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## EMBEDDED VALUE SYSTEMS IN SUSTAINABILITY EVALUATION TOOLS AND THEIR IMPLICATION

### Abstract

This paper explores the implications that arise with the selection of specific sustainability evaluation tools. Sustainability evaluation tools can be conceptualized as value articulating institutions and as such their choice is a far from a trivial matter. In fact their choice can entail various ethical and practical repercussions. However, in most cases the choice of the evaluation tool is made by the analyst(s) without taking into consideration the values of the affected stakeholders. By choosing the analytical tool the analyst “subscribes to” and ultimately “enforces” a particular worldview as the legitimate yardstick to evaluate the sustainability of a particular project (or policy). Instead, this paper argues that the selection of evaluation tools should be consistent with the values of the affected stakeholders. With this in mind, different sustainability evaluation tools’ assumptions are critically reviewed and a number of suggestions that could facilitate the choice of the most appropriate tool according to the context of the sustainability evaluation are provided. It is expected that conscious evaluation tool selection, following the suggestions made in this paper, will reduce the risk of providing distorted sustainability evaluations.

Keywords: Sustainability evaluation, participation, stakeholder values, value articulating institutions

### 1 Introduction

In order to support conscious environmental decision making, a growing number of different evaluation tools and frameworks have been developed, e.g. (Deakin et al., 2007). These trends of evaluation tool/framework proliferation will most likely continue uninhibited as a result of three interconnected policy realities.

First of all it seems inconceivable, nowadays, to decide about major projects and policies without an analysis of the positive and negative impacts on the environment. Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) have become legal requirements in most developed countries for projects that are expected to impact the environment significantly, e.g. through Directives 97/11/EC (EC, 1997) and 2001/41/EC (EC, 2001) in the European Union (EU). Of course the evaluation of projects and policies is not something new. Monetary tools, such as Cost Benefit Analysis (CBA), have been used for project and policy appraisal since the early 1970s, e.g. (HMSO, 1971) as cited by Glasson et al. (2005).

What is new though is the increasing demand for more and better quality evaluations<sup>1</sup>. A testament to this is the proliferation of national and regional professional evaluation societies (currently more than twenty), the increasing volume of relevant academic literature and most importantly the demand for accountability and freedom of information by national and international legislation. Currently, several organizations are providing guidelines and standards in order to assure the quality of an evaluation exercise and thus its usefulness for decision making. Such examples include the Independent Evaluation Group of the World Bank (Mackay, 2007; World Bank, 2004), the Development Assistance Committee (DAC) of the OECD (e.g. OECD, 1998) and the European Commission<sup>2</sup> (EC, 2008a). Evaluation can also be seen as the process of providing information to stakeholders and as such is considered pivotal to emerging paradigms of governance such as adaptive governance (Dietz et al., 2003).

A second important factor has been the increasing prominence of sustainable development in the public dialogue. Sustainable development entered the public debate in the late 1980s after the Brundtland Commission report that defined it as “*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*” (WCED, 1987). Since then it has become an important buzzword for policy makers, and hardly any policy discussion takes place at the highest levels without the term cropping up e.g. (DEFRA, 2005; EC, 2008b; UN, 1992). Sustainable development advocates make the case that a whole lot of different perspectives, sometimes conflicting (present vs. future generation interests, local vs. global interests, etc), are relevant and need to be considered during the decision making process. This “demand” to balance these very different perspectives in a meaningful manner further complicates the decision making process<sup>3</sup>.

The third important factor is the increasing interest for public participation. Even though there has been a recurring demand for broader and more meaningful public participation, at least in the EU, which dates back to 1985 and the Directive on Environmental Impact Assessment (Directive 85/337/EEC) it was the prominence of sustainable development as a legitimate policy objective that further promoted it. Agenda 21 was instrumental in bringing more attention to the notion that environmental issues are better approached when all concerned parties are involved (UN, 1992). Since then public participation for environmental issues has become legally binding within the EU after the ratification of the Aarhus Convention on “...[A]ccess to information, public participation in decision making and access to justice in environmental matters” as the Directive 2003/35/EC (EC, 2003). As a result, meaningful public participation has become an overarching policy requisite and has found its way in numerous pieces of environmental legislation such as the Water Framework Directive (EC, 2000) and the Floods Directive (EC, 2007). Furthermore, participatory monitoring and evaluation have been suggested as useful procedures for the evaluation of development projects around the world (World Bank, 1996; 2002).

It is within this nexus of evaluation, sustainable development and the need for meaningful public participation, that the future project/policy proposals will have to be decided.

