Environmental Valuation in Europe

Policy Research Brief

Number 1

The Concerted Action on Environmental Valuation in Europe (EVE): An Introduction

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This policy research brief is an introduction to the Concerted Action on Environmental Valuation in Europe (EVE) based on the programme which was conceived and co-ordinated by Clive L. Spash.

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Front cover: Representation of various facets of environmental values: natural, social and monetary. Collage by C. Carter

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Overview

Valuation is part of the policy debate determining approaches to international environmental issues such as biodiversity preservation, limiting the enhanced greenhouse effect, natural capital maintenance and sustainability. It also plays a significant role at regional and national levels in justifying policy and project choices such as new road schemes, airports and power stations. The range of research currently being undertaken on environmental valuation reflects this diverse scope, with analysis from materials damage to human health to ecosystem functions and specifics from legal compensation to the philosophical definition of value and the role of environmental ethics.

This policy research brief is the first in a series relating to the EC-funded Concerted Action on Environmental Valuation in Europe (EVE). The aim here is to introduce and explain some of the key issues in environmental valuation and the approach taken by the EVE project. The EVE programme ran for 30 months from June 1998 to November 2000 and involved a core group of 14 European partners.

Environmental policy analysis requires learning from a range of specialist disciplines.

Environmental valuation has tended to be associated with attempts to make economic agents realise the full costs of the environmental damages they create, i.e. internalising externalities. In the micro-economic context various methods have been developed for use in cost-benefit analysis (CBA) with the aim of forming as well as informing environmental decisions (see pp. 7–12, Policy Research Briefs 4, 7 and 8). This has been justified theoretically in economics for small (marginal) welfare changes but has become increasingly prevalent at both the project and policy levels. In the area of macro-economics green national accounting has been described by some as a method for rectifying environmental shortcomings in measures of national income (see Policy Research Brief 9).

However, these attempts to increase the relevance of the environment in economic decisions via monetary valuation have often proven controversial. For example, one concern has been for the information loss which takes place when conducting a CBA. The type of information being condensed into a few or even a single monetary number includes: the value of life support and nutrient cycling functions of ecosystems, economic well-being and ethical behaviour (see Policy Research Briefs 3 and 4). Thus, alternative approaches such as multi-criteria analysis (see Policy Research Brief 2), adaptive management (see Policy Research Brief 5), safe minimum standards, and an array of deliberative institutions (see Policy Research Brief 10) have been advanced as methods of expressing and conveying a variety of different (incommensurable) values.

Box1: Obstacles to Interdisciplinarity

There are several aspects preventing effective discussion amongst various research groups working on environmental valuation.

- Research groups lack full information on those in other disciplines.
- Language barriers conceal research publications and reports.
- Mono-disciplinary research is promoted as more rigorous while excluding external criticisms.
- Peer review often discriminates against interdisciplinary research, especially where there may be no obvious interdisciplinary peer group.
- Funding is channelled to the tried and tested methods and research groups who conform to accepted practice; thus innovation and criticism is stifled.
- Large research centres are favoured to the exclusion of smaller groups.
- Science and technology is funded in preference to socio-economics, philosophy or the arts.
- Combining a mix of disciplines can be difficult and time consuming whereas specialising in one area has the appearance of simplicity and efficiency.
- Resource constraints in time and money limit interdisciplinary interaction.
- The body of environmental literature is growing rapidly encouraging a retreat into specialist areas.

As an essentially interdisciplinary subject, environmental policy analysis requires learning from a range of specialist disciplines (see pp. 13–14). This in turn encourages reflection upon the criticisms, problems and experience of others. A key aim of the EVE project was to question the effectiveness of methods for expressing values associated with environmental entities. An interdisciplinary approach was incorporated into the structure of EVE in order to address the variety of approaches to valuation and perspectives on the issues valuation raises.

In recognising the importance of environmental valuation, the EVE concerted action realised the need to communicate with policy-makers and user groups about the diversity of research and approaches being applied to the issue. Improved interdisciplinary communication was also seen as necessary between research groups. As Box 1 explains there are several reasons why European (and other) researchers have failed to develop this approach, for example, disciplinary and geographical boundaries. The result has been to prevent progress towards effective understanding of the role and limitations of environmental valuation methods and the variety of ways in which environmental values (both monetary and non-monetary) influence individual choice and the policy process.

Environmental Values

Under the standard economic approach to environmental valuation, emphasis is placed upon physical impacts only to the extent that they affect human welfare. Thus economic value relates to the welfare generating aspects of the environment which is seen as a commodity. This results in the source of physical changes being less important than in the natural sciences; for example, the priority is loss of tourism or new medicines rather than ecosystems or biodiversity. Human concerns about impacts may have no physical basis while still causing dramatic social, welfare and economic impacts, as demonstrated by 'food scares'. Economic valuation techniques appeal to human preferences and as a result are influenced by whatever impacts upon those preferences and ignores whatever those preferences fail to take into account.

Assessing where economic valuation techniques are regarded as being operative requires some identification of the type and range of environmental changes valuation methods are expected to address. These changes can be divided into those affecting market values, those outside normal markets but which may be assessed in monetary terms, and those values beyond economic assessment.

