 'act sustainably' and to pursue policy paths toward 'sustainable development.' However, application of these concepts is hampered by serious interdisciplinary disagreements about the interactions of humans with their environment. Moreover, reducing disagreements about sustainability cannot be achieved solely through an improvement in scientific knowledge. These observations lead me to express skepticism about the capacity of *any* more or less mechanistic rule, economic, scientific or otherwise, to provide definitive and reliable answers about sustainable policies or conduct. However, there are processes and procedures that can help guide decisionmaking. I underscore the need for a methodologically pluralistic approach to addressing sustainability issues, while also underscoring the importance of addressing economic costs and benefits as one critical element of sustainability assessment. Practitioners of cost-benefit analysis are increasingly recognizing the need for embedding their findings in a broader set of information. A pluralistic approach, without mechanistic decision rules, only increases the need to have greater quantity and maturity of political discussion and education about sustainability than seems often to prevail.

Key Words: sustainable development, cost-benefit analysis, intergenerational equity, multicriteria analysis, social values

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Table of Contents

SUSTAINABLE DECISIONMAKING: THE STATE OF THE ART FROM AN ECONOMICS PERSPECTIVE

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INTRODUCTION

Government, corporate and other decision makers are more and more often being urged to 'act sustainably' and to pursue policy paths toward 'sustainable development.' These admonitions and instructions appear to express a significant societal commitment to alter current practices. And yet these widely supported admonitions provide little guidance to policy makers and other actors, because the term 'sustainable' embodies deep conceptual ambiguities. These ambiguities cannot be easily resolved because they rest, in turn, on serious theoretical disagreements about the interactions of humans with their environment that transcend disciplinary boundaries.

In this paper I attempt to summarize the current state of knowledge on sustainable development from the perspective of what practical guidance is offered by economic analysis to decisionmakers. I begin with the obvious point that there is no consensus about what constitutes sustainability, and such a consensus may be long in the future. I further argue that this is not a question that can be addressed solely through an improvement in scientific knowledge. These observations lead me to express skepticism about the capacity of *any* more or less mechanistic rule, economic, scientific or otherwise, to provide definitive and reliable answers about sustainable policies or conduct.

However, I do suggest that the past several years of research and debate about sustainability have begun to identify *processes and procedures* that can guide decisionmaking. I underscore the need for a methodologically pluralistic approach to addressing sustainability issues, and the need to recognize the range of different values at issue in sustainability debates. In making these points, however, I also underscore the importance of addressing economic costs and benefits as one important element of sustainability assessment, and I note that practitioners of cost-benefit analysis are increasingly recognizing the need for embedding their findings in a broader set of information. I further note that a pluralistic approach, without mechanistic decision rules, only increases the need to have greater quantity and maturity of political discussion and education about sustainability than seems often to prevail.

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* Senior Fellow and Division Director, Energy and Natural Resources Division, Resources for the Future. This paper is based in part on a presentation at 'Ecology, Society, and Economy: In Pursuit of Sustainable Development,' the inaugural conference of the European Society for Ecological Economics, 23-25 May 1996. A revised version of the paper will appear in *Valuation and the Environment: Theory, Methods, and Practice* (M. O'Connor and C. L. Spash, eds., Elgar). The author is especially grateful to Bryan Norton, his collaborator in developing a number of the ideas presented in the paper, and to a number of other colleagues for useful discussions of these issues. Responsibility for the ideas expressed in the paper is the author's alone, however.

THE LACK OF CONSENSUS ON SUSTAINABILITY

I do not propose here to review the plethora of sustainability definitions that has emerged over the last few years (see, for example, Pezzey 1989, and Toman 1994). Instead, I attempt to identify several broad and somewhat overlapping categories of interpretation which in practice have quite different policy implications, and to provide a fair description of some of the more controversial underlying assumptions.

Perhaps the most familiar definition to economic theorists is that sustainability requires nondecreasing well-being, or potential well-being, over time.[1] Two very large loose ends remain in this understanding of sustainability, however. The first concerns the kinds of endowments that must be provided to future generations to achieve a quality of life at least the equal of our own. Economists tend to assume that degradation of some resources can be ameliorated by increases in other kinds of social investment (in people, machines, or ideas). This *weak sustainability* concept (Solow 1986; Pearce and Atkinson 1993) draws particular attention to the total level of saving provided for the future, with less emphasis on the particular components of the endowments (e.g., nature versus human constructs). This perspective is by no means universally accepted in the sustainability debate (Stern 1997; Faucheux and O'Connor 1998).

