



Universiteit  
Leiden  
The Netherlands

## **The tension between nature conservation and economic valuation of ecosystem services**

Admiraal, J.F.

### **Citation**

Admiraal, J. F. (2016, December 1). *The tension between nature conservation and economic valuation of ecosystem services*. Retrieved from <https://hdl.handle.net/1887/44588>

Version: Not Applicable (or Unknown)

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/44588>

**Note:** To cite this publication please use the final published version (if applicable).

Cover Page



Universiteit Leiden



The handle <http://hdl.handle.net/1887/44588> holds various files of this Leiden University dissertation

**Author:** Admiraal, J.F.

**Title:** The tension between nature conservation and economic valuation of ecosystem services

**Issue Date:** 2016-12-01

## Chapter 2

# The polarization of opinion surrounding economic valuation of biodiversity

J.F. Admiraal<sup>1</sup>, P. Knights<sup>2</sup>, A. Beringer<sup>3</sup>, J. Hiedanpää<sup>4</sup>, E. Molinario<sup>5</sup>, F. Popa<sup>6</sup>, M. Prelovsek<sup>7</sup>, M. Scopelliti<sup>8</sup>, N. Soethe<sup>3</sup>, A. Wossink<sup>9</sup>

<sup>1</sup>Institute of Environmental Sciences CML, Leiden University, Einsteinweg 2, 2333 CC, Leiden

<sup>2</sup>Philosophy, School of Social Sciences, The University of Manchester, Oxford Road, Manchester, M13 9PL, United Kingdom

<sup>3</sup>Institute of Botany and Landscape Ecology - Environmental Ethics University of Greifswald, Soldmannstrasse 15, 17487 Greifswald, Germany

<sup>4</sup>Natural Resources Institute Finland, Itäinen Pitkäkatu 3, 20520, Finland

<sup>5</sup>Dipartimento di Psicologia dei Processi di Sviluppo e Socializzazione, Sapienza Università di Roma, Rome, Italy

<sup>6</sup>European Commission, DG Education and Culture, Rue de la Loi 200, B-1049 Brussels, Belgium

<sup>7</sup>Karst Research Institute ZRC SAZU Titov trg 2 SI-6230 Postojna, Slovenia

<sup>8</sup>Department of Human Studies, LUMSA University, Piazza delle Vaschette 101, 00193, Rome, Italy

<sup>9</sup>Economics, School of Social Sciences, The University of Manchester, Oxford Road, Manchester, M13 9PL, United Kingdom

*Submitted to Ecological Economics. Under review.*

## **Abstract**

Economic methods are increasingly used to express the value of ecosystems and biodiversity in monetary terms. The practice of monetary valuation is controversial and has been at the center of a wide ranging debate. In this paper we systematically examine the various different discourses about monetary valuation. We used Q methodology to clarify the discussions by identifying the underlying discourses behind the arguments. In Q methodology, respondents rank statements, and statistical analysis is used to ascertain which groups of statements cluster as discourses. In this study, we selected participants among economists and other relevant figures in the debate about the economic valuation of nature from seven EU Countries. The analysis showed four discourses: enthusiasm for economic valuation, value pluralism, social justice concerns and eco-deliberation. These results matter to policy making: by identifying the different discourses our results can improve environmental decision making by providing information that can help ensure all potential values of biodiversity are given a voice, and thus that the decision making process is procedurally just.

## **Keywords**

Economic valuation; biodiversity; ecosystems; ecosystem services; Q methodology; total economic value

## 1. Introduction

Economic valuation of ecosystems and biodiversity plays an increasingly prominent role in policy making as a means to promote biodiversity conservation (Vatn, 2010; Pirard, 2012). In recent years, environmental accounting and valuation of ecosystem services have been widely institutionalized at an international level, for example in the global initiative TEEB (2013) and the World Bank's WAVES partnership (WAVES, 2015). This institutionalization of economic valuation has occurred in an effort to support biodiversity conservation, but has also provoked criticism and debate about its validity and desirability.

Economic valuation of biodiversity in its most elementary form and function is a support tool in decision making which expresses alternative land uses in monetary values for comparison. Such an assessment is said to determine the Total Economic Value (TEV) of an ecosystem, which is a monetary figure representing the total net value of the change in the flow of ecosystem services to society occasioned by a marginal change to the conditions of that ecosystem (Dziegielewska, 2009; Bateman et al., 2010). Economic valuation of biodiversity can be done by either creating actual markets or by using valuation methods to determine 'shadow' prices for environmental goods that biodiversity produces (Nunes and Van den Bergh, 2001). TEV has advantages as a concept because it answers the need to understand the economic consequences of environmental management and facilitates managers in taking stock of trends and creating an inventory of actors and relationships for stakeholder analyses. In addition, the exercise has value in demonstrating to decision makers and publics how valuable the natural world is (Constanza et al., 1997; Bockstael et al., 2000), and the information about the socio-economic values of ecosystems has helped to develop economic incentives to preserve biodiversity, such as in Payment for Ecosystem Services schemes.

Some have argued that it remains unclear whether using economic valuation of biodiversity will have positive long-term effects on biodiversity conservation (Redford and Adams, 2009; Bartkowski et al., 2015) and there is growing empirical evidence of undesirable consequences such as a crowding out of intrinsic motivation to engage in conservation efforts (Gomez-Baggethun and Ruiz-Perez, 2011; Rode et al, 2015). In this context of uncertainty, a debate about economic valuation of biodiversity has arisen in the past fifteen years and spread out to involve a broad range of research fields, such as environmental and ecological economics (Nijkamp et al., 2008), environmental ethics (Knights et al., 2014), environmental psychology (Fuller et al., 2007) and conservation biology (Fisher and Young, 2007). As each field offers opinions on economic valuation from a specific perspective, the resulting richness of contestable issues surrounding the topic complicates how the method is best put to use in biodiversity conservation and even whether it should be used at all.

Perhaps the most important realization coming out of the debate is that the use of economic valuation of ecosystem services and biodiversity not only hinges on its professed stimulation of environmental protection, but also on the social and ethical consequences of using this approach (McCauley, 2006; Adams, 2014). This makes the debate surrounding economic valuation of biodiversity interdisciplinary,

straddling the boundary between science and society. The strongest critiques caution that not only may economic valuation of biodiversity lead to biodiversity loss (Vatn, 2010), but it may also have negative effects on equitable access to livelihood and resources with greater costs and environmental problems falling on the poor (Farley et al., 2015), on sustainable resource use (Common and Perrings, 1992; Admiraal et al., 2013) and may ignore what people value, personally and socially, in ecosystems (Nyborg, 2000; Hare, 2007).

