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Choices without Prices without Apologies*

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Valuing is usually regarded as a process of compressing information about attributes into a single metric. Armed with this reduced form of *compact* information, the consumer can consider a particular object, with a particular price attached (or implied), and make an "informed" decision. But the process of valuing is less straightforward than we ordinarily suppose. When environmental goods and services become the object of information compaction, it is possible that important information is lost. We comment on the choice problem germane to environmental goods and services and challenge the presumption that environmental choices made without explicit pricing are inferior to those in which hypothetical valuation studies are undertaken. © 1994 Academic Press, Inc.

It is no overstatement to observe that a large number of resource economists are engaged in empirical work whose purpose is to "value" parts of the natural environment. Indeed, a quick perusal of the contents of the two primary journals in which resource economists publish—*Land Economics* and the *Journal of Environmental Economics and Management*—reveals that approximately one-third of the published papers since 1990 are concerned with valuation. The Exxon Valdez oil spill appears to have further concentrated empirical work in this direction.[1] More recently, a special panel of economists, convened under the auspices of the National Oceanic and Atmospheric Administration, bestowed its considerable imprimatur on the use of the *contingent valuation method* to provide reliable estimates of natural resource damages [1].[2]

In light of the dominance of valuation studies within the profession and on the heels of this recent blessing from a few leading lights of the economics profession, there would certainly seem to be more auspicious times to demur. And yet it seems eminently reasonable—in places other than presidential addresses to professional societies—to pause and take stock. The history of science warns us that the mere

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[1] In 1990 approximately 24% of the papers in the two journals concerned valuation. By 1991 that proportion had increased to 28%. In 1992 approximately 42% of the articles in the two journals were either valuation studies or methodological treatises on valuation.

[2] The term "contingent valuation method" (CVM) refers to a range of experimental approaches intended to elicit monetized responses to hypothetical choice situations. One can immediately understand the strong affinity among practitioners for "contingent value" over "hypothetical value."

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that valuing (or pricing) of environmental goods and services is neither necessary nor sufficient for *coherent and consistent choices about the environment*.[7]

To the extent that hypothetical valuing obtains its social legitimacy (upon which its alleged "necessity" rests) from the claim that only in this way can society make economically correct decisions, then the loss of information in the process of valuing strips the final metric—the "price" or "value"—of its policy relevance by denying the legitimacy it needs. The claim of necessity in pricing must rest on the coherence of the ultimate product of valuation exercises. The lack of coherence in the resulting metric trumps the claim of necessity. The alleged sufficiency of valuation fares little better. The sufficiency claim rests on the presumption that valuation captures *all* of the information pertinent to any particular environmental choice. Most of what we will say below is directed at undermining this claim.

When pressed, many economists engaged in hypothetical valuation studies will perhaps deny that such pricing is either necessary or sufficient for informed environmental decisions. They will insist, however, that if society wishes to make "efficient" environmental choices, there is no substitute for hypothetical valuation (thereby reintroducing a modified necessity claim). The ambiguous role of efficiency in social choice has been discussed elsewhere and will not concern us here [6, 45]. Needless to say, the lesser claim for hypothetical valuation—that it infuses environmental choices with the salutary discipline of "efficiency"—is equally undermined by our thesis. After all, if hypothetical prices do not convey the information pertinent to particular choices—and we insist they do not convey that information—how can choices informed by those prices conduce to efficiency?

We base our argument on the fundamental complexity and multiple attributes of environmental goods and services. Some may object and point out that even the most ordinary commodity embodies a multitude of attributes. A loaf of bread is characterized by a constellation of calories, taste, smell, structure, and texture. There is bread for everyday use, bread for feasts, and bread for ceremonies. However, by purchasing bread on a routine basis, one learns about the relations between price and those attributes of bread considered both desirable and undesirable. Moreover, if the "wrong" choice is made on the basis of incomplete information in price, only the consumer knows of the mistake and bears its consequences.

Even with repeated transactions, there remains the problem of how consumers measure and value all of the pertinent attributes—subsequently to transform them into a single metric. The problem is, in other words, how do individuals map a multiplicity of attributes—mediated by preferences—into one measure? The verb "valuing" describes this information-processing activity in which the final product is some *reduced-form metric*. In valuing, individuals must weigh each attribute by

[7]Freeman notes: "On the basis of the familiarity and experience arguments, it appears that the CVM is likely to work best for those kinds of problems where we need it least: that is, where respondents' experience with changes in the level of the environmental good have left a record of trade-offs, substitutions, and so forth which can be the basis of econometric estimates of value. But for those problems for which we need something like the CVM most, that is, where individuals have little or no experience with different levels of the environmental good, CVM appears to be least reliable" [26, p. 160]. Freeman is arguing that in those instances where environmental goods and services are closest to ordinary commodities, hypothetical valuation is most reliable. Where the environmental good or service is not easily commoditized—say in choices concerning entire habitats or particular ecosystems—then hypothetical valuation is of dubious merit.

popularity of a particular epistemological program is not sufficient evidence of its truth content. Nor is popularity a sufficient guarantee that those in a shared pursuit will not lose sight of the larger issues at hand. Indeed, it could very well be that the considerable popularity of a particular research program serves, in a perverse way, to reduce the probability that its ultimate purpose will be kept firmly in view. The very popularity of the research program then becomes self-reinforcing and serves both to envelope an ever larger share of those who might otherwise follow different research programs,[3] and to stifle dissent out of fear of being thought out of the very broad and encompassing "mainstream."[4] Meanwhile, the research becomes ever more involuted, and it becomes easier to lose sight of why one began the journey in the first instance. If we may be permitted a nautical metaphor, a long series of technically perfect tacking maneuvers may very well deposit the fastidious crew at a destination quite devoid of virtue.

