

An Integrative Hierarchical Framework for Environmental Valuation: Value Pluralism, Thresholds, and Deliberation

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ABSTRACT: When assessing people's values for the natural environment, a variety of methodological approaches may be required. This is because value pluralism negates the ability to reduce the various kinds of values to a single conception of value or super-value. Environmental valuation endeavors are defined by the question to be answered. However, for some people, the methodology employed may conflict with their perception of the issue and what values are most important to them, i.e., the methods employed are not globally incentive compatible with all modes of expressing one's values. Therefore, any single disciplinary approach to environmental valuation may ignore these most important values, or restrict, in an unacceptable fashion, a person's ability to express her values. No single disciplinary valuation methodology is necessary and sufficient for providing information regarding all of the values confronted in environmental decisions. In recognizing a plurality of values comes the realization that each disciplinary approach to valuation is bounded by its theoretical assumptions. A comprehensive environmental values assessment must be multi-disciplinary in scope.

An integrative hierarchical framework for environmental values is proposed (figure 1). The hierarchy is based on the notion of a prepotency of certain kinds of values over others leading directly to the use of a plurality of decision strategies. The different value levels in the hierarchy are constructed from the role of thresholds, or non-compensatory evaluations, of environmental issues. By approaching environmental problems with an awareness of a plurality of values, decision-makers may be more tolerant toward multi-disciplinary endeavors, resulting in better management and policy that is balanced, democratic, and holistic. A democratic process is suggested to deal with competing value claims and evaluate management and policy, which also promotes an environment in which concerned individuals can adapt to, evolve with, and learn from continually changing circumstances. Environmental management should be pluralistic in philosophy, pragmatic in practice, and contextual in process. Several topics are discussed for potential future research.

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INTRODUCTION

Issues on the valuation of the natural environment have gained in importance and attention as concerns about the environment have grown. Valuation is a multi-disciplinary issue (Bengston 1994; Brunson 1993; Castle 1993; Norgaard 1989). *(Define value and valuation, and their role in decisions and policy, e.g., as an indirect input to decisions as gathered and summarized through survey research and as direct input to decisions as participatory models. Incorporate Brown 1984 concept of values paper, including three dimensions of value – held, relational, assigned).* Our understanding of the issues of valuation has been evolving as we struggle with new, along with the old, problems that arise when our attention turns toward environmental valuation. Within any given discipline (ecology, economics, philosophy, psychology, sociology, and geography) many theories, models, and methods for environmental valuation have been offered and supported. However, because of the inherent complexity of valuation, not the least of which are intra-disciplinary disputes concerning theory and methods, discourse across disciplines is limited (Beckerman and Pasek 1997; Castle 1993; Norgaard 1989).

In ecology, we are beginning to understand and accept that ecological systems are irreducibly complex (Allen and Starr 1982; O'Neill et al. 1986). These complex ecological systems and the interdependencies between humans and natural systems are the objectives of environmental valuation. Why should we assume that the human system(s) of environmental valuation is any less complex than those ecological systems upon which it is based? Why should we accept that environmental values are descriptively reducible to a single theory, principle, or concept of value? But this is exactly the foundation of the majority of valuation theories and approaches that have been developed and applied to environmental issues.

Most valuation theories rest on a view of value monism or a single source for all values, which is the limiting case of axiological simplification to a single, over-arching theory. From this single theory, all necessary and sufficient conditions for valuation can be deduced, providing a set of principles that are complete and jointly justifiable (Norton 1996). A monistic approach to valuation is inherently reductionistic; all values can be expressed in terms of the single super-value. One of the greatest motivating factors for a monistic conception of value is that all conflicts are resolvable once and for all; all value claims can be rank ordered in a consistent and absolute manner via the super-value. There can be no enduring value conflicts, just assessments of more and less. Revealed preference theory is built on the notion that people's choices are direct expressions of their values, and that these choices are rational only in the sense that they are consistent, complete, and transitive. As Sagoff (1994) argues, maximization of selfish preferences is but one story, one motivation, we can use to describe why someone chooses as she does.

Arguably the disciplinary valuation approach of neoclassical economics is the most widely applied approach to environmental valuation. It is also probably the most contentiously debated theory in application by people both outside as well as within the discipline. Arguments against the neoclassical theory of value are primarily about its basic axioms and their necessary implications, such as the notion of consumer sovereignty, stability of preferences, motivation(s) for values, and the reducibility and commensurability of values.¹ One such debate concerns the source of value(s) and is between the anthropocentrists (which neoclassical economists

¹ The literature on these issues is abundant and too numerous to list. However, for a sampling of the literature, see Gregory et al. (1993), Payne et al. (1992), Schkade and Payne (1994), and Slovic (1995) on preference construction; see Anderson (1993), Etzioni (1988), Lutz and Lux (1988), March (1978), Sen (1977), and Zajonc (1980) on alternative notions of rationality, see Booth (1994), Brennan (1992), Elster (1985), Etzioni (1988), Georgescu-Roegen (1954), Harsanyi (1955), Opaluch and Segerson (1989), Page (1983), Peterson et al. (1988), Prior (1998), Rolston (1985), Sagoff (1988a, 1988b, 1998), Simon (1955), Soderbaum (1998), and Vatn and Bromley (1994) on general critiques of various aspects of neoclassical economic theory.

necessarily are in principle, if not personal) and the biocentrists (Barrett and Grizzle 1999).

However, as Norton (1996) points out, both sides in this debate are unyieldingly monistic in their approaches; anthropocentrists in that the source of all values is human valuers (conflicts between valuers), and biocentrists in that the source of all values is life (conflicts between values).

Norton (1996) further provides the analogy that this desire for a monistic approach to valuation is like the search for a "Holy Grail" of unified theory in environmental valuation.

A recent trend in the environmental valuation literature is toward a pluralistic conception of value.² Just as we are beginning to acknowledge and accept the diversity and complexity of natural systems and processes, it may be time that we begin to accept and embrace the diversity and complexity of the human situation and our interdependencies with the natural world (Brennan 1994, Rosenthal and Buchholz 1998). By accepting a philosophy of value pluralism, we accept the irreducibility of values to a single super-value (happiness, pleasure, utility). By accepting a conception of value pluralism, we can become more tolerant of the methodological comprehensiveness necessary for valuation, including multiple motivations of values and multi-disciplinary approaches to valuation.

