

# INDIVIDUAL PREFERENCE-BASED VALUES AND ENVIRONMENTAL DECISION MAKING: SHOULD VALUATION HAVE ITS DAY IN COURT?

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## ABSTRACT

*The paper focuses on the question of the extent to which individual preference-based values are suitable in guiding environmental policy and damage assessment decisions. Three criteria for “suitableness” are reviewed: conceptual, moral and legal. Their discussion suggests that: (i) the concept of economic value as applied to environmental resources is a meaningful concept based on the notion of trade-off; (ii) the limitations of the moral foundations of cost-benefit analysis do not invalidate its use as a procedure for guiding environmental decision making; (iii) the input of individual preferences into damage assessment is compatible with the basic foundations of tort law; (iv) using individual preference-based methods provides incentives for efficient levels of due care; (v) determining standing is still very contentious for various categories of users as well as for aggregating non-use values. Overall, the discussion suggests that the use of*

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*preference-based approaches in both the policy and legal arenas is warranted provided that they are accurately applied, their limitations are openly acknowledged and they assume an information-providing rather than a determinative role.*

## 1. INTRODUCTION

The role of individual preferences and cost-benefit analysis (CBA) in environmental decision making has been extensively debated by economists (e.g. Kopp, 1991, 1992; Freeman, 1993), lawyers (e.g. Daum, 1993; Shavell, 1993; Boudreaux et al., 1999; Posner, 1980, 1983; Kennedy, 1981) and philosophers (e.g. Hubin, 1994; Sagoff, 1994; Dworkin, 1980; Kelman, 1981). Yet, despite the voluminous literature, the discussion remains disordered and confused. Further, though CBA has been widely used in practise (primarily in the U.S. but now increasingly in the EU as well) its actual influence on policy has been relatively limited.<sup>1</sup> Despite this limited acceptance and checkered history, the European Union is now considering a new Directive on Civil Liability that might imply bringing valuation into European courtrooms. Does this make sense? Should valuation have its day in court?

One of the reasons for the ongoing controversy over valuation and CBA within academic circles, and for the hesitancy in using CBA in the policy and legal arenas, can be traced to an entanglement of distinct issues.<sup>2</sup> For example, commentators typically confuse issues of measurement (e.g. ‘Are estimates of individual values valid?’) with conceptual issues – (e.g. ‘Is the economic concept of value coherent?’) or with moral issues (e.g. ‘Are decision makers and the courts morally obligated to consider individual preferences?’ or legal issues (e.g. ‘Do economic values adhere to the current legal framework of damages?’). It is far beyond the limits and scope of this paper to comprehensively present and review all the various aspects of the debate, and all the forms of confusion that exist. Instead the aim of this paper is to provide an eclectic survey of the issues concerning this debate. More specifically we focus on the question of the extent to which individual preference-based values are suitable in guiding policy and damage assessment decisions related to environmental resources. Three criteria for “suitableness” are reviewed here: (1) the conceptual; (2) the moral; and (3) the legal.<sup>3</sup>

The conceptual issues that are most relevant to this discussion have to do with the notion of ‘value’ as understood in economics. Within an economic context individual *preferences* over environmental goods and services are manifested through individual *choices* which in turn are used by the economist to infer individual *economic values*. Further, most economists agree that

individuals make choices from which we can infer both so-called 'use' and 'non-use values' for environmental resources.<sup>4</sup> Here we will focus on the conceptual debate relating to non-use values (see for example Quiggin, 1998, 1993). That is, is the economic concept of non-use value sufficiently coherent to be used in environmental policy and damage assessment or is it fundamentally flawed and unsuitable?

Beyond conceptual considerations the role of individual preferences in environmental decision making will be discussed on moral and legal grounds. The main question under discussion concerns whether the concept of economic value is compatible with the moral basis of environmental decision making or with the legal framework for damage assessment decisions. That is, if the concept is coherent and consistent, is it also socially acceptable and/or legally viable?

One last note on the organisation of the issues. We have intentionally left out of the discussion the issues on measurement. These refer to the general question on whether individual economic values (as expressions of the intensity of individual preference) can be validly and adequately measured. No doubt these issues are very important.<sup>5</sup> Yet, they are not the most fundamental ones. For the sake of argument the discussion that follows accepts that economic values are readily and validly measurable. Instead, we proceed with the more fundamental issues of the debate which concern the conceptual, moral and legal validity of using preferences in environmental decision making.

The organisation of the paper is as follows: The following section briefly classifies and reviews types of decision making processes in accordance with the manner and degree to which they rely on individual preferences or expert opinion. Section 3 deals with various objections that have been raised with respect to the adequacy of the concept of economic value as applied to environmental policy decisions. Section 4 turns to the fundamental moral question of whether policy makers and courts are morally obligated to utilise information from individual preference-based values. Finally Section 5 reviews some key legal issues surrounding the debate on the use of individual preference-based techniques for environmental policy and liability decisions.

## **2. CLASSIFICATION OF APPROACHES TO ENVIRONMENTAL DECISION MAKING**

One way of classifying different approaches to environmental decision making is in accordance with their degree of reliance upon individual preference-based values. All forms of decision making rely on individual preference to some extent. The major difference lies in the manner in which society (or the policy

maker or the courts) decides whose preferences matter. Some approaches rely on stakeholder groups, others on selected juries/focus groups or on large random surveys drawn from selected populations. In each case the preferences of the select group matter, but are handled in different ways. In some approaches to decision making, the preferences of the groups are supposed to determine the result of the policy or legal process, in other approaches, preferences are only part of that process. If a society moves away from other approaches to decision making and towards preference-based approaches, then it is extending and deepening its reliance upon individual preferences in environmental policy making. In this section we review possible approaches and indicate the direction of increasing reliance. Table 1 depicts a classification of various decision making methods along a 'preference reliance' spectrum. As we move from left to right along the spectrum the reliance on individual preferences and economic values in the decision making process diminishes. A brief account of these methods is presented in the following sections.

### 2.1. preference-based *Valuation Methods*

Preference-based valuation methods can be split into formal valuation methods and environmental pricing techniques.<sup>6</sup> The former are used to assess standard (neo-classical) *welfare measures* while the latter focus on market prices that are assumed to reflect economic scarcity and thus are in essence *efficiency* or *market prices*.

Valuation techniques are classified into revealed and stated preference techniques. *Revealed preference* valuation techniques (including travel costs, hedonic pricing and wage differential approaches) rely on information from individual consumption/ purchasing behaviour occurring in markets related to the environmental resource in question (surrogate markets). The price differential of the good (purchased in the surrogate market), once all other variables that affect choice apart from environmental quality have been controlled for, will reflect the purchaser's valuation of that particular level of environmental quality. These methods have the appeal of relying on actual/observed behaviour but their main fundamental drawbacks are the inability to estimate non-use values<sup>7</sup> and the dependence of the estimated values on the assumptions made on the relationship between the environmental good and the surrogate market good.<sup>8</sup> *Stated Preference* techniques (including contingent valuation, choice experiments, and contingent ranking) are used in situations where both use and non-values want to be estimated and/or when no surrogate market exists from which environmental (use) value can be deduced. These techniques use questionnaires to develop a hypothetical market through which

they elicit values (both use and non-use) for the environmental good under investigation. Stated preference techniques do not suffer from the same technical limitations as revealed preference-based approaches and can also be applied to non-use values. Yet, the hypothetical nature of the market constructed has raised numerous questions regarding the validity of the estimates (Navrud, 2000).

Table 1 then lists three categories of *environmental pricing techniques*. The first method relies on the use of market prices of directly related goods and services as surrogate values for environmental amenities. The quality of the environmental good is treated as an input into the production function of various goods and services (outputs). Changes in these environmental inputs may lead to changes in productivity or production costs which, in turn may lead to changes in prices and output levels which can be observed and quantified (Dixon et al., 1988). These approaches have been referred to as ‘dose-response’ techniques.<sup>9</sup> The second set of pricing techniques relies on data from *actual* costs of maintaining or preventing environmental degradation as a proxy for environmental value.<sup>10</sup> The third set of pricing methods is similar to above but relies on *potential* (as opposed to actual) costs as proxies for environmental value. These include methods as such ‘*shadow-project appraisal*’.