In what follows, we comment on valuation studies in the broad sense, seeking to remind economists of the need to reflect on why one began a particular journey. This is not a "review" of valuation studies in the usual sense of that term. It is, rather, about the conceptual basis for the general enterprise of environmental valuation as currently practiced.

I. ON VALUING ENVIRONMENTAL GOODS AND SERVICES

Our primary thesis here is simple: environmental goods and services embody characteristics that present serious complications when collective choices are to be made on the basis of recommendations derived from the aggregation of individual values (or prices) elicited by contingent valuation methods.[5] Efforts to derive hypothetical values for the complex and interrelated attributes of the environment, a process that compresses this complexity into a simple metric of monetary values, results in a non-trivial loss of information. We will argue here that this information loss is not randomly distributed and that therefore the process of assigning monetary values to environmental goods and services necessarily "twists" the information about their individual and collective significance.[6] So-called "contingent valuing" therefore, somewhat paradoxically, may contribute minimally—if at all—to the revelation of values. Given this, we are led to the inevitable conclusion

[3] If a large share of the profession is engaged in valuation studies, then it would seem to follow that a large share of the current graduate students majoring in resource economics are similarly engaged. The long-run implications of this are beyond the scope of the current paper.

[4] Our friends reassure us that we have scarcely been hampered by this prospect in the past, nor do they expect us to become suddenly fearful of it in the immediate future.

[5] Throughout we will use "values" and "prices" as carefully as possible to avoid confusion. Some readers will regard prices as the empirical manifestation of cleared markets, but we use the term in a more general way to connote per-unit monetary figures assigned by individuals to various parts of the ecosystem. That is, prices are the end product of a process of "valuing" by individuals who are asked to think about their value of various environmental goods and services. Their value may be in terms of what they would be willing to pay (a price), or what they might demand by way of compensation (a different price).

[6] We chose the term "twists" very carefully. Convention would suggest that terms such as "distorts" or "biases" might be used instead. We reject these latter terms because they imply knowledge of some "true" level that we do not believe is known—or knowable.

some standard and thereby compute one metric reflecting the multitude of characteristics of the object under consideration. The value measure (v^m) is the scalar product of two vectors—one describing the attributes $[a_1 \cdots a_n]$ of the commodity the person recognizes as pertinent and hence valuable and another vector describing the weighting $[w_1 \cdots w_n]$ of each attribute reflecting the individual's preferences.

Despite its formal simplicity, this computation process is difficult for most goods. Long experience is required for it to work quickly—and well. Children sent to the bakery for their first bread purchase would not find the process simple. Adults are reminded of this when they undertake the purchase of an automobile. Freeman comments on this aspect of "preference research" as the opportunity for individuals "... to modify their choices in light of what they learn about their preferences and the characteristics of goods" [26, pp. 150–151].

The calculation process may break down and give rise to information losses for three different reasons. First, losses may arise due to cognitive restrictions. This refers to the difficulty of observing and weighing attributes of the object of choice. We denote this the *cognition problem*. Second, losses will occur if different characteristics of the good are incommensurable. This property means that the chooser cannot easily map disparate attributes—via **w**—into one dimension. Moreover, if the components of **w** are regarded as orthogonal, one metric is unable to capture all relevant information. We call this the *incongruity problem*. Finally, there is the *composition problem*—the part–whole dimension. If the attributes of **a** are dynamically interrelated—either internally or with the attributes of other goods—the computation of v^m is problematical. In practical terms, information problems are created as soon as the value of one attribute depends upon the level of another. As we will see, the above points are of preeminent importance where environmental goods or services are concerned.

There is a second issue that must be addressed as well. We have in mind the important role of the context in which valuing is undertaken and choices are made. As already discussed, the attributes and qualities of goods and services are not immediately or intuitively apprehended or apparent. Preferences are not encoded in human DNA. Rather, preferences are developed or discovered as one goes about choosing. This means that the elicitation context becomes important, and the comprehension of goods and services is simultaneously attached to both vectors above.

These ideas parallel the "constructivist approach" recently suggested by Gregory *et al.* [29] and the idea of "preference researched bids" as discussed by Cummings *et al.* [13]. The issues raised in these works are focused primarily on how one might elicit values. Our concern is also directed toward the importance of preferences as social constructs—or the "social construction of reality." Societal processes form the context within which individual preferences are both developed and supported. Valuing that fails to recognize the preeminent role of context in preference formation will fail to produce coherent valuation estimates.

We will discusses our concerns about the dominant valuation approaches to collective choices by first addressing the problems related to calculating uni-dimensional value measures for environmental goods. Next we will turn to a discussion of the various contexts of valuation. We will close with the observation that choices in the realm of the environment are, to a large degree, about choosing alternative development paths.

II. THE PROCESS OF VALUE CALCULATION

As indicated above, the process of transforming a complex of relations into a single metric encounters three different problems—cognition, congruity, and composition.

A. The Cognition Problem

The process of individual valuing of goods and services entails the selective perception of certain data about the good or service and a corresponding disregard for other data. There are two issues here. First, there is the issue of observing and understanding those attributes that define a particular good or service. Environmental assets are, to a large extent, characterized by their quintessential invisibility —their *functional transparency*. This transparency creates obvious problems for the valuation process. Second, there is the problem of weighing various attributes. There is evidence that people have restricted capabilities in making *comparisons across scales*. Such discontinuities may explain several of the inconsistencies observed in the valuation literature.