This notion of value pluralism is not foreign or novel to environmental valuation issues. Past evidence for the recognition of value pluralism includes emphasis in federal mandates for multi-disciplinary assessments of environmental issues on federally-owned land and in multi-disciplinary organizational structures at academic institutions. There is also some evidence from empirical research.³ Glasser (1998) has identified eight categories, or sources, of value information, most with their own well-established disciplinary field – ecological,

² For example, Anderson (1993), Barrett and Grizzle (1999), Beckerman and Pasek (1997), Brennan (1992), Buchholz and Rosenthal (1996), Castle (1993), Kellert (1984), Minter and Manning (1999), Norgaard (1989), Norton and Toman (1997), Rolston (1985), Rosenthal and Buchholz (1998), Stocker (1990), and the articles appearing in Light and Katz (1996).

spiritual/aesthetic, ethical, social, legal, political, scientific/technical, and economic. To this list I would add a ninth category – psychological/emotional. The question is: Under what circumstances, if any, is a single category and its disciplinary approach(es) to valuation necessary and sufficient for understanding and evaluating values? When is a single approach appropriate?

One concern with adopting a pluralistic conception of value is whether conflicts among competing, irreducible value claims are resolvable. Anderson (1997) defines two goods being incommensurable when “neither one is better than or equal in value to the other” (pg.98). That is, when there is no common value by which each good can be reduced and commensurately compared, the two goods must be of different kinds. The goods are not varying in degree of some super-value, but require different values. When making choices, incommensurability signals “an opening for the free play of moods, interests, whims, impulses, appetites, mere tastes, likings, and other non-rational motivations” (Anderson 1997, pg.100; see also Etzioni 1988; Zajonc 1980). However, incommensurability is itself a strong claim for unresolvable conflicts. In reality, people make choices among incommensurable claims everyday, signaling that on some level incommensurable value claims must be comparable on some level. However, on what basis do people make these choices if not by reducing them to a common scale for comparison purposes?

Pragmatism offers us a theory about making choices in a value pluralism context of incommensurable value claims and enduring value conflicts. According to pragmatism, we make choices based on what we consider to be best under the specific context of the problem. At worst, we choose but then suspend judgment until more information becomes available (Levi

³ See Bengston and Xu (1995), Kellert (1984), Kempton et al. (1995), Minter and Manning (1999), and O’Riordan (1995). See also referenced studies in Bengston (1994), Minter and Manning (1999) and footnote 11 of this report.

1986). For critical issues with large, irreversible impacts, we may choose a cautious solution.⁴ This choice, however, does not signify a form of commensurability among the competing claims (Beckerman and Pasek 1997). In many cases, if not most, our choices are qualitative, not quantitative (Etzioni 1988; Georgescu-Roegen 1954).⁵ A choice's meaning is strictly its practical implications. Anderson (1997) sets out the connections of pragmatism and pluralism through her conception of practical reason and an expressive notion of rationality.⁶

“Practical reason is the power that agents have to adopt and revise their aims and attitudes in response to considerations they take to support or undermine them. Pragmatic theories of value claim that value judgments are constructions of practical reason that guide our reasoning about what to do and what to care about” (Anderson 1997, pg. 91). That is, value judgments have no proper application outside of practical reasoning and that these judgments are justified if they perform their practical function well. These judgments are also highly context-dependent in that our values “emerge from their organic embeddedness in the richness of the natural world” (Buchholz and Rosenthal 1996, pg. 270).

(Explore practical reason further. Tie in with weak anthropocentrism (Norton 1995b) and preferences=value (we do not desire something because it is good. Rather, it is good because

⁴ For references on cautionary approaches to environmental issues, see Bishop (1978), Castle and Berrens (1993), Ciriacy-Wantrup (1952), Crowards (1997), and Norton (1995a) on the safe minimum standard approach, and Costanza and Cornwell (1992), O’Riordan and Cameron (1994), O’Riordan and Jordan (1995), Page (1991), and Perrings (1991) on the precautionary principle approach.

⁵ Another concern with the quantification of values in decision-making tools and methodologies is the false sense of objectivity numbers manifest for decision-makers. Quantification seems to make values explicit, but are limited by the theories and concepts used to generate them, including aspects of valuation that are not amenable to quantification and latent value judgments (Rolston 1985). This problem has elsewhere been identified as the ‘myth of numerology’, which states that rationality requires counting and measuring. As Shrader-Frechette (1985) states: “Once one subscribes to this myth, says Self [1975], the numbers *distract* him from the harder task of examining the relationships between value judgments and the relevant information and between value judgments themselves” (pg. 158-159, author’s italics). Thus, this leads to the misuse and misunderstanding of what the numbers really represent, along with what they do not represent.

⁶ On arguments for other notions of rationality, including expressive rationality, see Bianchi (1990), Brown (1992), Etzioni (1988), Heap et al. (1992), March (1978), Simon (1955, 1972) and Zajonc (1980). See Rosenthal and Buchholz (1998) for a very good discussion of experience and value within a pragmatic framework.

we desire it (Santayana). I.e., scientific investigations into values is not a process of discovery of fixed, stable, and absolute values, preferences, facts (as a noun or subject), but is or can be a process through which we develop values, preferences, opinions (as a verb or action).)

“So instead of saying that it is rational to value something because it is good, pragmatism says that it is good because it is rational for us to value it. Claims about what it is rational to value determine claims of value. Things are good in virtue of their bearing certain relations to principles of practical reason” (Anderson 1997, pg.92). Our ‘muddling through’ is an attempt to integrate our experiences of value within the natural world surrounding us. And the rationality of our choices is our expression of our rational attitudes toward what we conceive as being valuable, given the context within which we must choose. Tomorrow, we may choose differently if the context (e.g., available information or expression of desired outcome) of the problem changes in a significant manner.

We are continually being confronted with new problems and choice contexts. Practical reason guides us through these changing times as we adapt to new circumstances, learn from new experiences, and evolve into the individuals we want to be. Therefore, when managing a complex and ever-changing environment to which we are deeply connected, we need an environmental valuation approach that is pluralistic in philosophy, pragmatic in practice and contextual (evolving, learning, adapting) in process (Castle 1993).

In application of a pluralistic, pragmatic, and contextual approach to environmental valuation, we will need some structure. But how can we find order in the seemingly chaotic world of pluralistic values? I will propose and develop a model that integrates various motivations of environmental values and choices in a hierarchical framework. This integrative

hierarchical model is based on the assumption of prepotency of certain motivations over others. This underlying structure may provide guidance on how people use different decision strategies.

Corollary issues that will be discussed in order to build the hierarchical framework include a brief discussion on different kinds of decision models and a discussion on thresholds. Thresholds are necessary manifestations of noncompensatory approaches to decision-making. We will identify three kinds of thresholds –objective thresholds based on science, and two subjective thresholds, deontological and satisficing.

It is my sincere hope that the proposed framework will prove to be helpful in promoting tolerance and acceptance of different value expressions, and balance in environmental management and policy. By being tolerant and open to various viewpoints and expressions of value, we may be able to better discuss important issues facing us today in a truly interdisciplinary setting.