This paper aims to contribute to the theory of sustainability evaluation. In particular the paper will focus on the analytical part of a sustainability evaluation (Section 2) and will offer suggestions that can reduce the risk of providing distorted sustainability evaluations. The results of this paper can be of particular interest to evaluators that environmental appraisals and sustainability assessments.

The main starting point is a critical review of the assumptions behind different sustainability evaluation tools and in particular of the valuation systems embedded within

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<sup>1</sup> Quality in evaluation is not universally defined as it may depend on the context of the evaluation, the methodology adopted and the client's needs. Nevertheless principles such as impartiality, independence, credibility and usefulness can be considered as some key aspects (OECD, 2007).

<sup>2</sup> Widmer (2004) briefly discusses how evaluation procedures have been uptaken differently between the different institutions of the European Commission.

<sup>3</sup> The interested reader is referred to Gibson et al. (2005), Pearce (1994) and Pope et al., (2004) among numerous others for definitions of sustainable development and key methodological aspects and challenges of sustainability assessment.

different sustainability evaluation tools (Section 3). Section 4.1 illustrates how certain methodological choices can be incompatible with the needs, wants and values of stakeholders. Consequently, the different sustainability assessment tools are conceptualized as value articulating institutions.

More importantly the paper discusses the implications and the risks that are a by product of such methodological choices and particularly how current evaluation tool selection practices might compromise effective stakeholder participation (Section 4.2). Attention is also being paid on how these practices result in the evaluator assuming (willingly or unwillingly) the role of the stakeholder. Finally the paper offers suggestions on how these findings can be operationalised and integrated within evaluation frameworks (Section 5).

## 2 Defining key concepts

### 2.1 Tools vs. Frameworks

First, it is important for the clarity of this paper to make a distinction between the notions of an evaluation tool and an evaluation framework. Frameworks are integrated and structured procedures, akin to protocols, which contain a number of prescribed stages that ought to be followed in order to meet a predetermined objective. Even though such frameworks, e.g. the EIA or the SEA, are legal requirements they do not specify how the different analyses within them, and in particular the comparison of the different project/policy alternatives, should be conducted. For the purpose of this paper evaluation tools are these various analytical techniques that can be used to conduct analyses/comparisons within frameworks such as the EIA or the SEA.

These tools, models in the broadest sense, attempt to understand a system and offer information in a format that can assist the decision making process. This is usually done by quantifying certain aspects that are deemed relevant (e.g. monetary costs/benefits, resource consumption, environmental impact etc) and in most cases aggregating these aspects. The most widely utilised evaluation tools include economic tools (e.g. CBA, Whole Life Costing), biophysical models (e.g. Material Flow Analysis, Ecological Footprint, Energy Accounting), indicators/composite indices and Multi Criteria Analysis (MCA).

To appreciate these subtle differences between evaluation tools and frameworks the SEA will be used as an example<sup>4</sup>. According to UNECE (2007) the purpose of a SEA “...is to ensure that environmental considerations inform and are integrated into strategic decision-making in support of environmentally sound and sustainable development”. In order to achieve this, a number of methodological steps have been prescribed, i.e. scoping, public participation, consultation with authorities, transboundary consultation, decision and monitoring. An integral part of the whole procedure is the development and comparison of different alternatives as well as the assessment and subsequent monitoring of their performance. Nevertheless no analytical technique is being singled out as the most appropriate to achieve these tasks. In fact, it is acknowledged that there is no single “best” analytical technique, but its choice is important for the quality of the information provided to the decision makers (UNECE, 2007). In a way the choice of the appropriate analytical tool is left to the analyst to decide – something that can have important repercussions to the overall procedure as will be discussed in Section 4.2.

It is also interesting to note in the previous extract how the concepts of evaluation, participation and sustainable development are linked with respect to environmental decision making.

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<sup>4</sup> The choice of a Sustainability Assessment framework would be a more appropriate example. However to the author’s best knowledge no such framework has become a legal requirement nationally or internationally. A consequence is that no significant guidance has been provided to evaluations on how to conduct a sustainability evaluation.

## **2.2 Valuation systems vs. Human values**

A second key distinction is between the concepts of value (valuation systems) embedded in evaluation tools and the human values which are inherent human characteristics.

Human values refer to "...a desirable trans situational goal varying in importance, which serves as a guiding principle in the life of a person or other social entity" (Schwartz, 1992). Karp (1996) argues that human values are relatively few in number, are relatively stable, are guides for behavior and they can have a measurable influence on behavioral choice. A review of different definitions of value, typologies, origins and their impact on human behavior are provided by Hitlin and Piliavin (2004).