The other major loose end is addressed by the question 'Whose well-being?' Most sustainability discussions implicitly or explicitly seem to emphasize the well-being of all future generations. However, there are respectable philosophical arguments that would put much greater emphasis on the well-being of the immediate future, the people with whom we arguably have the most identification (e.g., Golding 1972; Parfit 1983; Passmore 1974).[2] The emphasis on future generations in sustainability debates also puts less emphasis on other pressing questions related to the distribution of well-being and opportunities within the current generation, and how efforts to help safeguard the future are related to our current obligations to the world's destitute.

This point leads us to a second broad category of sustainability interpretations that also lies largely within the realm of economics. This view combines observations about the inefficiency of current economic policies and practices with theorems about the economically efficient management and protection of the environment to argue that correction of market

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[1] The emphasis on potential well-being, while often sluffed off in simple models, is important in that the current generation cannot guarantee how the future will turn out, either in terms of its opportunities or its proclivities. However, the current generation can take steps to make sure that the future generation is able to have opportunities to do as well as we are, at least as reckoned given our limited insights into future ecological conditions, technology, wants, and tastes.

[2] One of the interesting philosophical points to emerge from the sustainability debate has been an understanding that while neoclassical economics is strongly utilitarian, there are utilitarian constructs that put much more emphasis on future generations than the neoclassical model with discounting (see, e.g., Broome 1992). The debate is better cast as one over teleological (effects-based) approaches, deontological (rights-based) approaches, and contractarian (e.g., stewardship) approaches to intergenerational responsibility (Norton and Toman 1997). With respect to the mechanics of discounting, Horowitz (1996) and Azar and Sterner (1996) provide two interesting discussions of the consequences of departing from a time-invariant market discount rate.

failures (externalities) and policy failures is a key element of sustainability. According to this view, there is a substantial 'win-win' opportunity for increasing economic well-being as conventionally measured and the level of environmental protection. One of the most articulate versions of this argument can be found in World Bank (1992). The set of policy recommendations emerging from this argument combines standard prescriptions of environmental economics (correct open access and underpricing of collective environmental goods, tax or otherwise restrict the productions of bad spillovers) with standard prescriptions of economic growth and development theory (reduce economic pricing and management distortions, expand international trade and investment opportunities, develop stable macro policies and a secure regime of property rights).

Many economists and other experts heartily endorse these recommendations for expanding economic activity and environmental protection. Yet, critics can argue that even if one accepts these prescriptions as necessary for sustainability (and there is not unanimity on that point), they are not sufficient. By essentially reinventing environment and development economics, this conception of sustainability does not address whether more efficient market behavior will provide either adequate provision in general for future generations, or adequate provision of specific forms of capital that may be needed to maintain future well-being. Like the weak sustainability view, the environmental and development efficiency perspective tends to assume a relatively high degree of substitutability among resources. Moreover, it generally tends to be relatively 'presentist' in its orientation, focusing on expanding opportunities for the current poor and the next generation.

There is a variant of the 'win-win' which holds that there are significant untapped opportunities for technological innovation that will protect the environment and promote economic activity (see especially Porter and van der Linde 1995). By embracing regulations and other policies that spur this innovation, the argument continues, the parties involved (firms or nations) can further expand economic gains by increasing shares of domestic and foreign markets in the relevant technologies.

The part of the argument which holds that innovation can and will occur if policies are correctly designed, and that this innovation will reduce the cost of protecting natural and environmental resources, is widely accepted among economists and others. However, the argument that there are sufficient untapped opportunities as to make environmental protection the source of increased economic activity depends on the existence of a pretty deep well of low-cost untapped technical potential, which is much more controversial (see, for example, Palmer, Oates, and Portney 1995). Moreover, the argument that expanding markets can provide an offset to the economic costs of environmental protection needs to take into account the fact that if there is widespread demand for such protection, these markets likely will quickly become as competitive as other technology markets, with success less assured even for the early innovators.