A PLURALITY OF DECISION STRATEGIES

Different decision contexts may require different decision strategies, or approaches to processing available information and choice of desired outcome. Different models of decision-making have been offered in the past, and have oft times been viewed as being in competition with each other or developed in response to a problem a contemporary model could not adequately solve. Empirical testing of the different strategies provides evidence that each strategy performs well under certain circumstances. A philosophy of pluralism combined with the pragmatic approach requires that we be tolerant of the complexity of decision contexts and the use of different strategies in different decision contexts. For any given decision model, there are at least as many possible decision contexts in which the model performs poorly as well as

when it performs well. All that this means is that different problems may require different strategies. People may invoke various decision-making strategies when faced with different decision contexts (Kahneman et al. 1982; Lockwood 1997; Payne et al. 1990, 1992).

Conflict among competing values provides the opportunity to make choices; it is the reason decisions need to occur. A conflict is when more than one alternative or option is available, but only one can be chosen. A conflict can be intra-personal (among options) or inter-personal (among people). While not all conflicts may be resolvable (a unique or universally dominating solution), a choice must be made. Decision strategies may be categorized by how they approach conflicts, use or process information, or deal with other issues in decision-making such as complexity and uncertainty. Decision strategies involve some level of conscious effort on the part of the decision-maker, and therefore may not encompass non-cognitive, or non-rational factors.

(Construct a typology of decision strategies with value complexity as one dimension and value compensability as another dimension: low complexity by compensable; low complexity by noncompensable; high complexity by compensable; high complexity by noncompensable ('wicked problems'). Also could use level of knowledge x agreement on values, e.g., low knowledge x low agreement = wicked problems. See also Swearingen's (1999) typology of relative social costs x degree of substitutability, where high social costs with no substitutes becomes the dimension of deliberation.)

Hogarth (1987) categorizes decision strategies by how people deal with intra-personal conflicts. These strategies may also equivalently be categorized by the manner with which the available alternatives are evaluated. Compensatory strategies are conflict confronting, i.e., they allow the trading-off of less value on one dimension with more value on another dimension, or in

other words, values are substitutable. Compensatory models of decision making include the linear model, the additive difference model, the ideal point model, and a weak form of satisficing. In each model, the information available and the choice made is a simultaneous process.

Further restrictions can be placed on compensatory decisions such as completeness, consistency, and transitivity of preferences. However, evidence suggests that preferences are not stable and unambiguous, but adapted and constructed from beliefs, experiences, and the context of the choice occasion (Gregory et al. 1993; March 1978; Slovic 1995). Compensatory models seem to be most applicable when the choice occasion is not very complex and uncertainty is at a minimum. In what situations and under what circumstances compensable approaches for making decisions are used is an empirical question. Compensatory models may not be applicable for environmental issues, i.e., environmental goods and market goods are different in kind, they are non-substitutable (Beckerman and Pasek 1997).

Non-compensatory strategies are conflict avoiding, i.e., they do not allow infinite tradability or substitutability between different values. Non-compensatory models include the conjunctive model, the disjunctive model, the lexicographic model, and the elimination-by-aspects model. Non-compensatory strategies assume alternatives are mostly evaluated in a sequential manner with available information and choices being made at different stages of the decision process. There are three factors that increase the likelihood that a respondent will use a non-compensatory approach to making choices: 1) the complexity of the decision, 2) his cognitive ability in making a decision, and 3) the context of the decision including the values at risk.

In general, non-compensatory models assume people use structured sequential factors in their search for a decision under complexity. The criterion for each step in a sequential model can be interpreted to be a definable threshold. These thresholds can lead to simple binary choices by dichotomizing the question into the presence or absence of an aspect, to more complex processing of multiple aspects, implicitly ranking several of these in the decision process. Final choices in a non-compensatory decision process may be path-dependent, i.e., final outcomes of the process are dependent upon the choice at each stage of the process (Barrett and Grizzle 1999; Gregory et al. 1997).

THE ROLE OF THRESHOLDS

Thresholds play an integral part in most non-compensatory decision models. Thresholds are defined by criteria that place bounds, restrictions, or minimum or maximum levels on options, either in attributes space or goods space.⁷ Attributes space thresholds refer to a quality or characteristic of an option, while goods space thresholds refer to a certain magnitude or quantity of a good or characteristic of a good for an option.

Two kinds of thresholds are relevant for environmental valuation and decision-making – objective and subjective. We can also identify two types of subjective thresholds – deontological and satisficing (Glasser 1998). Assuming human well being is inextricably linked with the functioning of ecological processes and systems, then a goal for environmental management may be to sustain these systems and processes (Soderbaum 1998). *Objective thresholds* are defined by scientific criteria that identify limits to natural processes and systems, and subsequently limits

⁷ Thresholds play a common and integral part in many decision and choice modeling approaches, such as defining minimum levels in the safe minimum standard and precautionary principle approaches to management in contexts of uncertainty, complexity, and irreversibility (see footnote 4). Literature that deals with thresholds in different modeling contexts includes Brunson (1993), Corso (1963), DeBettencourt and Peterson (1981), Georgescu-Roegen

on human use of these processes and systems. These are *thresholds of sustainability*. For example, there are objective thresholds for minimum viable population and habitat size for species survival and maximum amounts of pollution that certain ecosystems can assimilate. Thresholds of sustainability operate in the *option-defining dimension* of feasible management outcomes. Objective criteria tend to define biophysically feasible management outcomes as those that operate within reasonable parameters of natural system and process capabilities.

There are two types of subjective thresholds – deontological and satisficing (Glasser 1998). *Deontological thresholds* are restrictions we place on our attitudes and actions toward the environment and each other, or are minimum or maximum requirements associated with certain aspects goods must possess. Deontological threshold criteria are non-tradable and non-negotiable.

There are two normative motivations for deontological expressions of value: 1) needs-deprivations, such as food, shelter, and safety, which dominate choices at the lowest level (but most powerful when unfulfilled); and 2) higher aspirations that express self-actualization and a conception of the good life (basic values in the religious, legal, and ethical value categories) (Georgescu-Roegen 1954, 1973; Maslow 1968, 1987). For example, when someone is starving (a needs-deprivation), an improvement in air quality and other health and aesthetic concerns are irrelevant to him. For someone who has all of his basic needs fulfilled and no imminent threats to his basic needs, he may then choose based on some higher aspirations toward a good life such as expressions of animal rights and a choice for a vegetarian diet or the preservation of species. In other cases, deontological criteria such as religious, ethical, and legal expressions of higher aspirations may precede even basic needs, such as the Jains' reverence for life leading to not

(1954), Glasser (1998), Lockwood (1996), Maslow (1968, 1987), Page (1991), Park (1978), Perrings and Pearce (1994) and Sen (1993).

harming any living being even at the cost of one's own life. Deontological values are not a matter of degree, but of kind.

We may also identify prescriptive deontological thresholds. Prescriptive thresholds define aspects a good must possess to be considered further (Tversky 1972). For example, when choosing an automobile, someone may require that it be less than \$x and/or get more than y miles per gallon in fuel efficiency.