In the same sense that human values are inherent characteristics of humans, valuation systems are inherent characteristics of certain evaluation tools. Valuation systems (concepts of value) are essentially some of the deepest assumptions of evaluation tools and in a sense indicate what is important and how it is to be measured. An evaluation tool's adopted concept of value essentially mirrors the worldview that the tool embraces when this tool is employed to measure the sustainability performance projects and policies.

In the following chapters it will be shown how certain valuation systems can reflect certain value orientations found in humans. From this starting point it will be suggested that the value orientations of affected stakeholders might offer a good stepping stone that can influence the choice of the most appropriate sustainability evaluation tool.

## **3 Evaluation paradigms and embedded value systems**

In a nutshell the different evaluation tools mentioned in Section 2.1 seem to fall within two broad categories; reductionist and non-reductionist. Economic tools, biophysical models and composite indices fall mainly within the former category while MCA falls within the latter. Although these tools are routinely referred to as environmental appraisal tools (e.g. Vatn, 2009), all of them can capture different aspects of sustainability (e.g. Gasparatos et al., 2008; 2009; Ness et al., 2007; Stagl, 2007). For the remainder of the paper these tools will be referred to as sustainability evaluation (or assessment) tools<sup>5</sup>.

What is really important within the argumentation of this paper is to appreciate that each tool employs a different worldview in order to measure the performance of a project. In order to understand how the choice of a tool will affect the outcome of the evaluation, the basic assumptions behind each tool need to be reviewed.

### **3.1 Reductionist tools**

According to Munda (2006), reductionist tools make use of a single measurable indicator (e.g. economic costs/benefits), a single dimension (i.e. one of the economic, environmental or social dimension of sustainability), a single scale of analysis, a single objective (e.g. maximization of economic efficiency) and a single time horizon. The advantage of such tools lies in the fact that they can measure the performance of projects by reducing and integrating their diverse aspects to a small set of numbers. This approach is to a certain degree compatible with the desire to "keep it simple" usually expressed by stakeholders and policy makers.

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<sup>5</sup> It should be noted that these tools can be used to evaluate the performance of both projects and policies. However biophysical and indicator tools have mainly been used to assess the performance of projects and as a result the paper will focus on the sustainability evaluation of projects. Nevertheless most findings and conclusions can also be extended and for the evaluation of policies.

In order to do so, economic tools and biophysical models adopt common denominators (currencies). However, economic and biophysical tools employ different concepts of value (Ecological Economics, 2002; Gasparatos et al., 2009; Patterson, 1998) so their evaluations employ radically different perspectives.

Monetary tools tend to capture a person's Willingness To Pay (WTP) for the consumption of a commodity or a person's Willingness To Accept (WTA) compensation to forfeit the consumption of a commodity. WTP and WTA are in turn considered as proxies for the measurement of a person's utility (Farber et al., 2002; Layard, 2005). Essentially economic tools based on the neoclassical paradigm account for the difference that consumption or non-consumption makes to the satisfaction of human preferences and in a way maximizing happiness is equated with maximizing consumption (Ayres et al., 1998; Layard, 2005). Or as Spash (2007a: 691) puts it "...in a standard market setting individuals engage in selling their labour and buying consumer items and their own limit on obtaining happiness is their ability to pay". As a result "...the basic notion of value that guides economic thought is inherently anthropocentric" (Farber et al., 2002: 379). Patterson (1998) refers to the theory of value adopted by economic tools as subjective preference theory of value.

Heinzerling and Ackerman (2002) and Spash et al. (2009), amongst numerous others, comment on the fact that within the assumption of neo-classical economic tools people are treated as individual consumers rather than as citizens living and acting within the society. Finally, there are certain criticisms within CBA which are concerned with the compensability and subsequent substitutability of the monetised quantities that represent the different socioeconomic and environmental issues included in the evaluation.. This implies the existence of trade offs between different sustainability issues (Munda, 1996) which are at the core of the debate of strong vs. weak sustainability (Neumayer, 2004). For example in an investment decision high economic gains might offset for significant environmental impact and vice versa.

Biophysical models, on the other hand, account for the amount of resources in the broadest sense that have been invested for the production of a good/service. They assume that the single most important yardstick when evaluating projects is the amount of natural resources appropriated, as a proxy to environmental impact. Generally speaking, the fewer resources appropriated, the more agreeable the project is. This is similar to the cost of production theory of value (Patterson, 1998). The fact that biophysical models adopt a different concept of value (valuation system) implies that they employ a different valuation perspective. This has been discussed extensively in the academic literature and results in the biophysical tools' general tendency to neglect certain human preferences (Cleveland et al., 2000; Winkler, 2006).

