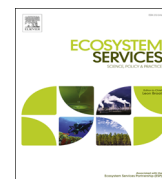




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Ecosystem services economic valuation, decision-support system or advocacy?

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ABSTRACT

There appears to be a discrepancy between the massive presence of Ecosystem Services (economic) Valuations (ESV) in biodiversity discourse and literature and the small number of examples where it is documented and demonstrated that they have been instrumental in changing policies. Part of this discrepancy may reflect an insufficient fit of ESV to the organizational and political dimensions of decision-making. This paper thus explores the relation between decision-making as it is viewed in the theoretical roots of ESV and also as it is depicted in disciplines that take decision as their central topic. Three alternative and complementary types of decision models (rational decision-maker, organization and political process) each shed a different light on what ESV can be useful for, and what qualities are then required of it. In general, the contribution of ESV to decision-making relies both on its ability to bring rationality to decision-making, and on its procedural qualities as resource of influence that is needed for advocacy and justification. Thus, the usefulness of ESV cannot be enhanced by either the strengthening of their rigor or the enhancement of their procedural qualities alone: to successfully address the challenge, both of these measures are required in combination. This produces a tension between the rational and substantial abilities that ESV must sustain on the one hand, and the rhetorical and procedural qualities it should develop on the other hand. To overcome this tension, it may prove useful to draw lessons from the field of policy evaluation. In this field, rationalization-based and process-based methodologies once fiercely contested each other. However, process-based and content-based methodologies are now deliberately combined in diverse designs.

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1. Introduction

Ecosystem Services Valuation (ESV) now occupies a central place in both the political and academic agendas of biodiversity conservation (see in particular Costanza and Jorgensen, 2002; Farley and Costanza, 2010; Secretary of State for Environment Food and Rural Affairs, 2011; Sukhdev et al., 2010). There appears, however, to be a discrepancy between the massive presence of ESV in biodiversity discourse and literature and the small number of examples where it has been documented and demonstrated to be instrumental in changing policies (Boezeman et al., 2010; Goldman et al., 2008; Navrud and Pruckner, 1997; Sagoff, 2011; Turner et al., 2003). This discrepancy raises concerns about the relevance and future of ESV: can we go on refining calculation methodologies, applying ESV to all kinds of ecosystems and

contexts, without clarifying how they will or will not impact decision-making?

There is a growing feeling that the scientific community should pay more attention to the Use of ESV (UESV), and to what is sometimes seen as an “implementation gap” between the possibilities of ESV and its actual utilization for decision and policy-making (Fisher et al., 2008; Fraas, 1991; Kushner et al., 2012; Liu et al., 2010; OECD, 2002; Pearce and Seccombe-Hett, 2000; Ruckelshaus et al., 2013). In a recently published paper (Laurans et al., 2013), we reviewed 313 papers dealing with ESV, from peer-reviewed literature, and analyzed how they addressed ESV. We showed that issues of UESV are, in our sample, only cursorily referred to, with only a very small number of papers taking utilization as a central subject.

This scarcity of reference to UESV gives rise to very different interpretations. Some stem from the assumption that the scientific community does not devote significant efforts to studying the process of utilization, which therefore goes unobserved in the literature (Fisher et al., 2008; Gowan et al., 2006). Others assume that ESV is in fact scarcely used, due to its remaining imperfections (Bingham et al., 1995; O'Neill, 2007; Toman, 1998; Turner, 2007), or

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to decision-makers being unwilling to quantify decision criteria and options (Braüer, 2003; Driml, 1997; Hahn, 2000; Liu et al., 2010).

Most of these assumptions are worth considering, and we concluded our recent review by putting forward new research avenues on the UESV (Laurans et al., 2013). In this paper, we now turn to the exploration of one of these avenues: the need to characterize clearly the policy-making processes for which ESV is often put forward as a useful resource. Failing to do so might lead to the offering of instruments that are not fully adapted to a user's needs, which could in turn explain why they are not used extensively. When it comes to “delivery” and having an impact on decisions, as Daily et al. (2009) rightfully called for, an explicit and relevant understanding of the decision-making process is of the essence. Researching how exactly, in the real world of policy-making, ESV can bring improvements to environmental decision-making is clearly a valuable subject for analysis.