Deontological thresholds are *thresholds of acceptability* and operate in the attributes space of decision-making (decisions are based on the presence or absence of a specified thing, either possessed by a good in the choice set or as an value to be expressed by the choice made). An option is evaluated as acceptable if it is consistent with an individual's deontological criteria and unacceptable if it violates these deontological criteria. As such, thresholds of acceptability operate in the *option-rejecting dimension* of feasible management outcomes. For an individual that is at a food need-deprivation level, all market baskets that include food are acceptable, all market baskets that do not contain food are unacceptable or rejected. Likewise, an individual that expresses a higher aspiration of species preservation, all environmental management options that do not negatively impact an endangered species are acceptable, all options that negatively affect endangered species are unacceptable or rejected.

Deontological thresholds are prepotent or lexical in power. That is, these thresholds come prior to any other decision strategies; they are option-rejecting principles. Only those options that are consistent with the criteria are feasible and available for further consideration. These thresholds often are sources of problems and confusion when assessments from one culture or sub-culture are applied to other cultures. This type of technology transfer is ignorant of individual levels of need-deprivation or higher aspirations (Georgescu-Roegen 1973; Maslow

1968). For example, when someone is starving the issue of a pristine natural environment is irrelevant; her physiological hunger need is most powerful and dominates her choices. Once her most basic needs (physiological, safety) have been fulfilled, her higher aspirations for a pristine natural environment may dominate her choices as an expression of what is best. International development projects targeting the preservation of pristine natural areas ignorant of local basic needs and values are doomed to complications in adoption.

Satisficing thresholds are degrees of magnitude thresholds; a minimum or maximum level or magnitude on a specific variable. Satisficing thresholds are *thresholds of desirability* that may be tradable and negotiable if the opportunity costs are large enough (similar to the safe minimum standard approach to environmental management, see footnote 4). For example, the Endangered Species Act (ESA) was originally created, in all intents and purposes, as a deontological threshold.⁸ However, since not all people share in the spirit of the ESA, and that the ESA, as a deontological criteria, is option rejecting, it has subsequently been weakened, lowered to the status of a satisficing criteria in practice. Thus, the ‘God squad’ was formed to adjudicate between value claims of preserving species and opportunity costs that are too large.

Satisficing criteria may also be based on some maximum level. For example, someone may set a maximum level of a good at which satisfaction is reached. Additional amounts of the good are unimportant, or not the source of additional value. That is, more of a good beyond its satisfaction level has no marginal value; the value of the good is a with/without, or satisfactory/unsatisfactory concept. In the case of a maximum level of pollution, it is also possible that more of the good can lead to an overall decline in welfare (Stocker 1990).

⁸Whether the Endangered Species Act is an expression of a needs-deprivation or higher aspiration depends on how the individual perceives the issue of species existence. It may be based on needs-deprivation if human survival depends on all species survival or a higher aspiration if all species are intrinsically valuable because of a right to life or a religious/spiritual connection.

Thresholds of desirability operate in the *option-limiting dimension* of feasible management outcomes. Satisficing thresholds place minimum and maximum desirable limits to management outcomes. However, these limits are not required for an option to be feasible. An individual may set a minimum threshold for the amount of food a market basket contains, thus limiting the number of acceptable baskets to those that are satisfactory. Similarly, an individual may set a maximum amount of food a market basket may contain. Any amount of food above the minimum level regardless of the maximum level may be traded for other basic needs goods or luxury goods. Thus, in this case, the minimum level is non-tradable, but additional food beyond this minimum level may be tradable. For higher aspirations, an individual may set a minimum level for critical habitat for an endangered species that is not ecologically necessary for the survival of the species.⁹ All management options that meet or exceed this minimum level are satisfactory. Likewise, a maximum level of critical habitat may be set, beyond which additional amounts of habitat have no additional value and may be traded off.

A HIERARCHICAL FRAMEWORK FOR ENVIRONMENTAL VALUATION

Value pluralism implies multi-dimensionality in that motivations to choose (express values) cannot be reduced to a single dimension (Soderbaum 1999). This multi-dimensionality requires that our choice processes and experiences aid our adaptation to changing circumstances and goals through the process of learning and evolving as we adapt. And because of the adaptation of the decision-making agent, our decisions are strongly contextual in nature. Value pluralism need not lead to epistemological relativism, i.e., that all value claims have equal

⁹ The minimum level of habitat necessary for species survival is an objective threshold. These thresholds are option-defining in the sense that no options are feasible that are below this threshold level. Thus, in an environmental

strength and validity (Anderson 1993, 1997; Stocker 1990). I believe there is an underlying structure. This structure can be based on the prepotency of certain motivations or values over others (Georgescu-Roegen 1954; Maslow 1968). Thus, certain dimensions of values must be considered prior to the consideration of lower, or weaker values.

We can now begin to sketch out a framework for environmental valuation. The proposed framework is comprised of four dimensions and is hierarchically structured based on an *a priori* prepotency of the different dimensions (figure 1). This prepotency is the strength of the different value claims and how strongly they affect an individual's actions and attitudes. (*Incorporate modeling notation from Levi; Tversky; and Munda et al.*).

The first dimension is the *option-rejecting dimension*. This dimension includes the deontological thresholds, which qualitatively constrain the number of options in the choice set by culling those options with unacceptable attributes or outcomes. This reduces, for the individual, the realm of possible options to those that are permissible or admissible (Etzioni 1988). At times, deontological criteria may be so deeply held by an individual or society that certain options that are relevant for a different individual or culture are not even perceived, let alone considered, as a possibility. Thus, deontological criteria are the most decisive criteria in the model and must precede other matters when evaluating options or alternatives. Religion, ethics, and law are expressions of deontological criteria insofar as they place normative constraints on individual actions for some conception of a good life or other reasons. When evaluating options, these criteria are expressed first and are strictly non-compensatory and incommensurable (but weakly comparable) with all other value expressions.

management scenario, options that do not meet this minimum level of critical habitat are not considered to be viable options.

All options that do not violate any of the deontological criteria that are relevant for the decision context are next evaluated on the *option-limiting dimension*. This dimension includes the satisficing thresholds, which place goals or desires as endogenously-defined constraints on the choice problem. These thresholds may be quantitatively defined. A satisficing criteria does not necessarily reduce the number of options available to the decision-maker, but it may lead to qualitative and quantitative distinctions from among the available options. That is, options may be rated as to whether they meet the desired minimum or maximum standards or levels defined by a satisficing criterion. Options that exceed the desirable level are not necessarily rated as being better than other options that just attain the limiting level. However, when an option is assessed with respect to other aspects, one may override the endogenously-defined satisficing criterion if there are high levels on a non-satisficing criterion. Thus, evaluations on the option limiting dimension may be weakly compensatory and comparable for unessential satisficing (“it would be nice if...”) claims, but non-compensatory and weakly comparable for essential satisficing claims (“we must have at least...”).