Pricing techniques have been widely used since they rely on real price data and can provide useful information for appraisal purposes. Yet they suffer from serious limitations. The dose response approaches do not account for either behavioural adaptations or price responses (Navrud, 2000) which can lead to over or underestimation of environmental damage. Potential cost approaches produce ad-hoc values that may bear little relationship to true social values. Actual and potential cost techniques disregard the benefits of change in the quality of environmental resource and only provide cost information. This is inadequate for a complete cost benefit analysis (Lovett et al., 2001).

In sum, valuation and pricing techniques both rely in individual preferences (through hypothetical or surrogate markets or through price information). Yet, the latter do not capture total social net value since they rely on price data to provide information on only the costs of environmental change. This places valuation techniques higher up the ‘preference reliance’ scale.<sup>11</sup> Also, stated preference approaches are the only methods available to capture both use and not-use values. In this respect they top the ‘preference reliance’ spectrum.

## 2.2. Participatory and or Deliberative Approaches

Participatory approaches have been suggested as an alternative decision making process that could possibly avoid some of the limitations of valuation techniques while allowing a platform for individual preferences to feed into

environmental decisions.<sup>12</sup> The citizens jury approach is one of the most explicit applications of participatory decision making processes that has been used on several occasions in the U.S. and Europe.<sup>13</sup> The approach has been modelled after the criminal law system where a “group of randomly selected citizens, when exposed to good information presented by witnesses from differing points of view, is able to make good judgements on public policy matters even though in terms of training and experience there are many people more competent than they” Crosby (1995). The citizen jury (also referred to as value juries – e.g. Brown et al. (1995) method was developed by the Jefferson Centre (in Minnesota, USA), a non-profit, non-partisan facilitation organisation. A randomly selected group of about a dozen jurors, designed to represent a microcosm of their society, is impanelled to study a specific local or regional public policy issue. The facilitating organisation develops a narrow ‘charge’, which is presented to jurors at the beginning of the process. The charge generally contains a clear statement of the problem to be addressed, often asking jurors to choose between three or four pre-selected options, and subsequent follow-up questions to consider. The jurors, who are paid for their time, participate in hearings over 4–5 days, facilitated by a neutral moderator. They hear from “witnesses” presenting a wide range of views on the issue. Jury members may question witnesses. The jurors then deliberate and issue findings and recommendations to policy makers. The process is designed, like a criminal jury, to examine a narrowly defined charge. Jurors receive limited background information and training, and the process does not promote critical inquiry into issues outside the limited mandate (Tickner & Ketelsen, 2001; Renn et al., 1995). As the decisions are made by majority vote, minority positions may not be adequately considered in the jury discourse. And, of course, currently these jury decisions have no legal weight but may or may not have a direct, formal input into the policy-making system. Indeed, the use of the term ‘jury’ is to some extent unfortunate in that it may imply a body with the power to decide a particular issue. It is both preferable and more legitimate to view such mechanisms as a method of providing information input to the policy process.

Consensus conferences and planning cells are two mechanisms that are very similar to citizen juries. They differ from the latter in that they engage citizens in examining broadly-defined questions of regional or national importance (see Diemel & Renn, 1995; Joss & Durant, 1994).<sup>14</sup>

Further scenario workshops, focus groups sessions, and other such models of deliberative decision making have been used as vehicles for goal-setting and alternative assessment. In Europe, several governments have undertaken “scenario workshops” to develop future visions for a country or region. They involve different groups (residents, government, academics, business, etc.) and

address broad questions, such as “how to develop a sustainable community” or “how to address toxic contamination.” Often goals are set and strategies are developed to achieve those goals. In the U.S., sustainable community planning exercises have been undertaken in various locations (Tickner & Ketelsen, 2001). Citizen Advisory Committees (CACs) have been used in the U.S. and Canada (since the early 1980s) to provide advice to federal, state and local government on implementing environmental law. As in citizen juries, a charge is given to the CAC (usually by the governmental agency responsible to resolving the problem at hand), yet its members are usually appointed. Members include interest groups or representatives of the constituency affected by the environmental issue. The main function of the CAC is to achieve some form of reconciliation between the participants rather than being instrumental in solving a particular problem (see Vari, 1995; Lynn & Kartez, 1995). It suffers from the ‘small numbers’ problem akin to all similar participatory methods but has the advantage of allowing public participation in a procedural stage where no preliminary decisions have been made. Thus, its scope is not restricted to the final decision but can include the definition of goals and constraints.

### *2.3. Expert-Based Approaches*

Expert-based approaches vary enormously and defy real classification. However, it is clear that they rely least on the individual preferences of those involved. Instead experts are usually thought to rely more on experience and scientific evidence to reach decisions. For these reasons, expert-based policy making falls at the end of the preference-based spectrum in Table 1 (Appendix).

Multi-Criteria Analysis (MCA) is an example of a structured decision-making approach sometimes used in expert-based decision making.<sup>15</sup> MCA requires policy makers, experts and/or stakeholders to identify a set of decision-making criteria and a scoring scale for each criterion. The various decision criteria are then weighted (alternative means of doing this are possible). The scoring of alternative environmental decision policies against the weighted criteria are then considered and the choice of the most appropriate alternative is made. MCA techniques have been more popular in European countries compared to the U.S., mainly because MCA purports to account for many policy objectives including distributional concerns which are much more stressed in European countries.

The *Delphi* technique informs policy experts by means of surveying groups of experts.<sup>16</sup> The experts are preferably selected from various fields and are typically interviewed more than once. The size of the panel varies considerably from under 10 to a few hundred. At each interview round they are presented with the evaluations of the other experts and are asked to re-assess their opinion

based on this new information. The method is used to either obtain a consensus or a characterisation of the distribution of experts' valuations. (Pearce & Mourato, 1998). The results of such an exercise provides information that can assist in ranking environmental resources (on ecological criteria) or in undertaking some form of cost-effectiveness analysis.<sup>17</sup>

In sum, expert-based decision making is grounded on many criteria, and the manner in which these criteria contribute to decision making varies in many ways as well. Hence, this approach to decision making is the least reliant upon the structured identification and application of individual preferences.

### **3. THE VALIDITY OF THE CONCEPT OF ECONOMIC VALUE**

Having described the various ways in which preferences can inform policy making, we now turn to the substantive issue of the conceptual nature of economic value. At the conceptual level the debate over the use of individual preferences in environmental decision making derives from the debate over the meaning and the validity of the concept of economic value in general, and as applied to environmental issues in particular. Comprehensive coverage of these topics can be found in Foster (1996), Crowards (1995), and Kopp (1992, 1991).

One source of confusion in the literature can be traced to the differential usage of similar terms. For economists the term 'value' has a very specific and limited meaning. For a moral philosopher, however, both individual and societal values are treated and articulated in a quite distinct way from preferences, and certainly cannot be equated in any way with preferences.

For economists, individual preferences are important in so far as they allow people to make choices over goods or more generally 'over states of the world'. The economist's definition of value is an inherently instrumentalist and anthropocentric concept that is based on the idea that people make choices under various constraints (e.g. income, time, information, etc.). Hence, economic value implies the notion of a 'trade-off': value is the 'amount' that has to be given up in order to get something else.<sup>18</sup>

In the most extreme case, critics have argued that the economic concept of value is inherently flawed when applied to environmental resources and thus should have no place in environmental decision making. The main line of attack revolves around the idea that people simply 'don't have values' for such resources in the way perceived by the economist, and that values for environmental resources cannot be defined in economic terms.

