

Environmental Values: The Desirability and Capacity for Integration

Dr Michael Lockwood

*School of Geography & Environmental Studies
University of Tasmania*

INTRODUCTION

The substantive context I address is environmental policy and decision making that involves the selection of one or more choices from a pool of options, each of which may comprise means (actions, strategies, policies) and/or ends (visions, goals, objectives). Typical elements in such a choice process are:

- an *environment*, that has biophysical, social, cultural and economic aspects;
- a *need*, that may be reactive (issue-based), or creative (vision based);
- a *body of knowledge* that may be scientific, local or individual;
- one or more *options* to address the need, that may be identified from an existing pool, or generated within the process;
- *selection* of one or more options;
- *implementation* of the selected options;
- *governing actors* who characterise the environment, identify the need(s), apply knowledge, identify options, make choices and advance their implementation (with different actors potentially involved for each element);
- *participating actors* who directly contribute to one or more of the elements, but do not govern outcomes in relation to them; and
- *alienated actors* who are impinged upon in respect of one or more of the elements, but who are not participating or governing actors.

I focus on how the notion of value is implicated, addressed and integrated in relation to these elements. In particular, I consider the problem of how to integrate values into environmental choices in a manner that is inclusive, theoretically defensible and methodologically coherent. The discussion is relevant for all natural resource management issues, whether sectoral (water allocation, forestry, fisheries, agriculture, protected areas), systemic (biodiversity conservation, prevention of land degradation) or



procedural (stakeholder participation, rationality, practicality). It is also pertinent across all jurisdictional and institutional scales—Commonwealth, state and territory, regional and local.

Theoretical positions drawn from philosophy, economics, sociology, politics and psychology are used to provide the necessary foundation for methodological considerations of value integration. I first consider the modes of rationality that are applied in environmental choice processes, followed by a characterisation of environmental values. I then describe the social and political theories that underpin the incorporation of citizen values into decision making processes. I also briefly consider and counter challenges to the desirability of integration raised by postmodern social theory.

These three threads (values, rationality and citizen participation) are then brought together in a review of methods for value integration in environmental decision making. Each method is discussed in relation to its processes and products, value inclusiveness, assumptions, limitations, strengths and application.

MODES OF RATIONALITY

Values are introduced into the choice process through the application of rationality, especially in need recognition, option identification and selection. Several kinds of rationality may be involved. Such rationalities are in contrast to irrational modes thinking and action such as stream of consciousness, random association, spontaneous creativity or instinctual action (Alexander 2000).

Instrumental rationality demands logical relations between means and ends, and prescribes how to decide on right action. Such efficiency in choice has been formalised, in economics for example, through axiomatic descriptions of human preferences based on logical conditions of transitivity, completeness, reflexivity and so on (Gravelle & Rees 1981). Rationality in economics can be characterised by internal consistency of choices that are directed toward maximisation of self-interest. Such approaches implicitly assume that there is one politically uncontentious optimal state (Rydin 2003). The ends justify the means, and no consideration is given to how the ends are established or their relative significance or validity.

Substantive rationality, articulated for example by the social theorist Weber, is more general in that it requires consideration of the relative importance of ends. Here reason demands a logical end or objective, justifiable by acceptable arguments. Substantively rational decisions require decision makers to give reasons, justified through argument, to support a course of action (Friedmann 1987, Alexander 2000).

Bounded rationality recognises that there are inescapable limitations on the ability of humans to adopt instrumental rationality, and of necessity we must resort to sub-optimal processing of information. Bounded rationality allows for truncated information search, limited information processing, and use of simplifying heuristic choice strategies. The demands of formal instrumental rationality are relaxed. Given limited intellectual

capacity and limited time, boundedly rational ‘doing well enough’ rather than optimising choices is inevitable in many contexts (Simon 1985, Briassoulis 1989). Here a governing actor's strategy is selected on the basis of a trade-off between the desire to make the correct decision and the investment to time and effort to make this decision.

Rationality has also been characterised according to quality of argument. The critical theory of German philosopher and sociologist Jurgen Habermas questioned the traditional epistemology on which rationality had been based. He argued that knowledge is not transcendental, empirical nor individual but essentially a social construct (Alexander 2000). Rationality here is not about ends, means or actions but social interactions. This is a *communicative rationality* that is concerned about the quality of communication, using criteria such as honesty, clarity, sincerity; as well as lack of distortion, manipulation and deception (Allmendinger 2002). With communicative rationality, decisions and actions are rational only if they arise from circumstances where all actors have been able to express themselves without inhibition or constraint, and where outcomes are freely accepted by all participating actors (Healey 1997).