Following this research avenue and probing the implementation gap, the purpose of this paper is to explore the relation between decision-making as it is viewed in the theoretical roots of ESV and also as it is depicted in disciplines that take decision as their central topic.

Section 1 examines the “rational” model of environmental decision-making processes that explicitly or (often) implicitly underlies the environmental economics literature. It depicts how this representation shapes our most common concepts of the roles of ESV. Section 2 compares it with complementary representations taken from basic political science and organization sociology, that suggest at least complementing the rational model with the “organizational” and “political” models. Section 3 discusses these findings and suggests that we should draw on the precedent of the policy evaluation field to better link the evaluation process with valuation instruments.

2. The rational model of decision-making underlies the ESV literature

Much of the attention devoted to ESV stems from the hope that it will result in better decisions about the environment (see e.g. Pearce, 2007). This requires that valuation is actually used for decisions, and that it has a significant impact on these decisions. How is such usage envisaged by the ESV literature, and how are valuations expected to impact decision-making?

2.1. The “pure” model of decision-making in environmental economics: Noah in search of the optimum

As one looks at the fundamentals of environmental economics, one rapidly realizes that decision-making is modeled as the identification and then search for a collective optimum, by a rational agent. This agent's decisions are based on weighing the costs and benefits attached to the options she is facing. Our analysis will be based on textbooks such as Pearce and Turner (1990), Barde and Pearce (1991), Cornes and Sandler (1999), OECD (2002) and Freeman (2003).

2.1.1. Collective optimum as a guide for decisions

Throughout environmental economics textbooks, valuation efforts are said to aim at assisting policy-making. Economic analysis is meant to equip the definition and search of a political norm (the collective optimum). This is done by revealing, in a commonly shared and manageable metric, the demand for ecosystem services. However, how policy is made, and who exactly is supposed to make use of this information, is always kept implicit. Actions are described using the passive form: the optimum “is defined”, solutions “are chosen”. Textbooks leave it for others to

define by whom and how these norms should be implemented and the instruments handled. As Freeman puts it in one such environmental economics classic, “Once the objective of maximum net economic value or economic efficiency has been accepted, policy becomes an almost mechanical (but not necessarily easy) process of working out estimates of marginal benefit and marginal cost curves and seeking their point of intersection.” (Freeman (2003), p. 10).

2.1.2. Policy-makers as Noah and his ark?

Of course, all these authors are well aware of the fact that ESV does not operate in such a social and political vacuum as to be an “automatic” optimization, as Freeman suggests in his parenthesis above. It has to be taken up and used by real policy-makers. But – and still according to the environmental economics fundamentals of ESV – who are those real policy-makers, and how do they decide?

When decision-making is viewed as optimizing, environmental policy-making theoretically results from choices made by a decision-making entity, which has to choose priorities and produce judgments regarding the use of limited resources (public spending, natural capital, land allotment...) and the regulations of the market (acts, authorizations, property rights, instruments...). Regardless of whether he is an individual or a collective, this “decision-maker” weighs the different possible options, and allocates means and constraints optimally according to the result of this weighing.

Such a model of decision-making clearly underlies, for example, the well-known paper by Metrick and Weitzman (Metrick and Weitzman, 1998), where biodiversity conservation is conceived as equivalent to the problem of a pure rational actor, Noah and his ark: a series of choices made by one agent for the sake of humankind, based on a budget constraint (the capacity of the ark), and on values attributed, through ESV, to the species. ESV is then intended to inform this decisional weighing, by revealing values on which an optimization calculus can be applied. This is also typical of Moyle's analysis of the Principal-agent problem of designing optimal biodiversity conservation contracts (Moyle, 1998) and of Westerberg et al.'s assessment of the optimal wetland restoration surface (Westerberg et al., 2010).

In this “pure” model, ESV is expected to reveal values that are not adequately signaled by the market due to their specific nature (public good externalities, club goods... (Cornes and Sandler, 1999)). ESV is thus a specific kind of information or expertise, to be factored into decision-making based on cost-benefit reasoning. As OECD wrote, “cost-benefit analyses (CBA) of specific investments and policies, that properly incorporate environmental costs and benefits, are essential to enable policy makers to choose the investment or policy option that maximizes total net benefits to society” (Dixon and Pagiola, 2001, p. 12).