But this argument confuses different meanings of the term 'value'. Economic values are simply attributed characteristics based on (actual or stated) choices. As



Kopp (1992) points out, many critics (e.g. Gregory et al., 1991) erroneously assume that economists believe that people have values for “things.” Yet economists merely assume that people *make choices* over bundles of things and value is merely the realisation of choice, i.e. what you give up to get something else.

There is nothing in well established economic theory that limits the object of choice to physical private goods. People do make choices in everyday life that do involve trade-offs between levels of environmental quality. Using these observed choices the economists can estimate the economic value for *using* environmental resource. These estimates lead to measures of use value: values that are related to the observed uses of the services provided by natural assets.

A particular form of value that has been at the centre of much debate is the so called *non-use values* (NUVs). The general/intuitive idea of NUVs as the value associated with no direct use of an environmental resource is usually attributed to Krutilla (1967). In economic terms NUVs are best conceptualised as a form of a pure public good. (e.g. McConnell, 1983). The conception of NUV acknowledges that one’s welfare can be enhanced from a particular natural resource without engaging in any observable behaviour. Note that the economic conception of economic value does not invalidate other types or conceptions of value (see Turner, 2000 for a review of various conceptions of value). Yet, these are the discourse of other sciences. “Value pluralism” may be important but is beyond the domain of economics. It is the role of policy makers – not the economist – to rank the importance of other forms of values.

#### *Objections to the concept of economic value as applied to environmental resources*

The economic definition of environmental use values as well as the conception of NUVs as forms of pure public goods has raised various objections, the most important of which are reviewed below.

#### *‘Slippery Slope’ Argument*

Some (e.g. Rosenthal & Nelson, 1992) have argued that perceiving NUVs as pure public goods may lead to a dangerous ‘slippery slope’: almost any ‘good’ may have a public good component and by including NUVs in CBA or damage assessment the task would become daunting. We agree that in principle anything could have a pure public good component and should thus be included in any environmental decision making process. Yet this would cause problems (e.g. over estimation of damages) only if the estimates from NUVs would be *equally* large for all environmental resources (i.e. the value would not vary with the nature of the good or damage). Yet, there is no evidence that suggests that

values are in fact non-good specific and do not vary with the nature or size of the good (see Carson, 2001)

*'Complexity of the Good' Argument*

Others have used some form of the 'complexity of the good' argument (e.g. Vatn, 2000; Vatn & Bromely, 1994; Clarke et al., 2000; Green, 1997; Jacobs, 1997) which acknowledges that economic value is a valid concept but one that is *not* valid for environmental goods since these are too complex to be 'commodified'. Vatn and Bromely (1994) offer a very convincing defence of this position based on cognition, incongruity and composition problems. Yet, these arguments seem misplaced in that the economic conception of value does not 'commodify' natural resources but simply treats them as objects of choice.

*Incommensurability, incomparability and lexicographic preference arguments*

The concept of economic value has been attacked by an array of arguments claiming *incommensurability, incomparability and lexicographic preferences* (Beckerman & Pasek, 1996; Lockwood, 1999; Rekola et al., 2000; Spash, 2000, 1997). These arguments support the view that environmental resources are not proper objects of choice and cannot be used to undertake trade-offs. Related to these arguments is the claim that people's preferences over these resources may change according to whether the individual is consulted as an individual (e.g. in a CV study) or as a citizen (e.g. in a citizen jury) (Sagoff, 1994; Blamely et al., 1995; Common et al., 1997; Spash, 2000; Martinez-Alier et al., 1998; Edwards, 1992).

One of the implications of the line of reasoning found in the above arguments is that other social goods such as health or education would also not be compatible with an economic framework of choice. Yet clearly, people *do* make choices over matters of health, education and the environment however complex the nature of the choices may be. The majority of these arguments concern choices made in stated preference studies. They argue that empirical evidence from these studies suggests that people do not make trade-offs over environmental resources and thus the concept of economic value is inappropriate and unsuitable for assisting environmental policy decision. What is important to note here is that these arguments fail to demonstrate that people in *any setting* (either actual or hypothetical) do not make trade-offs over environmental resources. There is abundant *revealed* preference data where individuals make choices over environmental resources (or public goods in general) as well as data on actual consumer choices motivated by commitment

and a sense of moral responsibility (e.g. donations to charities or environmental organisations).<sup>19</sup>

Thus, the concept of economic value is a meaningful concept based on the notion of trade-off and opportunity cost. Whether such a value should be used in policy and damage assessment decisions is discussed in the following sections.

#### **4. MORAL ISSUES IN USING INDIVIDUAL PREFERENCE IN POLICY DECISIONS.**

Having touched upon the conceptual validity of the economic notion of environmental valuation we can now turn to even more fundamental levels of the debate. This concerns the debate over the moral and the legal validity of using preference-based values in policy and damage assessment respectively.<sup>20</sup> In this section we discuss whether rational and moral decision makers would or should consult an account of economic benefits and costs in the course of policy making (Randall, 2002; Copp, 1985).<sup>21</sup> Economists justify the use of cost-benefit analysis in environmental decision making on the basis of Welfarism: CBA is seen as an empirical test of whether proposed public actions would increase preference satisfaction.<sup>22</sup> The economists' argument rests on attempting to argue that welfarism is the most adequate moral theory for public decision making and that CBA is justified as the direct implementation of the 'correct' moral theory.

Most critics against individual preference-based decision making (e.g. Sagoff, Spash) focus on criticising the welfarism and consequentialism on which CBA rests. Although this is done quite successfully<sup>23</sup> they fail to realise that undermining the moral theory of a procedure does not undermine the validity or the moral relevance of the procedure itself.

Hubin (1994) argues that the *procedure* of CBA (and the use of preference-based techniques) would be justified even if there exists flaws in the underlying moral theory.

He best summarises his argument by reference to an analogy to the validity of democratic procedures. Democratic moral theory – the theory that the right action *is* just that action approved by the majority – is the moral foundation of democratic electoral procedures. Yet, philosophers since Plato have (quite easily) shown that democratic moral theory is fundamentally problematic. “But this is not concern for the democrat; she has never felt that her conviction to democratic institutions committed her to democratic moral theory. Rather, the democrat sets about justifying democracy by appeal to other more plausible moral theories. The proponent of CBA should do likewise” (Hubin, 1994, p. 177).

Hubin (1994) further demonstrates that commonly accepted moral theories (consequentialism, contractualism, deontology) would accept that information derived from preference-based approaches is morally relevant and useful. The fact that the information incorporated in a CBA is deemed morally significant and useful by most currently held moral theories does not mean that such information *is* morally relevant. Yet, Hubin argues that the currently accepted moral theories are representative of the range of plausible moral theories. That means that it is reasonable to expect that whatever moral theory turns out to be correct, it is likely to assign some positive moral value to the justification of intrinsic preferences. Therefore, it is likely to be valid to take information about the degree to which such preferences are satisfied to be morally relevant information. Hence preference-based information should be considered to be valuable inputs into public decision making processes (see also Randall, 2002).

If the information from preference-based approaches is morally relevant, then what is the appropriate role for CBA in policy making? Most economists take the more modest stance that CBA merely provides information to decision makers which is to be treated as an advisory form of input to any decision making process (e.g. Arrow et al., 1996; Kopp, 1992). The role of CBA should, thus, be seen as providing information to the decision making process and not to be determinative in its self.<sup>24</sup> Hence, individual preferences can provide input towards finding more general rules of action (heuristics) rather than determining the details of a particular decision. Alternatively, information from individual preference-based approaches can be used as a decision making method subject to constraints. For example, CBA tools can be used in so far as this use does not infringe upon a set of basic well-defined human rights. We can view the role or use of constitutions in liberal societies as embodiments of such constraints.

In sum, the inadequacy of welfarism as a moral theory does not invalidate the use of preference-based approaches (such as cost-benefit analysis) as a procedure for guiding environmental policy decisions. This limitation does imply, however, that such approaches should be confined to an 'advisory' or 'information-providing' role in environmental decision making.