Market Values

Photo: C. Carter

A market exists where goods and services are traded. Standard economic models of supply and demand are then employed for policy analysis. In order to understand how a good or service will be impacted by change the connections between the environment and human culture are required. Thus some recreational activities have a market value, while others may have close market substitutes. However, in general, recreational activities involve an experience related to the quality of the environment which depends not only upon market characteristics and the availability of market substitutes, but also the value gained from participation in the activity. For example, gathering berries or wild mushrooms for recreation may be related to market substitutes but the experience of harvesting is often of more central concern in terms of the welfare gained. This means people may incur costs (in getting to and spending time conducting an activity) in excess of the market value of the harvest gathered, because the experience is valued in itself.

Photo: C.L. Spash

Non-Market Values

Non-market values relate to a variety of environmental characteristics including aesthetics, cultural heritage, health and safety, peace and quiet, water and air quality, ecosystems functions and biodiversity. For example, several attempts have been made to value aesthetics. The aesthetic appeal of a given environment or site involves the subjective perception of what is beautiful or stimulates the emotions. However, relating aesthetics to the type and quantity of individual landscape features is difficult, if not impossible. Questions can also be raised as to the relevance of a current aesthetic preference. That is, some landscapes may be regarded as worthy of preservation for the values they encapsulate and therefore should be removed from the vagaries of consumer choice, fashions and fads. This is certainly one of the principles underlying the foundation and spread of national parks and protected conservation zones.

Intrinsic Value in Nature

This category of values is by definition beyond any economic calculus. Hence the extent to which economic techniques can achieve a comprehensive valuation of environmental change is limited. Intrinsic values are related to non-consequentialist and therefore non-utilitarian aspects of the environment. For example, a species may be valued as a food source and because it is beautiful, but it may also be valued separately from all uses or good consequences for humans. This could be apparent as an expression of the rights of animals to welfare or the rights of humans to life (see Policy Research Brief 4).

Intrinsic values may be regarded as non-compensatory choices. An individual may refuse compensation for the loss of one good by increases in the quantity of another, no matter how small the former or how large the latter. The refusal to trade becomes particularly relevant when disruption of the environment affects such things as human health, animal welfare and ecosystems functioning and structure. Studies show a significant proportion of respondents to valuation surveys on biodiversity and wildlife rejecting the economic logic that all things are tradable (Spash 2000b).

Monetary Valuation: Progress and Problems

Economic valuation methods have been employed to assess whether project and policy costs are justified in terms of their benefits. This approach has been extended to include environmental gains and losses in monetary terms. The concern of those practising CBA has been for improving the internal validity of such methods by trying to identify sources of bias and ways in which monetary estimates might be influenced by the analyst. However, the topic of environmental values spreads far beyond the scope of standard micro-economic models of welfare upon which CBA depends for its theoretical justification.

The topic of environmental values spreads far beyond the scope of standard micro-economic models of welfare.

This section summarises the principal methods used in CBA: the travel cost method, hedonic pricing, production function analysis and the contingent valuation method. The first three produce monetary price equivalents related to observed behaviour, normally from secondary data (i.e. information gathered for other purposes). The resulting values represent direct use of the environment for personal gain. The fourth method is a direct survey approach for assessing trade-offs of money for environmental changes and so collects primary data. This technique is able to assess passive or indirect use values as well as the direct use values relating to environmental entities. Such passive uses include maintaining the option of future use (option value), preserving an entity for future generations (bequest value) and pay to maintain the existence of an entity for its own sake (existence value). All the tools have their own problems and limitations (see Hanley and Spash 1993 for further details) and therefore demand prudent use in any policy context.

Preferences from Observed Behaviour

The **Travel Cost Method (TCM)** is predominantly applied to outdoor recreation modelling. The approach uses the costs of consumption behaviour in markets related to a recreational activity. For example, to evaluate recreational fishing a TCM survey would typically gather information on travel costs, license fees, on-site expenses and capital expenditure on fishing equipment. Varying such costs and predicting fishing

activity can then be used to derive surrogate demand functions for fishing at a specific location. TCM is normally applied to site-specific locations and the cost of travel tends to be road-based, via cars.

Basic problems are: (i) whether to measure visits from a given geographical zone or the number of visits made on an individual basis; (ii) how to treat visits to other sites, (iii) deciding the treatment of costs (e.g. only use petrol costs or also sunk costs), and (iv) statistical problems. Another more general problem is the extent to which aggregating preferences reflects the type and range of values of concern. For example, the closer an ecosystem is to large human settlements the more there are likely to be frequent visitors and hence a larger aggregate monetary value may be calculated as being associated with the site. In the extreme a wilderness area which restricted all access would be regarded as having no value under the TCM. Thus, contrary to a criterion of environmental prioritisation based upon the pristine or virgin status or biodiversity of an ecosystem, an altered and ecologically degraded site can appear socially preferable (e.g. a city park) and of more value under the TCM.

