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What Practical Uses of Economic Valuation in Decision-Making Processes?

The Case of Marine Environment >

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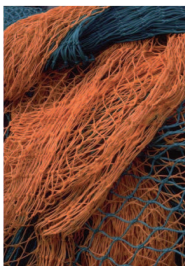
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Looking Beyond Academic Application of Environmental Valuation: What Practical Uses of Economic Valuation in Decision-Making Processes? The Case of Marine Environment.

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Abstract. Despite debates, economic valuation of the environment appears as the best solution to weight environmental issues with development projects. Its wide use as a decision support tool is urged at various political levels. There are now numerous examples of applications of Environmental Economic Valuation (EEV) methods, dealing with various environmental characteristics (species, terrestrial, but also coastal and marine ecosystem services…). Compared to the huge number of evaluation studies, the question of their actual use in management and decision making remain poorly addressed. Since the 1990s, few studies have focused on this issue. Some have focused on the place and role of EEV in the European regulatory framework; others analysed more deeply case studies. Surprisingly, those studies report weak use of EEV in decision-making process. The present study intended to make a systematic literature review of both academic and grey literature dealing with coastal and marine environment EEV. The aim was to analyse how the issue of the EEV use was addressed by the literature. Building on a previous study, we developed an analytical framework encompassing four criteria: (i) mention of an expected use of the EEV, (ii) mention of the effective use of the EEV, (iii) the type of mention (or details) of the EEV use and (iv) the end user. Each reference collected has been evaluated and categorised within this analytical framework. Our preliminary results show that if most studies mentioned an expected use, the effective use of EEV remained poorly addressed. The inclusion of the end user provided interesting results. All studies mentioning an effective use of their findings have clearly identified the end user and most of them are formally engaged with the end user.

1 Introduction

Environmental Economic Valuation (EEV) has become a mainstream field both on academic and political side. By revealing the value of the environment, EEV is supposed to help estimating the benefits retrieved from environmental assets and the costs associated with development. Indeed, putting a price on nature should allow economic agents to take the

environmental benefits into account in their decisions, and to modify their behaviour accordingly. The environment, biodiversity or ecosystem services should thereby be better taken into consideration in public decision and private choice. Thus, EEV appears as a relevant decision support tool. Economic literature extensively addresses this question. EEV Methods are well-established procedures and many examples and study cases can be found in academic literature (AL). On the political side, several international, regional and national convention, but also directives, guidelines etc., recommend the use of EEV as a relevant policy instrument to include the environment in management decision.

After years of debates on the pros and cons of economic valuation of the environment, the scientific community should now focus on the way EEV is actually used in the decision making process. This question is indeed essential as EEV is not self-sufficient. It is thus important to understand what is the role played by EEV in the decision-making process: who use EEV, how, to what purpose and with what results. Yet, only few studies have focused on this topic.

In 2001, an OCDE report focusing on biodiversity valuation concluded that "so far [it] has not achieved the same level of popularity in policymaking as it enjoys in academic circle" (OCDE 2001, p.25). Two years later, Turner et al. (2003) made a review of environmental valuation of ecosystem services. The aim was to analyse its policy relevance. Although they did not detail the way they selected case studies, the review encompass a wide range of biomes. They first highlighted the fact that policy relevant EEV are the one "valuing multiple function and uses" (R. K. Turner et al. 2003, p.493) and tracking environmental state changes. In their conclusion, they regretted the few number of EEV responding to those features. They pointed out the lake of relevance for decision makers of most EEV.

Several studies have focused on the use of EEV in the European Union environmental policies. In 1997, Navrud & Pruckner (1997) have conducted a comparative analysis of the use of Cost-Benefits Analysis (CBA) in the USA and Europe. They focused on five fields of application: project evaluation, regulatory review, natural resource damage assessment, environmental costing, and environmental accounting. They have noted that "very few cost-benefit studies" were conducted in Europe (Navrud & Pruckner 1997, p.21) especially compared to its uses in the USA. In another study on the role of CBA in UK and European environmental policy, Turner (2007) underlined the "at best 'patchy' take up of CBA by policy makers and the debate about its efficacy in academic and policy circle" (Turner 2007, p.4). Pearce (1998) and Pearce & Seccombe-Hett (2000) came to a similar conclusion. Their study focused on "the way economic valuation has been integrated into decision-making" at the European level (Pearce & Seccombe-Hett 2000, p.1419). In a first article, Pearce (1998) studied the use of formal policy

appraisal procedures in four European Directives. He concluded that until the 1990s, such procedures were hardly ever used (Pearce 1998). In a second paper, Pearce & Seccombe-Hett (2000) made a literature review based on a library search at the European Commission. They concluded that "monetary valuation is by no means included in all or even most of these studies" (Pearce & Seccombe-Hett 2000, p.1421). They also pointed out the "paucity of *ex post* studies on the effectiveness of economic instruments" (p. 1424).

Those studies have two features in common with the one conducted by Turner (2007) and Navrud and Pruckner (1997). First, they noticed that Europe is lacking behind the USA in terms of use of EEV in the decision making process. Second, they remained optimistic as regards an increase of the EEV in Europe. More recently, Liu et al. (2010) also addressed the issue of the use of EEV in ecosystem management *via* a literature survey. They regretted that "the contribution of ecosystem service valuation to ecosystem management has not been as significant as hoped, nor clearly defined" (Liu et al. 2010, p.54). However, while highly interesting, those studies do not provide enough methodological information on the approach adopted.