The third dimension of the hierarchy is the *relative preference dimension* (Park 1978). This dimension is similar to Etzioni’s (1988) ‘legitimate indifference zone’ that includes options that do not violate the deontological criteria and meet the satisficing criteria of the first two dimensions. Options are evaluated on this third dimension by the relative strengths of an individual’s preference for the remaining unconsidered qualities, attributes, or aspects. Evaluations on the relative preference dimension are compensatory by nature, and are potentially commensurable via some metric (such as neoclassical economic valuation).

The fourth dimension is included here solely for logical completeness, but it also may have important implications for environmental valuation research. This final dimension is the

irrelevant dimension (Park 1978). An individual is truly indifferent to certain qualities, attributes, and aspects of options on this dimension. Thus, these characteristics are irrelevant to any choice made by an individual. Setting completeness aside for the moment, this dimension is important to recognize in that not everyone has a value for everything. Under certain circumstances, some people may be completely indifferent to certain things. In one sense, irrelevance is related to thresholds of desirability in that failing to attain or exceed the threshold may provide no additional value such as in the cases of satiation and abundance. In another sense, irrelevance is simply due to an individual not caring or having no value for a good.

The overall structure of the hierarchy amongst its four levels is strictly lexicographic in nature. The lexicon is based on the relative power of each dimension over an individual's choices. Deontological criteria are most basic to expressing one's life vision, including values, attitudes, and beliefs, that they must come prior to considering permissible options according to any other criteria. This is similar to Maslow's (1968) physiological needs coming prior to any other needs considerations. The pattern of lexical strength of each dimension holds as we progress through the hierarchy of decision dimensions. However, within any dimension, the ordering of motivations is not necessarily lexicographic. It should be recognized that each motivation has varying degrees of strength associated with it. The intra-dimensional relative power of one criterion over another may change as the context changes (Stocker 1990).

IMPLICATIONS

Several other hierarchical models of valuation have been proposed in the past.¹⁰ What these models have in common, including the one currently being proposed, is that they all: 1)

¹⁰ Several of these other hierarchical models include Maslow's (1968, 1987) theory of motivation based on a hierarchy of needs, Park's (1978) consumer choice model, Glasser's (1998) hierarchical guidelines for

accept a value pluralism; 2) have a prepotency of certain values over others; and 3) approach behavior and value expressions as being contextual in nature. What this means for valuation of environmental goods, in general, is that the assessment of people's expressions of values is not amenable to a single, methodological approach. Not only may it be a category mistake to reduce the diversity of values to a single value (Sagoff 1988a), but it may also lead to highly volatile situations for environmental managers.

For example, neoclassical economic methodology (including the valuation of people's preferences regarding an issue) may be used to evaluate and select an economically efficient management alternative, only to later have the 'preferred' alternative contentiously debated publicly, and sometimes through lawsuits. What this may mean is that not all values are being accounted for in the methodology employed. While economic efficiency analysis is a useful information system for people concerned about economic efficiency, it cannot address other concerns people may have that are equally, if not more, important to the decision process. This is an issue of methodological appropriateness given the values at stake in the decision process (Brown 1984).

Only presenting people with one way of expressing values may not allow some people the opportunity to express those values that are most relevant to them concerning the issue at hand. That is, under certain circumstances, an economic question is not necessarily the appropriate question for all people.¹¹ Just because the majority of people answer the question

environmental policy analysis, Norton's (1995a, 1998) two-tiered and his (Norton 1996) three scalar approach to environmental policy in a hierarchy of spatio-temporal dimensions, Georgescu-Roegen's (1954) needs hierarchy model, and Brunson and Shelby's (1990) hierarchy of campsite attributes model.

¹¹Sagoff (1988a, 1988b) has argued that some protest responses and non-responses may not only be because of poor survey design resulting in biased responses to the valuation survey, but may also be triggered by respondents not perceiving the environmental problem to be a question of economic trade-offs. Several studies are beginning to empirically test for deontological, or rights-based ethical motivations toward the environment, in the context of economic survey research (Blamey and Common 1992; Lockwood 1998; Spash and Hanley 1995; and Steven et al. 1991). Deontological motivations may be an explanation, *inter alia*, for protest bids and nonresponse in certain

posed does not make it the best question for all concerned. This should also lend some doubt about the answers these people provide, either because they perceive the question to be nonsensical or answer it uncritically. Inconsistency in preference elicitation, *inter alia*, is a function of the incomparability of irreducible and independent motivations for behavior and choice (March 1978). Therefore, incentive compatibility is not only an important issue to be researched in the intra-disciplinary dimension, but also in the inter-disciplinary dimension. There is probably no single question that is adequate for or capable of capturing the diversity of value expressions invoked by environmental issues.

Accepting value pluralism has some significant implications for environmental valuation and assessment of environmental options in a management context. Since not all motivations for choosing are reducible to a single conception of value, standard tools in analyzing management issues are not available in all decision contexts, such as maximization and optimization. Anderson (1993, 1997) argues for two different concepts – distribution and obligation – to replace the maximization and optimization objectives, respectively, in certain situations. Maximization implies the tradability amongst the various values associated with a problem. However, for intrinsic values such as love, respect, and admiration, they have a distributive form. For example, parents do not maximize love by bestowing it upon one child, but distribute it to each of their children. Stocker (1990) argues for moderation or balance when making choices, not maximizing some super-value.

Anderson (1993, 1997) argues that not all goods can be treated as scalars of one value, that is, each good having more or less of one value. These goods may be valuable in different

economic survey research projects. Prior (1998) critiques the neoclassical economic method along similar value pluralism grounds. Other research on plural value expressions is in the area of people's attitudes toward environmental goods (Brown and Harris 1998, Dunlap 1991, Kellert 1984, Kempton et al. 1995, and Minter and Manning 1999).

ways, demanding that we treat them differently. We may have a felt obligation toward certain goods or people that disallows our trading them off. “When we must choose between them [your mother’s life and a friendship], the basis of choice is not a judgment telling us which is more valuable but a judgment telling us how best to reconcile the expressive demands of the different kinds of concern we owe to and have for them. In the cases at hand, the bases of choice are principles of obligation, not a principle of optimization” (Anderson 1997, pg. 103).

In certain decision contexts, perceived ethical motivations may be most strongly invoked. In other choice situation, maximization or optimization of a targeted value(s), restricted by the domain of permissible options, may be most relevant. In some cases where the question is well defined, the disciplinary approach and methodology to be used is predetermined, such as the use of economics for market goods valuation. However, as the question becomes broader or less well defined, then multiple disciplinary approaches and methodologies may be required. Value pluralism necessitates the use of a plurality of methodological techniques and approaches when gathering information on values (Norgaard 1989).

While not assuming no two people are alike, I am also not assuming that all people are alike. The basic unit of concern for value assessments must be the individual. However, instead of globally aggregating information on individual people’s values according to some super-value or over-arching utility function, the best we can hope for is to aggregate according to the dominant values as expressed by people. That is, when faced with a values assessment for an environmental policy issue, we may be able to aggregate people by their most dominating values for the issue at hand.