In general, the site characteristics valued by TCM are only those recognised by visitors as important. This means, if visitors fail to recognise the importance or even existence of a characteristic of a site (e.g. biodiversity) then this characteristic will be absent from the valuation via TCM. In particular, genetic diversity and ecosystem functions are unlikely to form part of site values.

The **Production Function Approach (PFA)** generally uses scientific knowledge on cause–effect or dose–response relationships, i.e. the relationship between environmental quality variables and the output level of a marketed commodity. This method has been popular in studying air pollution impacts on marketed goods (such as agricultural crops or fisheries). Assessing the gain or loss of benefits resulting from an environmental quality change requires the analysis of biological processes and technical possibilities, linking their interactions with producer decisions and the effect of resulting production changes on consumer and producer welfare. However, regionally or locally disaggregated data on environmental quality changes are normally unavailable. Also, there are few well-established economic models available to easily assess consumer and producer welfare. In their absence the analyst must construct a model and test its validity. Thus, applications have been limited by the availability of existing scientific information on dose-response functions and appropriate economic models.

Hedonic Pricing (HP) has been applied in labour and housing markets where environmental risks are internalised in the wage rate and house price respectively. Aspects of the environment are one of the characteristics which contribute to the

definition of the commodity which a particular house and location represent. Thus, proximity to clean water and air, recreational opportunities, peace and quiet can all be expected to be factors increasing prices of housing in certain markets. Conversely, the existence of intensive land use, air pollution, or noise may reduce the price of housing in the vicinity. Finding suitable variables to measure environmental quality attributes can be problematic.

The theoretical assumptions underlying HP mean it will give inaccurate estimates of environmental externalities if buyers lack perfect information about relevant environmental quality variables, or they are unable to attain their utility maximising position, or the housing market is in disequilibrium (all of which tend to be the case). HP requires weak complementarity which means only those environmental externalities that have an impact on the property market will be measured.

Preferences from Stated Behaviour

The advantage attributed to methods such as TCM and HP is that they relate to actual behaviour, but the links being drawn between observational data and the underlying motives are often weak or purely speculative. This suggests the need for economists to pay far more attention to motives for behaviour, whether intended or actual. Stated preference methods directly survey individuals to obtain their preferences rather than analysing their actual behaviour. Research collecting primary data on intended behaviour is common in other social sciences and the conditions for convergence with actual behaviour have been studied extensively, for example, in social psychology (Spash 2000a). The contingent valuation method (CVM) is the principal stated preference method although both conjoint analysis (CA) and choice experiments (CEs) have received some recent attention.

Conjoint Analysis (CA) uses a survey to make participants trade-off money for an environmental commodity whose attributes are hypothesised to alter marginally. CA has been used extensively in the marketing literature to infer implicit weights for each attribute of a multi-attribute commodity. Under CA the respondent is asked to rank commodities or options which have varying characteristics or attributes. This involves choosing both relative rankings of commodities and ratings for each commodity. Responses can be obtained by either multiple ranking or binary choice. Binary choice CA is almost identical to dichotomous choice CVM, and they share the same problems: choice of bid price, selection of functional form (linear *versus* non-linear), and utility consistent specification. The advantage of CA is the potential to vary commodity characteristics and, by including price as an attribute, derive implicit prices for each. The potential to disaggregate costs and benefits in this way is one of the principal

attractions of CA. However, CA assumes cardinal preferences which is in contrast to modern welfare economics. Although ordinal preferences should be obtainable from CA, in practice statistical variations across ratings differences, rankings and binary choice models prevent transition to ordinal preferences. CA also fails to request an explicit entry into the market trade-off scenario, unlike CVM which requests acceptance of a bid. This problem might be rectified for use values by the inclusion of a contingent-behaviour question but because of this, CA is of particularly limited application for the assessment of passive use values.

Choice Experiments (CEs) arose from CA. Instead of rating or ranking alternatives as in CA, in CEs individuals are asked to choose from several bundles of goods or services. Hence CEs are consistent with random utility theory. CEs examine values for attributes and their levels, as well as a precise scenario. However, CE studies require much effort in the design stage (several methodological issues remaining unresolved) and in their administration, especially the development of the relevant scenarios and their attributes, and the statistical design. Statistical analysis under CA and CE can often be opaque with results appearing from a black box of mathematical calculations.

Oiled Guillemot *(Uria aalge)* on shore stretching its wings. This one was lucky to survive an oil spill – unlike thousands of other seabirds and marine life.

Mike Richards (RSPB Images)

The **Contingent Valuation Method (CVM)** has received considerable attention with over 1000 academic journal articles on the subject. Its main advantage is the ability to estimate 'existence' and 'bequest' values in addition to direct use values. The combination of these indirect or passive use values can be large compared to the direct use values associated with non-market goods. The more extensive range of CVM has made it the most widely used and controversial method. Box 2 explains how the development of CVM has been stimulated by legal action.

There are several stages to conducting a CVM study. In particular, application of the technique requires careful survey design, awareness of potential biases and a decision on whether to use willingness to pay (WTP) or willingness to accept (WTA).

