Biodiversity and Conservation **9**: 1029–1044, 2000.

Biodiversity and environmental values: in search of a universal earth ethic

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Received 13 August 1999; accepted in revised form 19 November 1999

Abstract. While biodiversity protection has become a widely accepted goal of environmental protectionists, no such agreement exists regarding why it is important. Two, competing theories of natural value – here called 'Economism' and 'Intrinsic Value Theory' – are often cited to support the goal. Environmentalists, who have recently proposed the articulation of a universal 'Earth Charter' to express the shared values humans derive from nature, have cited both of these theories as support for biodivesity protection. Unfortunately these theories, which are expressed as polar opposites, do not work well together and the question arises: is there a shared value that humans place on nature? It is argued that these two value theories share four questionable assumptions: (1) a sharp distinction between 'intrinsic' and 'instrumental' value; (2) an entity orientation; (3) moral monism; and (4) placeless evaluation. If these four assumptions are denied, an alternative value system emerges which recognizes a continuum of ways humans value nature, values processes rather than only entities, is pluralistic, and values biodiversity in place. An alternative theory of value, which emphasizes protecting processes rather than protecting objects, and which values nature for the creativity of its processes, is proposed as a more attractive theory for expressing the universal values of nature that should motivate an Earth Charter and the goal of biodiversity protection.

Key words: biodiversity, creativity, social values, value theories

Value theories and biological diversity

Recent international discussions of biodiversity policy have established two points: (1) there is a growing international commitment to sustain and protect biodiversity, and (2) there is little agreement regarding why this should be done. Thus, while a significant international consensus regarding policy has apparently emerged, this consensus is not grounded in a consensually accepted value theory to explain why biodiversity protection, however strongly supported, should be a top priority of environmental policy. Lack of agreement on (2) has led to disagreements at the Earth Summit in Rio de Janeiro, for example, where delegates disagreed whether to emphasize nature's economic, 'utilitarian' value or its 'intrinsic' value, defined as value that exists independently of human values and motives. For simplicity of reference I will call these two general theories 'Economism' and 'Intrinsic Value Theory'. I use these phrases as names of the theories, respectively, that the value of biodiviersity and biological resources can be fully measured in economic terms and the theory

that the value of all biological entities, human and nonhuman, is 'intrinsic' to them. While I am aware there are other approaches to valuation of biodiversity, these two approaches are the only two that, to my knowledge, attempt to express all of the values of nature within a single, unitary theory of how/why humans value nature.

The ambivalence between saving nature for future use and saving nature for its own sake has, as will be shown presently, infected the discussion of a proposed Earth Charter. The Earth Charter is being urged as a next step in developing a legal and political framework to guide local, regional, national, and international efforts to protect nature. In an early statement of principles, Steven C. Rockefeller, an advocate of the Charter, writes: "In order to address the many interrelated social, economic, and ecological problems that face the world today, humanity must undergo a radical change in its attitudes, values, and behavior ... The purpose of the Earth Charter Project is to create a 'soft law' document that sets forth the fundamental principles of this emerging new ethics, principles that include respect for human rights, peace, economic equity, environmental protection, and sustainable living." He goes on to hope that the Earth Charter "will become a universal code of conduct" that expresses "the shared values of people of all races, cultures, and religions" (Rockefeller 1996). I laud these goals; and I think the idea of an Earth Charter is a wonderful one. But can we share Rockefeller's optimism about the early arrival, and consensual acceptance, of 'this emerging new ethics'?

First, we must ask: Is there an universal ethic that represents the values of all peoples? How might one articulate such an over-arching ethic, given the existing tensions surrounding evaluations of nature? I begin, then, by questioning whether the usually cited general and universal theories of value are likely to provide a unifying ethic such as might support a universal Earth Charter. My goal is to point the direction toward a new approach to environmental evaluation, one that is more likely to lead to an inclusivist ethic.

I believe that one reason this debate has been so frustrating and polarizing is that we have been asking the wrong questions in the wrong way, given the task at hand, and that neither of these theories is a good candidate for providing a theoretically unified and inclusive ethic to guide actions affecting nature, especially including wild life forms. First I must establish that there is an alternative to both Economism and Intrinsic Value Theory. That there is such an alternative can best be explained by showing how the two, polar positions regarding values actually share important, and highly controversial, assumptions; these assumptions will be examined in the remainder of this part. Subsequently, the paper provides a sketch of one alternative approach, an approach that has some promise to provide an inclusive theory of environmental values.