A composite indicator/index can be simply defined as an aggregation of different indicators under a well developed and pre-determined methodology. In contrast to monetary tools and biophysical models, composite indices do not make use of a common denominator and as a result they do not have an explicit valuation system. In fact any concept of value is lost during the normalization stage. However some of the methodological choices during their construction are value judgments in their own right. For example, choices regarding the indicators (not the issues represented) that will constitute the composite index are usually made by the analyst(s). Nevertheless, indicator choice can have a significant impact on the outcome of the evaluation. Lee (2006) points out that if the aim of the analyst is to address intergenerational equity then stock indicators would be more appropriate. Conversely in situations that the analyst seeks to capture intra-generational equity then a choice of distributional indicators would seem more justified. Another important issue is the weighting of the indicators. Weights are value judgments, so "...greater weight should be given to components which are considered to be more significant in the context of the particular composite indicator" (OECD, 2003: 12). Even though it is becoming standard practice to consult stakeholders during the assignment of the weights there are still cases where the weights are designated by the analysts themselves.

Perhaps the most important decision during the construction of the composite index that ultimately affects the outcome of the whole evaluation is the nature of the aggregation

methodology. Given that the aggregation of different indicators implies trade-offs between the issues represented, then it can be implied that composite indicators are measures of weak sustainability like CBA. In this case the weights also lose their value judgment status and play the role of trade-off ratio (Munda and Nardo, 2006). Some of the most popular aggregation techniques are the linear aggregation that allows unlimited tradeoffs between issues and the geometric aggregation that allows trade-offs, albeit to a lesser degree. However the acceptability and the extent of trade-offs is something that should depend on the views of stakeholders rather than being methodological choices made exclusively by the analyst (Section 4.2 provides a comprehensive discussion of the implications of methodological choices being made exclusively by the analyst).

These criticisms and inherent values within reductionist tools are only some of the most important. Gasparatos et al. (2008; 2009) discuss in depth how the assumptions and methodologies of these tools can sometimes be inconsistent with certain aspects of sustainable development and what different aspects of sustainable development each tool illuminates.

### **3.2 Non-reductionist tools**

MCA is a family of indicator based techniques whose development follows a procedure similar to that of composite indices. As a result several of the methodological choices including the choice of the indicator and of the weights are “subjective” (e.g. data selection, criteria definition, aggregation and weighting, (Messner et al., 2006)) which are influenced to a great degree from the analyst as discussed earlier. Van den Hove (2006: 15), for example, writes that in certain MCA tools there have been assigned “*equal weights to the dimensions used in the analysis (e.g. economic, social, environmental dimensions) notably because it “may reduce the probability of social conflicts inside the scientific team”*”. In a similar manner Munda (2006: 89) acknowledges that in his study “*all the indicators are considered to have the same importance, i.e., no weighting coefficient is used*”.

The main important difference is that in MCAs, contrary to composite indicators, an aggregation of the individual indicators does not take place. This is in order to prevent trade-offs between them and in effect between the different sustainability issues represented. This is closer to the concept of strong sustainability as discussed by Gasparatos et al., (2008) and it is, once more, a value judgment made by the analyst that might not necessarily reflect stakeholders’ considerations. In certain cases stakeholders might decide to intensify the exploitation or even alter an ecosystem in order to meet more urgent needs such as to alleviate poverty or offer protection from natural disasters such as flooding. Alternatively there can be a conscious choice to sacrifice certain economic activities, and thus some of the short term economic welfare of the community in order for example to maintain the ecosystem services provided by a fragile ecosystem.

## **4 Understanding the problem**

### **4.1 Conceptualising evaluation tools as value articulating institutions**

As it becomes obvious from the previous sections, different sustainability evaluation tools make different assumptions on what is important to measure and how to measure it. These assumptions are, in their core, forms of embedded value systems and as a result the outcome of such sustainability evaluations is far from neutral. It is thus justified to claim that at the time a certain tool is chosen as a yardstick to measure the performance of a project, at the same time the evaluation perspective is also chosen. In that sense these sustainability

evaluation approaches are value articulating institutions as defined by Jacobs (1997) and Vatn (2005a; 2005b; 2009).

