The tension between nature conservation and economic valuation of ecosystem services

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Chapter 7

General discussion

1. Introduction

The aim of this thesis is to investigate what would constitute an appropriate role for economic valuation of nature for nature conservation. This valuation approach rests on the earlier introduced paradigm of ecosystem services, where nature provides services to society. The ecosystem services idea has been integrated and taken up both by nature conservationists and various governmental and non-governmental organizations for various reasons, with either good or bad prospects for nature conservation. This thesis contributes to the identification of challenges for nature conservation in a world where the ecosystem services and economic valuation of nature paradigm is popular. In particular, it puts a focus on some of those challenges where the goals of nature conservation themselves are in danger of being lost due to the economic value approach, and it contributes to solving these issues by reassessing the role of this approach.

The topics dealt with in this thesis cover a broad range of topics. One chapter may deal with economics, while the next one investigates ecology, environmental policy or human psychology. The objective behind this variety is that the topic of economic valuation for nature conservation gets illuminated from many different angles, so that we might discover aspects of it that remained unknown beforehand. At the same time, it becomes challenging to tie the studies together in a comprehensive discussion. Nevertheless, there are themes that emerge that can be found in more than one of the studies, such as the worry that economic valuation ignores certain human values. Also, one study may comment upon the next one. For example, the study on discourses shows that a great debate exists about the consequences of using economic valuation, and the study on the expression of values in policy documents shows evidence that one of the debated fears may be well-founded.

This is then how the discussion is built up: with a focus on the themes that are shared between the various studies, and on how the chapters comment upon each other. The first study on the discourses opens up the debate and in effect introduces the various themes that are connected to ecosystem services and economic valuation, and the hopes and fears about its use in environmental policy. The next study on policy documents comments on one of those fears: namely that economic values crowd out other values. The two studies following that offer two different solutions to the fear that conservation values and conservation goals will be lost sight of. The final study opens up the discussion further by regarding the values that underlie human motivation for nature conservation, and hence we can investigate how economic valuation connects to those motivations, and what we might expect from it in terms of stimulating conservation actions.

The limits of the scope of the thesis become clear as well, now. The studies address a small part of the debate surrounding ecosystem services and economic valuation. There are many topics that do not return in this thesis, such as the fear that economic valuation has negative consequences for the poor, or the consequences of biodiversity offsetting, or the virtues or limits of alternative methods such as deliberative economics, or how economic valuation is regarded from the perspective of institutional economics. Yet, all these topics have important messages as well and are essential to form a clearer judgment about economic valuation. It is hence not the ambition of this thesis to regard economic

valuation from all possible angles and neither will it come to a final judgment about the conflicts between economic valuation and nature conservation. The discussion in this thesis will lead to recommendations for scientists and policy makers, but those recommendations will be based only on the studies that form part of this thesis.

With these caveats kept in mind, we return to the research questions and the answer that the studies produced for them.

2. Answers to the research questions

Q1: **What do practitioners think about economic valuation?**

The first study aimed to provide insights into the opinions of EU economic experts and practitioners, as well as critics, on economic valuation of ecosystem services relative to alternative or complementary valuation methods. The method used in this study generated 'discourses', coherent viewpoints that would reduce the complexity of the debate.

The conclusions are that four coherent viewpoints could be identified concerning economic valuation of ecosystem services: *enthusiasm*, *value pluralism*, *social justice concerns* and *eco-deliberation*. Some of the same arguments for or against economic valuation form part of different discourses. Furthermore, the sequence of salience of the four identified discourses illustrates a polarization of opinions. Only one discourse is in clear agreement with economic valuation of ecosystems and biodiversity and it is the most salient one. The three discourses besides *enthusiasm* express different forms of disagreement with economic valuation, and are nevertheless strongly expressed in the debate.

Q2: **How do EU research subsidy documents communicate the importance of biodiversity conservation?**

The second study analyzed the visibility of biodiversity and its conservation in the wording of open call research subsidy documents of the EU. It is a content analysis, which allowed us to trace trends in word use and make inferences based on those trends on thematic shifts underlying biodiversity conservation in the EU research programmes. The documents are the open call descriptions on the topic of biodiversity conservation in the documents of the environment theme in the EU Seventh Framework Research Programme (FP7) from 2007-2013 and the EU Framework Programme for Research and Innovation - Horizon 2020 of 2014-2015. The focus of the content analysis was on the prevalence of 'conservation' of biodiversity, and how this differs in prevalence from to other mentioned keywords related to biodiversity, such as 'ecosystem services'.