The economic perspectives just discussed contrast with other disciplinary perspectives. Some ecologists, for example, emphasize ecological concepts of system function and resiliency that do not appear in the standard economic representation of production and consumption

opportunities (see Holling 1986, 1993; see also Common and Perrings 1992, and Arrow et al. 1995). This view holds that ecological systems are only malleable within limits, beyond which they may abruptly transform into a new state. The new state may be very unlike the prior condition and not necessarily as friendly to human interests that were adapted to the status quo ante. Such transformations are ubiquitous naturally, but generally at a smaller scale than the stresses that can arise from human activities on a regional or global scale and overcome the redundancy of natural systems. Moreover, the threat of discontinuous unwelcome natural transformations can arise from a myriad of small stresses on component ecological systems that are individually less noticeable.

This argument raises questions about the substitution hypotheses underlying much economic analysis of sustainability and leads in turn to much greater emphasis on the need for ecological protection (see, for example, Daly 1990, 1992). In a number of cases, however, the argument for preservation is based on a scientific assessment of ecological consequences from the status quo, without a connection being drawn explicitly from the ecological to the human consequences. There is a presumption that humans cannot live with the ecological consequences--that substitution is not easy or even possible--and this presumption is used to justify a strong (in some cases, almost lexicographic) presumption in favor of ecological preservation. These presumptions are as hotly debated as the economists' perspectives and prescriptions. Their plausibility is a function of the scale of the potential impacts, since smaller-scale impacts generally are more readily ameliorated than larger-scale ones. The ecological and economic uncertainties surrounding the functions of natural systems, the contributions of those functions to human well-being, and the impacts of human intervention make firm scientific conclusions difficult to draw (Carpenter 1992).

Social perspectives on sustainability provide yet another set of views. Cultural theorists have attempted to describe people's values in terms of various 'social solidarities' to which they hew. In this approach, different social worldviews affect, among many things, the extent to which nature is seen as robust, fragile or somewhere in between, and the types of solutions prescribed for environmental threats (e.g., regulations or market outcomes). For example, Rayner (1994) argues that the position one takes on these issues could be described as depending on the extent to which one identifies with a worldview that is 'hierarchical' (implying a duty to act in the larger interest), 'egalitarian' (implying a duty to be fair to others), or 'competitive' (implying a duty to seek self-interested outcomes with peers). Perspectives like this emphasize the endogeneity of individual values to the cultural context in which they are formed, thereby admitting the possibility that as cultures change through exposure to new ideas, so will the individual values and preferences of its members.[3]

Related to these broad ideas of community values is the concept that humans attach great importance to a sense of place. This value may be seen by proponents of this perspective as transcending market values (see, e.g., Norton and Hannon 1997). Such a

[3] Economists also have wrestled with how to connect ethical concerns and endogenous values with models of individual preferences (Woodward and Bishop 1995; Spash and Hanley 1995; Stern 1997).

perspective can be used to support the minimization of spillovers that would disrupt the identity people derive from their connections to place and community. Critics of this view, while conceding that a sense of place has value, would again question the quasi-lexicographic view that loss of that value is so inherently noncompensable, and whether the exercise of a sense of place could disrupt a larger community by transferring large amounts of power to small disaffected groups.

Both economic and social arguments can be used to underscore the importance of procedural issues--in particular, the degree of inclusiveness of social decisionmaking and the sense of fair play people have about the process--in evaluating sustainability policies. For example, people may accept an outcome that seems a priori to treat them unfairly if they believe it has been arrived at through due process as part of a larger social compact; they may more readily accept government actions they believe reflect their own concerns. This argument has been expanded by advocates of 'place-based policymaking' to embrace a variety of economic, social, and environmental concerns (see, e.g., PCSD 1996).

This perspective on sustainability makes process a central concern, with, for example, an emphasis on participatory stakeholder forums for addressing contentious policy issues. While procedural fairness seems an undeniable virtue, it is also the case that for social agreements to be lasting and to contribute to meeting affected parties' needs, they need to reflect solid substance as well as process. In addition, they must reflect the views of all affected parties, including those not adequately organized to participate in stakeholder dialogues. Even advocates of place-based policymaking acknowledge that these are significant challenges to overcome.

SUSTAINABILITY AND SCIENCE

The discussion in the previous section reveals a wide range of different conceptions of sustainability, emphasizing substantive economic, ecological and social concerns and procedural issues. These various conceptions are based in turn on various sets of values, e.g., perceived differences in the importance of economic well-being, ecological integrity, and social legitimacy. It therefore seems obvious on its face that debate on sustainability cannot be resolved solely by recourse to scientific inquiry. For example, substantial progress in resolving uncertainties about the effects of greenhouse gases on the world's climate system, and the effects of climatic changes on ecological systems and human well-being, will not in itself address basic disagreements about the importance of humans versus nature.