Alexander (2000) argued for an *integrative rationality*, which he characterised as a complex deploying of different forms of rationality. Decisions are made about which actors, at what stages of a choice process, should involve which forms of rationality.

ENVIRONMENTAL VALUES

The word value in common speech, academic writing and literature is used variously and somewhat indiscriminately. Gaus (1990) noted that value language is complex, having three distinct grammatical forms—verb (to value), adjective (a valuable object) and noun (a value). There is no consensus on its precise meaning within and between disciplines and applications (Rescher 1969).

The term ‘value’ in the biological sciences is generally used to indicate particular functional relationships between elements of an ecosystem—for example, the value of tree hollows to arboreal mammals. Such functional relationships are often important aspects of the body of knowledge that provides a basis for constructing values, but do not constitute in themselves values as direct inputs into environmental choices.

Categorisation of choice-relevant environmental values can enable systematic elucidation of their key features and avoid the confusion associated with comparing value types across classificatory boundaries. Rescher (1969) described six approaches to value classification based on:

- subscribership to the value (who holds it) regardless of the content of the value;
- the objects being evaluated (hence environmental values, social values, personal values);
- the benefit at issue (economic, aesthetic, physical, moral, social);

- the purposes at issue (based on relationships between loci of value—food value, exchange value, deterrent value);
- the relationship between the subscriber and the beneficiary (egocentric, altruistic, humanitarian, patriotic); and
- the relationship the value itself has to other values (instrumental or intrinsic).

To provide a value language for use in the rest of the paper, I use a mixed-mode categorisation of environmental values that draws on philosophy and economics. I then consider value subscribership in environmental choice processes, alluding to some psychological aspects of value formation.

Anthropocentric values are all those values that are of human origin. Many philosophers have argued that all values are anthropocentric. This view is based on the position that only people have intrinsic value. For something to be intrinsically valuable, it must be an end in itself—valuable only for its own sake regardless of anything else (O'Neill 1992). Instrumental values are values that refer to some 'higher' purpose. There can be a chain of instrumental values that lead finally to a fundamental intrinsic value. Intrinsic values therefore impart meaning to instrumental values. For example, food is of instrumental value to human beings because it sustains the intrinsic value of human life. Many western philosophical traditions support the view that people have intrinsic value and that all other value is instrumentally related to human needs and wants (Passmore 1974).

Biocentric value arises from the possibility of an intrinsic value in nature. Some people think that nature has value in its own right, regardless of humans. Over the past 30 years, a number of environmental philosophers have gone against the anthropocentric tradition and developed arguments in support of an intrinsic value in nature (Attfield 2003, Jamieson 2003). While none of these theories have been entirely satisfactory, they do indicate a widespread academic and popular dissatisfaction with the anthropocentric account of value. Irrespective of its philosophical coherence, belief in the possibility an intrinsic value in nature is 'a widely shared intuition' (Callicott 1986, p. 140). Biocentric value means that preservation of the environment can be underpinned by more than just human centred survival or economic or aesthetic considerations. The notion of biocentric value means that it is too restrictive to simply regard the natural world as a resource. The possible existence of an intrinsic value in nature leads to ethical and moral questions (Callicott 1994).

Current and future use values are anthropocentric values that people assign to environmental goods and services—for example, timber for housing and furniture, or attractive places for undertaking recreation activities such as bushwalking or sightseeing. These values may be related to present use, or may be related to opportunities for use in the future. *Ecosystem services* indirectly support the production of such uses. Ecosystems services flow from natural assets (soil, biota, water systems and atmosphere) to support human activities and lifestyles that are generated outside natural areas, but indirectly dependent on them. The agricultural industry for example depends heavily on many ecological processes, including soil formation and nutrient cycling.

Non-use value has two aspects. First, existence value is the benefit received by those who derive satisfaction from knowing that a site is preserved in a certain condition irrespective of use or potential use by the individual or others (Randall & Stoll 1984, Madriaga & McConnell 1987). Second, people may also value natural areas as a 'bequest' to future generations (McConnell 1983). Note that non-use values are different from biocentric values. Non-use values are anthropocentric, related to some satisfaction a human being derives from knowing an area exists in a natural state. Biocentric values are independent of such human satisfaction.