## 5. SHOULD VALUATION HAVE ITS DAY IN COURT?

As set forth in the introduction, the policy issue of greatest concern here is whether it makes sense to extend the use of preference-based approaches to natural resource damage (NRD) assessment determination in Europe. That is, should valuation have its day in court in the EU, or is it a flawed approach to

public decision making in this context? Having concluded that preference-based approaches can be justified in policy making but only on limited or constrained basis, we turn now to assess what this implies regarding their use in the context of NRD assessment. As is the case in the debate on the validity of CBA tools in environmental policy decisions generally, a sizeable part of this debate concerns measurement issues (e.g. Shavell, 1993). The objections raised for the use of individual preference-based values mainly concern estimates of so called NUVs. The concerns raised are mostly the same as those found in the general debate on the validity of using stated preference techniques in CBA. Yet, there are two particular arguments raised in relation to using stated preferences estimates for damage assessment. The first concerns accuracy. Some have argued (e.g. Desvousges et al., 1993; Johnson et al., 2001) that damage assessment requires a much higher degree of accuracy than that required for CBA. Errors in welfare estimates for CBA may or may not influence realised outcomes, and realised benefit and costs are usually distributed broadly across many gainers and losers in the population. In contrast, the damages estimated for a NRD assessment may be born by a single or a few responsible parties.

The second point of concern has to do with the costs required to undertake a 'state-of-the-art' CBA. Some have argued (e.g. Shavell, 1993) that in many cases the cost of undertaking the study may exceed the damage itself and thus CBA may not pass a CBA itself!

Shavell (1993) believes that inclusion of preference-based estimates of loss would be costly and increase the bias and risks of the legal procedures, whereas exclusion would not greatly harm incentives when "the true elements of loss are not very large" (p. 379). Yet this line of reasoning breaks down if we accept that NUVs are a large component of natural resources value. Also, it tells us little about whether inclusion of preference-based values is legally justified if measurements of such values could be undertaken cheaply and accurately.

That is, the more fundamental issues with respect to using NUVs and individual preference in damage assessment are not issues of measurement but concern the problem of whether individual preference-based values are compatible with the legal framework of damage assessment. We turn now to assess these issues.

### *5.1. Is Valuation Consistent with Compensation?*

Daum (1993) examines the extent to which damages calculated using preference-based techniques correspond to ordinary legal definitions of compensable damage and loss. Daum argues that though the *ex ante* use of

preference-based values for the determination of benefits may be valuable for policy decisions, it does not follow that it is equally useful or desirable to use these methods *ex-post* for the measurement of damages. According to Daum the model of damage calculation embedded in tort law for determining compensation is not compatible with the type of damages that are derived from (stated) preference-based techniques for two reasons: first, stated preference studies are always carried out after the damage has occurred and does not reflect pre-existing values independent of the accident and of the valuation process, and second, stated preference studies simply do not estimate real economic value but something else (e.g. a sense of moral duty). The latter statement is a measurement issue and thus will not be dealt with further here. The first charge, however, is much more substantial. Economists do recognise that WTP to avoid damage is a different welfare concept than the value of damages to an environmental resource after the occurrence of harm. This simply means that stated preference techniques should be designed so as to capture the change in the value of the asset as a result of harm as opposed to estimating WTP to avoid damage. Thus, Daum's point that NUVs and stated preference techniques do not capture the appropriate concept of "compensation for loss" can be rectified by developing stated preference studies with the requirements of the legal system in mind.

Finally Daum argues that preference-based non-use values are not only incompatible with the standard legal notion of compensation but are also *unnecessary* in determining restoration levels (if that should be the prescribed remedy). Remediation of the resource can be applicable to damage to environmental resource: under such a rule the defendant would be liable for the cost of restoring the resource to its condition prior to the accident and is also liable for the interim loss in use values. And Daum concludes that the calculation of costs of restoration requires science (i.e. experts) and not individual preferences (i.e. for Daum the amount people are WTP to prevent harm to a resource has nothing to do with the actual costs of restoring that resource after it has been damaged). Yet, Daum's reasoning does not account for loss in non-use values or for situations where restoration is not feasible (irreversibilities). It also tells us very little about the determination of the type and level of restoration. A resolution of these issues is likely to require some reference to individual preferences. Therefore both compensation and remediation are likely to be consistent with the use of valuation techniques, if properly constructed and applied.

### 5.2. *Is Valuation Consistent with Incentives?*

For the *lawyer*, environmental damage cases fall into the domain of tort law in which the role of damages has a dual role: (a) to compensate the victims

for the loss suffered; and (b) to serve as an incentive for the tortfeasor to take cost-justified care to avoid damages (Brookshire & McKee, 1994). The deterrence role is usually described by reference to the so called 'Hand-rule', which provides for incentives to avoid damage to environmental assets to the point where the cost of care is equal to the expected cost of the damages. When the full amount of damages are not calculated (as in the case when NUVs are omitted), then this elementary incentive mechanism breaks down (Posner, 1970; Stephen, 1988; Hirsch, 1979).

For the *economist*, environmental damages are based on the diminished value of the services (both consumptive and non-consumptive) provided by the natural resource as a result of the harm caused. The values measured for these reductions in services represent the monetised change in individual's utility as a result of the injury to the resource. If the value of the diminished NUVs is not included in the damage award, then the award does not reflect the complete loss in monetised well-being to those members of society who benefit from the resource. The prospective efficiency of damage awards in inducing the optimal quantity of due care on the part of those undertaking risky activities rests on the damage award accurately reflecting society's loss once the accident has occurred (Kopp, 1991; Shavell, 1984, 1987). Hence setting the correct 'price' signal is crucial. Not using preference-based values would most likely under-estimate this signal (since non-use values would most likely be excluded) thus leading to inefficient levels of due care. It thus seems that the economist's rationalisation for using individual preferences is compatible with the requirement of economic efficiency.

This view has been contested by several authors mainly from the legal profession, e.g. Cummings and Harrison (1994), Daum (1993), Boudreaux et al. (1999) who question the record of success of using individual preference-based techniques to promote efficient levels of environmental protection. Yet these criticisms have almost exclusively been based on arguments that have to do with measurement issues (i.e. the totality of economic values for the environmental cannot be adequately measured) and thus do not challenge the use of valuation techniques at the legal or conceptual levels.

Even if we accept that measurements of economic values from stated or revealed preference techniques are not accurate, the use of this information is still justified if the losses avoided by such use exceed those from not using the information. Seen in this way, those who oppose the use of individual preferences in the determination of damage assessments should demonstrate that the information has no merit. Thus, utilising even imprecise information in damage assessment cases can improve the decision-making process. Skewed indicators of individual preferences can be still useful indicators, provided the

ways in which they are skewed are understood. Even prior to its repair, the Hubble telescope was apparently returning valuable information despite the distortions produced by the improper design of the telescope (Hubin, 1994, p. 185).

### 5.3. *The Debate Over Standing*

Finally, the most critical issue concerning the use of preference-based techniques in court concerns the question: “Whose preferences matter?” Though there is an extremely voluminous literature on various issues associated with estimating the (unit) value of environmental damages, there has been disproportionately less discussion on the issues of standing, that is the issues involved in determining whose preferences are to be included and whose to be excluded in a natural resource damage assessment.<sup>25,26,27</sup>

Generally, we can say that we should count whoever has suffered a *real* loss. Determining this population is relevant for both the purposes of sampling and aggregating. Sampling will produce an estimate of unit average damage. Aggregation will produce the total amount of damages. The choice of the relevant affected population will affect the estimated shape of the demand function but, more importantly, the choice of population will have an even greater effect on the estimated level of damages. Hence, if we were merely interested in unit mean values, then the problems of defining the relevant population are not so severe. Yet, in environmental damage assessment aggregate values are what matter and hence determining who should be included in the aggregation population can have profound consequences for the outcome of the litigation process.<sup>28</sup>

The economic conception of standing is much broader than the legal definition. It implies that everyone who experiences a real welfare loss should be included in the aggregation population (Whittington & Macrae, 1986). Legal standing is a much less inclusive concept and includes those individuals that can pursue a lawsuit or other cause of action against another party. When property rights are certain, determining legal standing is straight forward. Yet, in cases involving natural resource damages property rights over the resources involved are often uncertain and hence standing is far from an unambiguous matter. What must be resolved is not which individuals have experienced a welfare loss but which individuals have experienced a *compensable* welfare loss. Commentators have tried to discern the legal and economic constraints that delineate the appropriate “welfare space” for assessment of natural resource damages.<sup>29</sup> All those individuals in the appropriate welfare space that experience a loss consistent with these economic and legal requirements/constraints are to be included in aggregation. Yet, there is considerable debate on the nature



and extent of these constraints. A categorisation and clarification of some of these issues follow below. Only a selection of the issues involved is presented.<sup>30</sup> The issue of standing is still very much open both in the courts and in the academic journals.<sup>31</sup> The exposition highlights some of the misunderstandings and disagreements between economists and lawyers rather than purporting to offer a definitive resolution.