The ethical implications are for example visible in protest bids in economic valuation surveys (Raz, 1986; Burgess et al., 1995; Irwin, 2001), where participants refuse to put even a hypothetical price on natural places. Through these bids, participants express that monetary valuation is a social act with social meanings and associations, and that monetary values are not commensurable with these social values (O'Neill and Holland, 1999). Similarly, the adoption of policies such as biodiversity offsetting – whereby losses on development sites are 'offset' by habitat creation or restoration elsewhere – are hotly debated because they treat ecosystems as being interchangeable (Hannis and Sullivan, 2012), thus ignoring the role of natural, cultural and personal history in the human relationship to nature (O'Neill, 2007). In particular, environmental psychology research has consistently shown that the protection of nature deeply depends on people's values, beliefs, and feelings about the natural environment (Kals et al., 1999; Lockwood, 1999; Mayer and Frantz, 2004; Nisbet et al., 2009; Gosling and Williams, 2010).

Given these critiques, the increased use of economic incentives in recent years to stimulate biodiversity conservation raises the urgency to engage with these criticisms of the valuation approach. Deeper considerations have been published on the best use of economic valuation and its place as a tool in decision making processes (Laurila-Pant et al., 2015). Some authors clarify that economic valuation has specific roles to perform in broader policy making frameworks and that its usefulness is dependent on scale (Costanza et al., 1997) and on particular situations when specific conditions are fulfilled (Fisher et al., 2008; Turner, 2010). Hybrid valuation techniques, such as deliberative monetary valuation and participatory multi-criteria analysis, hold promise for systematic and integrated treatment of utilitarian, ethical and aesthetic considerations (Munda, 2004; Fish et al., 2011). Ethical values such as intrinsic and sustainability values may be expressed in such procedures (Miller, 1992). Frameworks of ecological risk management enable sustainability values to be accommodated alongside monetary valuation (Figge, 2004).

The debate about economic valuation thus exhibits a layered complexity, which impedes society from engaging with the critiques. It is even suggested that the critiques themselves further complicate a social transformation towards a sustainable society (Melathopoulos and Stoner, 2015). Some critiques focus solely on the greater social questions of whether marketization helps or hurts environmental protection and people (O'Neill, 2007). Others focus on the specific methods employed to determine monetary values of ecosystem services and whether those methods are appropriate or should perhaps be adapted (Burgess et al., 1995; Christie et al., 2006). Still others question whether economic valuation answers to the original goal of motivating people to protect biodiversity. There are no clear answers to whether the methods of the approach simply need adjustments, or whether the whole approach is fundamentally helpful or destructive.

Reducing the complexity of the debate will help policy makers in taking criticisms of economic valuation into account. This study seeks to provide insights into the opinions of EU economic experts and practitioners, as well as critics, on economic valuation relative to alternative or complementary valuation methods. We have used Q methodology, a method particularly suited to studying those issues around which there is much debate and contestation. Through this method, we aim to find shared viewpoints, named 'discourses', that transect the layered complexity of economic valuation support and criticism by gathering statements from different perspectives and levels into coherent viewpoints. Following the definition of Dryzek (2005), a discourse can be seen as *'a shared way of apprehending the world. [...] Each discourse rests on assumptions, judgements, and contentions that provide the basic terms for analysis, debates, agreements, and disagreements'*. Studying the discourses allows us to map differences and consensus areas in expert opinions, which is a necessary step towards subsequent improvement of economic tools and their appropriate application in environmental decision making.

## **2. Methods**

Q methodology has been used before to investigate a diverse range of issues within environmental policy (Barry and Proops, 1999; Addams and Proops, 2000), including forest management (Steelman and Maguire, 1999); global climate change (Lorenzoni et al., 2007); value plurality among conservation professionals (Sandbrook et al., 2011); competing visions among ecologists (Neff, 2011); shifting environmental perspectives among farmers (Davies and Hodge, 2012); if conservation should involve private land (Kamal et al., 2014); and landscape aspirations (Milcu et al., 2014).

In Q methodology, first a set of statements is prepared, then participants sort the statements along a continuum of preference between strong agreement and strong disagreement and the sorting data is subjected to factor analysis. An initial full set of 148 statements (the 'concourse') was collected through a review of the scientific literature, as well as blogs and journalism, to ensure a full coverage of the statements on the topic. For the selection of a final representative set of statements, a matrix was used that arranged the statements into themes (Table 1). The Q set, the final 36 statements that were used for the study, is given as part of Table 3. To further ensure content validity, the statements were reviewed by domain experts and tested in two pilot studies. For considerations of time and clarity for the respondents, the statements were made as concise as possible.

	<b>Environmental valuation methods and their relations to the causes of and potential solutions to environmental problems</b>	<b>Environmental valuation methods: strengths and weaknesses</b>	<b>Environmental valuation methods and motivation: ethical and motivational concerns, and institutional capacity</b>
<b>Broadly supportive of economic valuation</b>	REASONS WHY EV is fine and helps solve environmental problems Statements: 4	REASONS WHY the EV tool as such is a good way to value nature Statements: 2	REASONS WHY EV motivates people to use it Statements: 4
	REASONS WHY EV is flawed but could still be a solution with the right changes implemented Statements: 4	REASONS WHY the EV tool as such is flawed but could still be good with the right changes implemented Statements: 1	REASONS WHY alternative methods are not more motivating than EV Statements: 2
<b>Broadly critical of economic valuation</b>	REASONS WHY EV in general is just making things worse Statements: 5	REASONS WHY EV is in principle NOT a good tool for valuation Statements: 4	REASONS WHY EV does not motivate people Statements: 4
	REASONS WHY other decision making processes are better Statements: 3	REASONS WHY certain other tools might be better in a technical sense Statements: 2	REASONS WHY other tools are more motivating for people Statements: 1

**Table 1: Matrix used to select statements for the Q set.** The number of statements selected for each cell in the matrix is mentioned. The statements are not evenly spread over the matrix, because the arguments in the total discourse on which the Q set is based do not refer evenly to all subjects. The uneven spread is therefore a more precise reflection of the discourse.

Participants were selected from the following four categories to gather the full range of opinions on the subject: (i) environmental, behavioral and ecological economists based in universities; (ii) economists based in organizations, including governmental agencies, other than universities; (iii) representatives from NGOs and other groups critical of the economic valuation of nature; and (iv) any other individuals prominently involved in the economic valuation of nature debate (e.g. policy makers, environmental philosophers, conservation biologists). Based on these selection criteria, collaborating researchers selected and contacted possible participants at a national level in seven EU countries.