CBA provides both the method by which data and values are expressed and ordered, and the model for the process by which a decision is to be made (Munda, 1996). Decision-making and decision-makers are relays who should translate results as faithfully as possible from economic reasoning and calculus into the making of policy choices. An example of how such concepts influence views on the use of ESV is the repeated call made in the ESV literature for the better training of decision-makers in economics (Driml, 1997; Hahn, 1989; National Research Council et al., 2005; World Resources Institute, 2008).

2.2. The adapted model of decision-making: ESV contributes in two different ways

Despite the pervasive presence of the “pure optimization” model in the ESV literature, economists do not generally pretend

that their proposed instruments are to be applied to policy-making as per the book. For instance, regarding the implementation of economic instruments by policy-makers, Hahn observed that such instruments “are rarely, if ever, introduced in their textbook form” (Hahn, 1989, p. 110), and many other economists have repeatedly drawn attention to this fact (Keohane et al., 1999; Tietenberg, 1990). Theoretical propositions are not made to fit directly into the process, since authors are well aware that policy-making is not a pure process and that it entails the combination of various criteria. Working on stylized and modeled assumptions is rather a way to recommend policy orientations, inasmuch as efficiency is a valid criterion for policy-making.

But, as Freeman observes, “[...] most current resource and environmental policy is not based solely or even primarily on the efficiency criterion” (Freeman, 2003, p. 87). This leads many to an “adapted” view of decision-making procedures, which plays down the role of ESV to be a part of a CBA that will in turn be just one contribution to decision-making. Cost-benefit analysis should then be “helping inform regulatory decision-making, although it should not be the sole basis for such decision-making.” (Arrow et al., 1996, p. 221).

However, as economists adopt this “adapted” model of decision-making, the connection between ESV and CBA on the one side, and decisions on the other, is no longer specified, as it is in the “pure model” which defines the decision-maker as a single purely rational entity in search of a social optimum. It then becomes necessary to state clearly what the ESV contribution consists of, and how exactly it connects the sphere of calculating optimums to that of making political decisions, since the latter is no longer identified with the former. The ESV literature mentions two types of contribution that we shall now examine.

2.2.1. Rationalizing the process

For many authors, optimization is and should be as present as possible in the decision-making process, and ESV can contribute to this ambition. They acknowledge that institutions are complex and that, at the very least, politics, ethics, psychology, history and culture are involved in decision-making. Rationalization will therefore need a combination, or even a negotiation, between the requirements of optimization based on economic metrics, and other modalities of decision, based on other criteria (see for example Nyborg (2000), for a discussion of how monetary and non-monetary criteria interfere in environmental decision-making). This position is for instance vigorously expressed by Barde and Pearce (1991), for whom “No one suggests that CBA should dictate decisions”, but rather that they should assist decision-making, by revealing the logic, and even more the “illogicality” of public decisions under consideration. The literature makes it clear that the exact form of this combination is not the business of economists and that their role is to supply and equip the process with tools and methodologies for rationalization.

In this perspective, economists are meant to inject more rationality into the policy process.

Rationalizing first means enlightening the collective elaboration of options and choices, bringing the inputs of optimization as a reference and promoting more rational public policies, as Arrow et al. (1996) put it: “Because society has limited resources to spend on regulation, benefit-cost analysis can help illuminate the trade-offs involved in making different kinds of social investments.” (p. 221). Shogren (1998) expresses the need for such economic enlightening by saying that a conservation policy “would do poorly that tries to save all and makes no distinctions among species except those governed by ‘science’” (p. 567).

Second, the rationalization of decision-making can be improved by giving consideration to absentees. All interests are not necessarily

fully represented in the decision-making process. ESV and CBA can offer means to ensure that all preferences are expressed in the political and administrative processes, and taken into account by decision-makers. Our own previous research gave us the opportunity to participate in this kind of contribution in the context of coastal restoration projects and disputes in France. ESV were used by some stakeholders to give voice to parties that were mostly absent from decision-making local political arenas, in particular non-resident owners of holiday homes (Laurans, 2002).