Values can also be identified as *held* principles such as notions of fairness, liberty, or responsibility; or *assigned* to things, whether they are goods such as timber, activities such as recreation, or services such as education (Brown 1984). Held values are generally regarded as being more absolute and stable than assigned values, which are more contingent and labile. Assigned values for an environment or components may not exist prior to engagement with the choice process. People may have no view on an issue, or have an unformed view that is difficult to express. If the latter, then they may not desire to clarify or more exactly define their values (Fischhoff *et al.* 1980). Clearly defined values may only be held for items and in contexts with which the person has had previous valuation experience, and has had an opportunity to clarify his or her beliefs through trial and error (Fischhoff 1991). The choice process may provide actors with such opportunities, thereby facilitating construction of a new or modified value set (Gregory *et al.* 1993).

Governing actors hold values prior to engagement with the choice process. These prior values become embodied in the process elements. Environmental characterisation, needs and options identification, type(s) of rationality adopted, selection and use of knowledge, and choice methodology are all influenced by governing actors' values, including their attitudes to any participating and alienated actors. This imparts an inherent subjectivity to the choice process. In addition, the process itself may shift actors' prior values, or facilitate construction of a modified value set.

Participating and alienated actors recognise, possess or benefit from the complete range of values described above. None of the value categories are mutually exclusive. An actor may, for example, simultaneously believe in an intrinsic value in nature, enjoy recreation use benefits, hold non-use values and receive ecosystem service benefits to her agricultural enterprise from particular natural areas. Theoretical bases for incorporation of these values into decision making processes are considered in the next section.

DEMOCRACY, PARTICIPATION, DELIBERATION AND ENVIRONMENTAL VALUES

Demands for greater community participation reflect discontent with the legitimacy and efficacy of representative democratic government. In part, these demands arise from concern about the capacity of democratic institutions to represent and give expression to citizens' values. Public engagement can improve the efficacy of representative

democracy by synthesising the interests of stakeholders. This constitutes a shift from a representative to a participative democracy in which citizens are actively and continually engaged with the processes of policy development and implementation (Daneke 1983, Landre & Knuth 1993).

Participation processes should encourage all stakeholders to contribute; enable participation to occur in a manner which best suits the particular understandings, needs and contributions of each participant; provide access to all relevant information; and give participants power to influence process and outcomes (O’Riorden & O’Riorden 1993, Moote *et al.* 1997, Tuler & Webler 1999).

Liberal democratic and critical theories provide a foundation for further elaboration of the democratic ideal—the idea of a deliberative or discursive democracy. Theorists such as Dryzek (2000) argue that there is a need for more thorough consideration of environmental issues than is provided by a participatory democracy. Deliberative democratic processes involve collective decision making through open discussion, examination of relevant information, and critical discursive analysis of options. Attempts are made to eliminate the power and advantage afforded by political or economic position, so that participants regard one another as equals, defend and criticise positions in a reasonable manner, and accept the outcomes of such discussions (Dryzek 1997, Ferejohn 2000). Deliberative democracy is seen by its proponents as more effectively recognising participating actors’ values than instrumentally or substantively rational participative approaches (Dryzek & Braithwaite 2000). Deliberation is also thought to lessen or overcome the impact of bounded rationality in decision making (Elster 1998). It is claimed that such methods ‘help governments to identify the real values and judgements of all their citizens’ (Simonsen & Robbins 2000, p. 39). Others to draw on Habermas’ communicative rationality are planning theorists such as Healey (1997) and Forester (1989). They have articulated a similar vision of engagement in the context of urban and environmental planning.

In general, there are both substantive and normative reasons for direct public engagement with decision-making. Substantive benefits include reduced project failure (Pimbert & Pretty (1997); increased project acceptance (Renn *et al.* 1993, Lyden *et al.* 1990); reduced project delays (Shindler & Brunson 1999); use of local knowledge (Daneke 1983); managing competing interests and mediation of conflict (Wondolleck & Yaffee 1994, Wiseman 2003); and enhanced public ownership and commitment to solutions (Syme & Eaton 1989, Curtis & Lockwood 1998).

Normative benefits cited include supporting political equality and the rights of citizens to be involved in decisions that affect them (Slocum & Thomas-Slatyer 1995, Webler & Renn 1995); construction and communication of the public will (Dienel & Renn 1995); reduced citizen alienation (Webler & Renn 1995, Selin *et al.* 2000); and increased government accountability (Dienel & Renn 1995). Importantly for the focus of this paper, engagement has the potential to articulate, clarify and represent the diversity of interests and values involved in choices (Tuler & Webler 1999, Barham 2001, Wiseman 2003).