### *5.3.1. Standing and Use Values*

For the case of use values, determining the population for sampling and aggregation is less contentious. All individuals who can reasonably claim an expectation of possible or potential future use may be included in the population. There are some disagreements between the economic and legal conception of standing over certain categories of individuals such as children, 'rubberneckers' (those who go and observe damaged natural sites and clean-up/restoration operations), and tourists and foreigners (e.g. illegal aliens). Disagreement also exists over how to count individuals that claim damages when the facts (or experts) attest that there is no physical injury to the environmental site (e.g. individuals who continue not to use a damaged recreational site because they are unaware or not convinced that the site has been adequately resorted). Rulings in court cases have varied on whether and in what way preferences of such individuals are to be counted in the aggregation process. For a theoretical discussion of these issues and references to contrasting case rulings in the U.S. see Dunford et al. (1997) and Randall (1997), Whittington and Macrae (1986), Trumbull (1990), Zerbe (1991, 1998, 2001). For an exposition of how opposing parties and courts deal with such issues of standing for use values in practice see Chapman and Hanemann. (2000) who report on The American Trader Case, one of the few cases that used individual preference-based values that was not settled out of court.<sup>32</sup>

### *5.3.2. Standing and NUVs*

The issues surrounding the issue of standing for estimating unit and aggregate NUVs are much more contentious. Apart from measurement issues, the main problems of standing for non-use damages are two. The first raises concerns over the 'legitimacy' of various motivations (namely altruism and moral commitment) leading to individual NUVs while the second concerns the extent of the welfare space that defines compensable losses in non-use values.<sup>33</sup> Whilst, the criticism on the 'illegitimacy' of motives for NUV can be dismissed on grounds of misconception of modern utility theory, the issues raised as to whose non-use preferences are to be counted are much more serious. In practice the

courts in the U.S. have been inconsistent in defining the relevant population of non-users<sup>34</sup> while one of the few legal disputes in the U.K. that considered non-use values also produced conflicting results.<sup>35</sup>

The difficulties with determining the population of non-users are not confined to cases where property rights are poorly defined (for example who should have standing and who should compensate whom for loss in NUV from the extinction of a species in a habitat with open access?). Even if property rights are well defined, as is the case when the trustees act on behalf of society, the problems of defining who is included in this 'society' remain.

NUV was defined as the value one obtains from a natural resource when no present or future direct personal use is realised or intended. It is best to think of NUVs as not held over natural objects themselves but over the flows (or uses) these resources generate. Since non-use value by definition excludes personal enjoyment of these uses, it can be inferred that NUVs are derived from the knowledge that certain flows from a natural resource benefit certain other constituents (other people in the current or future generation leading to altruistic and bequest values or nature itself leading to existence and intrinsic values).<sup>36</sup> Hence, human *perception* or some *knowledge* about the resource is an important part of the definition of NUVs and has been the basis for the debate over standing.

Dunford et al. (1997) and Johnson et al. (2001) have argued that demand for knowledge about the resource and/or its injury are required for one's NUV to have legal standing. The authors acknowledge that since NUV leave a very poor behavioural trail, the courts are uncertain as to who has in fact experienced a loss in NUV (and thus who has standing) as the result of an injured natural asset. They argue, however, that observing the demand for information about the resource and/or its injury can provide a good indication as to who in fact has experienced such a loss and thus who should be compensated. They suggest using marketing questionnaire techniques (similar to those used in stated preference methods) to ascertain the percentage of people in a society (which could extend to the national level) that have some prior knowledge of the resource and some current or potential demand for information about the injury. They argue that it is only these individuals that should be granted legal standing. The rationale of the argument is that people with no prior demand for information about the resource and/or its injury in fact do not have true non-use values. That is, the lack of such demand for information tells the court something about the true preferences of these individuals. NUVs were defined as being a matter of conception and conception, their argument goes, involves some prior knowledge. Information acquisition activities involve opportunity costs are thus are indicators of one's

interest in (or intensity of and preferences for) a particular natural resource. Respondents in CV studies that have not (endogenously) acquired such information nevertheless receive (exogenous) information from the study itself. The authors in essence are claiming that expressed non-use values from individuals with no prior or no intended demand to acquire information are somehow “induced”, “constructed”, “hypothetical” or even “fictional” preferences and that the subsequent estimated losses would not have occurred if the respondent had not been sampled. The usefulness of the estimated values from such individuals for damage assessment is questionable. This raises the familiar issues of the role of information in stated preference studies.<sup>37</sup> Though the literature provides ambivalent guidance in resolving these informational issues, the crux of their arguments point to an important distinction between economic and legal standing for NUVs. The emphasis on supplying information to respondents makes sense in “traditional” non-use value studies designed to help policy makers evaluate the potential benefits of policy alternatives. These are *ex ante* studies of proposed changes and thus neither the entire number of constituents of a society nor the sample used in a stated preference study can have knowledge of the proposed changes. Further, measures of awareness and knowledge may be poor indicators of voting behaviour, regulatory mandates, or budget-allocation decisions and may have little to contribute to determining economic standing. It does not necessarily follow, however, that supplying information to respondents is also appropriate when assessing *ex post* compensation for actual welfare losses from a sample of respondents representing the general population (Dunford et al., 1997). Hence, attempts by natural resource trustees to measure aggregate losses in NUVs over informationally unrepresentative sub-samples of larger populations may be inconsistent with the *revealed* knowledge and concerns of that population (Johnson et al., 2001, p. 61).

Economists are divided over the necessity of positive (actual or potential) information demand as a precondition for real compensable losses in NUVs (e.g. see Zerbe (2001, 1998) and Randall (1997) arguing against while Moran (2000) arguing in favour of it). In the former camp there are two counter-arguments worth mentioning.

First, it has been argued that individuals have preference over *classes of environmental goods* (not particular types of environmental resource) and thus they would suffer a legitimate loss in NUV from a damage to a particular environmental asset even if they had no prior knowledge of the asset and/or the injury (Randall, 1997; Zerbe, 2001, 19??). Randall describes the existence of such preference emerging as a form of heuristic to deal with the realities of an overwhelming complex world and incomplete knowledge: people care about

Author:  
What is  
second cite  
date for  
Zerbe?

a class of things implies caring about particulars in that class. People that have such a class in their utility function once informed about the injury to a particular member of this class *may* suffer a utility loss. There are several objections to this reasoning. First, the fact that some individuals have resorted to developing such heuristics tells us something about their preferences. Second, accepting general rather than specific knowledge of environmental resource allows for the aggregation population to be overwhelmingly large. This may be reasonable for some unique natural resources but is not convincing for resources with many substitutes. Third, accepting that individuals care about *classes* of environmental resource poses problems on interpreting how people make choices over *specific* resources when asked to do so. That is, if, for example, people care about ‘all species’, on what basis can their intensity of preferences (i.e. their values) differ for one particular species to another? Would this mean that individuals would have the *same* value for *any* member of the class of resources? If not, then on what basis would these values differ other than individuals have different orderings for such specific preferences? Fourth, economists fail to appreciate/distinguish that such types of meta-preferences can allow for one to have economic but not legal standing. The purpose of damage assessment is to obtain compensation for injuries to *specific* natural resources. Thus general knowledge of ‘the environment’ is not sufficient for *legal* standing. While it may be good public policy to protect the environment (economic standing), there is no basis for crediting unaware citizens with *compensable* welfare losses (Johnson et al., 2001).<sup>38</sup>

Secondly, one may argue that prior knowledge of the resource is not required since society “owns” the resources managed by trustees (Zerbe, 1998). Yet this view ignores a crucial difference between NUVs for public resources and private property. NUVs do not exist independent of individual perception. Hence, losses in NUVs require some prior knowledge whereas losses in use values do not. Also, justifying legal standing on property rights is troublesome since property rights are often not clear (e.g. to whom do these rights extend to?).