Few studies have adopted a more formalized approach to examine the use of EEV. Fisher et al. (2008) surveyed authors of 34 papers dealing with ecosystems services valuation. The purpose was to assess the level of inclusion of EEV in policy. The responses of the fourteen respondents are very mixed. Some "were very frank at the lack of policy traction of their work"(Fisher et al. 2008, p.2063) whereas other "noted the efficacy of monetary valuation for gaining traction in the decision-making process" (p. 2064). We can also mention two extensively documented case studies dealing with the use of EEV in decision making. Gowan et al. (2006) analysed the decision making process leading to a dam removal on the Elwha River. The whole process has been followed up. The authors conclude that "ecosystem valuation played a minor role in the decision to remove the Elwha dams" (Gowan et al. 2006, p.508). They even reveal that the valuation study was done "only after the decision to remove the dams had been made" (Gowan et al. 2006, p. 509). Interestingly, Laurans & Aoubid (2012) came to a similar conclusion. They conducted an *ex post* study on the Catskills water catchment case. This case if often pointed out as an example of a political decision based on the ecosystem services valuation and then leading to payment for ecosystem services. One the one hand, the authors recognised that the decision to protect the environment was linked to economic criterion. On the other hand, they noticed that the formal economic analysis was not at the origin of the choice: "the economic instrument did not 'solved' a potential tension between environmental and economic objectives" (Laurans & Aoubid 2012, p.1). The cost of preserving the environment was not performed or only summarily assessed. The area to be protected was decided arbitrarily. In this

case, economic analysis was used in an *ex post* way, to legitimate the decision, once taken.

Despite first studies published in the late 1990s, this emerging field of research remains poorly documented. To our knowledge, the widest and most formalised study is the one conducted by Laurans et al. (2013). They analysed systematically articles dealing with EEV published in *Ecological Economics*. They have defined an analytical framework based on two criteria: the type of use of the EEV and the type of mention made in the article (see part 2 for more details). They reached a categorical conclusion: "the issue of use is overwhelmingly orphaned in peer-reviewed scientific literature" (Laurans, et al. 2013, p.217). Beside the focus of the valuation itself, the question of the real (or even potential) use of economic valuation studies is left aside. Two main hypotheses are given by the authors to explain this: either economic valuation is poorly used in decision making, or AL does not address this issue. This study represents an important step for the understanding of EEV's place in decision-making process.

The present study intended to keep up and to go beyond Laurans et al. (2013) analysis. Indeed, their methodology is the most formalised and robust. The analytical framework developed by the authors is very useful as it helps identifying the different possible use of EEV. It also reveals how far the use of EEV is documented with accurate details. Our study shares the same perspective; however we made several changes and improvements.

First, we improved the analytical framework. We emphasised the difference between expected and effective use and we improved the characterisation of the criterion for assessing expected and effective use. We also enriched the analytical framework by adding a criterion: the identification of the end user. Second, we focused on a different corpus. Laurans et al. (2013) analysed references from a single journal dealing with environment economic valuation. Here, we decided to use a thematic approach and to focus on references dealing with marine and coastal environment. This narrowly defined thematic scope allowed us not to restrict the analysis to AL and to include grey literature (GL), in order to check the assumption according to which GL would be more likely to mention the use of EEV.

Recently, the concern of the importance of human pressures on the marine environment took the shape of the implementation of integrated policies and plans. At the European level, the Marine Strategy Framework Directive (MSFD 2008) urges Member States to "take the necessary measures to achieve or maintain good environmental status in the marine environment by the year 2020 at the latest" (Article 1) and recommend that Member States ensure that measures are cost-effective and technically feasible, and carry out impact assessments, including cost-benefit analyses, prior to the introduction of any new measure (Article 13-3). The emergence of those new kinds of

policies requires feedbacks on existing marine assessment frameworks. This work is part of a broader research on this issue.

The remaining of the article is structured as follows: the second part explains the materials and methods used to carry this bibliometric research. The third part presents the main results obtained so far. In the fourth part we discuss those results. Then, we conclude with critical comments and expose avenues for research.

2 Materials and Methods

2.1 Materials

The study consisted in a literature review of EEV studies dealing with marine and coastal environment. This study did not focus on AL only: we broadened our research to GL. Indeed, it represents a huge amount of information, yet difficult to access, as it is, by definition, non-conventional. GL is considered here in a very extensive way. As defined by Alberani et al. (1990), GL " include but [is] not necessarily limited to the following types of materials: reports (pre-prints, preliminary progress and advanced reports, technical reports, statistical reports, memoranda, state-of-the art reports, market research reports, etc.), theses, conference proceedings, technical specifications and standards, non-commercial translations, bibliographies, technical and commercial documentation, and official documents not published commercially (primarily government reports and documents)" (p. 358). To overcome the issue of accessibility, we used the marine partnership ecosystem services online data base[1]. This database provides an extensive access to both academic and grey literature dealing with EEV of coastal and marine environment, which fits perfectly our purpose.

2.2 Methods

We developed an analytical framework partly based on the one developed by Laurans et al. (2013). Their analytical framework distinguishes the use of EEV and the way EEV is referred to. To come up with such an analytical framework, they first studied AL. By using a combination of key word ("'valuation' and 'ecosystem service'", "natural capital", "'environmental' and 'valuation'", "'biodiversity' and 'valuation'", and "total economic value") in the three ISI citation database and Elsevier's *Scopus*, they gathered 5028 unique references. Then, they browsed the corpus to find references

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[1] Marine Ecosystem Services Partnership. (2010). *Bibliographic List*. En ligne: http://www.marineecosystemservices.org/mesp-valuation-studies

mentioning well-defined categories of EEV use. Only three references matched this criterion: Liu et al. (2012), Navrud & Pruckner (1997) and Pearce & Seccombe-Hette (2000). Thus, they extended their research to GL. They came up with five more references: Navrud 2001; NRC 2005; OCDE 2002; Pearce 2001; SCBD 2007. Based on those eight references, they reworked and synthesised the mentions of EEV uses into three main categories: decisive, technical and informative use.