A typical participatory engagement is directed by governing actors as a process of consultation with participating actors who are one or more of passive receptors of information, sources of information, and sources of values and opinions (Pimbert &

Pretty 1997). Engagement, though initiated by a particular group of governing actors, can also come to be directed by participants in a process of community building and self-mobilisation, through which some power of governance shifts to the participating actors. Participants can then initiate action, independently make decisions and initiate action. The development of such 'social capital' allows once participating, now (partially) governing, actors to develop cooperative mechanisms for resolution of environmental issues, rather than relying on markets or a central authority (Ostrom 1990).

The Australian Landcare movement provides an example of such a process. Following initial leadership by government actors, Landcare is now a community-based movement with some self-governance capability and capacity to represent and act upon its members' values. Of course the leadership necessary to initiate such a process can also come from within the community, with self-empowered individuals taking the catalytic role. The Australian Bush Heritage Fund, a private protected area acquisition and management organisation, is a case example.

THE DESIRABILITY OF INTEGRATION — THE POSTMODERN CHALLENGE

It is thought by some academics that over the last three decades or so, a fundamental change has occurred in western society. Since the Enlightenment western culture has been engaged in 'the project of modernity'. Modernity is characterised by a reductionist scientific world view; instrumental rationalism; belief in progress especially that afforded by technological advances; and a preference for order and classification (Taylor 1998). In the modern world, technical capacity and rational thought enabled humans to maintain the illusion that environments can be controlled. It is thought by some that we are now moving into postmodern times in which the old 'certainties' and confidence of modernism are being superseded by more complex, diverse and dynamic understandings and behaviours (Allmendinger 2002).

Postmodernism is not just social theory, but also 'new times' associated with developments such as the information society and post-Fordist modes of production. This postmodern sensibility is relativistic rather than absolute, pluralistic rather than segregated, richly chaotic rather than ordered. Truth is replaced by interpretation, and the role of power in establishing interpretations is a central to concern of postmodern thinking (Allmendinger 2001). Postmodernism rejects any attempt to promote an overall theory or explanation. The work of a postmodern urban planner, for example, should be consciously fragmented and contingent, nonlinear, without aspiration to comprehensiveness, or even compelling authority (Beauregard 2003). Thus postmodernists reject the possibility of a monolithic 'public interest', replacing it with an irreducible plurality of voices and interests (Campbell & Fainstein 2003).

Integration often aspires to comprehensiveness. Value integration could thus be regarded as an attempt to represent an irreducible value complexity as one voice. In this voice, those with power will tend to be represented more fully than those without. Such

integration can be considered to be part of the project of modernity, giving rise to a tension between integrated decision processes and the postmodern period in which these decisions are being made and enacted (Allmendinger 2001).

However, a descent into an absolute, postmodernist relativism has little attraction to those of us interested in environmental, social and economic sustainability. Even in postmodern times, choices need to be, and will be made. These choices and decisions will have important environmental outcomes. Each choice will inevitably embody some value content. To the extent the choice is made using one or more of the types of rationality described above, this value content will be considered, and in some manner assessed holistically. In other words, some form of integration will inevitably take place.

It is one thing to recognise that our times involve a hitherto unparalleled complexity and diversity of contingent values. It is quite another to therefore abdicate from any collective responsibility for, amongst other things, environmental quality. Under extreme postmodern relativism, and in the absence of any legitimising authority, one can envision coalitions based on common values forming to each pursue their own interests. Under these circumstances, the fate of any particular environment will be determined by those with the most power to assume control over decisions. This is undesirable.

The alternative, as is emerging in a number of natural resource and catchment management processes, is to simultaneously accommodate centralised and decentralised power in a healthy tension of local self-determination, democratic governance (with participation and deliberation), and market engagement. Value integration has a place in this mix for informing democratic governance.

VALUE INTEGRATION METHODS

Value integration can be based on commensurability or comparability. Non-comparable values cannot be integrated.¹

Values can be treated as commensurable, measured according to a common scale, and aggregated to a single value. For example, economic valuation is an instrumentally rational process that requires value commensurability. The adopted goal of the economic rationalist is maximisation of utility, given constraints such as prices and income. What constitutes utility is generally regarded as irrelevant to the economist—under the principle of consumer sovereignty, that is left up to each individual. Utility maximisation is expressed through assigned values based on the relations of exchange. There is no exchange without the possibility of equality and no equality without commensurability (Georgescu-Roegen 1954). All things that are exchanged must be comparable against some common standard. The economic welfare that is created as a

1. In this paper I set aside some of the complexities articulated in the values literature surrounding notions of incomparability, non-comparability and rough equality—see Chang (1997) and Aldred (2002).

result of an act of exchange is measured as the difference between willingness to pay and price. In market contexts willingness to pay can be inferred through changes in demand in response to price changes. Exchange values are also expressed outside markets, in that some people have a demonstrable willingness to pay for public goods such as biodiversity conservation programs. These values are measured by non-market valuation techniques such as contingent valuation and choice modelling (Garrod & Willis 1999, Bennett & Blamey 2001).