Zerbe (2001, 1998) provides an argument similar to that found in Randall but base it in the context of rights. He argues that individuals care about environmental wealth in general and that once they are informed about the damage to a particular environmental resource they may suffer a real and legitimate loss in non-use value. He provides an interesting example of a rich individual who owns many firms which are run by managers. Though the wealthy individual does not have knowledge of his specific firms he/she would receive a legitimate welfare loss if were to find out that one of his/her enterprises went bankrupt.<sup>39</sup> There are two problems with this example: first the individual has the *private* property right over all his/her firms. The

individual receives use value from his/her wealth. Value from privately-held resources is not a matter of perception (it arises from personal benefits enjoyed by the individual) while non-use values over commonly-owned resource arise from the knowledge that certain environmental flows accrue to others. Hence, prior knowledge is a requirement for non-use values to exist *independently* of a CV study. Further, we can interpret individuals with no demand for knowledge of the resource as having 'waived' their right to the resource and thus as not having standing.

#### 5.4. Conclusion – Should Valuation have its Day in Court?

The previous sections provided a brief exposition of some legal and economic theory arguments for the inclusion of NUVs in damage assessment. It was shown that the need to include such values can be debated on both efficiency (economic) and tort law (legal) grounds. On balance there appears to be no logical or moral grounds for excluding this information, if it is used for the limited purpose of aiding improved decision making. Yet, considering the conceptual and measurement issues that have concerned many lawyers and economists, one would be enticed to ask whether these values, and NUVs in particular, are sufficiently large to necessitate their inclusion in damage assessment. If the court could somehow know a priori that the NUVs for a particular case would be small, it could avoid the complications and costs of their estimation.

For the purposes of answering this question, the literature on NUVs has emphasised the uniqueness or 'specialness' of the resource in question and the irreversibility of the loss or injury as criteria for generating large NUVs. In addition the literature suggests that NUVs may be small in cases where recovery from an injury is quick and complete, either through natural processes or via restoration acts. Yet there are problems in giving operational meaning to the idea of uniqueness. In economic terms, uniqueness would be reflected in the absence of substitutes and a low price elasticity of demand. Yet Freeman (1993) points out that there is no threshold on price elasticity that distinguishes between the presence or absence of close substitutes. Similarly, long-term injury with slow recovery (e.g. restoring a whale population) could give rise to NUVs that are of the same order of magnitude as those with irreversible injury (Freeman, 1993). These issues are not yet resolved which signifies the need for ongoing comparative research that tries to identify factors which could give a priori indications when NUVs are bound to be small.<sup>40</sup>

In sum, we believe that the input of individual preferences in damage assessment is compatible with the basic foundations of tort law since it promotes

both the compensatory and deterrent role of damages. Though the assignment of property rights that would give rise to non-use values is problematic when the environmental resources in question are privately owned, the assignment of such rights for publicly owned resources is quite sound.

## 6. CONCLUDING REMARKS

The role of individual preferences and cost-benefit analysis in environmental decision making has been extensively debated by economists, lawyers and philosophers. Yet, despite the voluminous literature, the discussion remains disordered and confused. Further, though CBA has been widely used, in practise its actual influence on policy has been relatively limited. Despite this limited acceptance and tainted history, the European Union is now considering a new Directive on Civil Liability that might imply bringing valuation into European courtrooms. The paper examined whether valuation should have a role in environmental policy and legal processes. The paper provided only an eclectic survey of the issues concerning this debate by focusing on the question of the extent to which individual preference-based values are suitable in guiding environmental policy and damage assessment decisions. Three criteria for "suitableness" were reviewed: conceptual, moral and legal.

The preceding discussion of these issues suggests that: (i) the concept of economic value as applied to environmental resources is a meaningful concept based on the notion of trade-off and opportunity cost. It was argued that a substantial portion of the criticism on the validity of the economic concept of value is ill-targeted since it is based on a misconceived understanding of the nature and scope of the concept of economic value; (ii) the limitations of the moral foundations of CBA do not invalidate its use as a procedure for guiding environmental decision making. It was further argued that individual preference-based approaches would be relevant to policy makers operating under a broad range of accepted moral theories (consequentialism, contractualism, deontology); (iii) the input of individual preferences into damage assessment is compatible with the basic foundations of tort law for determining compensation since it promotes both the compensatory and deterrent role of damages; (iv) using individual preference-based methods in damage was shown to provide incentives for efficient levels of due care; (v) the most critical issue concerning the use of preference-based techniques in court concerns the questions of standing. It was shown that determining the relevant population that has experienced a compensable welfare loss is still very contentious for various categories of users as well as for aggregating non-use values.

Overall, the discussion suggests that the use of preference-based approaches in the both policy and legal arenas is warranted provided that they are accurately applied, their limitations are openly acknowledged and they assume an information-providing rather than a determinative role.

## NOTES

1. Throughout the paper we will be referring to preference-based approaches as cost-benefit analysis (CBA). For a concise history of CBA (Pearce, 2000).

2. There are other reasons apart from disagreements or lack of proper understanding over measurement, conceptual, moral and legal issues related to the use of individual preference-based values. Scientists often feel threatened by economic estimates in that their own input or importance in the decision-making process is diminished. Also, regulators have shown antipathy towards CBA stemming from the need to avoid controversy and from the anxiety that their regulatory discretion and flexibility will be somehow diminished (Pearce, 1999). Finally, CBA has been criticised for neglecting distributional issues. Though this is partly true (see for example Zerbe, 1998, for how CBA can include distributional concerns) the fact remains that CBA fails when it comes to address issues of equity. Yet, CBA is not the only decision-making tool-kit that fails to account for multiple policy objectives (such efficiency, equity, etc.). See Section 4 on suggestions for the appropriate (albeit limited) role of CBA.

3. We acknowledge that there is considerable overlap between the three levels of the discussion (conceptual, moral and legal). Yet, the issues involved in each level are sufficiently different that a separate discussion is warranted.

4. Very roughly, the former refer to values associated with the direct in-situ use of the services provided by environmental resources (e.g. recreation) while the latter refer to individual values that are not associated with any current, potential or future personal use of any such services.

5. A striking illustration of the range of results produced by CBA techniques is given by Stirling, 1997. The author analysed over thirty published CBA studies of the external environmental costs of coal-fired power stations whose individual results were often expressed with a high degree of precision. But taken as whole, the results were so varied that they had to be expressed on a log scale table, with the highest values some 50,000 times the lowest. One message for policy makers is at least to be aware of the uncertainties involved, and to be clear about underlying assumptions.

6. For an introductory discussion of these techniques (Bateman, 1999; Freeman, 1993; Dixon et al., 1988).

7. See Larson (1992) for an alternative view.

8. See Freeman (1993) for a thorough discussion.

9. Three such techniques have been widely used: '*changes-in-productivity*' approaches where impacts on environmental quality are reflected in the changes in the productivity of the systems involved and these, in turn, are used to assign values. The physical changes in productivity (e.g. crop yield) are valued using market prices for inputs and outputs. '*Loss of earnings*' approaches measure the impacts on environmental quality from changes in human productivity. The value of lost earnings and of medical costs created from the degradation in the quality of some environmental resource (e.g. water poisoning) is used under such approaches as a proxy for environmental value.