Laurans et al. (2013) second criterion addresses "the way in which ecosystem services economic valuation is referred to" (p. 211) in the literature. They defined three possible categories of mention:

(1) "Cursory reference to a potential UESV: in introduction and/or conclusion, the authors merely mention the fact that economic valuations (their own or others') could actually be used, without more precision.

(2) Analysis of the use issue: the core of the paper is UESV, i.e. the focus is, once economic valuations are produced, on how their results are used by stakeholders: which stakeholders, in which context, for which purpose, with which results etc.

(3) Documentation of use cases: case studies that follow the subsequent use of an economic valuation by some stakeholders." (p. 211).

This approach represents an important step toward a robust and comprehensive analysis. Yet, this analytical framework still presents some limitations and we propose here to extend it following three directions. First we clearly differentiate expected use and effective use. Second, we added a new category to the typology of EEV uses: "Strategic use". Third, we tried to be more specific on the "stakeholder" criterion. Given what cited authors previously concluded regarding the inclusion of EEV in decision making, it appeared to be interesting to gather organised and precise information regarding the end users. Finally we came up with an analytical framework based on four main criteria: (i) expected use; (ii) effective use; (iii) type of mention and (iv) end user. For each criterion, the corresponding categories and sub categories are detailed below.

2.2.1 Expected use, effective use and the way they are mentioned

To deepen the analysis, we clearly differentiated expected and effective use. In Laurans et al. (2013) the difference is not really clearly made. In the criterion "type of mention" both are mixed. "Cursory reference" refers to a potential use and the two other type of use (that is: "Analysis of the use issue" and "Documentation of a use cases") refers to an actual use of the EEV. Expected use occurs when a potential use of the EEV study is mentioned in the article. The authors explain how their results could be used in practice. There is an effective use of EEV when the authors mentioned, even in a cursory way, an actual application of the EEV. When analysing the references of the corpus, we made separate records: one chart was dedicated to studies

Type of mention	Expected use	Effective use
Cursory reference	The authors briefly mention a potential use of EEV	The authors mention briefly an actual use of the EEV
Analysis of the issue	The authors mentioned how the EEV could be used, by whom, for which purpose…	The authors mentioned how the EEV has been used, by whom, for which purpose…
Documentation of use cases	The authors document their studies with other *ex-ante* analysis of EEV use	Case studies that fully document the subsequent use of an EEV

Tab. 1. Specification of the mentions of EEV uses

mentioning a potential use of their results (expected use), another one was dedicated to studies mentioning an existing use of their results (effective use).

Originally, the criteria "type of mention" included both aspects. "Cursory reference" refers the expected use and "Analysis of the use issue" and "Documenting of use cases" can be linked to an effective use. But given the paucity of references documenting cases of actual use, we found this categorisation too restrictive. Indeed, some cases are excluded and cannot be categorised. For instance, a study mentioning in the body of the article an effective use of the results in a management plan without further detail is out of the scope of Laurans et al. (2013) analytical framework. To solve this issue, we decided to distinguished expected use and effective use but we kept the three type of mention: Cursory reference, Analysis of the use issue, and Case study (Tab. 1).

2.2.2 The typology of EEV use

We kept the three main categories (that is Decisive, Technical and Informative use) and the eight sub categories defined by Laurans et al.(2013). We added two new categories. The first one is based on the findings in the field of research dealing with the use of scientific information in the decision making process. We named it "Strategic use". The second was added to include references that did not mention any kind of use. We will not detail further this last category.

a. Decisive use of EEV

Here, EEV is used as a contribution to a larger process "in which a given choice is to be made *ex ante*, by a decision-maker facing alternative" (Laurans et al., p.212). The EEV contributes to the decision making process by

documenting the possible alternatives in monetary term and their consequences on the environment. The authors have defined three sub categories of decisive use: EEV (i) for trade-offs; (ii) for participative use; and (iii) as a criterion for environmental management.

 (i) In this case, EEV "can aim at helping to factor related concerns into the CBA that are underpinning decision-makers' trade-offs" (p.212).

 (ii) Here, EEV is used as the "a basis for discussion: through an open debate on ESV parameters and assumptions, stakeholders negotiate and define a project" (p. 212).

 (iii) An EEV is used as a criterion for environmental management when it "help[s] prioritizing conservation efforts within an organization, in an optimal way" (p. 212).

b. Technical use of EEV

In this case, EEV is used "after the choice of a policy or project, to adjust the economic instrument that will implement the decision" (p. 212). There are two sub-categories. In the first case, EEV is used to "establish […] levels of damage compensation" (p. 212). In the second case, EEV is used to set tariffs (for a park entrance of the amount of payment for ecosystem services for example).

c. Informative use of EEV

EEV can also be used to "provide information intended to have an indirect influence on decision-making, considered in a very broad sense" (p. 212). There are three sub-categories of use: (i) for awareness-raising; (ii) for justification and support, (iii) for producing "accounting indicators".

 (i) EEV is used as "the vector for a broad message concerning the preferences that should be mainstreamed into society" (p. 212), in particular in public and private choice.

 (ii) Here, EEV is used by "a stakeholder to promote a given course of action" (p. 213), either to demonstrate the validity of an option (used *a priori*), or "as a tool for verification" (used *a posteriori*).