In total, 40 respondents from seven EU countries and all four categories participated in the study (Table 2). The respondents received an invitation to participate by email. Once accepted, a link was sent



25	Netherlands	University	0,3122	0,1898	0,5655	0,4102
26	Netherlands	University	0,7481X	-0,1638	-0,0420	0,0470
27	Netherlands	University	0,8138X	-0,1493	-0,2127	-0,0792
28	Netherlands	University	0,0034	0,1450	-0,0916	0,0039
29	Slovenia	NGO	-0,6365	0,3229	0,3275	-0,0264
30	Slovenia	NGO	0,1877	-0,1228	0,0433	0,1311
31	Slovenia	non-univ.	0,7889X	-0,1086	-0,3435	0,0988
32	Slovenia	University	0,0622	0,0308	0,1703	0,5267
33	UK	NGO	-0,5264	0,5142	0,3700	-0,0316
34	UK	NGO	-0,2717	0,6843X	0,1137	-0,0613
35	UK	NGO	-0,4512	0,3628	0,6857X	-0,0011
36	UK	non-univ.	0,7524X	-0,0412	0,1943	-0,3146
37	UK	non-univ.	0,8424X	-0,2448	-0,0767	0,0573
38	UK	non-univ.	0,7733X	-0,2564	-0,0844	0,1722
39	UK	non-univ.	0,8176X	-0,1765	-0,0387	-0,1466
40	UK	University	0,8468X	-0,1936	-0,0097	-0,0781
% Explained variance			29	14	9	6

**Table 2. Matrix of factor loadings.** Sorts flagged with an X indicate defining sorts for the factor.

Q methodology aims to find the main ordered patterns in opinions, commonly referred to as ‘discourses’. Discourses are identified via factor analysis. Each respondent’s rank-ordered sort of statements is transformed into an array of numerical data according to the seven-point scale, and is then inter-correlated with the arrays of all the others. The correlation matrix is then subjected to factor analysis to obtain correlated groupings of statements. A free software package (PQMethod, 2014) was used for the factor analysis. The resultant factor analysis is then rotated using the varimax rotation in the program to extract factors that explain the most variance in the data.

A benefit of Q methodology is that statistically meaningful results are obtained with relatively low numbers of respondents, regarding the discourses to be found in a debate (Barry and Proops, 1999). The factor analysis focuses on how statements rate against each other, instead of how individuals differ in their sorts. Therefore, each sort of a respondent generates a large amount of information because each statement is implicitly ranked against every other statement by a respondent in a Q sort, meaning that in our setup each placing of a statement in the grid (Fig. 1) implies 35 judgements against the other statements in the set. A second benefit of Q methodology is that the formation of discourses is largely driven by the ideas and responses of the participants and actors in the debate, while the role for the researcher in this formation is relatively small. The original statements derive from the actors in the debate themselves and those statements are then sorted by participants who too are actors in the debate. Consequentially, the discourses identified most closely reflect the debate.

The formation of discourses follows two steps of interpretation in our study. First, factor analysis identifies aggregations of statements from the Q set, which are then interpreted as discourses. Second, to further refine the discourse descriptions while keeping them as respondent-driven as possible, the respondents were asked to explain their choices for the three statements they most agreed with and the

three they least agreed with. Each respondent each received a factor loading score for the identified factors, which is a correlation coefficient between the sorting of the respondent and the factor and informs us of how much the sorting of each respondent defines the factor (table 2). Defining sorts are identified by PQMethod using two criteria: (1) the factor loading for that particular factor and that particular respondent must explain at least half of the total variance that is explained by all the factors together for that particular respondent, and (2) the loading must be significant at  $p < .05$ . The respondents with defining sorts provide us with further information for describing the discourses through their explanations of their sorting results.

### 3. Results

The recommended procedure for analyzing the Q-sort data is to use the eigenvalues of factors to select salient factors (eigenvalue  $>1$ ). An eigenvalue is a factor's relative contribution to explaining the total variance in the data-set. The procedure generated eight factors with eigenvalues  $>1$ . Factors 1 and 2 have high eigenvalues of 13.94 and 7.52 respectively, a consequence of having high percentages of variance that these two factors account for in the data. Using the criterion of cumulative explained variance, factors 1 and 2 were judged highly fit for selection, with factors 3 and 4 inhabiting a boundary area of decreasing importance for explaining variance in the data. It was possible however to make working descriptions of factors 3 and 4 and we provided the descriptions for a fuller treatment of data interpretation. Factors 5 to 8 were left out of the discussion because of low explained variance, which in addition caused many statements to receive the same factor scores with the consequence that no sensible interpretation could be made of them as discourses.

#### 3.1 Identified discourses

Describing the factors as discourses allows us to explore the patterns of opinions among experts. The following descriptions of the factors are based on the statements that were scored as significant for the factor. For the four factors, z-scores of the statements are generated that indicate scores of agreement within the factors (Table 3). A z-score is a standardized score, which eases cross-factor comparison. This allows us to compare the relevance of each statement for each factor, despite the fact that the factors differ in the number of defining sorts (Table 2). The basis of our descriptions of the factor is the significance of the scores of the statements for the factor. Significance in this instance is not linked to how high or low the z-score is, but whether the z-score itself is a significant rating for the factor. For factors 1 to 3, respondent comments provide a deeper nuance to the discourse descriptions.