So far, most discussions of how to evaluate nature have been based on one or the other of two theories of the value of nature – for brevity, I will call them 'Economism'(Baxter 1993; Freeman 1994) and 'Intrinsic Value Theory' (Rolston 1994). Although both theories come in multiple variants, for our purposes, we can examine

the two theories in their most general forms. First, there is the theory of Economists that environmental values are economic values. According to this view, elements of nature have instrumental value only, and should be valued like other commodities. Economists, of course, recognize that there are no existing markets for many environmental goods and services, so methods other than measuring market behavior must be used if we are to correctly describe human preferences regarding the environment. Intrinsic Value Theorists directly oppose this viewpoint. They argue, contrary to the instrumentalist, preference-based theories of Economists, that some elements of nature have 'inherent' value, and that these elements are therefore deserving of preservation for their own sake. According to this view, human individuals and some other elements of nature, either individuals, species, or ecosystems, 'have' their own values, values that are not dependent upon the preferences of individual human valuers.

Interestingly, the tension between utilitarian approaches and intrinsic value approaches is openly expressed within the 'Summary of Principles' stated by Rockefeller (1996). One Principle of the new Earth Charter, listed under the 'Worldview' section, states "Every Life form is unique and possesses intrinsic value independent of its worth to humanity. Nature as a whole and the community of life warrant respect." Meanwhile, the first Principle on 'Sustainable Development', states: "The purpose of development is to meet the basic needs of humanity, improve the quality of life for all, and ensure a secure future." Are these Principles consistent? Ultimately, I am not sure; it depends, obviously, on how the terms are defined. Whether or not these principles are directly contrary to each other, however, they certainly express a tension between two broad ways to value nature. The Worldview Principle emphasizes valuing nature in separation from humans and their activities, whereas the Sustainable Development Principle emphasizes the evolution of nature insofar as it fulfills human needs. Subsequent drafts of the Charter have continued to mention explicitly 'intrinsic value' in nature and also human rights to sustainable development.

It has also been noticed that the tension between these two value theories tends to polarize discussions of international efforts to protect biodiversity. Environmentalists from the United States (and other developed countries) espouse intrinsic values in nature, even though the US government – because of economic concerns – has failed to ratify the Convention on Biodiversity. It is common for spokespersons for the developing World to complain, in international policy forums: "First-World countries have already exploited and converted their forests; now they ask us to forgo forest-based development and attendant increases to human welfare." Even as governments of developing countries are attempting to maximize economic development based on exploitation of natural resources, there have emerged minority groups, including minorities from indigenous cultures opposed to capitalistic exploitation, that have attempted to retain or resurrect their animist religions as a counter-balance against economic exploitationism (Gadgil and Berkes 1991; Shiva 1993; Anderson 1996). The tension regarding why and how to value nature therefore has practical effects, making it more difficult to forge North/South, and other, coalitions.

The lack of a consensus regarding foundational values especially affects hopes for an Earth Charter because that effort, by its nature, must be inclusive. So we must also ask: Is it possible to embody both the use-and-development ethic and the utilitarian value concepts that usually come with it, and the save-nature-for-its-own-sake ethic in one Charter? Perhaps it is possible. Given the tension between the two sides in the Great Ethics debate, however, development of a more inclusivist ethic will require both sides to move toward a middle ground. Little of that has happened so far.

It is important to recognize that these opposed theories rest on a cluster of highly vulnerable assumptions. Both Economists and Intrinsic Value Theorists accept a sharp dichotomy between values that are 'inherent' and those that are instrumental; further, both groups proceed to use this sharp dichotomy to separate nature into beings/objects that have, and those that lack, 'moral considerability'. In a particularly strong version of Economism, for example, Gifford Pinchot (first Head of the US Forest Service), said, "There are just two things on this material earth – people and natural resources" (Pinchot 1987). Pinchot was thus enforcing a sharp dichotomy between persons and other things, living or nonliving – the well-being of the former, but not the latter, should be taken into account in our calculations regarding what is acceptable behavior. Interestingly, the position of Pinchot and his Economist allies coincides on a more basic level with that of Immanuel Kant, who is typically cited as opposed to the consequentialist emphasis of utilitarians. For Kant, only rational beings could be 'ends-in-themselves'. Both Pinchot's utilitarianism and Kant's rights theory are thus based on a sharp distinction among entities – those which are to be regarded as being 'ends in themselves' and those objects which can be used, without restriction, in service of those ends.