Governments and other decisionmakers continually seek to reduce factual uncertainties in order to support 'better' decisions. This can be seen in the attention paid to the quality of science underlying major regulatory and other policy decisions (witness the controversy during the 104th Session of the US Congress over legislation that would attempt to prescribe standards for scientific assessments and peer reviews before government regulated). It can also be seen in the surge of recent interest in 'sustainability indicators' that would seek to provide a snapshot view of whether sustainability is being achieved (PCSD 1996). Proposed indicators include both corrections to national income and product accounts to reflect depletion and degradation of natural endowments, and parallel measures of

ecological and social conditions (e.g., flows of materials and wastes, sociological data such as poverty statistics, etc.).

Efforts to improve scientific understanding are important contributions to better decisionmaking. However, such efforts also can mask deeper and more complex disagreements about social values. Even in the refuge of scientific inquiry, moreover, value judgments are not absent. Prior assumptions about what is important implicitly guide the structuring of scientific inquiry. For example, if one takes the view that ecological systems are organized hierarchically according to scale, the study of these systems at the micro scale (the function of a single leaf) will differ from the study of these systems at a macro scale (the biome), and there is no scientific basis for preferring one level of inquiry over another (Norton 1992a).

The fact that science is not and cannot be entirely value-free does not imply that science must be subservient to values in sustainability, or that established measures to test and validate scientific hypotheses must be discarded. Instead, I would argue that science and values need to be seen as two sides of a recurring process in which increased information about the natural world and human impacts leads to a reconsideration of values, which in turn leads to a refocusing of science as needed to address emerging policy issues. This recursive process ensures not only that scientific inquiry is focused on issues that need to be addressed in forming policies, but also that new scientific insights find their way into the policy debate and stimulate constructive reevaluations of existing positions.

THE NEED FOR A PLURALISTIC APPROACH

The plethora of different conceptions of sustainability, and the inability of these issues to be resolved through some 'silver bullet' scientific breakthrough, underscore the need for a pluralistic approach to sustainability. Knowledge from the ecological sciences about the physical consequences of different management regimes (including laissez faire), their scale and duration, clearly is important in an economic assessment. Similarly, information from other social sciences about determinants of values and how values might change in different circumstances is useful in its own right and useful for economists in considering the robustness of willingness to pay estimates. By the same token, information about economic and other values can help guide scientists in determining how studies of the natural world should be focused.

However, my argument goes beyond the relatively innocuous assertion that interdisciplinary enrichment in resource assessment is useful. A pluralistic approach to evaluation of options also is needed. Consider first the use of economic assessment; the role of other disciplinary perspectives is discussed below.

There are several reasons why a narrow cost-benefit approach to sustainability evaluation is in itself inadequate (see, e.g., Kneese and Schulze 1985, and Toman 1994). Such an approach does not adequately address important distributional concerns, both within and across generations. It also does not address concerns people may have with decisionmaking procedures themselves, e.g., how fair they are. In addition, sole reliance on monetary measures of benefits and costs cannot adequately address important impacts that are not easily

monetized.[4] It may further be problematic when, as is often the case with environmental issues, there is a high level of nonquantifiable uncertainty (in other words, there is limited information about underlying processes rather than just statistical uncertainty about key parameter values), and the possibility of very adverse effects. In these kinds of situations there is not just the problem of quantifying expected values and other moments of probability distributions; there also is concern that the standard model of expected utility maximization does not work very well--for example, that people have asymmetric attitudes toward different kinds of risks (Camerer and Kunreuther 1989; Machina 1987).

To overcome these limitations, decisionmakers must supplement economic information with information on the physical consequences (in space and time) of different decisions, information on the incidence of various effects, and other sources of information about social values and priorities, such as information from political processes. This information helps provide a broader context in which economic calculations of benefits and costs can be evaluated, especially significant uncertainties and irreversibilities can be identified, and conflicts with values like fairness can be explored. In this approach, the policy decision ultimately will rest with the judgment of the decisionmakers, and thus will be inherently a political question. However, while there are no magic formulae for these decisions, various kinds of sensitivity and multicriteria analytic techniques may be useful complements to the economic assessment.[5]

Just as one can express doubt about the usefulness of a rigid benefit-cost criterion for sustainability, one can just as strongly question the possibility of other disciplines having a unique capacity to settle such policy issues. In particular, ecological information--even if more of it were available than today--could not in itself establish a course of action. Some combination of information and assumptions about social values must give context to that information. This is why, for example, efforts to establish 'sustainability indicators' can only be meaningful with a set of explicit or implicit axioms about what is important to measure and why; without this context, only a mass of data is provided.