According to Vatn (2005a: 211) value articulating institutions define (a) “*who and in which capacity, i.e. in which role*”, should be considered during the decision making process and (b) “*what is considered relevant data and how data is to be handled*”. The latter point is the most relevant for this paper and was discussed in the pervious section. However, the former point is also of some interest. Neoclassical economic valuation tools such as the Contingent Valuation Method (CVM) view human as individual consumers that try to maximize their utility and that this “*net utility from the consequences of an action determines whether that action is right or wrong*” (Spash et al., 2009). Deliberative Monetary Valuation (DMV)<sup>6</sup> approaches, on the other hand, view humans as citizens or parts of broader social groups which unequivocally affects their attitude including the valuation of environmental, e.g. refer to (Howarth and Wilson, 2006; Niemeyer and Spash, 2001; Sagoff, 1998; Spash, 2007a; Wilson and Howarth, 2002) for theoretical discussions and (Spash, 2007b; 2008) for a literature review of empirical studies. On the other hand, when biophysical models are utilized then the role of the human seems to become altogether obsolete as these tools seem to neglect human preferences (Cleveland et al., 2000; Winkler, 2006). Although biophysical tools seem to focus on the “interest” of nature at the same time they seem to indirectly cater for future generations. As a rule of thumb projects with the lowest biophysical value (particularly for non renewable resources) are more agreeable. This is an indication of resource appropriation which seems to imply that by consuming fewer resources now, more resources are left in place for future generations to realize their potential.

## **4.2 Implications of current tool selection practices**

To sum up, the choice of the evaluation tool, and hence the worldview through which the analysis is made, is in most cases performed by the analyst(s) and is rarely, if ever, influenced by the stakeholders’ views, needs and most importantly values.

So what happens in those cases that the value system embedded in an evaluation tool is not aligned with the values of the stakeholders? Two interesting consequences arise, an ethical and a practical one.

The ethical implication lies in the fact that by choosing a certain tool to evaluate a project, the analyst “subscribes to” and in effect “enforces” a specific world view as the correct or most appropriate yardstick to measure the performance of a project from which he/she is not, most likely, going to be directly affected. However, the role of the analyst as an all knowing expert and the choice of one legitimate perspective above all others have drawn significant criticism within the context of post-normal science (Funtowicz and Ravetz, 1993). This deliberate (or accidental) bypassing of the stakeholders’ views and values is in a sense contrary to the whole idea behind meaningful public participation. A by-product of this is that the analyst by choosing the tool “assumes” willingly or unwillingly the role of the stakeholder in his/her own right.

It should be clarified here that the analyst might not necessarily agree, share, or even be aware of the worldview that a specific tool embraces. However, this world view (what is considered essential data, who and in what role is considered in the analysis, what legitimate perspectives of sustainability are captured etc) is embedded in the assumptions of the tool and as a result is an attribute of the tool that exists regardless of the analyst. It is fair to say that the moment the tool is selected these attributes enter the sustainability evaluation and unequivocally affect it.

The practical implication is more relevant to the fact that the performance of the project is not measured in a way that mirrors the needs and expectations of end users. For example, a housing project might be a technological state of the art and built following the most stringent

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<sup>6</sup> DMV attempts to combine large scale stated-preference methods (e.g. CVM) with small scale group deliberation (Spash, 2008). According DMV theorists, DMV is “...a social process of valuation because it engages individuals as representatives of social groups” (Spash, 2008: 471)

environmental standards but what happens if for any number of reasons people are not too keen to live in? Despite its good environmental performance if this building is abandoned before the end of its projected life cycle it can still be perceived as a waste of natural resources as the initial investment of natural resources has not fulfilled its initial objective. Vatn (2005a) makes a similar comment by making the case that by using different value articulating institutions different evaluation results and preferred solutions arise. He goes even further by suggesting that "...the people involved in the process will most probably have ideas about which frames they find most relevant. One should even expect that they would react negatively to frames that are not found relevant or acceptable – e.g. using individual-oriented value articulated institutions for something considered collective and vice versa" (Vatn, 2005a: 211). In a similar fashion Spash (2000: 205) suggests that "...individuals may reject the institution that imposes such a condition on them"<sup>7</sup>. Niemeyer and Spash (2001: 567) have argued that the most appropriate approach to policy making involves a difficult act of balancing performance in theory and practice and that "...if the theoretical basis is ontologically flawed – too abstract, ignoring important components, or factually incorrect – the method will fail to produce theoretically desired outcomes".

This practical implication can affect the long term sustainability of projects and can have repercussions on both stakeholders, at various scales, as well as the analyst(s). On the one hand the users and other directly affected stakeholders might end up with projects that could be inconsistent with their needs and values. It is doubtful whether such projects will realize their full potential and be sustainable in the long run. In a similar manner, decision makers such as governments and corporations will face considerable scrutiny over their decision to go ahead with such projects something that might materialize as political cost in the former case and economic loss in the latter. On the other hand analysts that might come from academia, government or consultancy also have a great stake in not offering distorted evaluations as they are putting their reputation on the line. This could manifest for example in the decrease in future earnings of a professional evaluator after providing poor evaluation results.