Economists and Intrinsic Value Theorists, then, agree that there must be some special status for those beings which have noninstrumental value – they simply disagree regarding which objects in nature actually have this special status. For Economists like Pinchot, the special status is co-extensive with humanhood; for the Intrinsic Value Theorists, moral considerability is co-extensive with a much larger subset of nature's components. Either way the sharp distinction between 'instrumental' and 'inherent' values ensures that questions of environmental value are posed in all-or-nothing terms. For the Economist, 'Should we protect this river?' becomes 'Does this river have net positive economic value (for humans) or not?' For the Intrinsic Value Theorist, it becomes, 'Does this river have inherent value?' These questions are usually formulated in incommensurable theoretical frameworks; what they share is their tendency to elicit yes-or-no determinations of the value of objects, because valuation is considered a function of categorization. The value of a thing is a consequence of the 'kind' of thing it is – the moral/evaluative category within which it is correctly placed.

Another, related consequence of the bipolar formulation of environmental valuations is the apparent bias of both sides in favor of evaluating objects or entities rather than evaluating dynamic processes and changes in processes. Protection is assumed

to be protection of items in an inventory: should we try hardest to save genes? Individuals? Populations? Species? Ecosystems? This object-bias is of course endemic to all of western culture at least from the classical period; it represents the triumph of Plato's concern for constancy of forms constituting reality over the ideas of Heraclitus who, around 500 BC declared that 'All is in flux' (Norton 1996). This ideological triumph has also led to modern scientific reductionism, which seeks explanation in the motion of elementary particles.

The 'atomistic' idea which emphasizes elements is so deeply engrained in Western thinking that alternative conceptualizations of nature have only been considered relatively recently. Since the publication of Charles Darwin's evolutionary theory, however, the importance of systemic change and irreversible development – of complex, dynamic processes – has asserted itself (Dewey 1910). This revolution has extended to physics, and physicists are now leaders in an interdisciplinary effort to develop a more dynamic worldview, as is evidenced by ever-increasing emphasis placed on nonequilibrium dynamics. The full implications of a dynamic worldview are just now being felt. It may be decades before these concepts are well understood, but creative work in nonequilibrium system dynamics is already leading to new insights in ecology, and this direction holds promise for applications to environmental policy (Pimm 1991; Norton 1992). This much we know for sure: full absorption of evolving systems thinking into environmental management will have far-reaching impacts on the policies we advocate, and will almost certainly require more attention to interspecific relationships and system-level characteristics.

Another similarity between Intrinsic Value Theorists and Economists is that they are both looking for a universal, 'monistic' approach to values. Monism, as defined by Christopher Stone, conceives the ethical enterprise "as aiming to produce, and to defend against all rivals, a single coherent and complete set of principles capable of governing all moral quandaries" (Stone 1988). Commitment to monism, ultimately, explains the categorical, all-or-nothing character of the two competing theories. Both Economists and Intrinsic Value Theorists think there is only one kind of ultimate value; they differ only in how widely they find that value. It seems unlikely to me that either of these all-or-nothing, monolithic theories of value will prove rich enough to guide difficult, real-world choices regarding what should be saved, where conservationists should concentrate efforts, and how they should set priorities. But should that not be precisely the role for a theory of environmental value in the conservation policy process?

Interestingly, the same entity-oriented concepts that have divided environmentalists regarding value theory have also affected thinking in practical, policy situations. For example, suppose one asks: What should be the highest priority in protecting biological resources? Typical answers to this question, given the Western tendency toward an entity-orientation, might cite, 'all species', or 'all species and all ecosystems'. Other answers might identify particular types of species, for example, 'producers' as the most important. Note how easily we fall into a characterization of the

problem as one of providing a list of entities – of providing an 'inventory' of things that should be saved. The problem of conservation priorities is thus expressed as a 'ranking' of various categories according to their importance (Norton 1987).