Similarly, to argue that certain norms for ecological protection must be met, and to confine socioeconomic assessment entirely to an evaluation of which means might be cost-effective, can only be justified by nonscientific value judgments that can and should be debated. In addition, the elaboration of moral precepts accomplishes little toward guiding actual management decisions unless one has some idea of the extent to which the precepts

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[4] This is an important consideration whether one believes that full monetization of impacts is possible in principle and that the handicap is empirical, or that some impacts are inherently incommensurable with individual monetary measures of well-being and thus defy monetization (Munda 1996).

[5] Faucheux, Froger, and Munda (1997) address these issues in the context of what they call 'procedural rationality.' The idea here is that when knowledge is limited, optima are hard to identify, and irreversible consequences may ensue, decisionmaking should seek to preserve options, identify measurable subgoals, and choose 'satisfactory' outcomes based on these goals. They advocate a particular form of multicriteria analysis to help identify such policies, with tradeoffs among subgoals mediated by certain imperatives (e.g., no reduction in biodiversity below a certain level) that must be satisfied.

actually animate decisionmakers, and the actual consequences of the precepts for management (e.g., the need to protect certain 'key' resources or alleviate another problem like child poverty).

It may be surprising to some critics of conventional environmental economics that there already is a growing recognition within that group of the need for the sort of pluralism described here. For example, Kopp, Krupnick, and Toman (1997) describe an expansive approach to cost-benefit analysis that combines intensive efforts to monetize environmental damages with the requirement to provide detailed information on the nature of physical effects and the incidence of benefits and costs. They argue that such information should have broad standing in public policy assessments and decisionmaking, but that its weight should not be overriding (as would be the case with a rigid benefit-cost decision criterion).[6]

Similar reasoning underlies the approach to regulation enunciated by the Clinton Administration under a September 1993 presidential action, Executive Order 12866. Under that approach, benefits are to 'justify' costs, rather than outweighing them, a conscious departure from earlier cost-benefit mandates which emphasizes a more pluralistic approach. The list of impacts to consider in the Executive Order includes a number of concerns (environmental protection, distribution, and equity) that can partly or entirely transcend economic calculations. The Executive Order also emphasizes the need for procedural fairness and transparency and inclusiveness in seeking out information and views on values affected.[7]

'Two-tier' conceptual frameworks such as a 'safe minimum standard' provide one basis for structuring a pluralistic approach (see Norton 1992b; Toman 1994; and Norton and Toman 1997 for discussions). In this sort of framework, decisionmakers must first consider what criteria and management tools to apply to a particular issue. It is presumed in the framework that human impacts on the environment that are larger in scale and longer in duration give rise to greater concerns about the opportunities for well-being available to future generations (as well as to ourselves), and about the opportunities for amelioration of adverse effects through the conventional channels of resource substitution and innovation. Impacts that are smaller in scale and shorter in duration give rise to less concern and thus are more amenable to being treated through conventional cost-benefit tools, supplemented with information about nonmonetizable impacts and distributional consequences. In other cases, standard economic

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[6] Adams (1995) argues that the only appropriate response to the limitations of cost-benefit analysis is to discard the method. While I agree that CBA techniques can be and are misused, and the CBA cannot determine social policy, I do not agree with his prescription.

[7] The fact that this conceptual parallel exists does not mean that the US government's decisionmaking apparatus is doing a good job in practice of generating sustainable outcomes. Critics express concern about the quality of the economic assessments done by agencies; the assessments may fall short because of statutory constraints on the scope of economic analysis in rulemaking or lack of agency commitment (i.e., too little spent too late on assessment with too little impact on agency decisions). As Kopp, Krupnick, and Toman (1997) point out, analyses such as Lutter and Morrall (1994), Congressional Budget Office (1995), and Hahn (1996) have identified very inconsistent economic assessments (e.g., very different levels of expenditures to reduce similar levels of risk, or greater expenditures to reduce lesser risks, as well as costs that seem very much in excess of benefits). This information suggests that the economic component of regulatory assessment often does not function well.

calculations are more likely to need supplementing with information about the physical robustness of underlying ecological systems and the potential consequences over time, and by information about social norms (e.g., basic presumptions about fairness to existing communities and future generations) that might be affected.