1. Perception and functional transparency. While it is possible that the environmental good under consideration in hypothetical valuation may be an easily demarcated object, the environment properly comprehended consists of interrelated functions that cannot be casually isolated or separated. Here one might mention a range of services related to: (1) the support of life as we know it—exemplified by certain cycles (hydrologic cycle, carbon cycle, nitrogen cycle); (2) the role of ecological diversity; and (3) the interplay between species. As part of essential life-support mechanisms, environmental goods are developed reciprocally over an enormous time span. A continuous trial and error process has shaped a myriad of relations that can best be characterized by their *functional transparency*. Functional transparency means that the precise contribution of a functional element in the ecosystem is not known—indeed is probably unknowable—until it ceases to function. It is through failure that we learn about the critical ecosystem functions that, while working, are transparent. For instance, nitrogen cycles in wetlands are not obvious until they are destroyed and we then begin to discover the serious implications.

If we relate this to the valuation process, some important problems become apparent. First, the conventional way of learning about the attributes of a good or service—learning by doing—is difficult, not necessarily enlightening, and likely to be very risky. Second, it is indeed problematic to describe the good in such a way that the participants in hypothetical valuation studies have the same feature in mind as they reveal their bids. It is not stretching the point to say that the "resource" in question can be practically anything the respondent—or the researcher—wants it to be.

2. Valuing across scales. Not all environmental goods are characterized by transparency. For some it is their visual (or other apprehended) properties that are perceived as the most important quality. While this would seem to simplify the valuation problem, there remains the problem of weighing sets of attributes that are very different. There is now evidence that individual respondents have difficulty converting environmental goods and services into monetized units for com-

parison with other goods. More generally, individuals have difficulties making comparisons *across* different forms of *scales*. Much of the empirical evidence for this comes from the literature on preference reversals [57, 66]. In essence, the measurement procedure itself influences the resulting measurement.

A number of empirical studies illustrate this problem. One study (9) defined four different groups of students who were presented with pictures showing: (1) two conditions for a set of outdoor scenes and (2) two qualities of a set of consumer products. Each group was asked to value the change in qualities between the amenities and the commodities. Choosing four groups enabled the crossing of two response scales—rating and money—with two different measures of value—importance and willingness to pay (WTP). For the two groups asked to respond on a rating scale (from 1 to 10), the response was generally independent of the measure used. The amenity changes were rated over the commodity changes in both instances. But for those groups asked to respond in dollars, an important difference occurred. Those asked to measure on the basis of importance also gave a higher bid for the amenity changes than for changes in quality of the commodities. For those asked to use WTP as a measure, the conclusion was the opposite.

In reviewing much of the literature on these issues, Gregory *et al.* [29] argue that individuals are not accustomed to interpreting environmental goods in monetary terms. That is, the respondents' cognitive beliefs about these values are not easily quantified, especially in monetary terms. The logic of the vector approach discussed above is the presumption that individuals can make extensive comparisons across multiple dimensions. If this is not the case, the vector model offers a seriously flawed heuristic. Tversky [63] argues that it is much simpler to compare the alternatives dimension by dimension than it is to evaluate each good across all dimensions and then compare these total assessments.

We see this at work even in regular commodity markets where individuals seem to restrict their calculative comparisons to commodities embodying rather similar attributes. Choices between or among commodity groups seem, by cognitive and computational necessity, driven by other considerations. Our view is that such comparisons are driven by learned behavior over previous constellations of attributes and prices. Price-based choices—that is, decisive comparisons—are largely confined to price changes within the same general group of goods or services.

This means that price bids over goods that have never been represented in a monetary form will be plagued with randomness. Gregory *et al.* note that:

> Environmental values do not exist in any well defined, stable form. Unless the items in question are both simple and familiar—and environmental goods are neither—individuals will construct values heuristically on the basis of the format and context provided by the elicitation setting. [29, p. x]

Thus the elicitation procedure may serve as a means to *construct* preferences rather than merely uncover them.

The elicitation problems related to functional transparency, and a multitude of scales, is compounded by a limited ability to handle situations where risks are involved. Important insights in this field come from the work of Tversky and Kahneman [64].[8] While part of the problem relates to restricted calculation capacity, there is something more fundamental at work attached to the ability to handle uncertainty and the restricted possibility to build on experience. If agreed

[8] Slovic *et al.* [58] is another important reference.

rules can be developed, *learned* behavior might solve this problem. As Fishoff puts it: "Unless the correct behavior is in people's 'repertoire,' there is no way that it can be reinforced by their experience" [25, pp. 318–319]. Douglas, in commenting on the debate about bounded rationality and work by Schotter [55], argues that there exist societal processes by which individuals try to cope with novel choice problems. Contextual devices—institutions—are constructed to help people through this problem:

> Past experience is encapsulated in an institution's rule so that it acts as a guide to what to expect from the future. The more fully the institutions encode expectations, the more they put uncertainty under control, with the further effect that behavior tends to conform to the institutional matrix. [15, p. 48]

The existence of such institutions is no guarantee that they will evolve where and when they are needed. But the above reasoning turns our attention, at least partly, in directions other than the one of eliciting prices.

B. The Incongruity Problem

If different attributes of a good are incongruous—that is, attached to orthogonal dimensions—one metric (price) will be unable to capture all relevant information. The *moral aspect* of environmental choices tends to introduce one important basis for such incongruity. In the broader literature, one encounters a range of situations in which individuals are seen to act in ways that differ from the economist's perception of the comparative calculus of the margin. There are many examples where restricted trade-off possibilities alter perceptions of value. Despite differences in emphasis, Douglas [16], Douglas and Wildavsky [17], Etzioni [23], Kneese and Schulze [37], and Sagoff [53, 54] offer serious explorations of this problem.