Biologists, like Economists and Intrinsic Value Theorists, tend to talk about conserving inventories of objects, and setting priorities among these. But whereas discussions of value theory emphasize philosophical considerations of what has ultimate value, in a management context these pure, philosophical considerations are inevitably mixed with questions of methods and means, and even with recognitions of political constraint. For example, a conservation biologist might believe that species are highest priority, and at the same time advocate policies to save ecosystems and habitats because the systems approach is the most efficient means to achieve the goal of saving species. Conversely, a policy analyst might argue that we should save ecosystems for the future, but that the best way to save ecosystems is by legislating protection of species (because they are fairly easily counted, etc.). The policy analyst and the conservation biologist, working in the field, differ from the moral theorist in having to take account of empirical realities imposed by the intricacies of systems, by our lack of knowledge, and by political constraints. These differences are very important, and are not denied here – the point is that, despite these differences in the categories of entities and how to sort them, both the philosophical, values debate and the practical, policy debate are framed as questions that can be anwered by presenting lists of entities. Setting priorities, given this entity-and-category orientation, is a matter of excluding some kinds of objects from a 'preferred' list.

Adaptive management: an alternative to monism

Considerable progress has been made in understanding environmental problems as problems of adaptation within complex, multiscalar, dynamic systems, and this approach may emerge as the management approach of the 21st century, encouraging a more holistic and process-oriented view of conservation. While this general approach owes much to the conservation ideas of Leopold (1949), it has been named and given more cohesion by C.S. Holling and his colleagues, who describe the approach as 'adaptive management'. The adaptive managers have argued that large, landscape-scaled ecological systems tend to become 'brittle' under continuous exploitation and that these large systems can disintegrate and then gradually re-equilibrate at different levels of functioning or with quite different structural organization and diminished attractiveness or usefulness to humans (Holling 1977; Walters 1986; Lee 1993; Gunderson et al. 1995). They argue that environmental management cannot be modelled in single-equilibrium systems, and that impacts on natural systems can approach thresholds which, if exceeded, can cause discontinuous and rapid change into an alternative steady-state (Common and Perrings 1992; Holling 1996). Speaking theoretically, this insight was embodied by arguing that good management must care for both the

productivity and the resilience of the ecophysical system. 'Resilience' is introduced as a measure of the magnitude of disturbances that can be absorbed before a system centered on one locally stable equilibrium flips to another (Regier and Kay 1996; Arrow et al. 1995).

This hypothesis has, also, been elaborated by the explicit employment of concepts from 'hierarchy theory', an application of general systems theory to ecological modelling (Allen and Starr 1982). Hierarchy theory models ecological systems according to two assumptions: (1) that all observations and measurements must be taken from some perspective within a hierarchically organized dynamic system, and (2) that the systems, as modelled, exhibit nestedness, with smaller subsystems changing more rapidly than do the larger systems which form their environment.

Writers and practitioners of this tradition have successfully developed an adequate characterization of how environmental problems emerge as problems of adaptation at the individual and cultural levels. This multiscalar system allows conceptualization of an 'individual' scale of action, and also a larger, community level on which populations interact with their environments. One important consequence of this multiscalar and multivariate formulation is that neither means nor goals of sustainability can be set concretely in the beginning, and the quest for sustainable human communities must involve many individual processes of experimentation, revision of scientific understanding, and reformulation of community goals. This adaptive, experimental approach requires the careful design and nurturing of institutions capable of fostering social learning and equitable, participatory decision making. Adaptive managers have argued that system resilience is a more useful index of sustainability than alternative measures (such as economic growth measures or simple carrying capacity measures), because economic activities are sustainable only if the life-support ecosystems on which they depend are resilient.

Adaptive management, then, has provided a theoretical model for understanding environmental problems as problems of what might be called 'cross-scale spill-overs'. If I, as an individual, cut down one tree, or even my whole woodlot, this will have little long-term impact, provided other individuals let trees grow. If all forest-owners in a watershed, however, clear-cut their forest within a few years, a standing resource – an option for use – will have been eliminated for decades; and there may be indirect effects of soil erosion and reduced stream-water quality that may last much longer. Environmental problems can then be understood as multi-scalar, or cross-scale spill-over problems – an idea to which we return below. The point I wish to state here is: adaptive managers have provided a model which illuminates the emergence of environmental problems at the systems level, providing a working, holistic model that integrates human, cultural activities into the larger-scaled and normally slower-changing landscape. Environmental problems emerge at the system level with increasing impacts resulting from increased human populations, increased technological power, and increased consumption. Cumulative individual choices can accelerate change, sometimes crossing crucial thresholds, and cause systems to undergo rapid

structural re-organization. But, if Holling and his colleagues are correct in asserting that 'flips' into new states will result in habitats that are less productive of humanly valued goods, then these changes will be experienced by individuals in subsequent generations as a constriction in the options available to them to find means to survive. The mix of opportunities and constraints presented by the habitat will have shifted for the worse.