 (iii) In this case, EEV is used as a monitoring indicator to provide information on the state of the environment to decision makers and/or general public.

d. Strategic use of EEV

Besides those three categories, we defined a new one, based on the literature dealing with the use and influence of scientific information in the decision making process. There is an extensive field of research addressing the issue of the "role of information and knowledge for policy making" (Bauler 2012,

p.38). In 1979, Weiss was already working on "what using research actually means" (Weiss 1979, p.429). Based on a literature review, she has come up with seven models of scientific information uses in the public decision arena. Some of the models identified, such as the political model, the tactical model or the enlightenment model, have been re-used and developed by other authors (Bauler 2012; Hezri & Dovers 2006). This corpus, even if not strictly focused on use of EEV, gives highly interesting information to complete the framework of Laurans et al. (2013). The purpose here is not to give an in-depth review of this field of research. Rather, we focused on the typology of information use that have emerged during those 30 years of research and summarised by Bauler (2012). He detailed three main type of use of information: (i) instrumental use of information; (ii) conceptual use of information and; (iii) strategic use (this category has no specific name in the paper so we took the liberty to give one).

(i)   Instrumental use can be related to the above mentioned technical used. Indeed, it refers to the "direct use of information as input to the formulation of policy options or to the definition of policy implementation" (Bauler, 2012, p. 39).

(ii)   Conceptual use tallies with the category "informative use" defined previously. Indeed, in this case, "information is more likely to be used in terms of enlightenment, informing problem framing, informing world views or influencing values" (p. 36).

(iii)   The category we have named "Strategic use" recovers three sub categories: political, symbolic and tactical use. It refers to cases where there is a "perversion of information" (Bauler, 2012, p.40). We included this last category in the analytical framework.

Information is used in a political way when it aimed at "confirm[ing], or infirm[ing], already acquired knowledge and to legitimate decisions in an *ex post* way" (Bauler, 2012, p. 40). Even if very close to the *a posteriori* use of EEV as "Justification and support", we did not merge the two categories as the aim here is not only to verify the relevance of a decision but to "support a pre-determined position of a user" (Hezri & Dovers 2006, p.93). In the first case, the information is used in a neutral way whereas in "Political use", the use is much more subjective.

The symbolic use of information occurs when "the process of information production itself is used as a means to reassure stakeholders by demonstrating the particular importance attached to the objectivation of decisions" (Bauler 2012, p.40). Here, again, the information is not use in a neutral way but as a mean to make sure "that those who make the decisions hold appropriate attitudes towards decision-making"(Hezri 2004, p.366).

Finally, there is tactical use of the information "when information gathering and information processes are used as a delaying strategy or as a justification

for non-action when confronted with emerging problems" (Bauler 2012, p. 40).

2.2.3 The end user

The issue of the consignee of an EEV exercise is highly important. It gives information on the anchorage of the study in an existing institutional context. We made the hypothesis that the more determined is the end user, the more chance the EEV has to play a role in the decision-making process. We defined three possible cases: (i) the end user is clearly named; (ii) there is a general indication on a potential end user; (iii) there is no mention of an end user.

For cases (i) and (ii) we defined 10 types of end users: Government, or administration, Decision makers or policy makers, Manager, Non-Governmental Organisations (NGOs), Resource users, General public, Stakeholders, Industries or enterprises, Development bank and Donors. When the end user is clearly named, the detail is recorded in the analytical framework. We did not gather "Government or administration" and "Decision or policy maker". Indeed, we considered that mentioning a government or its administration as a possible (or effective) end user was a more precise information then just "Decision or policy maker". Likewise, we differentiated "Resource users" and "Stakeholders" for the same reason, the definition of "Stakeholder" being extremely broad.

Each reference has been assessed against those three main criteria (end user, expected use and effective use). For each reference, only one type of mention was possible (for example, the end user is not mentioned or a general indication is given or he is clearly named). But each reference can mention different type of use (the four main categories detailed here above) or different type of end user (such as "government" and "policy makers").

3 Preliminary Results

The results presented here below are based on the analysis of 114 references retrieve from the online Marine Ecosystem Services Partnership database. These are only preliminary results but they constitute a sound basis for a first set of research. The observations can exceed 114 as some studies included references to several categories and sub-categories. Out of the 114 references studied, 55 have been peer-reviewed and 59 are GL. All references have been carefully reviewed and screened.

3.1 The Difference between Expected and Effective Use.

3.2.1 Expected use

Out of the 114 references, 14% did not make any kind of reference to a possible use of the EEV produced. There is no mention of a detailed analysis based on a previous study ("Documentation of use cases"). Less than 13% of the references analyse possible use of their results. The vast majority make only cursory references to the possible use of EEV (84 references or 73% of the corpus). We can notice that no study mentioned the possibility of using EEV neither as mean to monitor the state of the environment (Indicators) nor in a strategic way. The main uses considered are "Awareness-raising", "Environmental Management Criterion", "Trade-offs" and "Price Setting".
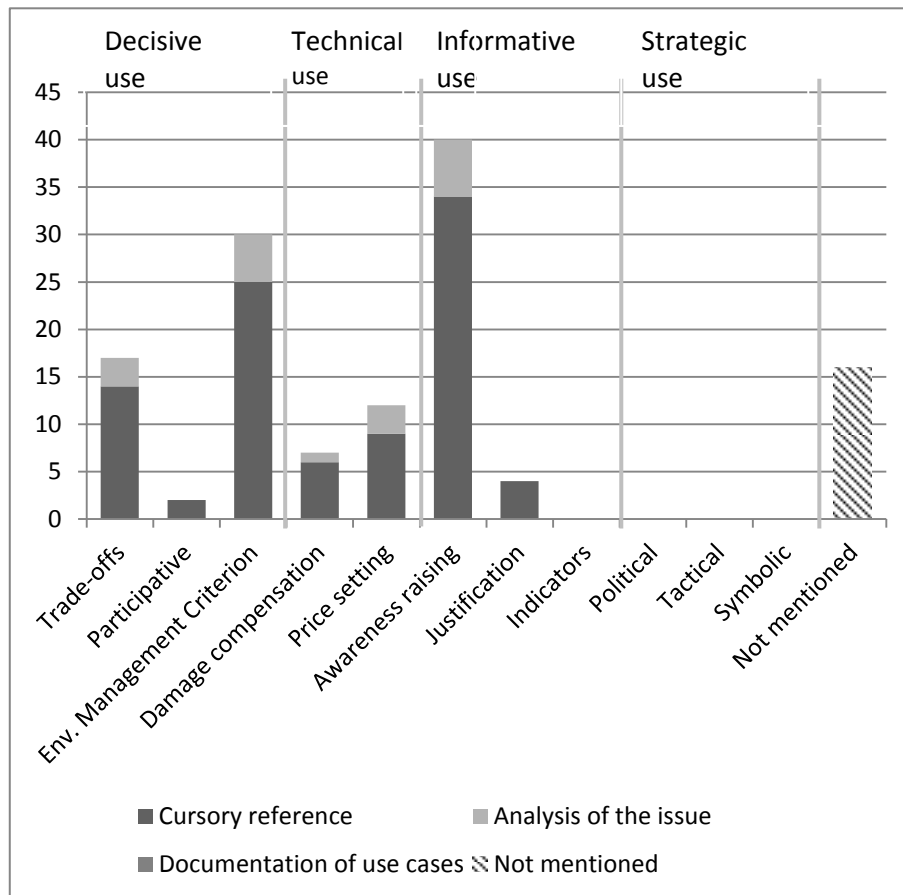