We can briefly illustrate these ideas in the context of climate change. Climate policies undertaken by the current generation will impose costs (and generate some ancillary benefits, like air quality improvements) for the current generation. These costs should be assessed to the extent possible using the best state of the art in economic analysis, including procedures for intragenerational discounting that reflect the opportunity costs of changes in consumption and investment streams. The benefits of action or the costs of inaction, on the other hand, are more complex to assess since they involve significant redistributions of income between current and future generations; they will accrue globally, not just to our own heirs; they are difficult to estimate; and they will depend on the actions taken--for example, actions to reduce future risks by limiting greenhouse gas emissions, versus actions to promote adaptability to future climate change that can also provide more immediate economic development benefits. Simply calculating the present value of these effects as they appear to the current generation does not provide an adequate basis for evaluating different outcomes. An alternative is to provide a description of the effects (monetary and otherwise) and their timing, and allow decisionmakers to weigh these effects and their costs against a variety of ethical criteria and the expressed wishes of various stakeholders.

The approach thus uses multiple disciplines in the first tier to assess how an issue should be judged, and then in the second tier in evaluating the issue and decisions (though the mix of disciplines will vary depending on the first tier outcome). The fact that this is not just an application of 'scientific' policy analysis can be underscored by the fact that value judgments will permeate the first tier categorization decisionmaking as well as guiding the second tier evaluation. The process thus can operate only if it is superimposed on a mature ongoing social discussion about which values matter in which contexts. With this superimposition, the interaction between science on the one hand and the process of values formation and education on the other hand can operate.

SUMMARY: A CONCEPTUAL BLUEPRINT FOR SUSTAINABILITY DECISION-MAKING

Based on the discussion in the previous sections, we can now sketch the following conceptual blueprint for action to promote sustainability:

(1) *Prior assessment of what criteria and evaluation tools should apply to the issue*. In the two-tier model sketched above, this amounts to assessing where the issue lies on a continuum between a simple analysis of economic tradeoffs and an analysis more circumscribed by physical limits on substitution and the operation of broader social norms, which themselves must be identified.

(2) *Assessment of physical impacts from different courses of action to the extent possible, with particular attention to their scale, to the identification of impacts that are difficult to evaluate in monetary terms and to distributional issues across space and time.*

(3) *Assessment of economic benefits and costs from different courses of action to the extent possible, as well as their incidence in space and time.*

(4) *Further identification of whether and how social values or norms beyond the quantified benefits and costs may be affected by a decision.*

(5) *Engagement of public discourse about both the consequences of different actions and the applicable social values, especially where operable norms are not clear-cut or are conflicting*. This is the step which explicitly acknowledges that the decision process cannot be purely scientific. The public engagement can take various forms, from educational programs to multiple-stakeholder negotiations to interagency debates with disclosure and electoral accountability.

(6) *Decisionmaking based on the pluralistic approach and criteria outlined above.*

(7) *Using the results of the decision process to consider what new information and uncertainties have been revealed about both science and social values, and plugging these insights back into both the values discourse and scientific research agendas.*

As noted at the beginning of the paper, this blueprint is long on process and short on concrete decision rules. Such rules may be very helpful in certain circumstances that are more clear-cut and where decision shortcuts are useful. This could be the case, for example, for a number of regulatory decisions on issues without large-scale and enduring ecological consequences (though there will be debate on these points too, indicating the provisional nature of policy evaluation). For decisions in this category, a rough cut on economic benefits and costs combined with information to screen out excessively adverse distributional consequences may be more than adequate. Not all actions will be completely efficient or fair, but actions with very unfair or inefficient consequences can be sieved out. For more complex issues, on the other hand, the more complex process sketched above would be needed.

Practical experience will be needed to flesh this out. Success in gaining this experience will be aided by a greater commitment to pluralism by analytical practitioners. It will also be aided by a greater commitment by decisionmakers and analysts alike to the use of analysis in policy determination, to exposing and evaluating hidden value judgments, and to the recursive interactions between policy determination and scientific assessments mentioned previously.

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