This view is in line with social choice theories, for which economic analysis is justified as a collective decision rule in the absence of better voting procedures, which are both unavailable at the frequency and detail that is required by policy-making, and have many imperfections, such as Condorcet’s paradox (Buchanan and Tullock, 1962; Mishan and Quah, 2007). In Barde and Pearce’s words: “What is being measured is people’s values in much the same way as we would ask people to vote for a political party or express their wants in the supermarket” (Barde and Pearce, 1991, p. 4).

Third and finally, some authors suggest that cost-benefit analysis – and the ESV that feeds into it – should frame the expertise and the logic of policy-making reasoning. This frame is a means to organize the display of information to decision-makers (Sagoff, 1998). This is for instance the type of use Claude Henry had in mind when proposing, in the early 1980 s, the use of valuation as “a negotiation language” in environmental decision-making (Henry, 1984). It is also a way to improve the process of decision-making. Arrow et al.’s proposals are typical of this view: “[CBA] can provide an exceptionally useful framework for consistently organizing disparate information, and in this way, it can greatly improve the process and, hence, the outcome of policy analysis” (Arrow et al., 1996, p. 222).

To sum up, ESV may be proposed by its authors for the improvement of the rationality of decision-making, by offering optimization methodologies, taking absentees into account and helping to frame the process. This orientation implies an explicit definition of what decision-making should be, and puts forward tools for weighing the options.

2.2.2. Revealing hidden values

The second type of contribution envisaged by the ESV literature consists in trying to enlarge the list of objects that are properly valued by decision-makers and, consequently, to influence the decision-making outcomes.

It takes it for granted that economic criteria are essential in the policy-making process, because this is what people care about and what elected representatives are judged on. Herendeen encapsulates this in a few words: “Economics is there first, and all must speak its language seriously, at least some of the time, or be cut out of crucial parts of the debate.” (Herendeen, 1998, p. 30). Environmental issues, however, are not naturally expressed in monetary terms because of market failures resulting from their typical characteristics (non-rivalry, non-exclusivity...). Therefore, if they are to be taken into consideration by the decision-making process, they must be actively translated into economic language (Turner et al., 2000). Hence, CBA and ESV may contribute to the decision-making process by revealing and giving salience to otherwise hidden values. In which case, the contribution of ESV and of the economist to decision-making is that of environmentalists with a specific form of expertise, who have perceived issues that the market and the current economic functioning cannot see before they have been translated. This is for instance the view of Pearce and Moran (1994), when they state the need to “demonstrate [that] the importance of conservation remains as strong as it ever was, perhaps stronger” (p. 17). Another illustration would be

Shogren's statement that economists "always have been environmentalists as witnessed by our century-long cry to get prices to reflect true social costs" (Shogren, 1998, p. 556).

This attitude entails speaking from the outside of the process, bringing in science-based evidence, and thus influencing the value systems of decision-makers, with a view to achieving a better preservation of ecosystem services.

Of course this second orientation is complementary to the first, since enlarging the spectrum of values under consideration is also a kind of rationalization (greater rationality is provided by a more complete set of preferences to be accounted for). They however differ in the extent of the contribution expected from the ESV authors. On the one hand, economists are called on to endow decision-making with specific methodologies that may guarantee a more neutral, complete and refutable process. In this case they are not necessarily supposed to have views on the outcome of the process. On the other hand the major role of economists is to supply science-based evidence to be taken into consideration by decision-makers.

In a nutshell, the contribution to decision-making proposed by the ESV literature is to help rationalize the process, and/or to supplement the information used with a view to influence decisions so that environmental issues are taken into account to a greater degree than they otherwise would. But what are economists up against, as they try to rationalize decision-making processes? And in what kind of arena do they try to make themselves heard as they advocate the need to give more importance to environmental issues? Let us turn to political science classics for suggestions.