Fig. 1. Typology of EEV expected use and type of mention

To go into more details, we made separate analysis of academic and grey literature. Out of the 55 academic references, 11 did not mention any kind of expected use. In the 44 remaining references, there were 37 cursory references of an expected use. Seven references analysed the possible use of their results. The most prevalent categories are "Environmental management criterion" and "Awareness-raising". In the GL sub-corpus, only five references did not mention an expected use (out of 59). For the whole GL corpus, there were 47 cursory references to an expected use and seven analyses. The three main categories are "Awareness raising", 'Environmental management criterion' and "trade-offs".

3.2.2 Effective use

The vast majority of the corpus (107 out of 114 references) did not mention an effective use. If most of studies mention an expected use of their EEV results, only seven mention an effective use. Four made only cursory reference to the
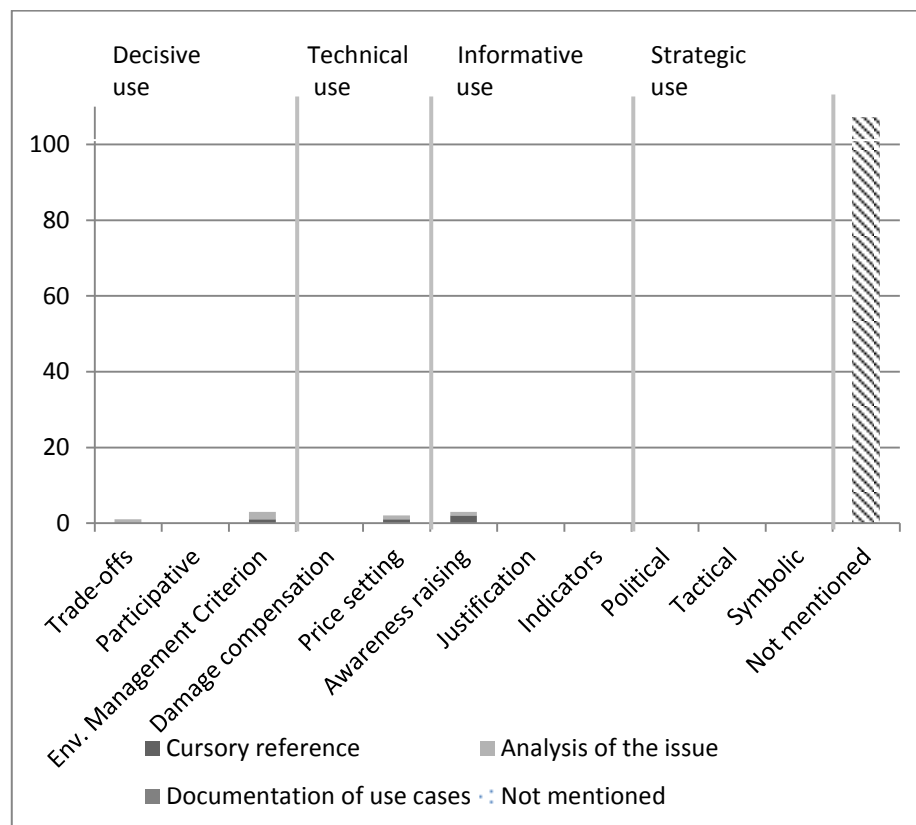

Fig. 2. Typology of EEV effective use and type of mention

effective use and three made an analysis. This is a really questioning result. The types of effective use mentioned are congruent with the four main type of expected use (see Fig. 1). Again, there is no documented case study.

In the GL sub-corpus, five studies mentioned an effective use, whereas only two peer reviewed references did so. In the AL, the two studies mentioning an effective use dealt with Environmental management criterion (one made a cursory reference and the other analysed the effective use). Regarding the GL, there were three studies mentioning briefly an effective use (two dealt with awareness raising and one with price setting). The two last studies made an analysis of the effective use. One dealt with EEV use for trade-offs. The other one analysed three types of use: "Environmental management criterion", "Price setting" and "Awareness-raising".