'*Opportunity cost*' approaches are based, as the term suggests, on the concept of opportunity costs: the value of using an environmental resource for a particular purpose is approximated with the value in forgone income from alternative uses of that resource. (see Dixon et al., 1988; Freeman, 1979, for a detailed exposition of such approaches).

10. This set includes '*cost-effectiveness*' analysis where a predetermined goal or objective regarding the quality of an environmental asset is set and then the most cost effective means of achieving it are chosen and '*preventive or mitigation expenditure*' approaches where the value of an environmental recourse is approximated by the cost of the preventive measures that people are willing to pay to avoid any damage to it or from the cost savings obtained from a reduction in maintenance cycles due to reduced damage rates.

11. A substantial part of the deliberations in many environmental liability cases in the U.S. have centred around the differences between pricing/costing and valuation techniques. For example, in the American Trader oil spill case the defence brought the very concept of 'consumer surplus' into dispute and argued that reliance on existing market price and cost data would suffice for a decision on damages to be reached. (see Chapman & Hanemann, 2000, for a detailed account of these arguments between the legal defence and the economists which were acting as expert witnesses in this case). It is, thus, useful to elaborate further on why economists argue that pricing techniques do not provide adequate measures of the benefits (loss) experienced by society from reduced (increased) damage in environmental resources. Cummings (1991) has shown that the market prices used by policy makers and the courts since the 1950s in the U.S. do not reflect economic values. He argues that violations of the assumptions of perfectly competitive markets and mobility of agents are the root of the problem. Hanemann and Keeler (1995) have further shown that even without such violations, market prices fail as a measure of value for *non-marginal* changes in environmental resources. This has been understood by economists since Hotelling's (1938) exposition of how the correct measure of value for non-marginal changes in the allocation of market goods is the change in consumer surplus. This is given by the area under two relevant demand curves or equivalently by people's willingness to pay for reduced damages (or the willingness to accept to tolerate these damages). WTP to prevent damage may be larger, smaller or equal to estimates from pricing or maintenance cost techniques. For marginal changes or for goods that are perfectly divisible, market prices work adequately as measures of welfare. When one uses market prices to measure the marginal value for a divisible market good, heterogeneity in preferences becomes irrelevant, and aggregation is trivial. At the margin, all consumers who face the same price have the same marginal value, regardless of their preferences, income or other commodity or individual attribute. All that the policy maker or the courts needs to know about people's marginal value of the good is provided in the market price. There is no need for further knowledge about the actual demand curve. In addition, since all individuals have the same value at the margin, aggregation of marginal value across consumers is relatively simple. This is not so for non-divisible goods with non-marginal changes. In this case, knowledge of the demand curve is required in determining individual welfare changes and preference heterogeneity becomes important in obtaining aggregate welfare estimates. This recognition has led to an important paradigm shift which moved the central focus of valuation in economics away from market prices and towards demand curves as the core repository of value. (Hanemann & Keeler, 1995, pp. 5-6). Such curves



or functions are behavioural relations, and the key implication of the behavioural shift is that economics re-affirmed itself as not merely the study of markets but more broadly the study of human preferences and behaviour.

12. Economists have recognised some of the appealing features of these methods and are attempting to develop 'hybrid' methods that combine economic and participatory approaches. Notable examples are the Market Stall approach (Macmillan et al., 2000) and the Valuation Workshop approach (Kenyon & Hanley, 2000).

13. Examples of the use of such techniques in the United Kingdom include a 1997 citizen's jury organised by the Welsh Institute for Health and Social Care on the subject of genetic testing for common disorders in the National Health Service. Moreover, the first attempt to apply the Danish model of consensus conferences involving a cross-section of the lay public was the 1994 three day Conference on plant biotechnology organised by the Science Museum in London and funded by the Biotechnology and Biological Sciences Research Council. See Royal Commission on Environmental Pollution (1998) 21st Report Setting Environmental Standards Cm 4053 HMSO, London.

14. The lay panel in planning cells is the main actor in the process, determining the expert panel that provides the information and the questions to be asked. The process consists of three steps: education and reception of information on the topic so that the panel members can formulate specific questions to be explored; processing of information through panel discussions, hearings, and questioning of experts; and group deliberations and findings. (Dienel & Renn, 1995; Sclove & Scammel, 1999; Fixdal, 1997). The planning cell procedure draws from Multi-attribute Utility Theory to elicit values, criteria, and attributes and the assignment of relative weights to the different value dimensions. Participants are asked to rate each decision option on each criterion that they deem important. Each criterion is weighted against each other criterion resulting in a matrix of relative weights and utility measures for each option and each criterion. Both tasks (the transformation in utilities and the assignment of trade-offs) are performed individually and in small groups (Dienel & Renn, 1995). The process is facilitated by a neutral third party. Results are generally widely distributed in the media and are the basis for further local hearings. Consensus conferences generally address broader issues than normally addressed by experts, and they issue broader recommendations. A Norwegian lay panel on genetically modified foods, for example, found that such foods were not needed because the selection and quality of food was already sufficient and there was too much uncertainty about the potential impacts of these foods on health and the environment. (Tickner & Ketelsen, 2001). For a review of applications of consensus conferences and planning cells in Europe and the U.S. (Dienel & Renn, 1995).

15. See for example Nijkamp and Voodge (1984) for an introduction to MCA.

16. The technique was developed by the Rand Corporation during the 1950s and 1960s (Pearce & Mourato, 1998).

17. Kuo and Yu (1999) use the Delphi technique to assist selection of which areas to be designated as national parks in Taiwan while Macmillan et al. (1998) use this method for cost-effective analysis of woodland ecosystem restoration.

18. Money is merely used to simplify matters by providing a single metric against which all states of the world can be traded-off.

19. See Zerbe (1998, p. 425) for similar arguments against the "citizen vs. consumer" argument.

20. The separation of the discussion between the moral relevance of individual preferences for policy decisions and legal compatibility for damage assessment reflects

the general debate in the existing literature that acknowledges that individual preferences and expert opinion may have differential roles or varying degrees of validity in these two fields. This debate primarily has focused on the use of individual preferences that lead to so called non-use values for environmental resources and is summarised in Table 2. That is, though most economists would agree that inclusion of use values is equally valid for both policy and damage assessment decisions, there is no such consensus regarding NUVs.

21. Of course there are other moral issues associated with the use of CBA. For example, some ethical philosophers argue that it is morally objectionable to debase the environment and render it as 'saleable' good. The argument is associated with the other familiar arguments that environmental goods are subject to lexicographic preferences. The justification here of the 'lexical' argument is made on moral rather than conceptual grounds. This view neglects and ignores the opportunity costs involved in conserving the environment. Philosophical discussion has concerned arguments on whether and on what basis environmental resource have some superior or higher order moral status over other (public) goods that would allow for a moral justification for ignoring costs (see Randall, 2002; and Pearce, 2000 for a discussion).

22. The Potential Pareto Improvement criterion: CBA as an empirical test for PPIs. In essence PPI implements welfarism (Randall, 2002).

23. The most effective points against the moral foundations of CBA include: (a) CBA moral theory assigns a morally unjustified status to the current state of affairs; (b) it fails to accord the appropriate role to considerations of distributive justice; (c) it fails to accord the proper status to future generations and to those individual/agents (human and non-human) lacking the cognitive abilities to express WTP/WTA; and (d) CBA moral theory endorses a naive form of subjectivism (Hubin, 1994).