It is now possible, following Holling and the Adaptive Managers, to think of values as emerging within a dialectic between culture and nature. Each generation faces a mix of opportunities and constraints; the cumulative choices of each generation will affect the mixture of opportunities and constraints that will be faced by coming generations.

Adaptive management has been given a political component by Lee (1993), who accepts the characterization of environmental management as an experimental, community-based search for ways to exploit natural systems without undermining their healthy functioning. Adaptive management, he says, should represent a negotiation within a politically organized ecosystem management process. Scientists, working within a political process in which stakeholder groups express and defend their interests, attempt to develop trust sufficient to undertake 'experiments' in management. These experiments are to be designed to produce both an 'epistemological community' devoted to experimentation and 'social learning', and a reduction in uncertainty in the present and related situations. Through this process, the community guides scientists to study aspects of the sytstem that are of importance to the community, and scientists respond with studies that will help to reduce negative impacts of valued human activities.

I endorse this general model, but I believe current formulations are lacking in one important respect in that the multi-generational models are put forward as 'descriptive' models only. Values, if they are mentioned at all, are treated exogenously to the science of management. Current versions of Adaptive Management theory therefore assume, with Economism and Intrinsic Value Theory, that environmental values have a source and are fully determined outside the policy process. The problem is that, while treated exogenously, valuations by individuals are important system drivers, because individual behaviors express the individual preferences that result in the cumulative impacts that threaten resilience. As long as values are thus maintained as exogenous and, hence, independent variables, the system of management can offer no remedy – no informational feedback loop – if individuals in the community are expressing preferences that promote more and more negative cross-scale impacts.

What adaptive managers want to say is that people really 'should' prefer a higher, or over-riding value – our obligation to protect resilient ecosystems for the future. But this latter alternative cannot even be expressed in the vocabulary of mainstream neo-classical economics, which describes preferences as they are expressed by present consumers (Norton et al. 1998). What is lacking, I would argue, is a theory of value that (a) establishes the possibility of articulating values that can compete with

currently felt preferences, such as an obligation to sustain opportunities for the future, and (b) some way to link those long-range values to physical features such as 'resilience'. Lacking such a value theory, adaptive management can simply describe a system going haywire – it can offer no analysis of how the system might right itself by affecting the driving, independent variable – current preferences. Preferences, and the 'evolution' of preferences, must be a part of the adaptational process; adaptive management must test and revise our values as well as our empirical hypotheses. Individual preferences and social values – as well as the institutions that shape them – must be considered, and modelled, as endogenous to the social process of environmental management.

Alternatives to monistic assumptions and the entity orientation

I have argued above that the philosophical debate regarding inherent value in nature and the policy debate about how to set conservation priorities have both presupposed an entity-orientation, in keeping with an unquestioned assumption of virtually all of Western thought. Management thinking is moving away from single-species management, and I believe it will eventually move away from the inventory-of-objects approach altogether, because environmental problems, on the emerging model of adaptive management, are best understood as problems of adaptation across multiple scales of time. In this Part I examine the prospects for a process-oriented system of environmental evaluation, and explore some of the general features of such a system by discussing the consequences of denying the crucial, shared assumptions of the Economists and the Intrinsic Value Theorists. Once freed from the the shared assumptions that bind both Economists and Intrinsic Value Theorists in polar opposition over classifying objects of value, it is possible to look with fresh eyes at questions of value and policy; I will discuss the effects of rejecting the central assumptions shared by these opposed groups.

Denying a sharp dichotomy between instrumental and intrinsic valuing

We have seen above that Economists and Intrinsic Value Theorists share a complex web of beliefs about the nature of environmental value; the defining feature of that complex, shared web is the belief that a sharp distinction must be drawn between two kinds of value, intrinsic and instrumental, and two types of things, those that are valued for their own sake and those that are not. Following J. Baird Callicott, however, we can argue that 'value' is a verb, not a noun, and that valuings are always acts or dispositions of conscious beings (Callicott 1989). On this interpretation it is possible to consider a range, or continuum, of ways of valuing, each of which constitutes a relationship between a conscious valuer who experiences nature in specific situations. But, given this 'adverbial' conception of environmental valuation, and once we give

up the entity orientation, there is no reason to separate objects into those which are 'intrinsically' valued and those that are 'instrumentally' valued. The assertion that nature, or one of its elements, 'has' intrinsic value is, on this view, a confusion; the point is to recognize, respect, and attempt to reconcile a whole range of varied values, not to sort objects into one of two categories.