## **5 Reducing the risk of providing distorted sustainability evaluations**

Of course it seems utopian to demand stakeholders to directly choose the analytical tool which reflects their own needs and values in the most effective manner. Although stakeholders, even with minimal education, have shown to understand advanced technical information and models when confronted with them, (e.g. Becu et al., 2008), and despite the notion of extended peer community catching on (Funtowicz and Ravetz, 1993), the fact remains that the complicated nature of such tools will most likely render this direct attempt to consider stakeholder values not feasible. Knowledge of the intricacies and the mechanisms within these tools, coupled with the fact that most tools trace their roots in different branches of knowledge, requires specialist training and expertise.

Additionally, even the choice of certain methodological steps within the tools themselves, e.g. the choice of the most appropriate non-market valuation technique for CBAs or the most appropriate indicators selection/aggregation/etc rules in indicator based tools, should be theoretically sound and consistent with the values of the stakeholders.

In order to allow for the stakeholder values to become an important consideration and actively influence the selection of analytical tools two proposals are suggested:

- (a) including value capturing mechanisms within existing evaluation frameworks;
- (b) broadening the composition and expertise needed in professional evaluating teams.

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<sup>7</sup> An example is the refusal of some respondents to provide WTP values in CVM surveys for the protection of wildlife (or WTA for the destruction of wildlife) despite their beliefs that wildlife ought to be preserved (e.g. Lockwood, 1998; Spash, 2000; Spash and Hanley, 1995)

## 5.1 Methodology

It has been made clear by now that it seems methodologically pressing to capture the stakeholder values and particularly the user values in order to inform the decision of the most appropriate evaluation tool(s). There is a rich literature on how (e.g. through questionnaires, interviews, psychological research etc) and when (at the beginning of the participatory process, after the information on the impact of the proposed project/policy has been presented to the stakeholders, etc) capture these values but the choice of the most appropriate approach should lie on the analyst(s). More importantly this choice should be made subject to the context of the case and be informed by other constraints such as the available time, expertise and budget.

What is really important thought is to search for certain types of value that will immediately give hints on which evaluation tools would be more relevant. Aspects that are considered important and need to be explored are the following:

- (a) whether stakeholders hold anthropocentric or biocentric beliefs. Approaches such as the New Environmental Paradigm (NEP) e.g. (Dunlap and van Liere, 1978; Dunlap et al., 2000), the value system devised by Schwartz (Karp, 1996; Stern and Dietz, 1994) or the Value-Belief-Norm theory (BNF) (Stern et al., 1999; Stern, 2000) can form a good basis on which to judge whether pro-environmental behavior is observed by the stakeholder. Milfont et al. (2006) suggest that altruistic and individualistic value systems imply that stakeholders will judge environmental issues on the basis of costs/benefits, in the broad sense, to human groups on the former case or an individual in the latter case. On the contrary, stakeholders with biospheric value systems in most cases judge and act primarily thinking of the impact to the environment (ibid). Similarly, Stern et al. (1995) suggested that pro-environmental action depends on both beliefs and values and identified three relevant types: the social-altruistic value orientation (concern for other human beings) the biospheric orientation (concern for nonhuman species) and self-interest (concern for the self).

A biospheric value orientation according to the above means that an evaluation using biophysical tools would be more consistent with the perception of the stakeholders. On the other hand egoistic and altruistic orientation would mean that monetary evaluation might be more appropriate considering that monetary evaluations employ anthropocentric valuation systems in their core.

Ojea and Loureiro (2007) have shown that individuals with egoistic and altruistic value orientations had a higher probability of paying for a wildlife restoration initiative in their CVM study. This conclusion agrees with previous findings by Stern et al. (1993; 1995) which show the reduced importance of biospheric value orientation, on the one hand, and the increased importance of anthropocentric orientation (egoistic/altruistic), on the other hand, when determining economic behavior. Such findings have been corroborated to a degree by Spash (2006). In his CVM it was found that the “...*egoistic-altruistic attitudes were more likely to be associated with positive bids than protests*”, that the “...*egoistic-altruistic attitudes scale proved to be highly significant and explained more of the variance in WTP than any other variable*”, that the “...*social biospheric scale was weaker and proved to explain little of the variance beyond that covered by egoistic-altruistic attitudes and rights based beliefs*” and that the “...*egoistic and selfish altruistic motives are important determinants of WTP*” (Spash, 2006: 620).

The above finding seem to imply that economic tools might be appropriate tools for sustainability evaluations where stakeholders hold anthropocentric value orientations (egoistic and altruistic) while they might be inappropriate tools when stakeholders hold biospheric value orientations.