3. Policy science models of decision-making

The limitations of the pure rational choice model have for decades been a central theme in political science, organization sociology and in management. These disciplines have long since considered alternative frameworks to guide our understanding of decision-making processes and to complement the rational choice model. Such a task was, for example, the central purpose of Allison's milestone book (Allison and Zelikow, 1999; Allison, 1971). In Allison's proposal, conceptual models of decision-making are differentiated based on *who has power over action*. (1) According to the "Rational Actor" models, power belongs to a "decision-maker", i.e. one monolithic entity, which makes choices based on calculating the best strategy amongst available options. (2) According to the "Organizational" models, power on action is exercised by an entire organization, which decides according to routines. Each organization strives to frame problems in such a way that solving them means appealing to its own routines and know-how. (3) In "Policy" models, power over action is shared by different entities and organizations, which compete to influence the outcome.

This section examines the way that even such basic decision models are already providing fruitful answers to the problem currently posed by UESV, as we have described it above.

3.1. Use of valuation in the rational actor model

The case of the "rational actor" decision-making model hardly needs further elaboration. Its archetype is the previously discussed Noah and his ark problem, where the role of ESV is to provide the figures requested by a decision-making entity to enable trade-offs so as to optimize the loading of the ark. As suggested above, however, this model should not be caricatured by reducing it to a naïve view of decision. It encompasses a wider domain of efforts to make actual decisions closer to an optimal choice based on

content, i.e. facts, data, clarified criteria and transparent calculus (Salles, 2011). Researchers have invested considerably in this field², mostly through the proposition of models that are designed to organize the knowledge of ecosystem services and of their physical evolution, linked with social and economic data (Fürst et al., 2010; Gret-Regamey et al., 2008; Groot et al., 2010; Kremen et al., 2007; Maes et al., 2009; Swetnam et al., 2010). Such models are proposed to assess the impact of land use changes, e.g. InVEST³ (Nelson et al., 2010; Polasky et al., 2010), ARIES⁴, or to predict land use changes from a set of drivers, e.g. IMAGE (Haines-Young, 2009).

3.2. Use of valuation in the organizational model

Simon (1946) on administrative behavior and decision-making processes puts forward a very different model of decision-making and of the effort to rationalize it. In the context of organizations, actors do not seek optimal but rather satisfying solutions – i.e. solutions that satisfy their respective needs in the framework of the organization's rules, values, goals and routines. In such a decision model, ESV would be considered as providing a specific sort of information (the economic values of ecosystem services). But the use of that information is not led by principles of optimal choice. Information is rather used by decision units, and especially those units that are in a leading position, to influence other decision units so that they work consistently with the organization's goals (Reese, 1993). For this, organizational processes (e.g. hierarchical) use guidance and persuasion rather than force, threats or promises. Applied to the environmental decision-making process, this would mean that ESV can contribute by influencing the perceptions of decision units and aligning them with overarching decisions, such as parliamentary or legal ones. A good example of UESV for such alignment is provided by Gowan et al.'s observations about decisions leading to the suppression of a dam, for environmental reasons, on a US river (Gowan et al., 2006). They show that in this case, ESV was used late in the decision-making process, after the legislative decision to suppress the dam. Its main use was by groups who supported the decision to advocate its enforcement by the administration. In this example, ESV appeared clearly as a tool used by some to attempt to influence the perception of an administration so that it lines up behind a parliamentary decision.

In a decision-making framework such as this, organizations also tend to define and redefine their own missions, as Moore exemplified with regard to the behavior of the US EPA (Moore, 1995). In so doing, they also define what is appropriate. In organizational decision-making theories, appropriateness is a key criterion for the decisions made by organizational entities (Allison and Zelikow, 1999). An important way to play a role in the decision-making process, then, is to influence norms of appropriateness within the organization (or across organizations operating in coordinated ways). Clearly, this is also an important role for ESV. Good examples are given by studies that provide ES values as guidelines for decisions to be made by organizations, such as the World Bank's "Global Partnership to Green National Accounts"⁵, OECD (2002) guidelines, and by official reports that cite reference values that should be included in administrative decision-making, as was the case for instance in France with regard to biodiversity (Chevassus-au-Louis et al., 2009).

² See for example www.valuing-nature.net/projects/bridge

³ See <http://www.naturalcapitalproject.org/InVEST.html>

⁴ (<http://www.ariesonline.org/>)

⁵ <http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,contentMDK:22746592~pagePK:64257043~piPK:437376~theSitePK:4607,00.html>

3.3. Use of valuation in “policy” models

The third type of decision-making model sees the process as an essentially political one, in which decision strongly relies on the pressures exerted by various groups, parties and institutions that are involved in a struggle to influence the outcome, in a public and controversial setting. For this type of decision-making model, we will use [Dahl \(1974\)](#) now classic analysis of power over decisions in New Haven (Connecticut, USA), which insists on the political interaction between interest groups and elected officials.