Commitment[9] and moral judgments are concepts often attached to those domains where issues about life, quality of life, and personal integrity are at stake. These are areas where social norms restrict or reject the commodity fiction.[10] It is clear that environmental issues are dominated by a moral dimension. Edwards [19], Gregory and McDaniels [30], Harris *et al.* [35], Kahneman and Knetsch [36], Opaluch and Segerson [48], and Stevens *et al.* [60] discuss this aspect of environmental choices.

Stevens *et al.* present standard contingent valuation (CV) results from an evaluation of the importance of enhancing the survival possibilities for different species in New England. Their study shows that "existence value" was the most important reason to support habitat restoration, even for those species with an immediate "use value" (salmon). A majority of their respondents (79%) agreed with the statement that "all species of wildlife have a right to live independent of any benefit or harm to people" [60, p. 396].

Yet, when confronted with hypothetical valuation, the majority of respondents refused to pay.[11] In attempting to understand this behavior, the authors reason

[9] See Sen [56] for a development of this concept.

[10] The idea of the "commodity fiction" originated with Karl Polanyi [50]. We will elaborate this idea below.

[11] In the survey instrument, a reduction in public spending on wildlife restoration in New England was assumed. A private trust fund was therefore created to compensate for the lack of public funding. The respondents were then asked to offer their bids as a (hypothetical) payment to this fund. The authors point to the possibility that some of the reactions are due to the view that habitat restoration is a public matter and should not be handled by a private trust.

that the respondents were: "...either uncertain about their valuation, believed that wildlife should not be valued in dollar terms, or protested the donation payment vehicle. Moreover, most of those who *would pay* exhibited behavior that appears inconsistent with the neoclassical theory underlying the CVM" [p. 399]. They point out that the actual contingent valuation method may have asked people to choose between ordinary goods (income) and a moral principle. They refer to Harper [32] and to Opaluch and Segerson [48], who argue that such choices are likely to produce conflict and ambivalence, and that the resulting behavior is likely to be inconsistent with the usual preference assumptions. That is, the hypothetical valuation approach—the questions asked—does not fit the perception of those taking part in the study.

In the Stevens *et al.* survey, many respondents showed considerable uncertainty about their hypothetical valuation—a finding consistent with the current theme. Since individuals are still in the process of forming their views about environmental goods and services, there is little common understanding, and therefore a paucity of norms, regarding how such issues ought to be framed and evaluated.[12] Certainly the information offered to the respondent may heavily influence the bids.[13]

In the above study, the moral issue is related to the presumed "right" of wildlife to survive and hence the obvious impertinence of respondents being asked to pay for it individually. Environmental issues raise the question of the right to life (or to a certain quality of life) for humans as well as for wildlife—be it now or in the future. The inter-generational question is certainly at the center of this discussion, emphasizing again the moral dimension of environmental choices.

C. The Composition Problem

Finally we have the composition problem. Loomis *et al.* distinguish five components of value related to natural resources:

> ...total economic value is made up of five components: (1) onsite **recreation use** of the resource; (2) **commercial use** of the resource; (3) an **option demand** from maintaining the potential to visit the resource in the future; (4) an **existence value** derived from simply knowing the resource exists in a preserved state; and (5) a **bequest value** derived by

[12]The issue here relates to the CVM instrument in use. The NOAA panel argues that "external validation of the CV method remains an important issue. A critically important contribution could come from experiments in which state-of-the-art CV studies are employed in contexts where they can in fact be compared with 'real' behavioral willingness to pay for goods that can actually be bought and sold" [1, p. 9]. This statement reinforces a point to be made below. That is, hypothetical valuation requires that the environment be fictitiously commoditized so that hypothetical values for those fictitious commodities can then be compared to a more familiar class of commodities bought and sold on a regular basis. This is regarded by the NOAA panel as "validation." We point out that this particular procedure would "validate" only that the researcher had successfully commoditized the piece of the environment being hypothetically valued and had then presented it to respondents as sufficiently commoditized to allow its precise comparison with "regular" commodities. Note that this protocol would not validate that the hypothetical value was the true value. Validity, as any logician would remind us, says noting about truth content.

[13]Sagoff [54] addresses this issue when he raises the question about what is the right amount of information to be given in the survey experiment. That is, how much discussion, deliberation, and "learning" ought to be allowed?

individuals from knowing that future generations will be able to enjoy existence or use of a resource. [40, pp. 412–413]

These five components fit well into the standard distinction between *use values* (1 and 2) and *non-use values* (3–5), with existence value as the archetype of the latter case. It is illustrative that such a finite—and divisible—list is offered. Further, as is typical for most of the hypothetical valuation literature, there is no component directed specifically toward the *functional aspects* of environmental goods and services.[14]

Indeed, the concept of *functional value* is totally absent in a model that draws the distinction between "use" and "nonuse" value. In essence, hypothetical valuation studies have a tendency to describe environmental goods and services in a manner that renders them commodity-like. A precise valuation demands a precisely demarcated object. The essence of commodities is that conceptual and definitional boundaries can be drawn around them and property rights can then be attached—or imagined. Polanyi [50] would emphasize that what individuals and societies choose to demarcate as commodities is entirely arbitrary. Indeed, he talks of the *commodity fiction*. Polanyi suggests that as markets evolved in human history, it became necessary to regard certain aspects of reality as commodities. After all, markets can operate only where things are—by definition—commodities.[15] The commoditization of land in 17th century Europe, when brought to the Americas with immigration, profoundly clashed with the Native American's perception of land. The Native American claimed, then as now, that people belong to land, not vice versa.