3.2 The End User

The results are summarised in Fig. 3. One third of the references did not mentioned an end user at all. Half of the references did mention a possible end user, without clearly naming it. Only 16% (18 out of 114) of the references did clearly mention the end user, which is, most of the time, a government (a ministry, a department …).
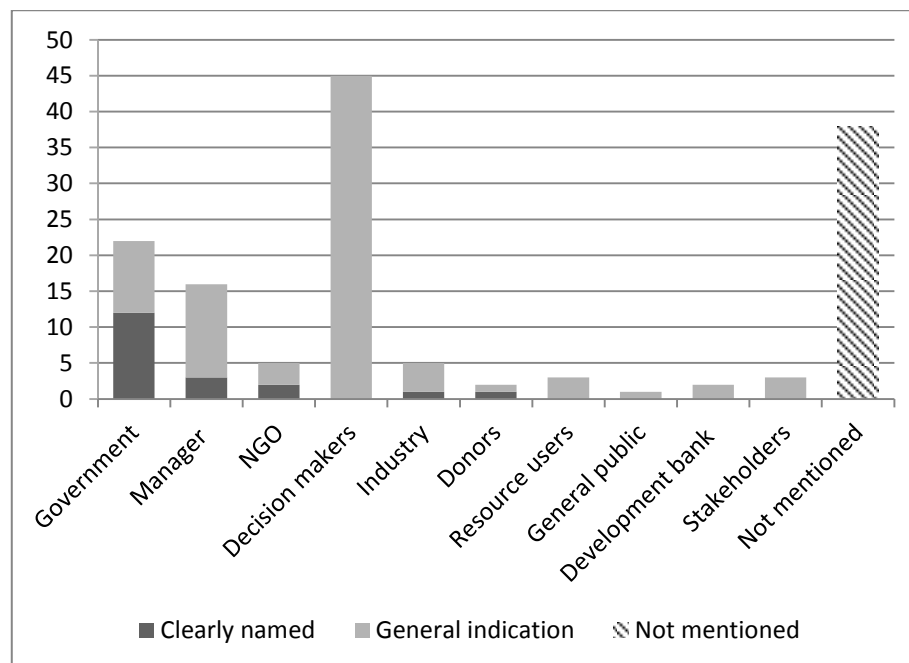

Fig. 3. Typology of end user mentioned and treatment in the literature.

We can notice that despite 45 references mentioned "Decision makers" as the end user, none gave more details. We can notice that very few studies have resource users and industries as target audience: EEV seems to be used at first by people responsible for designing public policies.

We examined in greater detail the 18 references clearly mentioning an end user. We studied the difference in the type of mention of end user according to the type of literature (AL *versus* GL). The results are summarised in Fig.4. When focusing on studies giving a general indication of the end user, there is no difference between academic and GL. But only four peer reviewed references clearly mentioned an end user, whereas 14 GL references did so.

Then we focused on the existence of a formal engagement between the authors of the study and the end user, when clearly mentioned. We wondered how many studies were parts of a formalised institutional framework. Fourteen studies did mention such an engagement. Out of those fourteen, three were AL and 11 GL. Two studies aimed at informing the implementation of marine and coastal strategy. Two were part of wider projects. Two were oriented toward management at a local level, two of these have developed economic instrument to support management. Two other are dealing with the implementation of a marine protected area. Finally one study dealt with the opportunity of installing cooling tower.

Out of the seven studies mentioning an effective use, five also clearly mentioned the end user and five are included in a formalised institutional
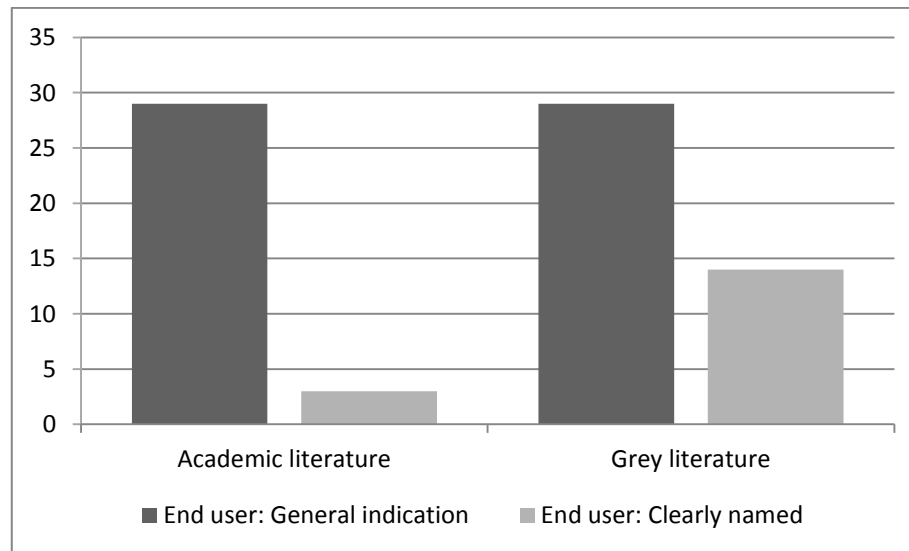

Fig. 4 Type of reference to the end user according to the type of literature

framework, with formal engagement with the end user. The set of data is not significant enough to support general statements, but the results suggest that the early identification as well as the engagement of end user are important conditions for the actual use of EEV in practice.

3.3. Links between the End User and the Affiliation of the Authors

We decided to go into more details and to combine data on the end user (when mentioned, either clearly or when a general indication was given) with the affiliation of the authors. By affiliation we mean the organisation they belong to. The main categories defined were: (i) Public research (including universities and public research institutes), (ii) Government related research (including ministries, departments and governmental agencies), (iii) Private research (including NGOs, think tank, foundations), and (iv) International research (including international organisations and programs).