On the view explored here, the question is not one of determining which objects 'have' some reified type of value, but rather to determine whether good reasons can be given for invoking a particular value in a particular situation. This line of reasoning apparently opens up the possibility of reconciling the two sides in the debate over 'intrinsic' versus 'instrumental' value in nature – it is possible to include both instrumental and noninstrumental reasons for preferring one set of policies to another, without asserting that 'intrinsic' value exists independently of human, valuing actions. If we reject this sharp dichotomy between instrumental and intrinsic values and the associated classification of natural objects as instruments or as moral beings, a pluralist and integrative position emerges as a possibility: there are many ways in which humans value nature and these ways range along a continuum from entirely self-directed and consumptive uses, and include also human spiritual values and aesthetic values, and also noninstrumental valuations. If one forgoes a sharp, definitional distinction between these two, opposed types of valuing, the moral task of sorting entities into those that have, and those that lack, this special feature of 'noninstrumental' value becomes a nonproblem. The sorting question, that is, has interest only after one enters the bipolarized conceptualization of environmental values that comes with the web of assumptions shared by Economists and Intrinsic Value Theorists.

Rejecting the entity orientation

Suppose that we, following this more pluralistic approach, stop thinking of environmental evaluation as an exercise in categorizing objects at all. Rather, the goal is to choose indicators of the adaptability of various technologies and policies. Attention would then turn to impacts of existing and proposed technologies and policies on ecophysical and social processes; the task is to develop an indicator, or suite of indicators, that would allow the ranking of 'development paths'. A development path would then be thought of as a scenario that can be projected to unfold under a given policy or set of policies. The task of evaluation will then be one of ranking various development processes that might unfold from the present into the future. We hope, in the end, to be able to say, "Development Path A is more (less) likely to fulfill social values, V1, V2, V3, . . . than Development Path B". So the process approach advocated here simply ignores the problems and possibilities of entification and sets out to evaluate processes of development and change as they play out on a landscape.

Rejection of the entity bias has an even more profound implication for the theory of environmental value. If we reject the assumption that environmental evaluation is basically a matter of sorting entities, and focus instead on evaluating processes

and paths of change and the values experienced by people and cultures within these processes, it is possible to recognize a deeper source of value in nature, what might be called 'nature's creativity'. Prigogine and Stengers (1984) have argued persuasively that Western thought has for too long emphasized 'Being' at the expense of 'Becoming', and entities at the expense of processes. Prigogine and other leaders of the emerging science of chaos and complexity have set out to repair this imbalance, arguing that change, process, and becoming are more basic than being – that the world of objects we see is simply our stilted perception of a rich, multiscalar, evolving system.

The more dynamic models suggested by the sciences of chaos and complexity place humans and their societies within a larger, evolving, ecological and physical system. All description and all evaluation occurs from within a dynamic system, so humans value nature from within nature. As parts of nature, they are also conscious and autonomous agents who can, inadvertently or purposively, affect the larger systems of which they are a part. Environmental values emerge from this key natural-cultural dialectic. What we need, on this way of thinking, is a measure of how well a system is maintaining those forms of creativity that support a wide range of human opportunities, both in the present and in the future. Nature's creativity is experienced by us as a set of opportunities (Norton 1999). The range of individual choices – an important pre-requisite of human freedom – is thus affected by the range of nature's creativity. For example, the opportunities of a whittler or a wood sculptor are provided, but also limited, by the range of tree species at his or her disposal. Similarly, the opportunities – and range of choice – available to a house-builder or developer is a reflection of the types and variety of landscapes and settings available.

Perhaps the impulse to value nature's creativity – an impulse that, thankfully, has been expressed in a multitude of ways by different persons in many cultures – comes closer than the theories of either the advocates of Intrinsic Value Theories or of Economists to capturing the universal value that could unite all peoples behind an Earth Charter. Those theories, one might say, are directed at the specific content of people's values, rather than the real and shared source of those specific values in nature. Emphasis on one type of value at the expense of others can only lead to conflict and divisiveness, because humans – struggling to survive in many local situations with differing constraints and opportunities, and different natural and cultural histories – will have different needs, preferences, and ideals. Some humans are hunters, some are birdwatchers, some are shamans, others are developers and capitalists.