For the most part, the commoditization of environmental goods can be looked upon as a product of the felt need to value them. It is not immediately obvious to many—other than economists—that environmental goods and services are "commodities." Nor is it apparent to non-economists why it is necessary to characterize environmental attributes in this way. This disciplinary need to create commodities where they may not, in fact, exist then encounters the reality that some environmental goods may be technically impossible—or perhaps prohibitively expensive—to demarcate and so to "commoditize." A fundamental danger with the commodity fiction is that the commoditized environment thereby becomes a contrived artifact of itself. The "market" exchange becomes one of trading hypothetical dollars (or even real dollars) for the hypothetical (or even real) opportunity to use the commodity for a certain period of time. The respondent is, in effect, renting parts of the ecosystem.

Denying the commodification of the environment forces one to try to comprehend environmental goods and services in a more holistic way—although economists tend to reject holism because it undermines the presumption of the analytical sufficiency of a world usefully defined as consisting of atomistic agents acting on atomistic objects. It is quite possible that much of the hostility arising in

[14]Cummings and Harrison offer their own comments on this particular classification scheme [12]. The NOAA panel uses the concept of "passive-use value" as an alternative to "non-use value." The idea of passive-use value seems close to our notion of "functional value." However, the NOAA panel still seems to use the concept within the framework of environmental goods and services as mere commodities. We differ from the NOAA panel in this important respect.

[15]By commodities we do not preclude services that are bought and sold.

the ecological community toward economics (and hypothetical valuation) rests on this aspect of holism.

Three issues arise with respect to hypothetical valuing and the problem of composition. First, in a fully functionalized system, each part must actually be as valuable as the whole, and hence the value of any single component cannot be understood—or priced—separately from its contribution to the whole. This means that the idea of continuous trade-offs among various components has nothing to offer. Tribe makes the observation:

> ... the problem ... relates not merely to undervaluing certain factors but to *reducing entire problems to terms that misstate their underlying structure*, typically collapsing into the task of maximizing some simple quantity an enterprise whose ordering principle is not one of maximization at all. [62, p. 97]

Second, ordinary commodities are characterized by their capacity to be exchanged, and their value—as measured in prices—is an exchange value. In these circumstances, the commodity represents a distinct set of attributes over which the use and enjoyment can be defined by, and controlled by, the buyer. The very process of production in an economy is one of transforming disparate factors of production (raw materials) into a constellation of attributes that, taken together, offer usefulness and so command a certain price.

With environmental goods and services this condition is not met. The value of many environmental goods and services is derived from the very act of keeping them working in their existing functional relation. Moreover, environment goods and services do not exist in discrete units:

> ... neither natural resources and environmental services as factors of production nor environmental impacts as products of economic activity come in discrete units. The assumptions of the ... [neoclassical] ... model are incongruent with the nature of the world. It is ironic that environmental problems in economics are thought of as problems of market failure rather than evidence of the applicable limits of the market model. [46, p. 160]

Third, from a systems perspective, individual components do not acquire their value from their *uniqueness to us as humans*, but rather from their *uniqueness in relation to the whole system of which they are a part*. In the standard approach to hypothetical valuation, uniqueness seems to be addressed by the concept of existence value. However, instead of capturing existence as a set of complex relations, the idea of existence value in hypothetical valuation is usually attached to discrete and demarcated segments of the environment that humans find attractive or compelling. Cummings and Harrison [12] note that it is this kind of uniqueness that actually dominates non-use values as that concept is normally used. Kahneman and Knetsch capture this notion as well when they argue that: "Indeed, the uniqueness of the valued good is the essence of existence value, as this notion has been discussed since Krutilla" [36, p. 59].

A related problem in some hypothetical valuation studies is that the spectacular or the visual tends to dominate the systemic or functional. Bald eagles and grand vistas get much more attention—and hence become more "valuable"—than an ugly fish or the muddy wetland. Lost in all of the attention to species extinction and scenic sunsets is the more fundamental question of which pieces of the environment are essential to long-run sustainability. It seems as if some have come to regard the natural environment as a large zoological garden from which we can select for policy attention those parts that happen to hold our momentary affec-

tion. But first we have to value it to reassure ourselves that the attention is warranted, or that the attention is efficient.

III. THE MULTIPLE CONTEXTS OF VALUATION

Valuation of environmental goods and services requires recognition of the multiple contexts within which individuals assign values to such goods and services. Values are context relative. There is no firm point against which one can compare different goods and services. Furthermore, individuals choose social contexts and thereby form the basis for their choices in the absence of prices.

A. Social Norms, Individual Preferences, and Individual Values

Consider first the relation between context and value. Two aspects are of relevance: (1) how the context of choice influences *individual's preferences* and (2) how the context of choice actually scales or *weighs individual values* (v^m) in the course of deriving a coherent measure (price or value) across individuals.

1. Context and individual preferences. While it is true that preferences are associated with the individual, it is also true that social processes play a major role in defining and forming those preferences. From an early age, individuals undergo the internalization of norms and values. Moreover, individual preferences undergo continual evolution as a result of implicit and explicit mechanisms of socialization and control. While Emile Durkheim [18] and Talcott Parsons [49] were among the most important contributors to a branch of literature emphasizing continuity, harmony, and solidarity, other writers have stressed differences in interests, class distinctions, and conflict in studying the evolution of norms and values [42–44].