For example, in the economic assessment of the value of endangered species, many studies found a certain percentage of the people in their sample seemed to be expressing a more

dominating rights-based ethical view toward animals (see footnote 11). This rights-based ethical expression is not amenable (reducible) to economic methodology. But instead of dismissing these people's value expressions as 'irrational' by economic definition or biased because of poor survey design, they should somehow be accounted for in assessments that are sensitive to different modes of value expression. In the aforementioned studies, some of the people were valuing endangered species morally. Thus, the assumed substitutability between market goods and endangered species is not broadly incentive compatible for these people. In this case, economic questions are not globally appropriate or sufficient in and of itself to provide relevant information for use in decision and policy processes. Other question foundations and/or modes of permitting concerned individual's to express their values may be necessary (for example, direct input via open meetings and other democratic processes).

We may be able to categorize or classify environmental management and policy issues according to the nine value categories¹², depending on the strength of the relevant values within each category and the number of individuals that strongly hold these values (Gregory et al. 1997). Issues of species survival, especially for mega-fauna, may be less perceived to be economic issues than, say, an expansion of a ski area.¹³ These issues may invoke values of different kinds and therefore may need to be treated and assessed differently. There may be certain environmental issues that are not only primarily economic in nature, but also the values of which may be commensurable to market values and market goods. One way to determine whether a single disciplinary approach to valuation is adequate and most appropriate is if the issue being assessed does not violate any perceived deontological threshold criteria and does not

¹² These nine value categories are ecological, spiritual/aesthetic, ethical, social, legal, political, scientific/technical, economic, and psychological/emotional. Most of the value categories will have needs and aspiration dimensions, mirroring the deontological thresholds classification.

have any strong satisficing threshold criteria. In other words, a single disciplinary approach to valuation may be adequate if the management or policy issue outcomes are all within the domain of permissible options. For environmental and other social issues, the domain of permissibility for single valuation approaches seems to be nearly empty.¹⁴ This would mean that most environmental issues are multi-disciplinary concerns. However, this is an empirical question, the answer to which may be provided by comprehensive, multi-disciplinary value assessments.

A RESEARCH AGENDA

The proposed hierarchical framework and theory of pluralistic values seem to make the issue of environmental valuation too complex for critical investigation. This could not be further from the truth. The complexity of environmental valuation is the reason to continue to investigate values, methodologies, and integrative models. Good management and policy are built off of well-informed foundations concerning the values at stake. Typically, management and policy actions are contentious because they are based on ill-informed foundations or approach the issue too narrowly.

The following topics, I believe, would be a step in the right direction in attempting to figure out how to deal with complex environmental valuation issues. Prior (1998) argues for a holistic environmental assessment approach that is sensitive to and receptive of individual's potentially incommensurable value expressions. If we are to intelligently deal with important

¹³ This is assuming that the expansion of a ski area is not onto land that may be critical habitat for an endangered species, *ceteris paribus*.

¹⁴ This is not to say that intra-disciplinary investigation is not the best source for important and needed information when deciding on a management or policy action. For example, if there is an economic component to an environmental management or policy issue, then economics is the best option for providing information on that component. Similarly, if there are strong psychological issues involved, then psychology is the best option for providing information on that component. What I am saying is that a single disciplinary approach to environmental valuation is probably not necessary and sufficient for determining the best management or policy action. And since

issues, then we need to be aware of each of the other's point of view in a holistic and realistic framework (Castle 1993; Norgaard 1989). In the final section, I will briefly discuss possible solutions to adjudicating between conflicting value claims at the macro level.

Value Typologies or Value Inventories

In order to account for and increase an awareness of the plurality of environmental values and their relative strengths in individual decision-making, we need a comprehensive inventory of potential values. This can be accomplished by developing value typologies for each of the nine value categories: ecological, spiritual/aesthetic, ethical, social, legal, political, scientific/technical, economic, and psychological/emotional. The typologies would have to be comprehensive in that they, *inter alia*, cross religious and cultural boundaries. In order to understand what values an environmental issue may invoke, we need to have a full listing of value categories and value types.

Different worldviews many times lead to inter-personal value conflicts. Norton (1997) argues that even diverse worldviews can converge in environmental policy if it is distant future-oriented and sufficiently pluralistic in its perspective of human-nature relationships.¹⁵ For example, if we are unaware of the culturally defined, spiritual significance of an area, object, or life form for an individual, then we may find that individual's choices to be incomprehensible. That is, until we are aware of the spiritual significance to that individual. We may still disagree, but at least we are aware of their worldview, becoming more tolerant and respectful of the diversity of values involved in environmental issues. By recognizing our own biases and those

multi-disciplinary approaches are needed, then we may all be better off when these disciplines communicate better about important issues.

¹⁵ Norton's (1997) convergence hypothesis is that if "anthropocentrists consider the full breadth of human values as they unfold into the indefinite future, and provided nonanthropocentrists endorse a consistent and coherent version of the view that nature has intrinsic value, all sides may be able to endorse a common policy direction" (pg. 87).

biases of other people, we may develop methods that enable effective expressions of values and enable understanding and communication.

A good start on these value typologies can be gleaned from the literature. For example, Rolston (1988, 1994) provides a general environmental value typology; Kellert (1984, 1996) provides a typology of our values for animals; Minter and Manning (1999) provide a typology for different kinds of environmental ethics; Kempton et al. (1995) provide value, attitudinal, and ethical typologies of the environment; Driver et al. (1996) provides information on spiritual, psychological, and cultural values of nature; and Randall and Stoll (1983) and McCollum et al. (1992) provide economic value typologies. (*Provide tables of these typologies.*) Experts in different fields, from different countries, and with different worldviews, can provide further insights and refinements of the value typologies.

These value typologies for each value category are then to become the base, or foundation, for value assessments of environmental issues. We can then explore which value expressions are prepotent over other value expressions for those people who hold them. In this way, maybe we can then define the limits or bounds to different methodological investigations of values for different environmental issues; these limits or bounds to methodology defining their realm of appropriateness in providing information to the decision process.

Decision Contexts

The context of the decision is important to understanding the kinds and strength of various value claims invoked when making environmental decisions. Context effects are important for developing incentive compatible modes of value expression in intra- and inter-disciplinary scientific investigations of value. Contexts effects can be on the intra-personal, inter-personal, and extra-personal dimensions (Brown and Slovic 1988). Intra-personal contexts

include an individual's perceptions, held values, beliefs, physical and emotional state, endowment, and dispositions. Inter-personal contexts include social setting and constituency effects. Extra-personal contexts include the scope of the environmental issue on spatial and temporal scales and survey methodological effects such as response mode, order effects, stimulus mixture, and informational cues. Other factors can include the size of the impact from a management perspective may affect what values are invoked and/or how strongly, and sense of place may greatly affect what is perceived to be permissible in management contexts (Norton 1996; Norton and Hannon 1997; Williams and Stewart 1998). Temporal dimension issues include uncertainty, irreversibility, and duration of management action (see footnote 4).