- **Survey design** requires decisions about the amount, type and method of presenting information. Improving the knowledge of an individual concerning the characteristics of a commodity is regarded as informing a consumption decision. Information which alters the preferences is more problematic in the neo-classical framework and regarded as creating a bias. There is a wide body of evidence to suggest that survey design can affect responses. Survey design requires framing a realistic decision concerning the environment where the monetary question to be asked is accepted as a possible state of the world in which individual respondents might find themselves.

Major controversy has surrounded the choice between WTP or WTA welfare measures. WTP has generally been found to be significantly lower than stated WTA. Following a generic prescription to always use WTP formats as a 'conservative estimate' of values often conflicts with prevailing property rights (see Box 2). This reinforces the theoretical argument for using WTA to measure a loss and WTP for a gain (Knetsch 1994, see also Policy Research Brief 4). However, the social and ethical norms prevalent in a given situation are more appropriate as guidance because of the susceptibility of property rights to manipulation by vested interests and a *status quo* in the maintenance of political power. Thus, neither universal application of WTP formats nor the prevailing (and potentially unjust) property rights are recommended, but rather context specific measures based upon social and ethical norms (see also Policy Research Brief 6).

- The **main survey** can use several variations. The in-house interview is now most favoured, although the expense of this approach often means surveys are completed in the street, by telephone interview or mail. The sample is often weighted in terms of the local or regional population which is seen as politically more important to the decision and likely to have strong direct economic connections to the outcome.

  When estimating WTP and/or WTA, typically, median bids are less than mean bids so both are reported. At this stage the treatment of 'protest bids' becomes problematic and these are often omitted from the mean calculation. Protest bids are zero bids given for reasons other than a zero value being placed on the environmental change in question (e.g. if a respondent refuses any amount of compensation for loss of an environmental asset which they feel should be protected at all costs; or they reject the survey as an institutional approach to the problem or because they have an ethical objection to the trade-off being requested).

- The method of **aggregating data**, both across time and space, requires deciding on the relevant population, the method of aggregation, and the time period or discounting procedure for aggregation. These are major concerns in CBA and have

Box 2: Damages and Compensation

CVM was given considerable force by its adoption in the United States as legal evidence in compensation cases for natural resource damages. The Exxon Valdez oil spill, March 1989, led to extensive CVM studies being conducted and in effect placed the method itself on trial. An out of court settlement (in the order of $1 billion) prevented such a public judgement. Instead the National Oceanic and Atmospheric Administration (NOAA) set up an expert panel including Nobel economists from each side of the litigation (Arrow for Exxon and Solow for Alaska). This NOAA Panel set down rules for the conduct of CVM studies which have been adopted by many in Europe as an 'industry standard'. However, the rules remain controversial, e.g. the rejection of questions on individual compensation for resource damages in preference for payment to reduce damages (the theoretically incorrect measure). An unjustified preference of the panel was for 'conservative' values, which seems to mean underestimating environmental values by as much as possible. The desire for under-valuation seems to reflect political as opposed to theoretical limitations. In Europe the question of compensation may be given added emphasis by the EU Directive on environmental liability. The White Paper refers approvingly to 'economic valuation methods' for valuing environmental damages and CVM would then come to the fore.

Box 3: The Largest UK CVM Study

In 1999 the largest CVM survey ever conducted in the UK (total sample size 10,650) was completed to provide evidence for a possible aggregates tax. Monetary estimates of environmental damages were obtained on the advice of a CVM expert panel using 'an approach that is more likely to produce conservative results' (p.12). Amongst the 'conservative' design aspects was the incorrect welfare measure for local damages (i.e. WTP instead of WTA) and aggregation of the final results using a 25% discount rate with no sensitivity analysis.

Department of the Environment Transport and the Regions (1999) *The Environmental Costs and Benefits of the Supply of Aggregates: Phase 2.* London, Department of the Environment Transport and the Regions, 208pp.

serious impacts on any resulting monetary values. The sensitivity of the results to variations in such factors should be tested and presented as a central aspect of the findings; however, this is rarely the case (see Box 3).

A further area of controversy is 'part-whole bias', also termed embedding, which arises when the component parts are evaluated by an individual separately and when summed found to exceed the valuation placed upon the whole. Various CVM studies have found embedding and this has been attributed by some to valuation of the moral satisfaction from contributing to a worthy cause ('warm glow') rather than the provision of a commodity itself. The counter reaction has been that CVM surveys finding embedding are flawed in some way which creates the part-whole bias, and that this can be corrected by careful survey design. However, experimental evidence for the existence of part-whole bias for private goods outside of the CVM context implies the problem lies with economic preference theory rather than CVM (see Bateman *et al.* 1997).

Is Cost Analysis an Effective Alternative?