The conclusions are that a clear shift in word use is visible in the environment themes of the FP7 and Horizon 2020 work programs towards using 'ecosystem services' as the foremost way to express the value of biodiversity. There is little explicit referral to economic valuation of biodiversity in the documents. Coupled with a simultaneous decrease of other expressions of values and goals such as

'conservation' and 'sustainability', 'ecosystem services' substitutes other expressions of value in the work programs.

Q3: **How can we combine economic valuation with notions of sustainable use of ecosystems?**

This chapter addressed the research question of how economic valuation of nature could be combined with notions of sustainable use of ecosystems in economic models of nature conservation. Two sub-questions were asked:
1. What notions of ecosystem resilience need to be added to Total Economic Value assessments in decision making to foster a sustainable use of ecosystem services?
2. How can the concept of Total Economic Value be combined with notions of ecosystem resilience?

The main conclusions of this paper are that ecological theory of resilience has an important role to play to arrive at a sustainable use of ecosystems. To connect the theory of ecological resilience to the methods of economic valuation, we need to regard the diversity of genes, species and ecosystems as providing humanity with an insurance against the collapse of ecosystems. Then, to safeguard the future provision of ecosystem services, maintaining a high level of biodiversity is a way to invest in security for future revenue of services and to insure us against a loss of production. From the perspective of economics, the value of diversifying your investments has been worked out in portfolio theory, and investing in the diversity of genes, species and ecosystems can be regarded in the same way. From the perspective of ecologists, the theory about functional diversity and how that relates to stability and resilience is what is useful in this framework, because it relates to sustained ecosystem functioning.

Q4: **What are stakeholders' ideas about good indicators for conservation action success by farmers?**

This chapter measured the preferences of agricultural chain parties on different indicators for rating a farmer's biodiversity performance. We consider three different potential metrics of rating a farmer's biodiversity performance: the effort of the farmer in nature management, the preconditions of soil, water, air and local biodiversity that present the environmental frame in which farmers operate, and the attained nature results irrespective of effort and preconditions. We ask different agricultural chain parties their opinions towards such rating systems: farmers' organizations, nature conservation organizations, governmental organizations and food companies.

The conclusions are that there are no clear differences in preference between the agricultural chain parties. However, the potential metrics did receive significantly different scores, suggesting that a rating system, such as a score card, based on a combination of the preconditions on the farm and the attained biodiversity results will be experienced as most acceptable throughout the chain of agricultural production.

Q5: **What are the motivations underlying committed conservation action?**

The final study aimed to answer the following research question: How do highly committed actors for biodiversity and highly committed actors for other, non-biodiversity causes rank their motivations to act for nature, given a broad set of motivational options that include hedonic, moral and eudemonic values? The knowledge gaps that this research question aimed to fill were the unknown but suspected specific roles of hedonic, moral and eudemonic values in conservation action in committed actors, and how these motivations differed between biodiversity and non-biodiversity actors.

The conclusions are that a basic palette of motivations appears to exist for committed action in general, and this palette is broad, including the motivations *curiosity and learning*, *living a worthwhile life*, *future generations* and *value in itself*. Secondly, small specific differences are found between biodiversity and non-biodiversity actors. The findings suggest that the discovery of beauty in nature, even though not prime motivations for devoted biodiversity activists, may play a more important role for the non-biodiversity actors in their motivation to act for nature.

3. Reflections

3.1 The economic valuation discussion within the community of practitioners and experts is mostly about hypothetical consequences instead of empirical evidence.

The first study strictly identified discourses. But in addition to that, we can interpret the discourses as an excellent summary of the topics that are deemed important by the community of practitioners and experts about economic valuation. We can make this interpretation because the discourses arose from the data as emergent constructs that are ultimately based on the available literature on the topic. What is interesting in this interpretation is that successful nature conservation is not a prominent topic of discussion in this debate. Instead, the discussion is mostly about hypothetical consequences of economic valuation on social issues and on the crowding out of values.