Values can also be comparable, but not commensurable. Comparable values can be ordered in relation to each other, from most preferred to least preferred. Value equality is also recognised. Such orderings can be strictly qualitative, in that comparisons are made without any numerical attributions. Numerical attributions can also be made to establish a preference ordering, without implying any cardinal relationships.

Numerous methods have been used to integrate values into environmental decision making processes. The major approaches are summarised in Table 1, and their characteristics with respect to their theoretical or rational bases, extent of value integration and end products are indicated. A more detailed consideration of each method follows.

Table 1. Summary of value integration methods

| Method | Theoretical and/or rational basis ^a | Extent of value integration | Usual Product |
|----------------------------|---|--|---|
| Benefit cost analysis | Neoclassical welfare economics, instrumental rationality | Exchange values only | Economic worth |
| Multicriteria analysis | Substantive rationality, multi-attribute utility theory | Analyst determined, potentially all | Qualitative comparison or ordinal ranking |
| Psychometric scaling | Substantive rationality, psychological choice theory | Analyst determined, potentially all | Ordinal comparison |
| Paired comparisons, voting | Substantive rationality, psychological and public policy theories | Analyst determined, potentially all | Ordinal or cardinal ranking |
| Political judgement | Representative democracy, public policy, bounded rationality | Politically determined, likely to be limited | Decision |

Table 1. (cont'd) Summary of value integration methods

| Method | Theoretical and/or rational basis ^a | Extent of value integration | Usual Product |
|---|--|---|----------------------|
| Public inquiries, meetings, submissions and the like | Participative engagement, public policy | Process determined, potentially all | Policy advice |
| Citizen jury, deliberative poll, consensus conference | Deliberative engagement, communicative rationality | Participant determined, potentially all | Recommended decision |
| Professional judgement, private judgement | Bounded rationality, liberalism (private) | Individually determined, limited | Decision |
| Market | Neoclassical or Austrian economic theory, instrumental rationality | Market values only | Substantive outcome |

a. Space does not permit elaboration of all these theoretical traditions. Some starting points into theories not already mentioned are Keeney & Raiffa (1976), Hogarth & Reder (1987), Heap et al. (1992), Clemons & McBeth (2000) and Pennington (2000).

Benefit cost analysis (BCA)

Typical steps in BCA include: identification of the proposal(s) to be examined, and the ‘lifetime’ of each proposal; identification of the values associated with each proposal that can be measured in economic terms—that is, the relevant exchange values; quantification of these benefits and costs in dollar terms, using a suitable economic valuation methodology; and aggregate the values using a decision rule such as the Net Present Value (NPV) criterion. If the NPV is positive, then benefits outweigh costs and the project makes economic sense. Where a market exists it is relatively easy to determine values, but where there is no market, economic values must be deduced from whatever evidence can be found of how people would behave if there was one. Techniques for evaluating non-market economic goods include contingent valuation, choice modelling and the travel cost method (Garrod & Willis 1999, Bennett & Blamey 2001). The term ‘extended BCA’ is sometimes used to distinguish those BCA analyses which attempt to take account of non-market benefits and costs, from limited BCAs that only consider market factors.

Assumptions

- The goal of policy should be to maximise net social benefits.
- Individual preferences are all that should count (consumer sovereignty).
- Individuals act as rational, self-interested utility maximisers.
- Preferences should be weighted by the existing distribution of income.

Problems and limitations

- The relative influence of participating actors is determined by economic capacity.

- Not all values are tradeable.
- Many people have preferences inconsistent with rational, self-interested utility maximisers.
- Preferences are not necessarily accurate reflections of well-being.
- BCA does not direct policy towards sustainable outcomes.

Strengths

- Everyone's exchange values can be incorporated.
- Participating actors with the strongest preferences have the most influence over outcomes.
- The method is instrumentally rational.
- The method is transparent.
- BCA produces clear policy advice.

Examples

- Forest management options in south-east Australia (Streeting & Hamilton 1992).
- Salinity control in Goulburn Broken catchment, Victoria (Read Sturgess and Associates 2000).
- Remnant native vegetation on private property (Lockwood & Walpole 2000).
- New housing energy performance regulations (Allen Consulting Group 2002).