No	Q set	F1	F2	F3	F4
1	The economic approach to nature fails to respect that people value the particular irreplaceable history of the places they know.	-1,04	1,56**	-0,22	-0,4
2	A better understanding of the total economic value of ecosystem services will lead to more effective biodiversity protection.	1,2**	- 1,53**	-0,61	0,23
3	The economic approach to nature is dangerous because it assumes that no natural place is valued as unique or irreplaceable.	-1,79	0*	-0,82*	-1,77

4	The goals of sustainability and equity are not served by economic valuation methods.	- 1,24**	0,86**	-0,15	-0,23
5	Economic valuations highlight the importance of ecosystems for human well-being.	1,61**	-0,08	-1,5	-0,8
6	A weakness of economic valuations of ecosystems is that they do not provide an indication of the ability of the ecosystem to provide services into the future.	-0,89	-0,59	-0,08	1,77**
7	If the environment is brought into a market system, environmental harms will fall most severely upon the poor.	-0,78	-0,3	1,5**	-0,8
8	A single, monetary measure of value is needed to weigh the value of the environment against other societal goals.	-0,25*	-2,23	-1,73	-0,97
9	We can still make rational decisions about the environment even without translating all its values to money.	0,56	1,01	2,03**	0
10	Environmental problems can be created not by the absence of markets but by the expansion of market institutions into the environmental domain.	- 1,41**	-0,35	0,84*	-0,12
11	Placing an economic value on 'free' environmental goods will help justify their protection.	1,27*	0,43	- 1,42**	0,4
12	No single unit of measurement, such as money, can capture all the distinct dimensions of environmental values.	0,81	2,13**	0,46	0,86
13	Fairer environmental decision making is achieved by open public debate, not economic valuation.	- 0,56**	1,21	0,52	0,69
14	Decision makers should have the conflicting values involved in environmental problems made clear to them, rather than having them reduced to a single monetary figure.	0,53*	1,46	- 0,45**	1,26
15	Economic valuation methods have been applied convincingly to many components of biodiversity and ecosystem services.	0,89	-0,98	-0,38	0,29
16	Introducing economic values for changes to biodiversity and ecosystem services will support better policy decisions about land use.	1,31	-0,37	0,07	1,49
17	Economists should include ecological theories in their models so they can better analyze trade-offs between ecosystem sustainability and economic growth.	1,09	0*	1,72	1,09
18	Even though there are still gaps in scientific knowledge about ecosystems, we can still build appropriate scenarios upon which to base the economic valuation.	0,87	-1,2**	-0,31	0,52
19	Putting a monetary value on nature demotivates people to protect it because it treats biodiversity as a commodity to be exploited.	-1,34	0,47	0,76	-0,69
20	Economic valuation of nature is necessary to be realistic and engage in the decision making process.	0,5*	-1,53	-1,73	-0,29*
21	A major cause of environmental problems is the failure of the market to reflect the scarcity of ecosystem services in prices.	1,2**	0,2**	-0,76	-1,26
22	Bringing the environment into the market system will help solve environmental problems.	0,59*	-1,21	-1,51	-0,17*
23	Since people feel that they have an obligation to hand on ecosystems to future generations, the economic approach fails to understand that to offer money for them is an act of bribery and to accept money for them is an act of	-1,33*	0,39*	-0,37*	-2,06*

	betrayal.				
24	Environmental decisions should be guided by debate amongst different interested parties in which each must state their reasons and allow others to challenge them.	-0,11	0,61**	-0,37	1,66**
25	Quantifying the financial benefits of ecosystems is key to accessing private funding and generating income for protected areas.	0,14	-1,96*	-1,2*	0,12
26	Clarity about the economic benefits of maintaining ecosystem services could increase political support for protection.	0,89	0,08	-0,53	1,09
27	Monetary payment for environmental action can undermine people's sense of duty as a citizen and therefore result in poorer environmental outcomes.	-0,75*	0,11	-0,14	0,57
28	Economic valuation that is sophisticated enough to take account of the enormous complexity of ecosystems will be too complicated to be used in practice.	-0,46*	0,08	0,53	1,2
29	Pricing biodiversity and incorporating that price into the cost of goods and services creates an economic incentive for its protection.	0,79*	0,1	0,14	0
30	A decision making process that recognizes the multiple values of nature rather than reducing them to a monetary value can reveal the differences between and the potential consensus among interested parties.	0,01	1,28	0,89	0,57
31	Economic valuation leads to maximizing the current value of an ecosystem at the expense of the future.	-1,3*	-0,62	0,83**	-0,4
32	Damage to the environment needs to be reflected in the prices of market goods so that people cease to think of it as being 'free'.	1,05**	0,05	-0,01	-1,09*
33	A participatory approach can lead to better decisions and more commitment among interested parties than economic valuation because it is more democratic.	-0,49	0,67*	0	-0,86
34	The costing and sale of nature represents another transfer of power to corporations and the very rich.	-1,55	-0,09**	1,36*	-1,49
35	Ecosystems and biodiversity are valued by people in a different way to ordinary goods they buy in the market, so we should use a different non-monetary language to value them.	-0,66**	0,91	1,43	0,97
36	Deliberative alternatives to economic valuation can be dominated by those who have the loudest voice.	0,63	-0,58*	1,21	-1,37*

**Table 3. Distinguishing statements per factor.** Asterisk (\*) indicates significance at P < .05. Double asterisk (\*\*) Indicates Significance at P < .01.

### 3.1.1 Factor 1: *Enthusiasm for economic valuation of ecosystems and biodiversity.*

The discourse of enthusiasm for economic valuation of ecosystems and biodiversity is the most prominent in the data. It claims that a better understanding of the TEV of ecosystems will justify and lead to more effective protection and highlights the importance of ecosystems for human well-being. Economic valuation is also claimed to be necessary to be realistic and to engage in the decision making process and that a market system will help solve environmental problems. Furthermore, a major cause of environmental problems is the failure of the market to reflect the scarcity of ecosystem services in prices and that damage to the environment needs to be reflected in the prices of market goods. This

incorporation of damage into the cost of goods and services creates an economic incentive for environmental protection. However, decision makers should also have the conflicting values involved in environmental problems made clear to them, rather than having them reduced to a single monetary figure.

The discourse also claims that certain critiques do not apply to economic valuation. It is not the case that environmental problems are created by the expansion of market institutions into the environmental domain; nor that to offer money for environmental goods is an act of bribery and to accept money for them is an act of betrayal, and therefore a different non-monetary language to value them is not a necessity; and it claims that monetary valuation neither undermines people's sense of duty as a citizen, nor maximizes the current value of an ecosystem at the expense of the future.

The replies from the respondents whose sorting matched the discourse provide nuance and further insight into the above description based on the Q set statements. These respondents propounded the strengths of economic valuation, arguing that economic valuation has an important role to play and that a good understanding of it would probably lead to better decisions by clarifying the constraints and trade-offs apparent while making it more difficult for strong arguments for nature conservation to be ignored. It also aids in our understanding of the linked reality of the human economy and the natural world. These respondents also defended economic valuation from the criticisms implicit in many of the Q set statements. For example, the criticism that economic valuation does not account for the future sustainability of ecosystems was rebutted, with one respondent noting that economic valuation often happens in projections or scenarios that include concerns of sustainability and future service provision. The motivations of environmental economists were defended from criticism, with the claim that such valuations are performed by economists and policy makers whose motivations do not necessarily include a commodification of nature. Hence, criticisms of valuation that focus on a lack of values and unwanted motivations are unreasonable. Further, these techniques are not claimed to be a panacea and should be supplemented with other assessments. All matching respondents explained that the final monetary figure produced by EV is not necessarily the most important addition to the decision making process; it's rather the thinking, debate and revelations of the values and relationships at stake that the process of producing this monetary figure involves.