It is clear that social norms, conventions, and shared values are necessary components in helping individuals to establish their identity in a community, to provide "reasonable" solutions in certain situations, and to structure or frame necessary choices. There is a duality here to the extent that norms both *enable* individuals to make choices, and norms *constrain* individuals in order to mediate potential conflicts [7, 23, 27]. Economists tend to overlook (or dismiss) the contextual framing of individual preferences. However, children are a *tabula rasa* and the values they acquire are the social constructs communicated to them over a range of circumstances. As new issues enter the mental stage, individuals form or solidify their "preferences" as part of the social group to which they closely relate.

From this realization, it follows that the basic challenge in environmental decision making is not measuring, say, individual willingness to pay. Rather, the challenge is one of specifying the conditions for discourse over what is worth valuing by individuals—and why that is so. To a very large extent, social context *shapes* individuals, and so environmental values in the monetary sense used here.

2. Context and the weighing of individual values. Social context determines whose interests are to count in the decision process, and to what extent. Preferences already subject to information loss in the process of revelation are once again twisted through contextual mechanisms to influence individual estimates of value (the bids in hypothetical valuation studies).

A discussion of this influence of context is, at bottom, a discussion of actual and presumed rights. The so-called Coase Theorem denies that the rights structure influences resource allocation and thus prices. But this conclusion rests on a set of strong assumptions more clearly articulated by Coase himself than by many of his more ardent followers [11, 51]. The most obvious problem here is the reality of non-zero transaction costs—without which economists would have very little to do. Further, the acceptance of the Coase Theorem as a guide to policy rests on the assumption of a population with homogeneous and homothetic preferences. Here one enters the domain of income distribution and its obvious effect on prices—be it market prices or bids in hypothetical valuation studies.

It is now well understood that certain environmental costs are not accounted for because the prevailing rights structure allows them to be disregarded. Environmental issues are precisely concerned with the status quo presumption of rights which allow certain costs to go unrecorded [5, 8]. This status quo lack of internalization is thought, by some economists, to be optimal. The logic is as follows: internalization of such external costs will occur when the costs of a change—including transaction costs—become less than the gains of internalization. Until that time, it is alleged that what exists in the status quo must be, by definition, optimal. If it were not optimal, it would change. Demsetz [14] is the most explicit in support of this definitional trick.

The danger in this line of thought, with its strong emphasis on individual bargaining within a given institutional setting, is that such logic conceals the fact that transaction costs are themselves a function of the prevailing institutional setup. That is, not only are *externalities* a function of the status quo institutions, but transaction costs that allow externalities to exist in the first instance—and persist under that most wondrous of Panglossian benedictions, Pareto irrelevant externalities—are as well. Moreover, an emphasis on individual bargaining ignores the effects related to the distribution of income and the crucial matter of whose interests are to count in the bargaining process.

An equally serious problem arises when a false picture of the institutional setup is used to justify one particular approach to the monetary valuation of environmental goods and services. The evidence is irrefutable that bids based on willingness to accept compensation (WTA) will systematically exceed—often by a large ratio—bids based on willingness to pay [4, 28, 29, 31, 38, 39, 52, 65]. After reviewing the literature, Gregory [28] concludes that the WTA measures generally seem to exceed the WTP measures by not less than a factor of three.

Several explanations come to mind. First, income effects may not always be negligible. This will certainly be the case when moral aspects of the environment comprise a non-trivial part of "well being." Second, the fundamental asymmetry between WTP and WTA arises from the fact that while WTA is unconstrained, in the eyes of the respondent, WTP will always be constrained by existing income.[16] This dimension encompasses the concept of "loss aversion." It is now well known

[16] This is seen most clearly if we consider the status of life. If a person is assumed to have no right to life, one might ask how much the person is willing to pay to secure that right. The bid will, in most instances, be high, but can be no means exceed the presumed present value of all future income. If, on the contrary, the individual is assumed to have a right to life (and not be risk loving), the individual's willingness to accept compensation for a gamble to give up that right would most probably approach infinity.

that the value function is steeper for losses than for gains [64]. This alone is sufficient to conclude that WTA will be higher than WTP for related choices. In their work on prospect theory, Tversky and Kahneman emphasize that gains and losses are evaluated—or perceived—on the basis of the status quo situation. Thus *change* from the status quo becomes the important issue, not the absolute level as in ordinary utility theory. This perspective also means that the same future state—or outcome—is valued differently depending on the nature of the existing state.

The third point concerns perceptions of the structure of actual and presumed rights. That is, differences in perceptions of gains and losses arise from differences in the presumed entitlement structure. Simply put, individuals are less inclined to give up something that they perceive to be "theirs." The presumption here is that the individual has a right to something and therefore may be disinclined to offer much in the way of WTP. On the other hand, such *endowment goods* could be expected to have a very high WTA [8, 61]. If the question of value presupposes that a person has a right to, say, clean air or water, it will be valued differently than if it is supposed that the person does not have this right. In the former case, willingness to accept compensation is the relevant approach, while in the latter setting one must inquire about willingness to pay.

Yet one often sees a distinct preference for WTP measures on the apparent ground that individuals spend their consuming life "bidding for" regular commodities. In this way, by striving to mimic the conventional market behavior of individual consumers, it is apparently thought that environmental goods and services can be made to seem like "ordinary" goods and services. But of course the moral dimension intrudes into the presumed clarity of economic choice. Individuals who imagine with some conviction that, say, their drinking water should be uncontaminated, will be expected to be unimpressed, if not irate, about having to pay to prevent it from becoming even more contaminated. They will often wonder why they should have to pay to obtain a state of nature that existed prior to the advent of chemical runoff caused by someone else. Indeed, they might legitimately wonder why they should not be asked their necessary level of compensation to evince stoicism while the contamination of groundwater continues.