Characteristics of environmental goods may also affect what values are being invoked and to what degree. Different characteristics that may be important include whether the area is public or private land, forested or grassland or wetland, designated wilderness area or a city park, unique or rare. Other issues include what animals and plants (endangered, mega-fauna or mega-flora, native or exotic) are affected and to what extent. If management is a restoration effort, is it because of a natural or human-caused event? Therefore, we may be able to classify environmental issues into broad categories with identifiable characteristics.

Defining and Identifying Bounds to Valuation Methodologies

At this point, we want a conceptual framework that links the value typologies and their classification based on the proposed hierarchy and decision contexts. This will enable us to identify values, their hierarchical classification, and their relative strengths that are involved when considering different management and policy actions. For example, if a management action would negatively affect mega-fauna or an endangered species, then the decision-makers can be relatively assured they will be confronting some very powerful value expressions from the

deontological, option-rejecting dimension. We can then design an investigative project that is at least sensitive to the reality that there will be non-compensatory value expressions by some people. Therefore, we can accept that any compensatory approaches to gathering environmental values information will only represent part of the concerned public at large. What the exact proportion of the concerned public will be is an empirical question that is highly context dependent. The main point here being that there are probably few cases for environmental issues when a single question or disciplinary approach to valuation is adequate to explain the many values at stake.

On a general level, we could assess the information provided by specific disciplinary approaches to valuation as to whether they are sufficiently adequate in providing value information for a proposed management or policy action. In some cases, a compensatory valuation approach may be sufficient in assessing the value impacts of a proposed action or is the best approach for answering a specific question about the proposed action (such as assessing its economic impacts). In other cases, multi-disciplinary approaches may be required. At least the decision-maker can have a good feel for whether the information available is adequate for the problem at hand.

We need tools that can help identify the links between the value typologies and the classification of environmental issues. I am not certain whether and to what extent models can be developed that systematically relate the values and environmental characteristics to predict the occurrence of the different levels of value expressions and the proportion of the concerned public that may hold these different value claims. I will discuss three approaches that have the potential for assisting us in identifying the links between plural values and environmental characteristics and contexts.

The first is the Environmental Response Inventory (ERI) survey (McKechnie 1974). The ERI is an instrument for measuring environmental dispositions, that is, “individual differences in the ways people think about and relate to the everyday physical environment” (McKechnie 1974, pg. 1). The ERI is a way to study human-environment relations that is interdisciplinary in nature. The ERI has merit in that it may enable us to define various values and their strengths, and dependency of these values on environmental contexts, along with their role in evaluating environmental issues according to the proposed hierarchy. Along a similar vein, Max-Neef’s (1991) matrix of needs and satisfiers approach to development issues could be productive in inventorying and understanding the plurality of values held by people. By applying Max-Neef’s (1991) approach across a variety of environmental contexts, we may be able to map the relationships between values and environmental characteristics and issues.

A second tool with potential merit for discovering the links between values and the environment is the decision-pathway survey (DPS) technique (Gregory et al. 1997). The DPS is built on the insights of behavioral decision theory. The DPS is designed to “ask a set of linked questions that encourage participants to construct their expressed attitudes and reveal their thinking as part of the survey results, thereby yielding information about key trade-offs and providing policy-relevant profiles of their attitudes” (Gregory et al. 1997, pg. 241). This survey technique not only would prove helpful in identifying the links between the various levels in a value hierarchy and environmental characteristics of management and policy issues, but could also be used to identify different segments of the population according to what role these values have in evaluating environmental issues according to the proposed hierarchy. That is, DPS may be able to identify whether there are any deontologically held values and what proportion of the population holds them for a given environmental issue of certain definable characteristics.

A third approach to linking plural values with environmental characteristics is through the use of multi-attribute choice modeling for different environmental characteristics of management and policy issues. The relationships among different values and their role in evaluating environmental issues could be defined through their role in various multi-attribute choice model scenarios. These relationships could then be used to develop site scores and ordinal rankings of different land parcels and/or issues according to the probability of different kinds of values being invoked based on different environmental characteristics.¹⁶ In addition, people could be segmented according to the role of their values according to the proposed hierarchy. *(what could be the role of multi-attribute choice modeling, broadly applied household production theory, multi-criteria decision modeling?)*

CONCLUSIONS

Value pluralism necessarily leads to the irreducibility of values to some super-value. This means that there is not, for all issues, an objective, quantifiable methodology based on exogenously defined preferences by which to advise policy and management. For those cases in which information gathered via survey research is inadequate in representing people's values, how do we enable people to directly input their value expressions into the decision and policy making process?

¹⁶ This is an expansion on the literature and methodology used in the University of Rhode Island approach to siting noxious facilities that integrates technical, economic, and political considerations (Opaluch et al. 1993; Swallow et al. 1992, 1994). Their approach combines the three components of technical suitability, social suitability, and community acceptance of a noxious facility siting. This approach includes three stages:

“Stage One of the process identifies a ‘long list’ of candidate sites that meet minimum technical standards. Stage Two selects a ‘short list’ of candidate sites based on social suitability criteria. Stage Three provides a mechanism for local community acceptance and identification of the final site” (Swallow et al. 1992, pg. 288).

This approach can be modified to identify parcels and issues according to their potential for invoking different values from various levels of the proposed hierarchy.

The answer may well lie in the realm of a deliberative model of policy and management decision-making (Sagoff 1988b, 1998). Deliberation is the weighing of normative constraints (ethical, spiritual, religious, political, legal) expressed as deontological thresholds of acceptability and satisficing thresholds of desirability with the technical and economic realities of the world against the opportunity costs (broadly-defined to include economic considerations along with irreversibility, risk and uncertainty, and conceptions of the good life) of alternative futures. The deliberative process is inherently a learning, evolving, and negotiating process.

A deliberative model of management and policy decision-making must be adaptive to changing circumstances, especially when the stakes are of large spatial scale, temporally distant, irreversible, and uncertain (Norton 1996, 1998; Page 1977). Adaptation would be in response to new information and an evolving understanding of the implications of our management and policy decisions (Glasser 1998). It would also be inherently cautionary, providing us with opportunities to learn about our endogenously defined values, our role in managing natural and cultural systems and processes in a complex world, and to evolve into who we want to be.