Keys results are presented in Fig. 4. As there are often several authors for one study, the number of authors exceed the number of references reviewed. Scholars are the main provider of EEV studies, and their target audience is "Decision makers" and then "Government". Interestingly, some authors linked to governmental entities target "Decision makers" as an audience. Out of the seven studies mentioning an effective use, four were conducted by scholars and three by a mixed team (scholar and civil servant).
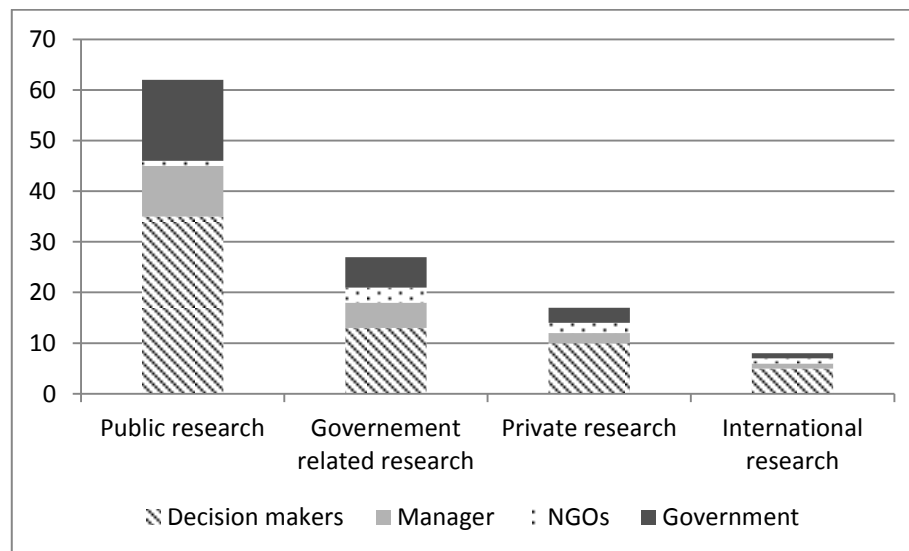

Fig. 5. Type of end user mentioned according to the authors affiliations, main results

4. Discussion

Despites results slightly different regarding the distribution of the EEV use, we came to the same general conclusion as Laurans et al. (2013). The results show the paucity of EEV studies addressing the issue of its use in the decision making process. In their article, Laurans et al. (2013) came up with several hypotheses to explain this gap in the literature. We will first briefly come back on those hypotheses. Then, we will discuss out results and explain how they provide some answers.

4.1 Some Hypotheses to Explain the Lack of Information Available

Stating that the peer reviewed literature rarely addressed the issue of the EEV, Laurans et al. (2013) have put forward two possible groups of explanations: (i) there may be a "possible bias in the selected literature" (p. 214) and (ii) EEV may not comply with expectation in practice.

4.1.1 A possible bias in the selected literature

Recognising that studying the peer-reviewed literature does not give the whole picture; Laurans et al. (2013) have put forward four hypotheses to explain this literature blindspot.

First, EEV application may be out of the scope of EEV researcher. In this case, EEV would be "more widely found in practice than peer-reviewed scientific literature indicates" (Laurans et al., 2013, p. 214). It is also probable that the "enlightenment" arising from EEV is hard to observe. Second, it is most probable that studying the use of EEV in decision-making is an emerging field that remains poorly addressed. Third, this kind of issue may be out of the scope of economists. This issue may be more in the field of humanities (sociology or anthropology for example). Fourth, they authors pointed out that EEV use "may not be a scientific question" (Laurans et al., 2013, p. 215).

4.1.2 The question of the relevance of EEV in practice

The other group of explanations deals with the relevance of EEV use in practice. They developed six hypotheses to explain why EEV use may be limited in practice.

First, the results of the EEV may not be robust enough to arouse interest of decision-makers. Second, EEV may fall short in practice due to an inadequacy between the needs of decision makers and the imprecision and incompleteness of EEV. Moreover, EEV may not provide relevant information to support decision-making. Indeed, it does not inform distributive issues. Third, the cost and time needed to conduct a comprehensive EEV may restrict its use. Fourth,

the scant use of EEV may derive from the lack of skill of decision makers in economics. Fifth, the "regulatory framework may not be conductive" to EEV (p.215). Several comparative studies between Europe and the USA explain the lag of Europe in term of EEV use by this reason. Sixth, EEV "by enhancing transparency, may hamper political strategies that require a certain opacity or ambiguity" (p. 215). The paucity use of EEV could be linked to the willing of certain decision makers to keep part of the decision process off records.

4.2 Bringing Some Answers

As we adopted a thematic approach, we have been able to explore both academic and grey literature. One hypothesis proposed by Laurans et al. (2013) was that GL might provide more information on the EEV use. Our preliminary results show that this is only partially true regarding the effective use of EEV.

4.2.1 The importance of the end user

By differentiating excepted and effective use, we showed that most of the studies mentioned an expected use. We can infer that the authors (who are mainly scholar) do care about the practical use of their findings or at least, they believe such results can be useful in practice. Yet, only seven reported on effective use.

We have also noted that most of the studies reporting an effective use of EEV shared two characteristics: they had a clearly defined end user and they were part of a formalised institutional framework. Conversely, the vast majority of the studies targeted "Decision makers", without mentioning further detail. "Decision makers" is a polymorphous notion, covering various possibilities. When targeting such an end user, studies may lack of precision and never reach interested end user. So we can add a hypothesis to the ones expressed by Laurans et al. (2013): EEV may remain unused due to insufficient or inadequate targeting of potential end users.

4.2.2 The differences between academic and grey literature

Information on the effective use on EEV is only slightly more frequent in the GL (5 references out of 59) than it is in the AL (2 out of 55). However, other interesting differences between academic and GL have emerged. First, more GL references mentioned clearly an end user, and by far. More GL studies are part of (i) a formal engagement with the end user and (ii) a formalised institutional framework. Those two characteristics seem really important to facilitate the use of EVV in decision making process.