Critics of CBA often advocate avoiding benefit assessment altogether by concentrating on costs alone. Cost-effectiveness analysis is then regarded as an alternative approach. However, costs are assessable with the same set of tools as benefits, require the same process of monetary valuation and have the same theoretical underpinnings. Whether an environmental change is regarded as a cost or a benefit is in fact determined by the definition of the *status quo* position. For example, a tax on petrol to reduce car use would simultaneously reduce many other negative externalities which must be accounted for as a reduction in control costs, i.e. a benefit of the control decision. In this way the benefits associated with, say, tropospheric ozone control become part of the cost-effectiveness calculation. Alternatively, greenhouse gas control might require the planting of more forests, and preservation of old growth forests, which store terrestrial carbon stocks. If forests are 'managed' to reduce emissions, this implies associated impacts upon related goods and services; the 'products' of interest to humans in this case include recreation, wildlife conservation and biodiversity. These 'products' are the same environmental entities which cost-effectiveness is apparently supposed to avoid putting into monetary terms. In short, cost-effectiveness is a constrained CBA and can face many of the same problems. In the case of complex environmental issues a reduced cost under one policy will be a benefit under another.

Expanding Perspectives

Environmental economics and the emphasis it places on CBA can be seen as a first step towards the inclusion of environmental concerns expressed in the natural sciences. The formation of this sub-discipline can be viewed as centring upon the extension of externality theory and attempts to incorporate the laws of thermodynamics. This initial development phase, during the late 1960s, was one in which other disciplines (mainly physical sciences) were looked upon as important indicators of where economic models might be regarded as inadequate. In the following thirty years, the initial outward looking perspective gave way to wholesale adoption of standard neo-classical models. While this led to broad acceptance of the sub-discipline, the concentration on internal validation of methods and models has neglected lessons from other disciplines.

The treatment of Nature in standard economic theory has followed the route of regarding all aspects as a machine. This approach presumes unchanging parts and relations between them allowing knowledge to be treated as universally applicable over space and time, for example, as suggested under benefit transfer. Variations in natural and social systems are then regarded as due to differences in the proportions of parts and the strength of relations, rather than being an indication of fundamental differences. "Thus, the idea of underlying universal truths could be maintained across diverse environments and cultures" (Norgaard 1994, p. 67). On this basis policy questions are formulated so as to be resolved by positive scientific and economic analysis. Unfortunately, socio-economic problems and evolving systems deviate strongly from this mechanistic characterisation. A variety of perspectives can help enlighten the search for better approaches to valuation, including ecology, moral philosophy, law and political science.

An Ecological Perspective on Economics

Ecological economics appeared in the 1990s as a new perspective, but is in some respects a return to an earlier debate in environmental economics (see Spash 1999). That is, ecological economics has shown a primary concern for external criticisms of economics and how they can be addressed. Thermodynamics, for example, re-emerged as being relevant to economics. Yet the new combination of ecology with economics has also raised previously neglected issues, such as the importance of ecosystems functions, resilience and far from equilibrium systems.

Ecologists have been concerned to see economists learn from their experience and the accumulated body of evidence from natural, disturbed and managed ecosystems. In particular, Holling *et al.* (1995) identified four key features common to the function and structure of many ecosystems, which economists should bring into their subject. Their points can be summarised as follows:

- Ecosystem change is episodic rather than continuous and gradual. For example, uncommon events (such as hurricanes) can unpredictably reshape structure at critical times or in vulnerable locations.
- Scaling up from small to large is a non-linear process. Thus, spatial attributes vary with scale rather than being uniform.
- Ecosystems can exhibit multiple equilibria, or absence of equilibria and can be destabilised by forces far from equilibria. The movement between such states maintains structure and diversity. This contrasts with the conception of ecosystems as single equilibrium systems with functions operating to maintain a stable state.
- Ecosystems have multiple features, which are uncertain and unpredictable. This requires management and policies to be flexible, adaptive and experimental at scales compatible with those of critical ecosystem functions.

These points raise fundamental problems for the use of tools grounded in neo-classical economic theory which assumes continuous functions and perfect information.

Environmental Ethics

Besides the ecological critique, another disciplinary perspective on environmental valuation in recent years has been from philosophy with the development of environmental ethics. This has raised methodological issues as a priority and shown the potential for rethinking economic problems. Philosophers have raised the subject of intrinsic values and this has brought an as yet unresolved problem into the economics literature on valuation. There is evidently scope for economists to learn more about the concepts of value. Existence value itself is poorly defined in economics and raises a range of considerations about the theoretical limits of CBA. Such issues have been explored in the journal *Environmental Values*.

Environmental Law and Political Science

As has been mentioned, CVM has played a prominent role in extending the range and type of values economists have attempted to put into monetary terms. The potential importance of CVM for decisions in legal cases on damage compensation (see Box 2) has firmly placed environmental economics and law together in the context of valuation. Environmental law has also been seen as providing potential decision-making alternatives to CBA. The range of models includes citizens' juries (being used in the UK in the area of health and environmental policy) and environmental courts (as used in New Zealand). Such methods are discussed in political science as having the potential to allow ethical perspectives to be articulated as part of a policy process. This also means that the traditional model of decision-making needs to be reconsidered.

Underlying Themes

Theory formation, information development, and empirical analysis are inter-dependent and interactive. Theories need to be adjusted based on empirical findings and measurements. Therefore, the feedback loops must be addressed more explicitly along with the methods of measuring and developing information in theoretical models.