### 3.1.2 Factor 2: *Value pluralism*.

The value pluralism discourse claims that no single unit of measurement, such as money, can capture all the distinct dimensions of environmental values; that economic valuation fails to respect that people value the particular irreplaceable history of the places they know and is dangerous because it assumes that no natural place is valued as unique or irreplaceable; that since people feel that they have an obligation to hand on ecosystems to future generations, to offer money for them is an act of bribery and to accept money for them is an act of betrayal; and that the goals of sustainability and equity are not served by economic valuation methods. In contrast, a participatory decision making approach can lead to better decisions and more commitment among interested parties than economic valuation because it is

more democratic. Furthermore, environmental decisions should be guided by debate amongst different interested parties in which each must state their reasons and allow others to challenge them.

The value pluralism discourse claims that it is not the case that quantifying the financial benefits of ecosystems is key to accessing private funding and generating income for protected areas; and neither is it the case that a better understanding of the TEV of ecosystems will lead to more effective biodiversity protection. There are, rather, no appropriate scenarios upon which to base economic valuation.

Respondents agreeing the most with this discourse made further comments on the relationships people have with nature, noting that this relationship is neither a service, nor a commodity, and that monetary expressions are meaningless and inappropriate as descriptions of such relationships. The essence of the value pluralism discourse is summed up in the following comment from one respondent: 'Neither environmental nor social values can be meaningfully translated into money – and often they can't be weighed against each other either. There are many dimensions involved, not just one'. Human-nature relationships also vary in time and space for different human populations, and this variation and uncertainty about future values are not included in monetary valuation. In addition, biodiversity is a public good and should be valued and distributed as such.

### 3.1.3 Factor 3: *Social justice concerns.*

The third most salient discourse is one of social justice. The social justice concerns are mostly focused on the equity aspects related to the economic valuation of nature. This discourse claims that if the environment is brought into a market system, environmental harms will fall most severely upon the poor; the costing and sale of nature represents a transfer of power from poor to rich; environmental problems are created by the expansion of market institutions into the environmental domain; and economic valuation leads to maximizing the current value of an ecosystem at the expense of the future. It also claims that rational decisions about the environment are possible without translating all its values to money.

This discourse claims that placing an economic value on 'free' environmental goods does not necessarily help to justify their protection and that economic valuation is not central to accessing private funding and generating income for protected areas. It follows that this social justice discourse has similarities with the *value pluralism* discourse, but is less engaged with capturing all environmental values. According to this discourse it does not hold, for instance, that the economic approach to nature is dangerous because it may ignore the uniqueness or irreplaceability of natural places.

Respondents most closely agreeing with this score note that economic valuation of the environment is a moral issue, specifically because it involves commodification and enclosure of public goods that is a profit-creating process, which transfers access to and control of those resources socially upwards. In addition, respondents noted that the idea that rational decision making equals economic decision making should be resisted and likewise the supposed commensurability of values in economic valuation.

However, standardized indicators for health and biodiversity performance may help in the decision making process.

#### 3.1.4 Factor 4: *Eco-deliberation*

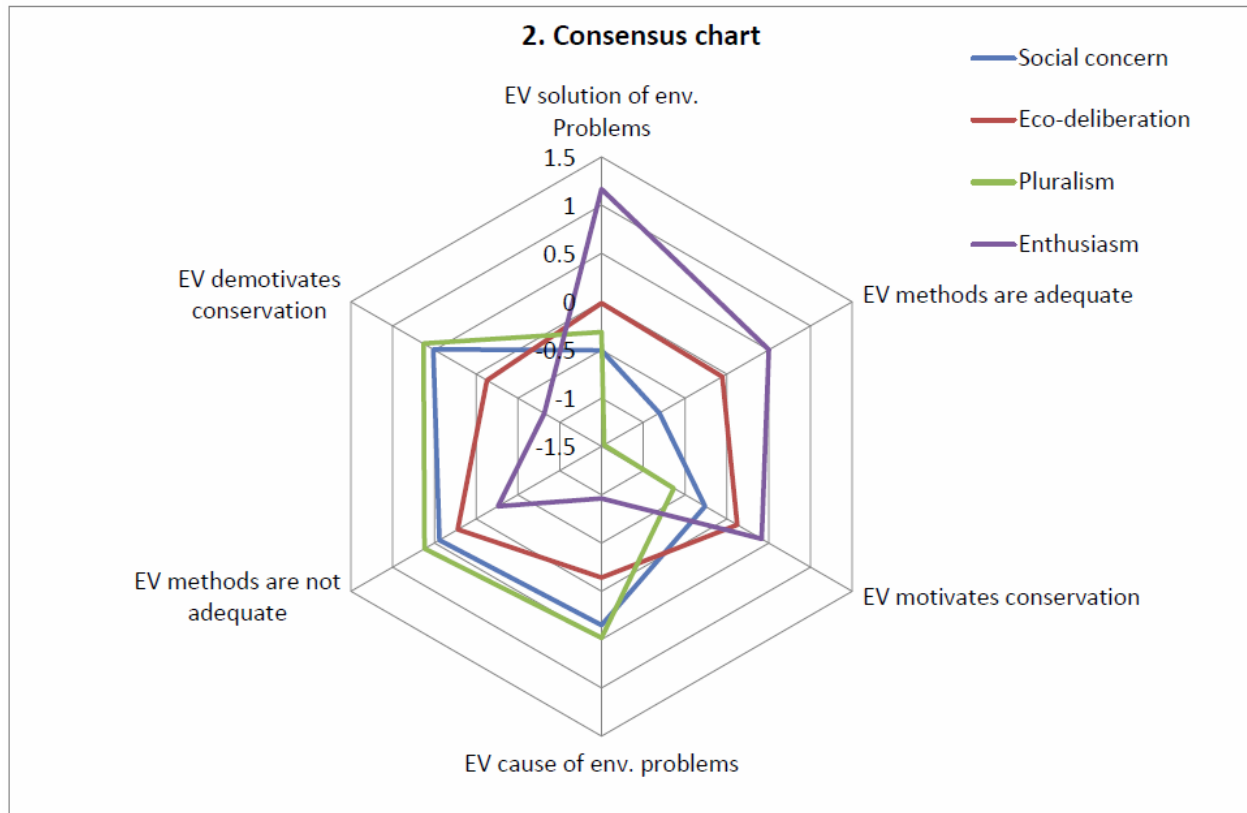
The fourth discourse is less visible in the data than the ones mentioned above but distinct enough for recognition. The eco-deliberation discourse claims that economic valuation of biodiversity has weaknesses. For instance, economic valuations of ecosystems do not provide an indication of the ability of the ecosystem to provide services into the future. Also, environmental decisions should ideally be guided by debate amongst different interested parties in which each must state their reasons and allow others to challenge them. There is no concern that such debates are dominated by those who have the loudest voice.