Multicriteria analysis (MCA)

MCA is a general term used to describe a number of procedures that organise information relevant to the decision making process. The basic element common to all MCA is an effects table that indicates the performance of each management option in relation to a set of selected criteria. MCA can be used to choose one or more superior alternatives, generate a complete or partial ranking of alternatives or analyse the acceptability of each alternative (Lahdelma *et al.* 2000). At its most basic, no attempt is made to formally aggregate across the different criteria to determine the best option. In this case, MCA serves simply as a means of organising and presenting the value implications involved. The decision-maker(s) can use the MCA effects table as a means of assisting choice and clarifying the nature of the options, but some professional judgement must be explicitly applied to select a preferred alternative. If the analyst wants to more formally compare options, they can be scaled against a qualitative index. This scaling typically proceeds by determining the performance of each alternative against each criterion using some common measure, multiplying this performance score by a weighting that reflects the relative importance of the criterion, and aggregating across criteria to produce an overall score for the option.

Assumptions

- Values must be at least numerically comparable if the index approach is used.

- Reducing all options to a common index effectively invokes similar assumptions about preferences as with BCA.

Problems and limitations

- There is no standard, agreed method of establishing criteria, criteria weights or aggregating across criteria.
- It is usually impractical to incorporate the preferences of all affected actors—the number of participating actors is typically small and the number of alienated actors large.

Strengths

- All value types can be represented.
- Any type and number of criteria can be included.
- Policy can be directed towards sustainable outcomes.
- The method is transparent.

Examples

- Comparison of road access options (Cape Woolamai Steering Committee 1989).
- Comparison of riparian revegetation options in North Queensland (Qureshi & Harrison 2001).
- Establishing politically feasible water markets (Ballesterio *et al.* 2002).
- Regional priority setting in Queensland (Hajkowicz 2002).

Psychometric scaling

Value scales can be developed using psychometric methods. Data is gathered using a survey instrument, often containing value statements for which respondents are asked to give importance ratings against a Likert scale. Responses are processed to identify the relative strengths of underlying value types using exploratory factor analysis (if no prior value classification is assumed) or confirmatory factor analysis (to confirm a theoretically derived value structure). Each value type is represented by a sub-scale, and in a confirmatory model regression factor scores indicate the relative importance of the various value subscales. Depending on the factor analytic process used, the value types can be independent or correlated. Data on the relative importance of various values (use, non-use and biocentric) can be used to inform decisions. However, although such data can be considered to give an integrated account of value, they are usually collected in relation to a general good such as ‘natural areas’, rather than a specific decision making context. This reflects the psychometric approach of describing and understanding broad characteristics and trends within a population, rather than a focus on assisting resolution of specific issues.

Assumptions

- Values must be at least numerically comparable.

- Respondents have well defined values, or are able to construct them during the survey process.

Problems and limitations

- Responses are based on a population sample, not a complete population, so some minority views may be neglected.
- Respondents need to have at least moderate levels of literacy and English comprehension.
- Translation of the value information into a choice context can be difficult.

Strengths

- All value types can be represented.
- Understanding of participating actors' values is enhanced.
- A representative sample of citizens' values can be incorporated.
- It is transparent, though technical.

Examples

- Biocentric and anthropocentric value orientations (Thompson & Barton 1994, Stern & Dietz 1994).
- Linkages between values and pro-environmental behaviour (Nordlund & Garvill 2002).
- Comparative measurement of intrinsic, use and non-use values (Winter & Lockwood 2004).

Paired comparisons, voting

The psychometric method of paired comparisons enables an ordering of preferences to be established between the elements of a choice set (David 1988, Peterson *et al.* 1996). Participants are presented with two of the options from the choice set, and asked to 'vote' for one of them. The process is repeated for each pair of options. The choice data are processed to produce an ordinal ranking of options. A number of other voting systems are also used, varying in complexity from the simple selection of one preferred option and aggregation of this choice across participating actors to produce a preference ordering; to Borda counts and the Hare system (D'Angelo *et al.* 1998). The value bases for the preferences expressed through a vote are generally not evident. It can be assumed that value positions underlie the preference expressions, but no information is elicited on the nature, content or strength of these value positions. Voting provides a mechanism for an integrated expression of all those values considered relevant by each individual, but the values themselves remain unrevealed, except when the items over which preference are expressed specifically require value revelation, as for example, in a referendum over willingness to pay for an environmental good and in some paired comparison designs.

Assumptions

- Equality of participating actors

Problems and limitations

- Participants may not find any of the options on offer particularly attractive.
- Value information is not directly revealed, so the motivations behind the votes cast are unknown.