Key in the “policy” model of decision-making is the influence of representatives of interest groups, even though they have no official mandate ([Tsebelis, 1988](#)). This influence is mostly based on assessing and advocating the likely consequences of political decisions on the interest of the group they defend ([Dahl, 1974](#)). Information and expertise are essentially viewed as resources for that purpose ([Gudeman, 2009](#)). [Majone \(1989\)](#) even considers information mostly as a rhetorical resource: “like dialectic, policy analysis usually starts with plausible premises, with contestable and shifting viewpoints, not with indisputable principles or hard facts. Like dialectics, it does not produce formal proofs but only persuasive arguments” (p. 6).

Within such a paradigm, ESV is expected to underline how decisions affect the interests of groups, categories, communities, etc. ([Boezeman et al., 2010](#)). Examples where ESV is put forward in this perspective are indeed numerous in the literature. One such example is provided by [Ferraro](#), who concludes from his results: “Relative to the national and global benefits from protecting the rain forests of Ranomafana, however, the costs are quite small and the analysis offers hope that government agencies and international donors can design conservation plans that benefit both endangered ecosystems and the welfare of local communities.” ([Ferraro, 2002](#), p. 261).

Information and messages from ESV can be used by pre-existing groups, but sometimes they can also trigger the organization of new interest groups, by pointing to “winners” and “losers” that emerge from a potential decision. In the context of environmental disputes, ESV may relay the reciprocal claims of social groups engaged in a politicized struggle, as [Bandar and Tisdell \(2004\)](#) stated: “We investigate whether urban residents’ WTP [willingness to pay] for the conservation of elephants is sufficient to compensate farmers for the damage caused by elephants. We find that the beneficiaries (the urban residents) could compensate losers (the farmers in the areas affected by human–elephant conflict) and be better off than in the absence of elephants in Sri Lanka”, p. 93.

In the “political” model of decision-making, elected officials themselves also behave like a pressure group, rather than an optimizing decision-maker body ([Ringe, 2010](#)). They generally develop a strategy of imputation, in trying to attribute positive outcomes to their own action, and to blame other factors, and especially the social and geographical context, for the remaining difficulties ([Eldersveld et al., 1995](#); [Le Bart, 1990](#)). For instance they may use information as a way to argue about the positive impacts of their decisions on local activities and jobs. ESV can provide such means, as when ecosystem services preservation is praised for its role in sustaining local activities ([Bishop, 1999](#); [Butler et al., 2009](#); [Heal, 2005](#); [Lange and Jiddawi, 2009](#); [World Bank, 2003](#)). In this perspective, ecosystem services are evaluated and magnified as factors of attracting new businesses, jobs and fiscal resources to a given territory (agriculture, tourism and leisure activities...), or reducing the cost of living of the residents due to avoided costs (drinking water services, flood protection, etc.). Here, ESV does not “make” the decision, but helps in its defense.

Another important aspect of this model is that in a political process, values are essential resources for the exercise of power,

support and influence. Thus influencing values is the dominant way to influence decision-making. Here, information, messages and expertise are sought to promote new norms, so as to indirectly influence values.

3.4. ESV in organizational and political contexts: influence rather than optimization

Organizational and political models of decision-making are quite different. On the one side is the alignment of routines and norms, on the other, the struggles of advocacy and power. But these two basic models of decision-making in political science share one trait that is essential for the use of ESV and which addresses the limits of the rational model. Since it is not assumed that a single rational actor makes the decisions, the role of information and expertise such as ESV is mostly as a resource for influence: influence on perceptions, values, norms and appropriateness, and on the alignment of behaviors. A typical case is made by [Naidoo et al.](#), when they describe how ESV has been used as a resource to influence the Indonesian government’s policy on oil palm plantations ([Naidoo et al., 2009](#)).