The eco-deliberation discourse also claims that it is not the case that economic valuations betray unrecognized values. The approach of payment for ecosystem services is not, according to this discourse, an act of bribery to hand over unique places, or a betrayal of future generations. But that does not mean either that economic valuation is the sole answer to solve environmental problems. Bringing the environment into the market system may not necessarily help to solve environmental problems, and is not necessary to be realistic and to engage in the decision making process.

### 3.2 Consensus and conflict between group preferences

A further exploration of the relative agreements among the discourses about economic valuation allows us to identify areas of consensus and conflict between the discourses. The Q set of 36 statements highlight different themes related to the economic valuation of ecosystems and biodiversity. In selecting the Q set, we created six groups of statements, represented by the rows and columns in Table 1. Statements about environmental valuation methods may refer to their relations to the causes of environmental problems and potential solutions; or to their strengths and weaknesses; or to ethical and motivational concerns, and institutional capacity. The statements are also either broadly supportive or broadly critical of economic valuation with regard to these themes.

Areas of consensus and conflict among the discourses about these themes are shown in Figure 2. The greatest consensus among the discourses can be found on the topic of weaknesses of economic valuation methods — all discourses agree that these exist. The greatest conflict can be found on the topic of causes and solutions of environmental problems, where the *enthusiasm* discourse supports to a far greater extent the notion that economic valuation offers one kind of solution to environmental problems, while the other discourses take a more sceptical position. The *value pluralism* and *social justice concerns* discourses are largely in agreement. The differences between the two can be found in the scores of statements within the themes. The *eco-deliberation* discourse straddles the other discourses as an intermediate that agrees with some statements upheld by the *enthusiasm* discourse while also sharing the concerns of *value pluralism* and *social justice concerns*.



**Figure 2:** Areas of consensus and conflict between the discourses. For six themes in the Q set that form the columns and rows of the matrix in Table 1, the discourses are ranked on their averaged z-scores of the statements that are part of each theme.

#### 4. Discussion

This paper has identified the most salient discourses concerning economic valuation of biodiversity and ecosystems. As the discourses show, the same arguments may be marshalled for different collections of ideas. The four discourses can be used to show how individuals or groups align themselves to a certain extent with different sets of ideas and arguments.

The sequence of salience of the four identified discourses illustrates a polarization of opinions. Surprisingly, only one discourse is in clear agreement with economic valuation of ecosystems and biodiversity. The three discourses besides *enthusiasm* express different forms of disagreement with economic valuation. This shows that economic valuation is a salient approach through the *enthusiasm* discourse, but also that disagreements about the virtues of such methods are strongly expressed in the debate and that these disagreements take shape as discourses around different topics. The two discourses that are most salient in the data— the *enthusiasm* and *value pluralism* discourses — have very few points of consensus among the contested issues surrounding the economic valuation of ecosystems and biodiversity (Figure 2). With the *social justice concerns* discourse largely overlapping with *value pluralism* and the *eco-deliberation* discourse weakly expressed in the dataset, a polarization in opinions appears in which *enthusiasm* forms one extreme and *value pluralism* and *social justice concerns*

the other extreme. This finding of the polarization of opinion regarding the monetary valuation of nature is in accordance with Stevenson's (2015) finding in her own Q study of international debates about sustainable economic development. Her factor *statist progressivism* contains claims similar to those of our *enthusiasm* discourse, such as although caution should be exercised regarding commoditizing nature and opening it up to trade, we should not assume that pricing nature is inherently dangerous. In contrast, her factor *radical transformationism* contains claims similar to our *value pluralism* and *social justice concerns* discourses, such as that pricing nature is dangerous insofar as it 'leads to the commodification of the natural world and legitimizes the privatization of essential common resources'.

It should be kept in mind that the discourses identified here are an outcome of a study with limits in scope and provides a snapshot in time of the arena of debate. The identification of discourses is also constrained by the choice of statements for the Q set. Various statements used in this Q set rest on assumptions and convictions that may change through time by additional future empirical research into the ecological and social consequences, and motivational strengths or weaknesses, of economic valuation of biodiversity. The ongoing discussion on the topic shows that the scope, the arguments and the implications of economic valuation are not set but are still in development and subject of research. Furthermore, as debates evolve over time, it may be instructive to periodically review the discourses that are assumed to exist on sensitive topics, and to trace whether new sets of concerns appear in time and old ones disappear (Davies and Hodge, 2012). Nevertheless, the discourses identified here fulfill a role in both identifying the complexity of the debate in its current form and an illumination of coherent points of view on the topic.

Our findings relate to recent studies that search for practical solutions in environmental management. For example, Laurila-Pant et al. (2015) propose situating economic valuation of biodiversity in a framework that takes critiques into account. In this framework, economic values are restricted in use to provide globally comparative values, and for local decision making primarily the language of ecosystem services could be used. Our study suggests this proposal should be modified to one of local decision making being augmented by expressing *all* discourses in addition to economic valuation of ecosystem services, through for example participatory decision making. Also, the use of market-based instruments in environmental policy is accompanied by heated debates that refer to the discourses identified in this study. Gomez-Baggethun and Muradian (2015) clarify that some instruments such as biodiversity banking generate greater discussion about ethical perspectives than others, such as carbon markets. Such instruments differ in their setup and hence in the opposition they may provoke. The identified discourses help support a more appropriate application of such instruments, suited to local conditions and the desires of stakeholders.

On a more theoretical level, our identification of discourses helps to differentiate between understandings of sustainable development. During the past decades, competing paradigms about sustainable development have been put forward, such as *green economy*, *green accounting*, *gross national happiness* and others. These paradigms see a different role for economic valuation. For instance, a rejection of economic valuation can be found in the paradigms of *green politics* and *green*

*consciousness* which incorporate deep ecology sensibilities, but less so in other recent interpretations of sustainable living (Stevenson, 2015).