Perhaps the most important point related to the issue of hypothetical valuation is the ambiguous entitlement structures associated with many environmental goods and services. As Gregory and McDaniels [30] point out, there is often a lack of distinction between compensation and purchase structures, and even if this distinction exists, it is often not supported by legal entitlements. Thus confusion may occur in hypothetical valuation studies because either the individual lacks clarity as to the actual entitlement structure or the survey instrument presumes a structure different from that presumed by the respondent. The work of Stevens *et al.* [60] illustrates this issue.

If the good or service is considered a right for the individual—we call it an *endowment good or service*—then WTA would be the proper approach if hypothetical monetary valuation is to be undertaken. But care must be taken even here. If an individual is asked to value wildlife, this may be viewed as an endowments issue —the right of a certain species to exist. But as long as this right is assumed to apply to the species itself, WTA suddenly gets a strong flavor of "bribery." The same reasoning applies to situations where the respondent finds it relevant to take the rights of other humans into consideration. But in situations like this, WTP is

not a good measure either. Perhaps the respondent is valuing both his/her own interests and those of others at the same time. Further, we have already seen that there are strong arguments against converting moral commitments into money equivalents.

These insights are helpful in explaining the different types of protest reactions observed in CV studies. Similar reasoning leads Opaluch and Grigalunas [47] to conclude that one may do better by focusing policy measures on levels of in-kind compensation through natural resource restoration than attempting to drive hypothetical monetary measures of compensation.

B. Individual Values and Social Choices

In a new domain of collective choice—and many novel issues related to the management of environmental goods and services certainly qualify as a new domain—the most basic question concerns the development of societal norms and standards. The collective choice problem is, first of all, about advancing common ways of understanding what the pertinent issues are about. Only then can we develop a basis for collective choice predicated upon the elicitation of individual choice. It is axiomatic—and also well known since Arrow's seminal work—that coherent collective choice cannot be made on the basis of some simple aggregation of individual preferences alone.

That is, because individual preferences are context relative, a fundamental problem becomes which of many "contexts" is pertinent to any particular choice problem? We can actually make a distinction between two kinds of choice processes in society. One concerns decisions from within sets of given values or constraints. The other is about choosing these sets of norms and common values [7, 24, 56]. As discussed by Elster [21, 22], reality is complicated by the interrelatedness of both kinds of choices.

In essence, individuals are both consumers and citizens [54], and environmental choices uniquely span both domains. Just as *preferences* count for consumer choice within constraints, *judgments* can be used as the driving concept for citizens choosing basic norms or modifying existing constraints. The distinction is not easily operationalized, but it is nonetheless central to the current discussion. If the choice can be categorized as a "mere" consumer choice, individual preferences and bids are relevant. If choices are about formulating common norms and values, such individual bids have little to offer. Indeed, the concern with strategic behavior in collective action arises from precisely this aspect of choice.

In addition, our approach insists that norms are *instruments* in dealing with certain complex policy issues. These norms and conventions may be understood as having a functional role—or a functional meaning—in the relation between society and, in this case, its natural environment. Douglas is a strong advocate for the view that the decisions of greatest importance are in fact institutionalized—they have a normative form. Concerning the idea of a "just" choice, she writes:

> Justice has nothing to do with isolated cases . . . individuals normally off-load such decisions on to institutions. No private ratiocination can find the answer. The most profound decisions about justice are not made by individuals as such, but by individuals within and on behalf of institutions . . . . Choosing rationally, on this argument, is not choosing intermittently among crises or private preferences, but choosing continuously among social institutions. [15, p. 124]

Here Douglas also offers a tentative answer to the question of why norms are of such importance in difficult choice settings. If we look at history, there is evidence that underlying norms, conventions, and taboos evolve in the human struggle for social order and survival [41]. Harris [33, 34] is representative of a tradition that sees the basis of such norms lying in the human struggle for mastery over the physical environment. Such norms may be purposely invented, they may have a pure functional explanation, or they may be chosen "by luck" [20].

We would emphasize that valuing environmental goods without taking into account the importance of commitments—or the value-laden character of most issues—is destined to be a biased undertaking. Issues of this kind cannot be resolved through simple aggregation of individual hypothetical bids. Rather, collective discussion is necessary to form a collective understanding and to construct a coherent *basis for choice*. There are certainly variations here, for the simple reason that some environment goods are more "commodity-like" than others. That may be the case with many recreational goods. A bid for hunting opportunities among potential hunters may be as trustworthy as any real market price. But as soon as the purview is broadened to other interests attached to, say, wildlife or certain amenities, the object of study loses its defining character as a commodity in the ordinary sense.

IV. CHOICE UNDER THE CLOUD OF IRREVERSIBILITIES

At bottom, our concern is about environmental choices in the face of the non-trivial possibility that resultant outcomes ordain a development path that is both detrimental and irreversible. Much of the literature handles this issue as a risk problem—a problem of known probabilities over a set of clearly specified outcomes.[17] However useful this mental construct may be to the empirically oriented economist, this characterization will rarely conform to reality. Because of functional transparency, the most important relations are indubitably the ones hampered by unknown probabilities—that is, by pure (Knightian) uncertainty. Since we cannot know the implications of many environmental choices, the main strategy for those not characterized as risk lovers must be to minimize the chance of loss of future opportunities. The characteristics of such a norm—or decision rule—can be illustrated by the *safe minimum standard* (SMS) of conservation [10]. It is, admittedly, a fairly coarse norm, and one developed for decisions in the realm of renewable resources with a critical zone.[18]

But even with this kind of decision rule, one is still faced with the difficult task of identifying the level of costs at which the avoidance of future opportunity losses becomes "too expensive" [3]. A determination of this level of "acceptable costs" is necessary, and it is this consideration that will lead to a preservation decision or a contrary decision. This issue can be handled in different ways.