Strengths

- All value types can be represented.
- The method is transparent, though some voting systems can be technically demanding.
- Clear policy advice can be provided.

Examples

- Election of representative governments.
- Voting on water resource management (D'Angelo *et al.* 1998).
- Paired comparisons of forest management options in Victoria (Lockwood 1999).
- Voting on forest management options in Finland (in combination with MCA) (Laukkanen *et al.* 2002).

Political judgement

While political judgement is an almost ubiquitous component of environmental choice processes, it is usually done in conjunction with one or more of the other methods described in this paper. The legitimacy of unaided political choice relies on the power afforded by a representative democracy to its elected officials.

Assumptions

- Elected representatives have a mandate to make choices on behalf of enfranchised citizens.

Problems and limitations

- It is unlikely that all relevant values will be fairly represented in the choice process.
- Choices are generally not transparent.
- Political processes are subject to capture by special interest groups.

Strengths

- Enlightened political leadership can advance environmental sustainability.

Example

- Over-rule by the Tasmanian government of its planning authority's recommendation not to proceed with the Meander Dam.
- Decision by the South Australian Government to prohibit land clearing.

Public inquiries, meetings, submissions and the like

There are numerous methods used by governing actors to enable wider participation in environmental choice processes. These range from formal inquiries and opportunities to make written submissions, through to informal consultation via face-to-face discussions with participating actors. Some of the advantages of such processes and the conditions under which they can be successful were discussed earlier in the paper.

Assumptions

- The political process needs to be augmented by various forms of direct citizen participation in environmental choices.

Problems and limitations

- Contributions may only be token, in that choices have already been made.
- Resolving conflict between participating actors is often difficult.
- Participating and governing actors often have different views on the purpose of participation.
- Participating actors are often those who have the capacity (time, knowledge, social connections, economic freedom) to engage, leaving a large body of alienated actors.
- The grounds on which the governing actors make their final choices may not be transparent.

Strengths

- Choices are likely to be more reflective of community values than those made solely through political judgement.
- Local knowledge is more likely to be acknowledged and incorporated.
- Public ownership and commitment to solutions is likely to be enhanced.
- Government accountability is increased.

Examples

- All states and territories have processes for public involvement in management plans for protected areas, forests and catchments.
- Most jurisdictions have legislatively mandated public representations on local government planning schemes.

Citizen jury, deliberative poll, consensus conference

Citizen juries, deliberative polls and consensus conferences have been used to enable informed choices over contested options for addressing environmental issues. These methods are designed to provide participants with an opportunity to investigate an issue, deliberate on options, and arrive at a mutually agreed decision (Wiseman 2003). Citizen juries are a group of about twelve people chosen to make a decision on behalf of the community. The jury is given a 'charge' that typically requires them to choose a preferred option from several alternatives. In meeting the charge, the jury is able to ask for any information required, and can call and question witnesses to assist their deliberations. A deliberative poll involves a large group of people, perhaps several hundred, hearing and discussing evidence, before voting on a proposition related to the issue at hand. In a consensus conference, a panel of about twelve participants engage in a process that typically involves two preparatory sessions and an extended conference session. As with the other deliberative methods, panel members have the opportunity to hear from witnesses and engage in extended discussion. The aim is to come to a consensus view on the issue (James 2004).

Assumptions

- Deliberation gives rise to superior choices.

Problems and limitations

- Members of citizen juries and consensus conferences are not representative of stakeholders. Even with the larger numbers of a deliberative poll, representativeness can be a problem.
- Consensus may not be reached (but is not necessarily required in citizen juries or deliberative polls).
- The value domain covered in the process is dependent on the interests and diligence of the participants, so that some values may not be considered, or inadequately considered.
- Outcomes can be influenced by personalities and relative power of participating actors.
- Final choices are still generally made by governing actors, outside the deliberative process.

Strengths

- The ethical dimensions of environmental values are best considered in a deliberative environment (Wilson & Howarth 2002).
- Time and information availability allow for value construction, so that during the deliberation, well developed and stable value positions can be attained.

Examples

- Consensus conference on gene technology (Australian Museum 1999).
- Deliberative poll on whether Australia should become a republic.

- Citizens' jury of allocation of funding to park management activities in NSW (James 2004).

Professional or private judgement

Professional judgement can be exercised by planners or policy makers in a conventional 'top-down' choice process. Private judgements are made by individuals regarding their own behaviour.

Assumptions

- The problem under consideration does not require wider input in relation to the values involved.