As is apparent, both economists and non-economists have become discontent with the current approach to economic valuation. One proposed solution is to add 'new auxiliary hypotheses', or concepts. However, results have usually been inconsistent with the basic assumptions of the neo-classical economic model (e.g. lexicographic preferences, embedding). Alternatively, environmental valuation could be dismissed outright as non-economic requiring that the assumptions and problems be made explicit to provide a better understanding of the boundaries. A third alternative is to use observations to produce a 'better theory' of preference formation and choice.

In order to probe these issues three underlying themes were chosen for debate under EVE, i.e. theoretical issues which were judged to be at the core of environmental valuation (see Box 4).

Choice and Decision-Making

Economics uses a model of the individual making rational choices about consuming goods and services in an internally consistent way. However, if some of the assumptions are altered, the model loses applicability. Models may also become more important than observed reality. Thus, while a map can be a useful tool for navigation, confusing a 'map' with the actual 'territory' is far from

Box 4: Underlying Themes of the EVE Project

1. Choice and decision-making
   - social psychology and individual behaviour
   - preference formation/construction

   Explaining and understanding 'anomalies' in valuation studies
   Preference formation and the role of information

2. The environment as 'commodity'
   - complexity, systems performance
   - moral issues

   The role of markets and exchange values
   The role of scientific information

3. Acceptable and fair public decision processes
   - consensus not always the goal
   - CBA as a treasury tool *versus* public participation

   Evolution and the design of alternative institutions
   Government and policy

helpful. Such problems result in reification where observations which deviate from theoretical expectations are forced to conform with constructed models. The analogy would be removing hills and creating valleys because this is what appears on a poorly drawn map; for example, rejecting survey respondents as irrational and therefore irrelevant because they fail to act in conformity with economic models of the agent. Economists have favoured acting as archaeologists trying to find the best tools to uncover preferences although in the environmental area they seem closer to architects constructing preferences. People from different disciplines approach human behaviour in different ways and so different models are likely to emerge when discussing preference formation with psychologists or sociologists.

The Environment as 'Commodity'

The environment enters economic models as a commodity; that is, a good or service to be traded. The economic concept of trading at 'the margin' fails to capture key aspects of environmental concern. Complexity in environmental systems is assumed away by the reduction of all entities to goods and services. Values beyond pure exchange or trade prices are relevant to environmental policy and require adequate expressions. Thus, moral and social norms represent a different type of value. Commodification also fails to convey the complex and detailed information coming from the natural sciences.

The eight-year campaign to save an undisturbed cultural and natural landscape in England was lost with the completion of the M3 motorway through Twyford Down. This case showed flaws in enforcement of EC environmental law and "has come to epitomize the failure of the system to protect the environment or to allow citizens an effective legal role in challenging its despoliation" (Kunzlik 1996: 225–226)

Photo: The Hampshire Chronicle

Legitimate Processes for Decisions in the Public Domain

The notion that commitment to an environmental concern is required by the general public or vested interests raises questions as to the legitimacy or fairness of the outcome *versus* the process that produces that outcome. Valuation techniques may produce internally or methodologically consistent results, but can still be unfair with regard to the processes by which they are produced. A 'solution' or optimal outcome implies consensus whereas much environmental policy is characterised by conflict. CBA tends to ignore conflict by assuming everything is tradable or compensable. Alternative institutional approaches are required to explore conflicting values.

Aims under EVE

On the basis of the foregoing discussion, the aims of the EVE concerted action were set out in summary form as follows:

- Build a European network of organisations actively working on environmental valuation issues from a variety of perspectives both at the theoretical and policy levels.
- Assess the state of the art and validity of environmental valuation in a range of specific policy areas, and identify gaps in current understanding.
- Identify and explore problems with on-going environmental valuation research in Europe.
- Expose the variety of ways in which a range of environmental values influence individual choice.
- Include user groups' concerns and input.
- Go beyond standard 'technical' debates and explore fundamental issues.
- Produce policy-relevant outputs.
- Recommend a programme of future interdisciplinary research on environmental valuation relevant to the decision-taking process.

The approach to achieving these stated aims was to:

- Use a core network of active researchers to disseminate and improve environmental valuation research.
- Address a set of current environmental issues via a series of interdisciplinary workshops.
- Use the interdisciplinary approach built into the structure and conduct of EVE workshops to stimulate debate rather than merely present 'papers'.
- Employ the internet, this series of policy research briefs, and other publications (e.g. journal special issues and books) to disseminate findings, reach user groups and widen the debate.