This does not disqualify the “attempt to rationalize” decisions. Rather it suggests that this attempt itself has to take the form of organizational norms or advocacy, rather than optimal choice: it will have to go through the political process, be claimed and supported by groups and representatives. Rationalization will progress through a struggle for influence, or by being laid down in organizational routines, and not just on the basis of its own intrinsic virtues.

But it certainly suggests that, out of the two main types of contributions offered by ESV ([Section 1](#)), the “external” position of economists “revealing hidden values” might be the most relevant. Also, since utilization of information is more diffuse and more difficult to observe in practice than rationalized calculation, this helps to explain the limited appearance of UESV in the literature: the utilization of ESV as a resource for influence is not easily observable without specific research focus and methodologies.

Finally, these insights from political science suggest an explanation for the fact that many ESV authors seem to be aware that influence is the main attainable outcome of their valuation studies. This was demonstrated in [Laurans et al.](#)’s selection of ESV papers by the strong representation of “informative” expected UESV rather than ESV for “trade-offs” ([Laurans et al., 2013](#)). This is paradoxical, in view of the rational model of decision underlying ESV theory, but is in line with the findings of political science in the field of decision-making processes. The exact nature and potential extent of such possible influence of ESV has hitherto been the subject of only cursory consideration, as a remote and vague perspective that is opened up by the results; whereas it should in fact be placed at the center of attention.

Overall, it is not necessarily by being instrumental and neutral that ESV results will be successful in the policy process, but through the provision of resources that will be available for use by organizations, individuals, groups and representatives, etc. to gain power over decisions by exerting influence. There now appears a need to consider seriously, as an essential output of valuation activities, their ability to provide relevant tools for “influence-making” in policy-making processes. How can valuation exercises maintain a technical, instrumental and scientific nature, while being delivered as a resource for influence? How should the results be adapted, or even the valuation methodologies, so as to play an effective influential role in the decision-making process? How should objectivity, which is essential for credibility, be combined with economist participation in a political and social process?

Clearly, this opens the question of the interface between science and policy and decision-making. This is a central issue for the sociology of science and, of course, this paper is not the place for a review of this discipline. However, until now sociologists have paid little attention to the specific issue of the interface between economics and policy-making. Pielke's categorization of the scientist's role in the decision-making process may prove useful for this purpose. ESV authors are careful not to restrict the options of decision-makers, as are the "issue advocates", and would rather view themselves as "honest brokers" who inform decision-makers with synthetic and didactic information on all relevant alternatives (Pielke, 2007). Latour's model is even more generically applied to these complex relations, however he has not yet extensively addressed the specific role of environmental economics, apart from his suggestion that the economist's role is to "hold account" of what is and is not integrated into the collective organization that deals with policy (Latour, 2004).

There appears to be a need to invest more effort into understanding the issues mentioned above, and to find approaches that will help us do so. Section 3 suggests some key orientations to advance this agenda.

4. Towards a clearer utilization-focus for ESV research and practice

To answer some of the questions raised by this confrontation between different models of the decision-making process (Section 2) and the major views on use of ESV in the literature (Section 1), our proposal for a renewed focus on ESV utilization is built on five points.

- (1) Different models of the decision-making process lead to different views on what kinds of roles valuation can play. For instance, in an organizational perspective of decision-making, ESV would impact decision by supporting an organization's play in the power competition, and by participating in the definition of the organization's framework, criteria and routines. Alternatively, in a political process perspective of decision-making, a powerful ESV can be one that strikes public opinion, which can be a strong challenge to certain existing interests or lead to a tipping point in political arbitrage.
- (2) One role of ESV is common to all decision-making models: to inform about the consequences of alternative conditions of ES (What are the economic effects of certain changes in ES? On whom? And how would various strategies compare in terms of economic demands and consequences?). Where roles diverge sharply is regarding who uses this information, for what purpose and what action. This divergence impacts on how ESV is supposed to measure the consequences of ES conditions. The framing of the question and the methodology in handling the data have to be treated in ways that depend on the kind of use the ESV is designed for.
- (3) Decision-making processes are not entirely predictable, even if they can be analyzed. The rationality of the actors and of the process itself is limited, and not necessarily based on interests only. In brief, essential dimensions of decision-making processes are highly contingent and dependent on place, time, culture, politics and organizations.
- (4) Connecting the two previous points leads to what we think is the crux of the tension in the ESV field: a strong sense of our role, as ESV authors, to provide objective information, along with an equally strong dependence on highly contingent decision-making contexts and processes (Vatn, 2009). In our view, to increase their influence in decision-making processes, ESVs have to adapt strongly to the contexts they are used in.