Egoistic or altruistic value orientations can further affect methodological choices within monetary analysis as well. In the former case traditional valuation techniques such as CVM might be more appropriate, while DMV seems more appropriate in the latter case. This of course stems from the different role that the participants assume in traditional economic valuation exercises (i.e. as individual consumers in CVM surveys) and in DMV

(i.e. as citizens) – refer to Table 1 and Section 4.1. Furthermore, it has been shown that consumer values are better addressed by CVM while such a tool was deemed as inappropriate to address the citizen values (e.g. Spash, 2000). Additionally it has been shown that WTP estimates are related in with egoistic value orientations, and not with altruistic values (Stern and Dietz, 1994). Finally, Spash (2008) makes the case that most DMV theorists advocate group arbitrated values which further implies that DMV might be the appropriate tool when stakeholders exhibit altruistic value orientations.

In the same manner, understanding the value orientation of the affected stakeholders can suggest which indicators would be more appropriate in composite indices and MCAs as well as the most appropriate way to assign weights/normalise/etc.

- (b) the acceptability and the extent of trade-offs. Acceptability of trade-offs would mean that it is theoretically sound to use CBA which allows unlimited substitution between the monetized values that are fed in it. Furthermore, it could inform the type of aggregator in indicator based tools with linear aggregation, for example, being relevant if unlimited trade-offs are acceptable, geometric aggregation when limited trade-offs are acceptable or no aggregation at all (MCA) when trade-offs are deemed unacceptable
- (c) the extent to which there is a strong feeling for preserving the rights of future generations. Knowledge on such issues should feed into the choice of right indicators as discussed in Section 3. Additionally, Gasparatos et al. (2008) discuss the different aspects of inter- and intra-generational equity that each tool captures. A better understanding of the aspects of equity which are relevant to the stakeholders can also be important for the choice of the appropriate tool.

Another important question that arises is at which point of the evaluation procedure (framework) should, the stakeholder values and attitudes towards the proposed alternatives (i.e. projects), be captured. This would depend on the format of the participatory process and must be judged by the evaluation team considering the context of the case, e.g. the degree of participation (consultation, partnership, delegated power etc refer to (Arnstein, 1967)), the participatory method (e.g. focus group, citizen juries etc), whether the stakeholders are the decision makers themselves or not, etc. Given this context dependency, it is difficult to specify the specific point within the participatory process that the stakeholder values should be captured in order to inform the selection of the appropriate analytical tool.

It seems reasonable to suggest that the attitudes and values of the stakeholders should be captured after the provision of information regarding the different alternatives and before the final decision is being made. Even though the stakeholders' overall value system will not change dramatically, at least in the short term, stakeholders are known in certain cases, to change their minds regarding the relative merits and the appeal of specific projects after information has been presented. Such an example has been the case of citizen's juries where the acceptance of different alternatives changed after information on their relative merits and drawbacks was provided (Niemeyer, 2005). In those cases perhaps a value capturing mechanism that explicitly links the values and attitudes of the stakeholder to the specific project, similar to the one used by Spash et al. (2009), might be more appropriate.

## **5.2 Evaluation team**

Implementing the proposal discussed in the previous section, means that the evaluators should actively try to understand the values of the stakeholders. Multidisciplinary teams are thus essential in order to conduct such types of evaluations given that insights from different academic disciplines become relevant. Even though there seems to be a trend towards multidisciplinary evaluation groups what seems to be lacking is the inclusion of voices from branches of knowledge previously considered as "soft". Considering the importance of capturing the stakeholder values such teams should include persons knowledgeable in psychology and anthropology that are not usually represented in professional evaluation teams.

### **5.3 Caveats and future research**

Section 3 highlighted the different concept of value employed by monetary and biophysical sustainability evaluation tools (i.e. cost of production value and subjective preference value). On the other hand, the value systems that stakeholders might have (i.e. altruistic, egoistic, biospheric) and the behaviours that might arise have been discussed in Sections 5.1.

The combination of these two research strands (Table 1 summarises the main points) is made through a comparative review of the respective literature. This culminates with the suggestion of employing stakeholder values as a guide for selecting the most appropriate analytical tool during sustainability evaluations.

As a result this proposal should be currently viewed as a theoretical inquiry and a basis for future research. Gaps, especially on empirical cases, in the academic literature constitute the three major concerns regarding the applicability and expected benefits of this proposal.

Caveat #1: To the author's best knowledge there have not been any attempts in the academic literature to base the choice of the analytical tool on the value systems of the stakeholders. As a result the assertion that the selection of the evaluation tools should be influenced by the values of the stakeholders cannot be empirically backed. Additionally there is some evidence which supports the existence of mixed motives and plural values (e.g. Spash, 2006), without however contradicting the basic premises of Stern et al., (1995).