The identification of these discourses and their polarization into two opposing groupings has further implications for environmental policy. There is a danger in environmental policy making that only a narrow range of the discourses is represented. The consequence of such an action is that the resulting decisions lack social legitimacy. The identification of the different discourses by means of Q methodology can improve decision making, by ensuring that all the potential values of biodiversity are given a voice. In particular it can inform the improvement of representation for deliberative methods in economic decision-making (Davies et al., 2005, Dryzek and Niemeyer, 2008). This study further supports the claims that socio-cultural perspectives are an integral part of biodiversity valuation approaches. Giving voice and appropriate expression to different modes of valuing biodiversity is a necessary condition for defensible procedures for arriving at environmental policy.

### **Acknowledgements**

This material is based on work supported by the European Research Council under FP7 Grant Agreement FP7 282625, BIOMOT: MOTivational strength of ecosystem services and alternative ways to express the value of BIODiversity. The authors are grateful to the participants in the Q study, and also thank John O'Neill, Clive L. Spash, Kees Musters and Geert de Snoo for helpful comments.

### **References**

1. Adams, W.M. 2014. The value of valuing nature. *Science* 346, 549-551.
2. Addams, H., Proops, J. 2000. *Social Discourse and Environmental Policy: An Application of Q Methodology*. Cheltenham, UK: Edward Elgar.
3. Admiraal, J.F., Wossink, A., De Groot, W.T., De Snoo, G.R. 2013. More than total economic value: How to combine economic valuation of biodiversity with ecological resilience. *Ecological Economics* 89, 115–122.
4. Barry, J., Proops, J. 1999. Seeking sustainability discourses with Q methodology. *Ecological Economics* 28, 337-345.
5. Bartkowski, B., Lienhoop, N., Hansjürgens, B. 2015. Capturing the complexity of biodiversity: A critical review of economic valuation studies of biological diversity. *Ecological Economics* 113, 1–14.
6. Bateman, I., Mace, G.M., Fezzi, C., Atkinson, G., and Turner, K. 2010. Economic analysis for ecosystem service assessments. *Environmental Resource Economics* 48, 177–218.
7. Bockstael, N.E., Myrick Freeman III, A., Kopp, R.J., Portney P.R., Kerry Smith V. 2000. On measuring economic values for nature. *Environmental Science & Technology* 34, 1384–1389.
8. Burgess, J., Clark, J., Harrison, C.M. 1995. *Valuing Nature: What Lies Behind Responses to Contingent Valuation Surveys?* London: UCL Press.
9. Common, M., Perrings, C. 1992. Towards an ecological economics of sustainability. *Ecological Economics* 6, 7–34.

10. Costanza, R., d'Arge, R., deGroot, R., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem, S., O'Neill, R.V., Paruelo, J., Raskin, R.G., Sutton, P., vandenBelt, M., 1997. The value of the world's ecosystem services and natural capital. *Nature* 387, 253–260.
11. Christie, M., Hanley, N., Warren, J., Murphy, K., Wright, R., Hyde, A. 2006. Valuing the diversity of biodiversity. *Ecological Economics* 58. 304-317.
12. Davies, B.B., Hodge, I.D. 2012. Shifting environmental perspectives in agriculture: Repeated Q analysis and the stability of preference structures. *Ecological Economics* 83, 51-57.
13. Davies, B. B., Sherlock, K., Rauschmayer, F. 2005. 'Recruitment', 'composition', and 'mandate' issues in deliberative processes: should we focus on arguments rather than individuals? *Environment and Planning C-Government and Policy* 23, 599–615.
14. Dryzek, J.S., Niemeyer, S. 2008. Discursive Representation. *American Political Science Review*, 102, 481-493.
15. Dryzek, J. 2005. *Politics of the Earth: Environmental Discourses (Second Edition)*. New York: Oxford University Press.
16. Dziegielewska, D. 2009. 'Total economic value', in T. Tietenberg and S. Niggol Seo (eds.) *Encyclopedia of Earth*. Washington, D.C.: Environmental Information Coalition, National Council for Science and the Environment. Available from <http://www.eoearth.org/>
17. [Farley, J., Filho, A.S., Burke, M., Farr, M. 2015. Extending market allocation to ecosystem services: Moral and practical implications on a full and unequal planet. \*Ecological economics\* 117, 244–252.](#)
18. Figge, F. 2004. Bio-folio: applying portfolio theory to biodiversity. *Biodiversity and Conservation* 13, 827-849.
19. Fish, R., Burgess, J., Church, A., Turner, K. 2011 Shared values for the contributions ecosystem services make to human wellbeing - Chapter 24 of the UK National Ecosystem Assessment. Available from <http://uknea.unep-wcmc.org/LinkClick.aspx?fileticket=OrzPtSfQ5ng%3D&tabid=82>
20. Fisher, A., Young, J.C. 2007. Understanding mental constructs of biodiversity: Implications for biodiversity management and conservation. *Biological Conservation* 136, 271-282.
21. Fisher, B., Turner, K., Zylstra, M., Brouwer, R., De Groot, R., Farber, S., Ferraro, P., Green, R., Hadley, D., Harlow, J., Jefferiss, P., Kirkby, C., Morling, P., Mowatt, S., Naidoo, R., Paavola, J., Strassburg, B., Yu, D., Balmford, A., 2008. Ecosystem services and economic theory: integration for policy-relevant research. *Ecological Applications* 18, 2050–2067.
22. Fuller, R.A., Irvine, K.N., Devine-Wright, P., Warren, P.H., Kevin J Gaston, K.J. 2007. Psychological benefits of greenspace increase with biodiversity. *Biology Letters*, 3, 390-394.
23. Gomez-Baggethun, E., Ruiz-Perez, M. 2011. Economic valuation and the commodification of ecosystem services. *Progress in Physical Geography* 35, 613-628.
24. Gomez-Baggethun, E., Muradian, R. 2015. In markets we trust? Setting the boundaries of Market-Based Instruments in ecosystem services governance. *Ecological Economics* 117, 217–224.
25. Gosling, E., Williams, K.J.H. 2010. Connectedness to nature, place attachment and conservation behaviour: Testing connectedness theory among farmers. *Journal of Environmental Psychology*, 30, 298-304.