They should be subject to debate, to be argued over, both for and against. Thus, ESVs could be regarded as specific kinds of reasoning. The questions they are required to answer are usually very problem and situation-specific. For instance, we showed in Laurans et al. (2001) that six parallel economic analyses of regional water management plans all had very different methodologies and structures, because stakeholders and policy-makers would ask the economist very different questions in each context. Prima facie, this looks like a challenge: how can ESV methodologies be adapted to each different decision-making process? Should the basics of ESV be redefined according to specific social situations? Should actors and strategies have precedence over data and calculations? Who should define the criteria on which valuation should be based? Coming to terms with this fundamental tension should be at the center of the agenda of the ESV field for the coming years.

- (5) In the management of this tension between the quest for increased rigor and objectivity on the one side, and context sensitivity on the other, the precedent of policy evaluation can be enlightening. Indeed, policy evaluators have realized that the same tension is at the core of their field (Mermet, 1996; Owen, 2007; Stufflebeam, 2001). The whole policy evaluation field has been through successive stages since the fierce debate that once raged. The domination of process-insensitive approaches, based on statistical measurements, was challenged in the late 1970s. Process approaches developed rapidly in the 1980s (Guba and Lincoln, 1981) before both gradually came to terms with each other in the 1990s and 2000s (Vedung, 2010). Not that the tension between measurement- and process-oriented approaches has disappeared, far from it in fact (Vedung, 2010), but the forms of this opposition have evolved and it is actively managed in the field in a more constructive way than has previously been the case. A wide array of methodological resources has developed over time, as a result of this evolution, be it in terms of measuring and valuing methodologies, process approaches and adaptation to context, or coupling process and valuation methods in relevant ways. Some ESV methodologies may intend to provide such possibilities. This is for instance the case for model-based ESV, when they propose to help stakeholders discuss their divergences based on models that link social and economic decisions with ecological variations (see references mentioned in Section 2.1). Nevertheless, these methodologies are able to answer a given set of questions, and they may tend to structure the decision-making process to fit into their logical framework. On the contrary, above-mentioned policy evaluation approaches are designed to express and elaborate policy-making questions, and to then define what measurement or modeling process would match the specific logic of the policy-making context, with its specific and unique set of relevant questions.

Another feature has been the strong influence of some deeply deliberated theoretical perspectives and approaches that integrate substance and process. "Utilization-focused evaluation", first introduced by Patton (Patton, 1986), is such an approach that has been instrumental in the policy evaluation field, and could be of interest for ESV. If evaluation – and this is just as true for ESV as it is for policy evaluation – is to make a difference, then it must actually be used. For this to happen it has (1) to be commissioned strategically, with a view to building the knowledge base and the methodology for the given context and (2) to be designed in this perspective; i.e. it should simultaneously be relevant to context and robust.

5. Conclusion

Concurring with Liu et al. (2010) on the idea that the utilization of ESV should develop as an essential new frontier in ESV research, we have examined the way in which it is viewed in the ESV literature (Section 1). We envisaged three alternative model types (rational actor, organization and political process) that can be used as a basis for the analysis of decision-making and of the use of valuation (Section 2). A discussion of the results (Section 3) leads us to the following conclusions: (a) a clear utilization-focus in further developments of ecosystem services valuation is necessary to overcome the present ESV “implementation gap” and some of the conceptual and methodological problems underlying it. (b) Neither by strengthening the rigor of ESV or by enhancing its procedural qualities alone could successfully address the challenge: both such steps are needed jointly. (c) In overcoming the strong tensions and numerous methodological difficulties inherent in combining process-based and content-based valuation approaches, looking at things from the perspective of utilization may provide a new and instrumental fulcrum. (d) On the way to understanding ESV uses and contexts of use, it is essential to complement our effort on methodology with an in-depth analysis of the decision-making processes to which we aim to contribute.

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