As developed here, decisive information—or managerial wisdom—cannot be purchased through the simple act of valuing potential costs attached to different strategies. In most choices of this kind, the decision is easy if the costs of securing future opportunities can be kept low. The question of too expensive becomes of

[17] A discussion of this issue can be found in Bishop [3], Smith and Kurtilla [59], and Bishop [2].

[18] The critical zone is the level of harvest or extraction beyond which the future viability of the renewable resource is in doubt.

little importance. At the core of this problem, we encounter the search for strategies and development paths that will reduce competition between the "man-made" (internal) economy and the environment. As the problem is characterized here, this seems to be an important way of framing the question.

Ideally, if competition can be avoided, human interaction with the natural environment will not result in any lost opportunities for the future. The environmental goods and service are already "produced" and therefore offer a set—or a constellation—of possible benefits. But certainly, the realization of many benefits may block the realization of others. We cannot have both fancy resorts and undisturbed nature. Still, many uses need not entail competition—or be mutually exclusive. While competition is seldom totally avoided, many losses or risks can be reduced by bringing new options into the choice set. That is, one can search for alternative development paths, thereby reducing competition. Often the "market" is unable to bring forward such alternatives.

Examples of existing ways of increasing the choice set are multiple-use strategies securing forestry, wildlife, and recreation. Others are zoning policies where activities with positive external effects are situated together, thereby creating mutual benefits. Those examples are evident, but the idea of combined use can be fertile in a much wider range of issues such as which materials to use in production processes and which material flow patterns to develop. The perspective of deliberately seeking to establish complementarities tends to encourage thinking in "co-evolutionary" terms [46].

Framing the questions this way opens up the opportunity for important decisions to be made in the absence of guidance from prices. Our primary concern is that by advocating hypothetical valuation (pricing) of environmental goods and services—and then insisting upon benefit–cost analysis built on these hypothetical values—economists have focused analytical attention away from the broader decision strategies introduced here.

V. IMPLICATIONS

We have raised a number of concerns with the widespread practice of hypothetical valuation of environmental goods and services. To return to an earlier point, the *necessity claim* for such valuation will usually be that consistent and efficient choices demand these values (prices) so that meaningful comparisons with other alternatives—including doing nothing—can be easily undertaken.[19] But this claim of necessity must rest on clear proof that the values (prices) derived from hypothetical valuation studies capture all of the information pertinent to a particular environmental choice. In the absence of such proof, values (prices) from hypothetical valuation studies carry no more normative significance than do competing claims expressed by self-proclaimed interest groups on either side of any particular decision.

Evidence would suggest that a great many "enlightened" choices concerning the environment have been taken in the absence of pricing. Early efforts at disease control through water purification in major urban centers of Europe and America

[19]Some will even remind us of Executive Order 12291 requiring that benefits and costs be estimated for governmental regulatory actions.

certainly come to mind. Similarly, air pollution programs in these same cities did not await decisive evidence that the citizenry was prepared to pay an aggregate sum in excess of the anticipated "costs" imposed on those whose actions were to be modified.

The dedication of large tracts of the American continent as public domain lands for the eternal enjoyment of all—regardless of their economic situation—is yet another reminder of the historical irrelevance of pricing and valuing of the sort that now seems de rigueur. Recent efforts to reduce the chemical contamination of groundwater and to staunch the loss of millions of tons of valuable topsoil also suggest that collective choices about the environment need not await definitive proof that aggregated indications of willingness to pay could—if necessary—compose a sum sufficient to compensate those who imagine that they might lose something of alleged value.

Of course the complaint will be immediately offered that while indeed these programs are probably "worth it," there is no guarantee that drinking water is not now too pure, or that the air over our cities is not too clean, or that groundwater is not too clean, or that there is not too much land devoted to parks and wilderness areas.[20] We grant the point, but immediately dismiss its pertinence for the very arguments already advanced. To be less subtle, there is nothing in economics in general—or in hypothetical valuation in particular—that can address the optimal level of air or water quality, or of land devoted to parks and wilderness.

The corollary is, of course, that pricing is not sufficient to ensure informed and coherent collective choices about environmental goods and services. We raise the tyranny of the status quo. Because most environmental problems are the result of new technical information about the health effects of certain economic processes —or because the individual and collective value of many amenities is itself undergoing continual change in an evolving world—hypothetical valuing and pricing of environmental goods and services necessarily fails to provide decisive information about what is "efficient" and what is "welfare enhancing."

The collective choice problem about environmental goods and services is complex and problematical precisely because it entails aspects of our social existence that defy reduction to the venerable fiction of commodities. Efforts to redefine reality may prove useful in discussing certain aspects of environmental policy in the classroom, but it does not therefore follow that collective choices which reject the commodity fiction are ill-informed, inconsistent, or not in the interest of efficiency. The hypothetical valuation exercise may be its own reward for what it tells us about how individuals value non-ordinary aspects of their lives. But the most fundamental environmental choices will continue to be made without prices—and without apologies.

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[20]Of course, there will be those who will suggest that these foregoing comparisons ought to be the other way around—drinking water is still too impure, the air is still too dirty, soil erosion is still excessive, and too little land has been devoted to parks and wilderness areas.

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