Problems and limitations

- Value selection and emphasis is likely to be biased.
- The value bases underlying choices made by the various actors are generally not evident.
- The reasons for choices are generally not transparent.
- Where externalities, public goods or ethical questions are involved, the outcomes may not be democratically legitimate, and may not have community support.

Strengths

- Response to addressing the issue can be rapid.
- Some professionals have a sound understanding of the implications of their choices, and can efficiently and effectively make decisions.
- Private choices are made freely.

Examples

- Management agency choices of how to interpret and implement strategic plans.
- Private decisions are routinely made by individual landholders and recreationists.

Markets

As long as certain conditions can be met, markets are thought to efficiently allocate resources, so that benefits to the community can be maximised. With respect to environmental issues, one of the most important of these conditions concerns allocation of property rights. For efficient market exchange, goods need to be rival and exclusive. A good is rival when one person's use of it automatically precludes others from using it. A good is exclusive when, once the good is provided, only those who pay for it are able to use it. Many environmental resources are of course produced, consumed and exchanged through markets. In many cases, however, these markets have been, and in some cases still are, 'distorted' by government subsidies. Such subsidies, evident for example in water and timber production (National Institute of Economic and Industry Research 1996), can encourage over-production and consumption. Over the last decade there has been increasing interest in developing or improving the efficiency of markets

for environmental resources. A market value for a scarce environmental asset can be established by creating tradeable property rights over its use. For example, in the case of water, an upper limit on total allocations is first identified, taking into account factors such as resource availability and environmental flow requirements. Initial quotas are then allocated to water owners and a market is established by allowing them the opportunity to sell some or all of their water to others.

Assumptions

- The goal of policy should be the efficient allocation of resources.
- Individual preferences are all that should count (consumer sovereignty).
- Individuals act as rational, self-interested utility maximisers.

Problems and limitations

- Property rights allocations based on prior rights, historic precedent and special interest group preferences can:
 - result in resource commitments that exceed sustainable environmental capacity;
 - perpetuate inequitable power relations (for example, it has been shown that water markets disadvantage women (Davidson & Stratford 2003)); and
 - produce a large number of alienated actors.
- Not all values are tradeable.
- Alienated actors must rely on market governance mechanisms to secure their interests and represent their values.
- Many people have environmental values inconsistent with rational, self-interested utility maximisers.
- Markets do not necessarily give rise to sustainable outcomes.

Strengths

- Participating actors' exchange values can be incorporated.
- Choice and decision-making are decentralised.
- Participating actors with the strongest preferences have the most influence over outcomes.
- The method is instrumentally rational.
- There are potential environmental and efficiency benefits.

Examples

- Murray–Darling Basin water markets.
- Hunter River salinity trading scheme.

CONCLUSION

None of the methods described in this paper have the ability to comprehensively and adequately represent and integrate all relevant values for all actors across the variety of contexts in which environmental choices must be made. What is required is application of an integrative rationality, as advocated by Alexander (2000), to yield a combined approach that utilises a number of methods in ways that their respective limitations and weaknesses are, as far as possible, overcome.

Governance powers and responsibilities should be shared amongst actors from government, stakeholder groups and citizens. Different actors could take on governance roles at various stages through the choice process. For example, government actors could initiate a statement of need, and together with stakeholders, identify a range of options in a deliberative process. Selection from amongst these options could involve first the use of a technical method such as MCA, with criteria and weightings again established through a multi-actor deliberative process. Choice powers could then be widened so that scoring each option was done by aggregating responses from an extended pool of participating actors. Deliberation on the implications of the MCA could then again be tasked to the stakeholder/government group. Implementation governance would depend on the particularities of the chosen option.

Of course, many other process models could be devised. There is almost certainly no single optimal process. Depending on the specific need and environmental context, centralised and decentralised power can be brought together in a healthy tension of local self-determination, democratic governance (with participation and deliberation), and market engagement.

The choice process should be transparent at every stage, with full information and decision rationales available to any interested person. The process should seek to minimise the number of alienated actors. Particular attention may need to be given to including actors with minority interests who hold particular values, as well as members of the general public who are generally disengaged from choice processes. The goal is to achieve comprehensive value inclusiveness in the choice process.

Actor-inclusive and type-comprehensive value integration requires the use of multiple approaches, drawn from the menu of technical, participatory, deliberative and decentralised methods. In a way, that is what is already done. However, there are considerable opportunities for using integrative rationality to create a more coordinated, inclusive and transparent value pluralism for informing democratic governance and choice in relation to environmental issues. While there is still work to be done enhancing the validity and reliability of individual techniques, the more important task is to enhance our capacity for designing citizen inclusive, value comprehensive and transparent multi-method processes.

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