It has been shown that people often can act in a specific manner according to their value system (e.g. Hitlin and Piliavin, 2004). Thus, considering stakeholder values during the evaluation following the distinct typologies adopted in this paper may reduce the risk of providing a distorted evaluation through the random choice of an analytical tool. This could be instrumental for promoting the sustainability of the provided solutions (i.e. projects) as it will safeguard that they will be measured according to the needs and values of the stakeholders.

Caveat #2: The possibility of all stakeholders holding the same value systems is almost negligible, especially when increasing the spatial scale. In this case more than one tools or a well balanced indicator approach should be employed in order to be more representative of this value multiplicity. Nevertheless the author is not aware of any significant research that could facilitate the linkage of biophysical and monetary tools in a meaningful manner.

Caveat #3: Most of the different studies regarding the links between values and observed behavior (e.g. pro-environmental behavior) have been conducted in developed countries, e.g. (Karp, 1996). The question then is whether such value orientations, e.g. biospheric, will give rise to the same kinds of behavior across different cultures. Empirical studies (e.g. Chung and Poon, 2001; Leung and Rice, 2002; Milfont et al., 2006 among others) have shown that this can be the case between different groups within the same society (urban vs. rural populations in China, Anglo vs. Chinese Australians, European vs. Asian New Zealanders respectively). However studies in different country contexts had mixed results, (e.g. Bostrom et al., 2006; Gooch, 1995; Rauwald and Moore, 2002; Schultz and Zelezny, 1998; Schultz and Zelezny, 1999) to name just a few. In a similar manner most of these studies are conducted considering only specific social groups, usually students, and as such their universal applicability is further questioned. Nevertheless, Janssen and Ostrom (2006) mention a number of cases where social science research findings (not exclusively related to environmental values though) have been replicated across different cultures and social groups.

## **6 Conclusions**

The monetary, biophysical and indicator-based sustainability evaluation tools reviewed in this paper can be perceived as value articulating institutions. Such tools exhibit different embedded value systems that in a sense articulate what is considered relevant data/how

data is to be handled/who and in which capacity (i.e. role) should be considered during the decision making process/etc. In most cases the choice of an evaluation tool is made by the analyst(s) without taking into consideration the needs, wants and values of the stakeholders. It is argued throughout this paper that such a choice is not trivial not the least because it carries ethical and practical implications. By choosing the tools the analyst(s) “subscribe(s) to” and ultimately “enforce(s)” a particular world view as the legitimate yardstick to measure the performance of a project which might be incompatible with the values of the affected stakeholders. As a result the performance of a project is not measured in a way that mirrors stakeholders’ values and possibly their needs and expectations. This practical implication can be detrimental to the long term sustainability of projects and can have repercussions both to stakeholders and analyst(s).

This paper proposes that basing the selection of sustainability evaluation tools on the values of the stakeholders can provide information that could improve the decision making process. It is theorized that stakeholder values should guide the selection of the appropriate sustainability evaluation tool and it is suggested that certain stakeholder value orientations are more compatible with certain evaluation tools. For example, biospheric value orientation seems to imply that biophysical sustainability assessment tools are more appropriate. On the other hand egoistic and altruistic value orientations make the case for the utilization of monetary tools albeit following different monetary valuation approaches; traditional valuation (e.g. through CVMs) in the former case and DMV in the latter.

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Table 1: Features of evaluation tools

<b>Tool</b>	<b>Concept of value (valuation system)</b>	<b>Valuation perspective</b>	<b>Role of participant</b>	<b>Relevant stakeholder value orientation</b>
<b>Biophysical</b>	Cost of production <sup>1</sup>	Eco-centric	Participant becomes irrelevant	Biocentric
<b>Traditional monetary valuation (e.g. CVM)</b>	Subjective preference <sup>1</sup>	Anthropocentric	Individual consumer	Egoistic
<b>Deliberative monetary valuation</b>	Inconclusive evidence <sup>2</sup>	Anthropocentric	Citizen	Altruistic
<b>Composite indicators</b>	Lost during the normalisation/aggregation	Lost during the normalisation/aggregation	Lost during the normalisation/aggregation	NA
<b>Multi-criteria analysis</b>	Depends on methodological choices <sup>3</sup>	Depends on methodological choices <sup>3</sup>	Depends on methodological choices <sup>3</sup>	Depends on methodological choices <sup>3</sup>

Notes

1 Following the distinction made by (Patterson, 1998)

2 Refer to Vatn (2005b) and Spash (2008). Howarth and Wilson (2006) have suggested that in DMV additional concerns to economic efficiency are expected to be articulated (e.g. fairness of distribution).

3 Particularly indicator selection.