The common factor in all of these evaluative stances – when expressed in a dynamic, process model – is nature valued as a multi-scaled system of creative processes. This creativity is exhibited on many scales of nature. On the paleontological scale, it has resulted in diversity of all kinds; and on the shortest scale it gives hope of the next harvest to the faithful peasant who plants seeds. These creative processes, we can further say, are valued by humans because a creative and building nature provides

options and opportunities to fulfill human values whatever those human values are. These values emerge from the human-nature dialectic of co-evolution; they do not exist in either the humans-only world of economists or in the independent realm of non-human values envisaged by the Intrinsic Value Theorists. One way to articulate this viewpoint would be to suggest that events take on meaning only within a cultural context and that environmental values must be found woven into the experience and narratives of real people who live in real cultures.

The point of an Earth Charter should not be to tell the many peoples and cultures of the world how they should value nature; it should rather express the underlying value placed on nature's creativity and the opportunities this creativity offers humans to choose and adapt. It is this underlying creative and sustaining force that allows species to reproduce and maintain themselves, and to create new adaptive responses to changing ecophysical processes that form their environment. This value, it can be argued, exists at a deeper level than do the values of Economists and Intrinsic Value Theorists. Creativity – nature as a source – is the sine qua non for all of these, and other, more specific values.

If we were to apply this kind of thinking to biodiversity policy, we would focus on the processes that have created and sustained the species/elements that currently exist and populate the world rather than on the species/elements themselves. Indeed, emphasis on the value of creative processes in nature may go a long way toward expressing the common factor in most people's valuing of nature. When the native animist worships or respects trees or animals, it is their activity and presumed potency, their ability to affect processes that entwine with human life, that excite religious impulses. When the agriculturalist or the forester values nature, it is the ongoing processes of productivity, the ability to provide a flow of useful products, that is the essence of the value perceived. Similarly, when the Intrinsic Value Theorist says that elements of nature have intrinsic or inherent value, one might express this object-oriented statement in a more process-oriented vernacular as an insistence that there is majesty and meaning to be found in the evolving processes of life. The common element of these different object-oriented statements of value is a correspondence, in a more process-oriented vernacular, to an important aspect of nature's ability to create, and to an important human impulse to value that creativity. Similarly, it is reasonable to interpret the advocate of biodiversity protection as valuing natural processes for their capacity to maintain, support, and repair damage to its parts.

Following our excursion into foundational values, we have now circled back to the position of the adaptive managers and their concept of resilience. This concept can be thought of as a promising attempt to identify and operationalize characteristic processes of natural systems that are essential to their continued creativity. What has been added by our expansion of adaptive management to include a corrective to destructive human preferences within the management model is a capacity to close the valuational loop. It is now possible to explain why individuals who value the future –

those who are committed to living sustainably – should care about resilience. We value resilience because resilience allows a system to remain productive, to maintain structure through energy dissipation, and to heal wounds and repair stresses; these are the essential features of a system that maintains its creative force by maintaining its self-organizing, auto-poietic (literally, 'self-making') structure.

Nature's creativity is valued both in the present and for the future because it is the very basis of human opportunity. Making value analysis endogenous to policy process allows us to explain why individuals, who value natural products for personal consumption, might also come to see how certain consumptive patterns in the present – and the preferences that drive them – are inconsistent with maintaining opportunities and a range of free choices – opportunities to adapt – for future generations. Just as the smoker who realizes continued smoking is inconsistent with the value of good health, the driver might someday realize that excessive use of fossil fuels is inconsistent with maintaining opportunities for the future. It is granted that the latter case differs from the smoking case in involving also an element of altruism, but my point is that both individuals face the need to adjust their behaviors, and in doing so they will likely also alter their preferences, at least eventually. Science in both cases provides data and models that alert consumers to a conflict between their behavior in fulfilling one value and maintenance of another value. It should be possible for social scientists to model resulting changes in preferences. So I expect that cognitive psychology and related disciplines will become increasingly important as aspects of community-based adaptive management (Norton et al. 1998).