24. Reasons for rejecting an unrestricted/decisive role for CBA include: (a) CBA *itself* does not allow any role for side constraints on government action (e.g. CBA itself would not allow for a constitution); (b) CBA only captures economic values. Non-economic (e.g. intrinsic, non-anthropocentric values) are not captured (see Turner, 2000); (c) the reliance on WTP/WTA skews the analysis in favour of those with greater initial endowments; (d) CBA is indifferent to matters of distribution (this is a consequence of the fact the CBA is rooted in consequentialist moral theories) (Hubin, 1994). These are 'result oriented' objections to CBA (i.e. there are objections directed against the kind of choices made as a result of strict application of CBA). Yet, there may be even more fundamental 'process-oriented' objections. For example, most would object to dictatorial procedures even if they did reach the same results as democratic ones.

25. The term standing to refer to the issue of who is to be counted in CBA has been coined by Whittington, and Macrae (1986).

26. Considering that determining the relevant population determines both the estimated demand function (required to estimate unit damage values) and the subsequent estimated aggregated values such lack of comparative attention is in fact irregular. One explanation for this could be that such issues are of political or normative nature and should not be the subject matter of economics. Of course, economics and CBA is unavoidably laden with value judgements and hence such an assertion bears little weight.

27. Though the emphasis in U.S. regulation has shifted from monetary to in-kind compensation, the present discussion of standing is still relevant.

28. The Eagle Mine case is typical of the relative importance of the standing issue over the issue of estimating average unit damages. In this case the state of Colorado

sought damages for the release of hazardous substances into groundwater. What is interesting is that although both the trustees and the defendants' estimates of unit average damages coincided, their estimates of aggregate damages differed by several orders of magnitude (see Kopp & Smith, 1989 for more details).

29. The term "welfare space" is attributed to Trumbull (1990).

30. For a more comprehensive view of the debate see Dunford et al. (1997), Randall (1997), Johnson et al. (2001), Zerbe (1991, 1998, 2001) Trumbull (1990), Whittington and Macrae (1986) Kopp and Smith (1989). The discussion in these papers assume that non-use values are invariant across individuals. The issue they discuss is how to identify who has standing and then impute the same average value to the specified population. The discussion concerns "who counts" in aggregation. Yet, the issue of standing can also be viewed as a matter of degree. That is, individuals may have partial and full standing. Here the issue is "how much weight do we assign to each individual or group of individuals". Such forms of 'non-temporal discounting' can be performed using income weights, distance decay assumptions or other variables affecting WTP. For a discussion see Bateman et al. (2000), Moran, 2000, Pearce (2000), Trumbull (1990) Johnson et al. (2001), Pate and Loomis, (1997) and Sutherland and Walsh, (1985).

31. "Of all the issues of CBA few are misunderstood more", Trumbull (1990, p. 201).

32. Discussion of other natural resource cases in the U.S. can be found Brown et al. (1983), Kopp and Smith, (1993) and Ward and Duffield, (1992).

33. The issues of standing for use values (children, rubberneckers, tourists, foreigners etc.) mentioned above also apply to NUVs and become even more troublesome.

34. In the Nestucca oil spill case, for example, the populations of Washington and British Columbia were used for estimating damages, while in the case of the Exxon Valdez spill, the population of the entire United States was held to be the potentially affected population. In a more recent case, *Montrose Chemical Corp. v. Superior Court*, the Trustees defined the potentially affected population as the English-speaking households in California (Zerbe, 1998).

35. See Moran (2000) for a description of how the issue of standing over NUVs was handled in a case between Thames Water Utilities and the U.K. Environment Agency over ground water abstraction damages.

36. The concept of intrinsic value should not be interpreted as meaning the value something has in and of itself irrespective of any human 'valuer'. Such a metaphysical conception of value may have philosophical basis but is of no practical merit. That is, it is entirely irrelevant in a framework that involves making choices. Instead, intrinsic value can be interpreted in an anthropocentric manner, in that a human agent must acknowledge such a value. Hence, 'trees do have standing' if people have preference for granting such rights (on this issue see Stone, 1974).

37. For an overview of these issues see Munro and Hanley (2000), Chilton and Hutchinson (1999), Blomquist and Whitehead (1998), Blomquist and Whitehead (1998), Cameron and Englin (1997), Boyle, K. J. et al. (1995), Whitehead, and Blomquist (1991), and Bergstrom, Stoll and Randall (1990).

38. Note that there is also ample empirical evidence that WTP from non-users declines and eventually is reduced to zero when demand for information is absent. Various studies have shown that NUV have declined with distance and familiarity with the resource. See Bateman et al. (2000), Moran (2000), Pate and Loomis (1997), Smith and Desvousges (1986), Peters et al. (1995) and Sutherland and Walsh (1985).

39. Presumably the individual in the hypothetical example has inherited his/her wealth since otherwise the individual would have engaged in information acquiring information in order to build his/her fortune.

40. Meta-analytic research of existing valuation studies could be potentially useful to address these issues (see e.g. Loomis & White, 1996).

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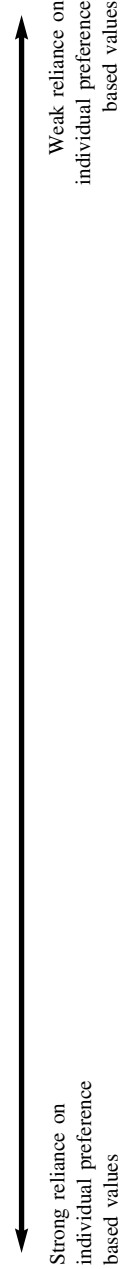
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## APPENDIX

See Table 1 on facing page and Table 2 on page 216.

**Table 1.** Spectrum of Environmental Decision Making Approaches (adopted from Dixon et al., 1988; Bateman, 1999, Navrud 2000; Renn et al., 1995; Beierle 2000; English et al., 1993; and Tickner & Ketelsen 2001).

|                        | Pricing Techniques             |  | Participatory/<br>Deliberative Approaches         |  | 'Expert'-based Methods          |
|------------------------|--------------------------------|--|---|--|---------------------------------|
| Stated Preference      | Revealed Preference            | Market prices/dose-response techniques | Value of Actual Expenditures Approaches           | Value of Potential Expenditures Approaches | 'Pure' participatory approaches |
| • Contingent Valuation | • Travel Cost Method           | • Changes in productivity approaches   | • Cost effectiveness analysis                     | • Replacement Cost approaches              | • Citizen Juries                |
| • Choice Experiments   | • Hedonic Pricing methods      | • Loss of earnings approaches          | • Preventive or mitigation expenditure approaches | • Relocation Cost approaches               | • Consensus Conferences         |
| • Contingent Ranking   | • Wage Differential approaches | • Opportunity Cost Approaches          | • Shadow-Project approaches                       | • Market Stall                             | • Focus Groups                  |
|                        |                                |  |   | • Valuation Workshops                      | • Expert Panels                 |
|                        |                                |  |   | • Multi-criteria Analysis                  | • Delphi Method                 |
|                        |                                |  |   | • Task Forces                              | • Planning Cells                |
|                        |                                |  |   | • Citizens Advisory committees             | • Scenario workshops            |
|                        |                                |  |   | • Town meetings                            |                                 |



*Table 2.* Views on the Use of NUV's CBA in Policy and Damage Assessment Decisions.

| In favour of using non-use values for CBA (policy recommendations) and legal judgements (internalising externalities). Argue in favour of the concept of non-use values | Non-use values should be used for CBA <i>but not</i> for legal settlements | Non-use values should be decomposed and only some of these sub-components can be used for CBA and/or legal settlements | Non-use values should be used in legal settlements <i>but not</i> for CBA. | Against the use of non-use values for both policy and legal recommendations. Criticise the concept of non-use values per se. |
|---|--|--|--|--|
| NOOA Panel (Arrow et al., 1993) Carson et al., 1994; Haneman, 1992; Kopp, 1991  | Desvougues et al., 1993; Shavell, 1993                                     | Milgrom, 1993; Madariaga and McConnell, 1987; Brookshire et al., 1986  | Bishop and Welsh, 1992   | Diamond and Hausman (1994)   |