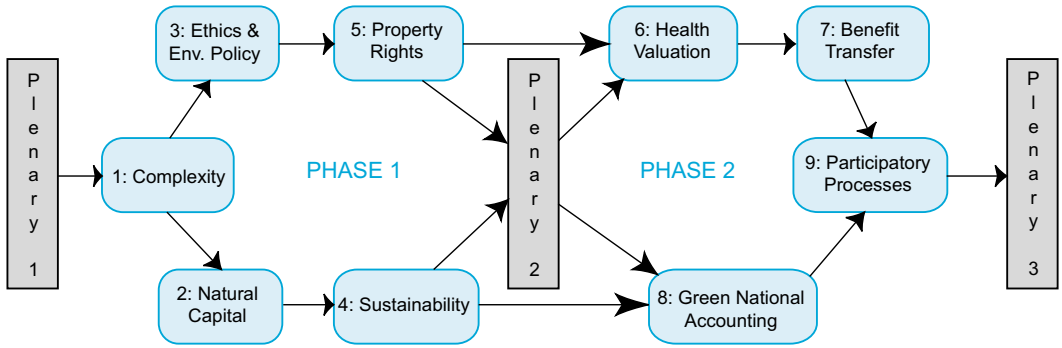
EVE thereby aimed to provide a platform for addressing problems relating to the current use of environmental valuation methods for addressing concerns which might be grouped under the concept of sustainability, and for identifying where research is needed into wider concepts of value for inclusion in the policy arena.

EVE Workshop Series

Some of the main objectives of the EVE programme were achieved through a series of nine international workshops and three plenary meetings (see Figure 1). These analysed the current understanding with regard to valuation using a range of topical subjects and the underlying methodological and theoretical themes. Workshops were attended by specialists from the host institution, collaborating partners to the concerted action, and invited specialists (including consultants, NGOs and government representatives). Thus, each workshop involved an interdisciplinary international team and invited experts and user groups forming the arena for debate and synthesis.

While each workshop aimed to include one or more of the methodological themes (within the context of their topic) three were chosen to specifically address each. Rational choice and decision-making was the underlying theme of the workshop on Ethics and Nature (Policy Research Brief 4); the character of the 'good' was addressed under Methodology for and Approaches to Issues of High Complexity (Policy Research Brief 2); and the legitimacy of process in the workshop on Participatory Decision-Making Processes (Policy Research Brief 10).

Figure 1. The EVE programme



The policy brief series fulfils part of the aim to communicate with policy-makers, specialists and interested parties about the state of the art, problems and conflicts arising in this interdisciplinary setting. The key EVE partner(s) responsible for producing each brief is indicated on the back cover. Each of the policy briefs in this series aims to convey the key findings from the workshops but also to report a post-workshop synthesis of issues raised by the debate.

Searching for Alternatives

This brief has outlined various areas of overlap between disciplines and shown some of the ways in which lessons might be learnt from increased communication. In general, there are overarching issues and concerns which touch upon all these disciplines. The EVE Policy Research Brief series addresses a variety of these issues including:

- the complexity of environmental problems (see Policy Research Brief 2);
- uncertainty and how to include ignorance as well as risk in the decision process (see Policy Research Briefs 2, 4 and 10);
- intergenerational equity, fairness and justice in the distribution of burdens and benefits over time (see Policy Research Briefs 5, 6, 7 and 8);
- limits to substitutability and the interpretation given to natural capital and within this context biodiversity maintenance (see Policy Research Brief 3, 5 and 9);
- distributional issues relating to resource use in social and spatial terms (see Policy Research Brief 6); and
- conceptualising key aspects of environmental policy and recognising policy as a process involving multiple values (see Policy Research Briefs 4, 5 and 10).

These are problems which no one discipline can address successfully and which are essentially interdisciplinary but which have a bearing on the use and practice of environmental valuation whether carried out in the tradition of environmental economics or via some newer decision process, such as a citizens' jury. In the last decade the appeal for alternative decision-making criteria has grown along with the use of CBA. Various forms of multicriteria analysis have been put forward and together with deliberative participatory approaches offer an alternative to CBA. EVE itself formed part of a deliberative process on environmental valuation.

Photo: CRE

Interaction of EVE concerted action members from different disciplines (philosophy, economics, sociology, geography, human ecology and ecology)

Key Points

Limitations of CBA

Each category of CBA methods has a limited range of applications to which it is best suited. Thus, for any specific project the most appropriate approach will be dependent upon the characteristics of environmental changes involved. This raises problems for environmental CBA because some of the most important environmental changes (e.g. biodiversity loss, climatic change) are the least suited to monetary valuation.

CBA Methods

In summary, the hedonic pricing (HP) method can assess certain aspects of externalities after they have occurred and have been capitalised. The production function approach (PFA) is difficult to use due to a lack of scientific data. The travel cost method (TCM) is primarily concerned with recreation and tourism values at a site prior to any development. The contingent valuation method (CVM) provides the most potential for comprehensive coverage of externalities and could be conducted before or after an environmental change. CVM also provides some flexibility in the types of non-market value which can be addressed in the survey. In practical terms, the cost of and time needed for conducting a CVM survey can be relatively high and have increased due to the extent to which various design features are now regarded as required practice. Perhaps the greatest contribution of the technique is in terms of forcing economists to reconsider the content and meaning of both observed and intended human behaviour with regard to a plurality of environmental values (Spash 2000a, b).

Interdisciplinary Approach

Besides these purely economic methods, environmental valuation is being approached by different disciplines and in different ways. There is much to be gained in bringing together these disciplines rather than allowing fragmentation. Due to the potential for conflicting advice, serious reflection is required upon the validity of different approaches to environmental valuation and the way in which environmental values enter individual and societal decisions.