To achieve this, we need an open forum that is conducive to public negotiation, education, and discussion (Brennan 1994, Sagoff 1998). The forum would have to be democratic in process, providing the opportunity for all concerned to voice their values directly or through a representative, along with input from scientific information on values. It is through this democratic process of debating and criticizing each other's values that we can learn about ourselves and each other, and to evolve into who we want to be. Authentic democratic communication and discussion needs to be tolerant of different worldviews in order to lead to beneficial outcomes (Minteer and Manning 1999). John Dewey understood the importance of democratic deliberation when he stated:

For what is the faith in democracy in the role of consultation, of conference, of persuasion, of discussion, in formation of public opinion, which in the long run is self-corrective, except faith in the capacity of the intelligence of the common man to respond with common sense to the free play of facts and ideas which are secured by effective guarantees of free inquiry, free assembly, and free communication (John Dewey as quoted in Minter and Manning 1999, pg. 202).

This sentiment is also expressed by Sagoff (1988b) in that a deliberative approach to decision-making is tied to the “virtues of deliberation, for example, intellectual honesty, civility, willingness to see a problem in a larger context, and openness of mind” (pg. 69). This process is democratic, reasonable, civilized, and intelligent, not some process that requires decisions to conform to some predefined criteria, methodologies, and guidelines (Sagoff 1988b).

So what form could this democratic process for environmental value elicitation and management and policy evaluation be like? Several scholars have suggested that the process be in a juridical, discursive form: Shrader-Frechette’s (1985) *Technology Tribunal*, Tonn’s (1991) *Court of Generations*, Brown et al.’s (1995) *Values Jury*, and Sagoff’s (1998) *Citizen-Jury*.¹⁷ In each case, the function is to provide a democratic means for eliciting and adjudicating between and amongst environmental values and other values that are not commensurable and/or well defined.¹⁸ Along the way, through the aid of open discourse with experts and the public, people are educated about the issues at stake, exposed to each other’s perspectives, and collaboratively

¹⁷ The exact composition of the juridical body is debatable. Consensus seems to suggest that experts and the general public have important roles in the discursive body. In order to be truly democratic, it could not be otherwise. However, it is still unclear whether the decision-making body should be comprised primarily of experts, well-educated citizens, or randomly selected citizens. The development of a model that links plural values with environmental issues could prove to be essential for directing deliberations and providing a means for public involvement and participation.

¹⁸ Norton and Hannon (1997) argue that more attention needs to be placed on local modeling of ecological processes and local participation and responsibility for environmental management. The democratic process would enable local values and issues to be equally considered with national ones.

search for the best pathway to select given current situations and acceptable alternative futures. In these senses, the democratic process promotes an environment in which we, as concerned inhabitants of this realm, can adapt to, evolve with, and learn from continually changing circumstances.

The process would be adversarial, but in a good sense. This adversarial nature of the process enables all points of view to be expressed and provides a means for integrating qualitative and quantitative expressions of value. The necessary virtues to be promoted in the process in order for it to function well in resolving value conflicts are honesty in expressing values, tolerance of alternative views, and a willingness to see the big picture. In this way, we can discover whether there is a form of convergence on the socially best outcome for important environmental issues, regardless of a person's philosophical perspective on plural sources of values. But most importantly, a democratic process would ensure future opportunities for growth and improvement.

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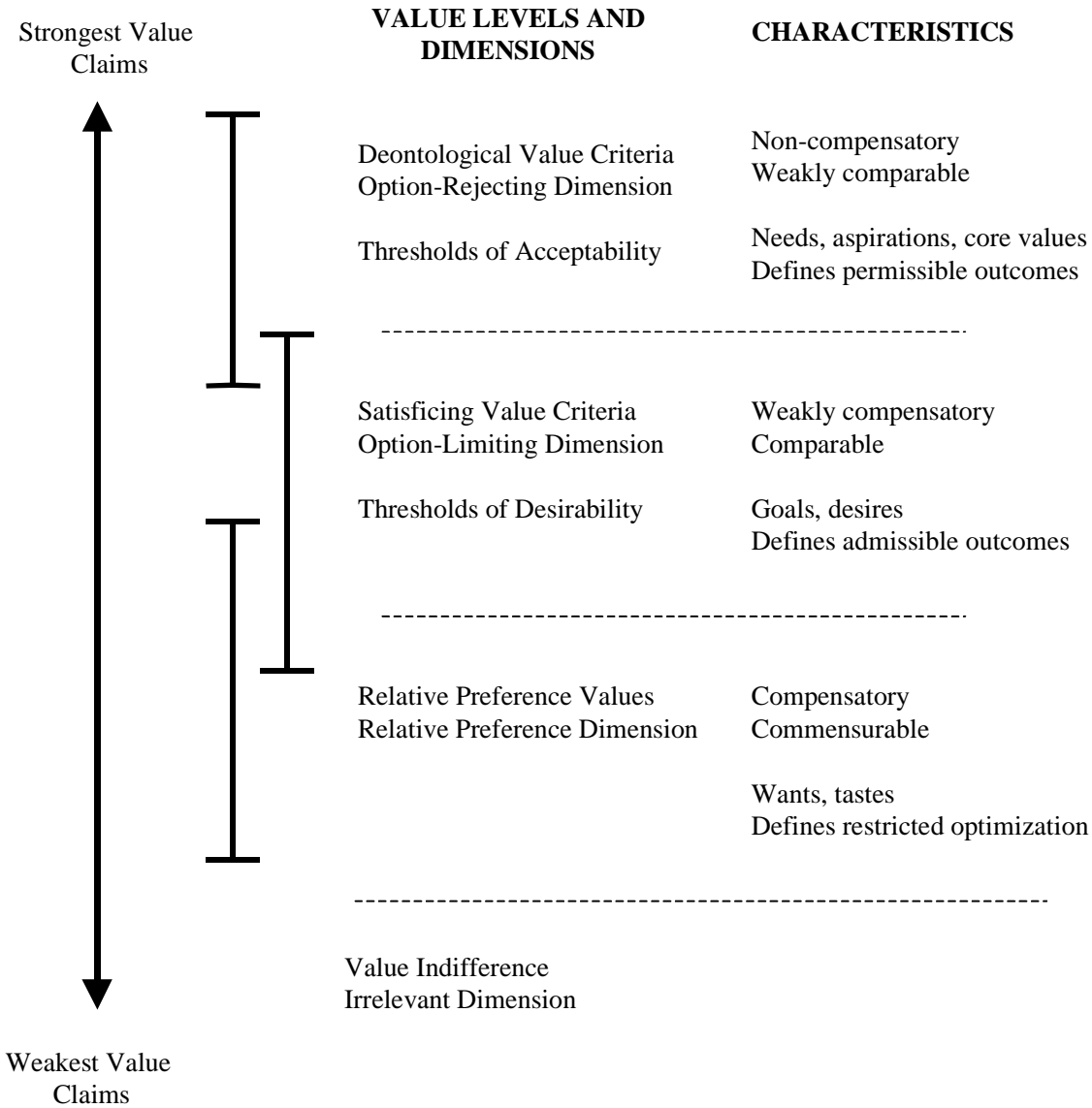


Figure 1. Levels, dimensions, and characteristics of a values hierarchy.