As mentioned by Laurans et al. (2013) and Turner et al. (2003), one explanation of the scant use of EEV in decision making may be linked to the

inadequacy between the results of the EEV and the needs of decision makers. We can make the hypothesis that EEV studies developed outside a formalised institutional framework have few chances to meet the end users expectations. On the contrary, when part of such a framework, EEV studies can identify precisely the needs and thus have more chances to be use.

4.2.3 Benefit transfer and cost limitation of the use of EEV

Regarding the issue raised by Laurans et al. (2013) of the cost of EEV as an obstacle to a wider use, our records of the type of economic valuation used give some interesting information. Over the 114 references, benefit transfer is the most widely spread technic. Forty-two references mentioned using transfer of benefits as economic valuation technic: twenty-eight used benefit transfer as the sole economic valuation methods and 14 used it combined with other economic valuation methods. Benefits transfer has a major advantage which can explain its supremacy, despite methodological issues: it helps reducing the cost of the economic valuation.

Out of the seven references mentioning an effective use of EEV, six were based on benefit transfer. Four of these references were based on benefit transfers only. Two used both benefit transfers and other valuation technic: one was based on the travel cost method and the other one was based on contingent valuation method and also used market value. Only one study was based on contingent valuation method only. Two studies clearly stated limited lime and money to explain the use of benefit transfers method: "Given the limitations of time and budget, many of these global benefits had to be estimated by use of the benefits transfer approach" (Mohd-Shahwahid 2001, p.8).

If further results confirm that benefit transfer is the most widely used method and that it supports decision making, it would raise many questions. Given the methodological issues raised by benefit transfers method, it could be needed either to make other valuation technics more affordable, or to improve benefit transfers. As things stand, we can question the economic relevance of founding arbitrations on benefit transfer results. From a pragmatic perspective, one could assume that benefit transfer may frequently appear to be the easiest and less expensive method to implement when an EEV is required by end-users themselves.

4.2.4 Role of economists for analysing strategic uses of EEV

Thanks to previous research on the use of scientific information in the decision making process, we know that such information can be used in a strategic way. If we also take into account the case study analyses carried out by Gowan et al.(2006) and Laurans & Aoubid (2012), we can conclude that EEV are probably used in a strategic way. Yet, this kind of use is not

documented in our review. Literature reviews are unable to get the all picture and more research should be conducted on this topic.

As mentioned by several authors (Liu et al. 2010; Navrud 2001; Navrud & Pruckner 1997) the use of EEV (and especially of CBA) is getting an increasing importance in European policies and directives. Thus, it should be considered very problematic if, the issue of the use of EEV is not on the research agenda, as suggested by Laurans et al. (2013). Indeed, deep knowledge of what is at stake in the decision making process regarding the use of EEV is needed. Without such knowledge, it will not be possible to assess the way EEV are used: in a neutral or in a strategic way? And if not used at all, how the balance between environment and development is decided? With which means? And by who?

Thus, it seems that this question is a real important one. More researches are needed and economists have a key role to play in the emergence of this field. Of course, inputs and support from other discipline would provide significant perspectives. But EEV use remains a real issue for economists. Indeed, what is the point of developing tools, improving methodologies and performing applications if *in fine* EEV is not used or misused?

Moreover, it seems really important to care about the use of EEV, and especially the strategic uses, since European directives, such as the Water Framework Directive and the Marine Strategy Framework Directive have mentioned the use of CBA as a decision-support tool. Conducting deep *ex post* study is out of the scope of economists. But economists, as specialist of economic valuation, should follow up the implementation of such policies, in order to understand when, how and by whom EEV is used. Without the feedbacks from economists, it is highly likely that EEV remain poorly or even misused.

4.2.5 Limits and research perspectives

Of course, such a study is unable to capture the all story of the use of EEV in decision making. We do not pretend replacing other studies such as field investigation and qualitative case studies, which remain essential as the use of EEV in the decision making process is a complicated issue. Rather, we hope that highlighting this gap in the literature, will demonstrate how more studies are needed to address this complicated issue.

It is important to develop a more extensive scientific corpus dealing with this issue of the EEV use. Several axis of research can be roughly defined. First, it seems important to define who the interested end users are and what their needs are. Second, the place and role of EEV in the implementation of environmental public policy should be investigated more broadly. Third, *ex post* studies dealing with the use of economic tools could provide interesting information on past use of EEV.

5. Conclusions

EEV has emerged and boomed since the 1990s. Applications of EEV are now over manned, covering a wide range of ecosystems, species, area… One reason of this success lies in the belief of a better inclusion of environmental assets in development projects. EEV is widely recognised as a useful tool to support decision making. Yet, very few studies have focused on the practical use of EEV. The answers provided by researchers who have questioned this issue are highly interesting but remain fragmented. The actual use of EEV in the decision making process is still rarely addressed in academic literature, what may suggest that actual use also rarely happens in practice.

This study intended to go a step further in this emerging field. It consisted in a systematic review of academic and grey literature dealing with EEV of marine and coastal environment. Our results show that if most study reviewed mentioned an expected use of their results, only few cases mentioned an effective use. This result is in line with previous studies: the use of EEV is poorly documented in the literature. Our results bring new highlights on the role of the identification of the end user and the linkage to an institutional framework. Most of the studies mentioning an effective use shared those two characteristics. With respect to this, grey literature meets more frequently those characteristics than academic literature.

Deeper researches on the practical use of EEV are needed. It is important to understand how EEV studies have been used so far, if used. In particular, the issue of strategic use of EEV should be carefully scrutinised. EEV is increasingly adopted in regulatory frameworks in order to support sustainable decision. Several recent European directives require the use of economic assessment for their implementation with the aim of balancing environment and development, protection measures and associated costs. If EEV is actually unused or used in strategic ways which appear to remain undocumented at this stage, we have to wonder about the way decisions are really made and if they observe the alleged neutrality of economic valuation.

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