External Validity

Interdisciplinary interaction in environmental valuation research and applications are essential if external validity is to be addressed. In this context some of the issues raised by this brief are as follows:

intrinsic value

- In philosophy, the concept of intrinsic value has been discussed as outside the preference related value concepts of modern welfare economics.

complexity, uncertainty and ignorance

- In ecology, ecosystem functions can be considered as building blocks to sustainable, or at least resilient, systems but complexity, uncertainty and lack of knowledge move such concepts beyond the comprehension of the general public. Economic approaches, based upon assessing the preferences of a fully informed public, then fail when trying to value such functions.

property rights

- In law, the definition of property rights often sets the basis upon which valuation is to be conducted but the division of property rights is contentious. Actually enforced rights can conflict with social norms affecting the expression of values.

social norms, justice and values

- In social psychology models of individual choice include a variety of potential explanations (biological, cognitive, humanistic, psycho-dynamic and learning-theory perspectives), but economic models are based upon a simplistic theory of rationality which fails to explain much of human behaviour and whole core values in society, e.g. justice, morality, rights.

Clarifying the Terms of Debate

Broadening the debate on environmental values means understanding the different language and framing applied to the same issue. The use of terminology in debates on environmental valuation issues becomes crucial: for example, a 'choice' is different from a 'decision'. Thus the desire to 'increase choice' in the political economy of free markets has a logic, unlike 'increasing decisions'. Similarly, debates over environmental valuation often confuse categorically different terms, for example, intrinsic and existence values. Terms are chosen because they mean something specific and it is important to keep these differences in mind when trying to communicate.

EVE

In order to better grasp the role of environmental valuation and identify areas for future research openess is required. This means clarifying the problems confronting the economic approach to environmental valuation as seen by those operating outside the economic framework. At the same time the alternatives being offered by others require analysis as to their own advantages and disadvantages. These then formed the aims of the EVE concerted action.

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Concerted Action on Environmental Valuation in Europe (EVE)

This policy briefing series communicates the findings from nine workshops and three plenary meetings under the EVE programme. These showed the diversity of research currently being undertaken in the area of environmental values and their policy expression. The type of information relevant to the decision process extends from ecological functioning to moral values. Thus a range of approaches to environmental valuation, from ecology to economics to philosophy were presented.

EVE was a 30 month project which started in June 1998 funded by the European Commission, Directorate General XII within Area 4, Human Dimensions, of the Environment and Climate RTD programme, Contract No. ENV4–CT97–0558.

The project was co-ordinated by Clive L. Spash and managed by Claudia Carter, Cambridge Research for the Environment (CRE) in the Department of Land Economy, University of Cambridge. The following research institutes were partners in the concerted action:

Bureau d'Economie Théorique et Appliquée (BETA), University Louis Pasteur, Strasbourg, France
Cambridge Research for the Environment, Department of Land Economy, University of Cambridge, UK
Centre for Human Ecology and Environmental Sciences, University of Geneva, Switzerland
Centre d'Economie et d'Ethique pour l'Environnement et le Développement (C3ED), University of Versailles Saint-Quentin-en-Yvelines, France
Centre for Social and Economic Research on the Global Environment (CSERGE), University of East Anglia, Norwich, UK
Department of Economics and Economic History, Autonomous University of Barcelona, Spain
Department of Economics and Social Sciences, Agricultural University of Norway, Åas, Norway
Department of Environmental Economics and Management, University of York, UK
Department of Philosophy, Lancaster University, UK
Department of Rural Development Studies, Swedish University of Agricultural Sciences, Uppsala, Sweden
Department of Applied Economics, University of Laguna, Tenerife, Canary Islands, Spain
Environmental Economic Accounting Section, Federal Statistical Office, Wiesbaden, Germany
Ethics Centre, University of Zurich, Switzerland
Fondazione Eni Enrico Mattei (FEEM), Milan, Italy
Istituto di Sociologia Internazionale di Gorizia (ISIG), Gorizia, Italy

The purpose of this concerted action was to analyse effective methods for expressing the values associated with environmental goods and services, ecosystem functions and natural capital, with a view to the achievement of the goals summarised in the concept of sustainability. The appropriate role of decision-makers and citizens in environmental policy-forming became a central focus in the debate over how different values should be expressed.

Titles in the EVE Policy Research Brief Series:

1 **The Concerted Action on Environmental Valuation in Europe (EVE): An Introduction**
by Clive L. Spash

2 **Conceptualising and Responding to Complexity**
by Giuseppe Munda

3 **Natural Capital**
by Martin O'Connor

4 **Conceptions of Value in Environmental Decision-Making**
by John O'Neill & Clive L. Spash

5 **Conceptualising Sustainability**
by Anton Leist & Alan Holland

6 **Property, Rights and Fairness**
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7 **Environmental Quality, Health and the Value of Life**
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8 **Value Transfer and Environmental Policy**
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9 **Greening National Accounts**
by Martin O'Connor, Anton Steurer & Marialuisa Tamborra

10 **Participatory Approaches to Environmental Policy**
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