Avoiding reductionism and monism

One reason such sweeping consequences follow from rejecting the entity orientation is that, on the deeper level of persons in cultures evaluating changes in the context of that culture, monism becomes irrelevant. Since we no longer need to sort entities into those that are instrumentally and those that are inherently valued, why should we care about monism? If we reject the monistic assumption, according to which all value must be explained according to a single principle, it is possible to start from the pluralistic viewpoint that all cultures value nature and natural processes in many ways. We should, as a first step, develop a vocabulary and operational measurements that are rich enough to express these multiple values. We thus embrace pluralism as a working hypothesis, setting out to characterize and operationalize as many values and types of values as possible. This leaves, for subsequent discussion, the question whether some of these types of values can be usefully 'reduced' to other types, assuming some level of consolidation of multiple frameworks will eventually emerge. In the meantime, our evaluations are no longer constrained by the requirement that environmental values must be commensurable and measurable within a unified system of evaluation, with a single moral or evaluative 'currency'.

Rejecting the assumption of placeless evaluation

Evaluation models like Economism and Intrinsic Value Theory are constrained by their monism to express all value in a common currency, so their accounts of value tend to lose, in the process of aggregation, the place-relative knowledge and value that emerges within a specific dialectic between a human culture and its physical and ecological setting, or context. One implication of the adaptational model for understanding environmental problems is to emphasize the importance of localism; as we know from evolution, all adaptation takes place at the local level, as individuals 'experiment' with various adaptations to local conditions and survive, or fail to survive. As one relaxes the assumption that we need a single, universally aggregable accounting system for all environmental values, it becomes more possible to hear, and register, the very real concerns of local cultures trapped between the hard realities of international economic forces beyond their control, and the equally real limits and constraints that manifest themselves at the local and regional level. Localism, as a replacement for universalism, leads to an emphasis on local variation, on diversity from locale to locale and from region to region, and to many local 'senses of place', each of which expresses a unique outcome, at each particular place of the infinitely variable dialectics between local cultures and their habitats. Development and various development paths can therefore represent differing trajectories created by the nature–culture dialectic in a specific, culturally evolved place. This trajectory, given the above conceptualizations, can be measured at an economic scale, and also at the multi-generational scale required to judge the true sustainability of a culture.

Conclusion

The attempt to develop an Earth Charter, a document that expresses "the shared values of people of all races, cultures, and religions", may provide an occasion for re-examining current approaches to environmental valuation, and provide clarification of issues that form the essential cultural backdrop for developing an ethic for the practice of conservation biology. Neither the narrow, human-centered utilitarianism of Economism nor the assertion by Intrinsic Value Theorists of human-independent values in nature are able to characterize a universal value that can unite humankind behind an effort to protect biological diversity. These widely espoused, opposed theories share a set of assumptions about the nature of environmental value – monism, a sharp separation of intrinsic and instrumental values, and an object-orientation. Further, it was shown that these assumptions are highly vulnerable when examined objectively.

Adopting an attitude of skepticism toward entity-oriented concepts and the value theories of the Economists and the Intrinsic Value Theorists, we then examined in

particular the adaptive management model as a way of understanding human–nature interactions from the viewpoint of a community adapting to a larger, changing eco-physical system. This approach, it was found, provides a simple and plausible model of how environmental problems emerge at the interface of human, technological change and environmental change: collective individual choices, in response to the opportunities and constraints offered by the environment of individuals in Generation I, can change the environment so that individuals of Generation II face a less rich range of options. Thus, while all peoples must derive economic sustenance from their environment, a concern for the future demands that we also monitor the impacts of current actions on the future mix of opportunities and constraints. It is therefore reasonable for members of freedom-loving human communities to accept responsibility to maintain a non-declining set of opportunities based on possible uses of the environment for future members of their community. This responsibility is based on a sense of community with the future and on a sense of fairness – the future ought not to face, as a result of our actions today, a seriously reduced range of options and choices, as they try to adapt to the environment that they face. Acceptance of this responsibility as an important aspect of an adaptive management model, however, would require that the adaptive management model allow the reconsideration of values and preferences when evidence suggests that current values and behaviors are likely to reduce the amount of opportunities, and increase the amount of constraints, that will be faced in the future.

Building on this adaptational model, and trying to avoid reducing the many values humans derive from nature to a single type, it is possible to see that what is valued in common by persons with diverse relationships to nature is its creativity. The creativity of nature provides 'options' which are the basis for human opportunity. Here, then, we have located a level of environmental value that may be universal. If, we can avoid the assumptions – of monism, of a sharp dichotomy between intrinsic and instrumental value, and of the entity orientation – that bind Intrinsic Value Theorists and Economists in a polarized opposition, it may be possible to find, in a celebration of nature's infinite creativity, a universal value capable of supporting a truly unifying Earth Charter.

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