26. Hannis, M., Sullivan, S. 2012. Offsetting Nature? Habitat Banking and Biodiversity Offsets in the English Land Use Planning System. Weymouth: Green House.
27. Hare, C. 2007. Voices from another world: must we respect the interests of people who do not, and never will, exist? *Ethics* 117, 498–523.
28. Irwin, J.R., Baron J. 2001. Response Mode Effects and Moral Values. *Organizational Behavior and Human Decision Processes* 84, 177-197.
29. Kals, E., Schumacher, D., Montada, L. 1999. Emotional affinity toward nature as a motivational basis to protect nature. *Environment and Behavior*, 31, 178-202.
30. Kamal, S., Grodzinska-Jurcak, M. 2014. Should conservation of biodiversity involve private land? A Q methodological study in Poland to assess stakeholders' attitude. *Biodiversity and Conservation* 23, 2689-2704.
31. Knights, P., Admiraal, J., Wossink, A., Banerjee, P., O'Neill, J., Scott, M. 2013. Economic Environmental Valuation: An Analysis of Limitations and Alternatives. BIOMOT Project Deliverable 1.1. European Union FP7. Available from [http://www.biomot.eu/docs/BIOMOT\\_WP1\\_Deliverable\\_1.1-FINAL-16.08.13.pdf](http://www.biomot.eu/docs/BIOMOT_WP1_Deliverable_1.1-FINAL-16.08.13.pdf)
32. Laurila-Pant, M., Lehtikoinen, A., Uusitalo, L., Venesjärvi, R. 2015. How to value biodiversity in environmental management? *Ecological Indicators* 55, 1–11.
33. Lockwood, M. 1999. Humans valuing nature: synthesising insights from philosophy, psychology and economics. *Environmental Values*, 8, 381-401.
34. Lorenzoni, I., Nicholson-Cole, S., Whitmarsh, L. 2007. Barriers perceived to engaging with climate change among the UK public and their policy implications. *Global Environmental Change* 17, 445-459.
35. Mayer, F.S., Frantz, C.M.P. 2004. The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of Environmental Psychology*, 24, 503-515.
36. McCauley, D.J. 2006. Selling out on nature. *Nature* 443, 27-28.
37. Melathopoulos, A.P., Stoner, A.M. 2015. Critique and transformation: On the hypothetical nature of ecosystem service value and its neo-Marxist, liberal and pragmatist criticisms. *Ecological Economics* 117, 173–181.
38. Milcu, A.I., Sherren, K., Hanspach, J, Abson, D., Fischer, J. 2014. Navigating conflicting landscape aspirations: Application of a photo-based Q-method in Transylvania. *Land Use Policy* 41, 408-422.
39. Miller, D. 1992. Deliberative democracy and social choice. *Political Studies* 40, 54–67.
40. Munda, G. 2004. Social multi-criteria evaluation: Methodological foundations and operational consequences. *European Journal of Operational Research* 158, 662–677.
41. Neff, W.M. 2011. What research should be done and why? Competing visions among ecologists. *Frontiers of Ecology and the Environment* 9, 462–469.
42. Neuteleers, S., Engelen, B. 2015. Talking money: How market-based valuation can undermine environmental protection. *Ecological Economics* 117, 253–260.
43. Nijkamp, P., Vindigni, G., Nunes, P.A.L.D. 2008. Economic valuation of biodiversity: a comparative study. *Ecological Economics* 67, 217-231.

44. Nisbet, E.K., Zelenski, J.M., Murphy, S.A. 2009. The nature relatedness scale: Linking individuals' connection with nature to environmental concern and behavior. *Environment and Behavior*, 41, 715-740.
45. Nunes, P.A.L.D., Van den Bergh, J.C.J.M. 2001. Economic valuation of biodiversity: sense or nonsense? *Ecological Economics* 39, 203–222.
46. Nyborg, K. 2000. Homo Economicus and Homo Politicus: interpretation and aggregation of environmental values. *Journal of Economic Behavior & Organization* 42. 305–322.
47. O'Neill, J. 2007. *Markets, Deliberation and Environment*. London: Routledge.
48. O'Neill, J., Holland, A. 1999. Two conceptions of biodiversity value. D.A. Posey (ed.) *Cultural and Spiritual Values of Biodiversity*. London: United Nations Environment Programme.
49. Pirard, R. 2012. Market-based instruments for biodiversity and ecosystem services: A lexicon. *Environmental Science & Policy* 19–20, 59–68.
50. PQMethod. 2014. Accessed from [schmolck.userweb.mwn.de/qmethod/downpqwin.htm](http://schmolck.userweb.mwn.de/qmethod/downpqwin.htm)
51. Raz, J. 1986. *The Morality of Freedom*. Oxford: Clarendon Press.
52. Redford, K, Adams, W. 2009. Payment for Ecosystem Services and the Challenge of Saving Nature. *Conservation Biology* 23, 785–787.
53. Rode, J., Gomez-Baggethun, E., Krause, T. 2015. Motivation crowding by economic incentives in conservation policy: A review of the empirical evidence. *Ecological Economics* 109, 270–282.
54. Sandbrook, C., Scales, I.R., Vira, B., Adams, W.M. 2011. Value Plurality among Conservation Professionals, *Conservation Biology* 25, 285-294.
55. Steelman, T.A., Maguire, L.A. 1999. Understanding participant perspectives: Q-methodology in national forest management. *Journal of Policy Analysis and Management* 18, 361-388.
56. Stevenson, H. 2015. Contemporary Discourses on the Environment-Economy Nexus. SPERI Paper No. 19. ISSN 2052-000X Available online at: <http://speri.dept.shef.ac.uk/wp-content/uploads/2015/03/SPERI-Paper-19-Contemporary-Discourses-on-the-Environment-Economy-Nexus.pdf>
57. TEEB (The Economics of Ecosystems and Biodiversity). 2013. A synthesis of approaches to assess and value ecosystem services in the EU in the context of TEEB. Available online at: <http://ec.europa.eu/environment/nature/biodiversity/economics> Viewed Feb. 19 2015.
58. Turner, R.K., Morse-Jones, S., Fisher, B. 2010. Ecosystem valuation: a sequential decision support system and quality assessment issues. *Annals of the New York Academy of Sciences* 1185, 79–101.
59. Vatn A. 2010. An institutional analysis of payments for environmental services. *Ecological economics* 69, 1245–1252.
60. WAVES (Wealth Accounting and the Valuation of Ecosystem Services). 2015. WAVES Annual Report 2015. [http://www.wavespartnership.org/sites/waves/files/images/WAVES\\_AR\\_2015.pdf](http://www.wavespartnership.org/sites/waves/files/images/WAVES_AR_2015.pdf)