Looking at the four discourses, the *enthusiasm* discourse sees economic valuation as a useful approach for a variety of topics: for protection of nature, for issues of sustainable development and for political decision making. In general, the end goal, what economic valuation might be good for, isn't well specified in the debate. Underlying the discourse seems to be a feeling that economic valuation has a general usefulness that supports good decision-making about the environment, without specifying any clear goal. The reason for this could be that economic valuation has a variety of uses for policy makers (Laurans *et al.* 2013). The three other discourses are largely negative reactions to this approach, and the two strongest negative reactions are the discourses of value pluralism and social justice. These both embody concerns about values that humans uphold, recognition of personal values and the treatment of humans in the economic system. Personal values, the values perhaps on which nature conservation is built, are seen as under attack. It was hypothesized in this study that a discourse of pragmatism would emerge from this study, but because the end goals such as nature conservation are apparently so undefined in the debate as it exists now, pragmatism didn't emerge as a discourse.

This result could be a consequence of that the effectiveness of economic valuation to protect nature is still unknown. Different setups of PES schemes have different efficacy (Wunder *et al.* 2008) and may or may not cause a crowding out of intrinsic motivation (Rode *et al.* 2015). The debate is hence largely about hypotheticals. It could be that, as empirical evidence mounts for or against economic valuation approaches for the goal of nature conservation, then the debate on this topic might shift from imagined applicability and side-effects to more clearly defined limits and usefulness. Another reason for the focus on hypothetical consequences could be that economic valuation so misrepresents certain types of relationships between humans and nature (van den Born 2008) and issues of identities and perceived rights (O'Neill & Walsh 2000) that the resultant discussion is largely focused on good expression of personal values instead of its effectiveness in nature conservation.

From the point of view of nature conservation, this result begs the question whether the ethical and social issues connected with economic valuation of nature are relevant at this moment for reaching conservation goals. Are these issues raised by the discourses not simply questions for politicians and ethicists, but not for conservationists? For nature conservation, would it not be enough to keep a focus on the effectiveness of economic valuation for conservation goals? Fisher and Young (2007) argue that these ethical and socio-economic issues are relevant for nature conservation in the sense that they are connected to the motivations and justifications behind nature conservation. The individual's relationship with nature, that is seen as attacked by economic valuation in the discourse *value pluralism*, is a personal motivator to act for nature conservation. This is supported by a rich literature of environmental psychology which identified factors such as connectedness to nature (Mayer & Frantz 2004), place attachment (Williams & Vaske 2003) and many others as having an important role in environmentally friendly behavior. Also, the social justice debate about economic valuation drags nature conservation deeper into the web of socio-economic issues. As Rose (2014) argues, this provides an opportunity for stronger policy-relevant, socio-economic reasons in favor of nature conservation.

3.2 Framing nature conservation as ecosystem services protection replaces clear nature conservation goals.

As the first study on discourses concluded that empirical evidence is lacking about the consequences of economic valuation of ecosystem services, the second study aimed to fill part of that lack. The research question about how the value of biodiversity was communicated in EU subsidy documents was concluded with the finding that referrals to ecosystem services gained in popularity, whilst more direct referrals to nature conservation went down through time. In other words, the frame of ecosystem services is not simply used in tandem with other frames for nature conservation, but it replaces the previous calls for nature conservation.

Related to issues of framing nature conservation are the ethical questions of where responsibility should lie for stating clear conservation goals, and how much either policy makers or scientists should adapt their language to each other. Sutherland *et al.* (2013) lament that policy makers fail to interpret and use scientific data, and lists 20 concepts about the process of science that policy makers could take into account. On the other side of this debate, Adams & Sandbrook (2013) and Rose (2014) argue that

scientists should communicate science through evidence-informed narratives and so adapt their communication more to the messy process of policy making. Coupling nature conservation to ecosystem services protection is one such strategy and, according to Rose (2014), could be used in tandem with arguments of the intrinsic value of nature. Our research shows however that fears about ecosystem services replacing other arguments for nature conservation is well founded.

The study was limited in scope, considering seven years and a limited number of documents. It remains unknown whether these observations are part of a broader trend in policy documents about environmental themes, but it could prove to be indicative of such a trend. Additional research could clarify whether the term ecosystem services replaces nature conservation in other documents. Here it would be interesting to investigate whether such a trend occurs top-down, from global to national to regional and local levels, and whether concrete goals for nature conservation are only maintained in the research goals of scientists, local conservation projects and local government. Investigations that delve deeper in time could shed more light on how shifts in word use might change over time.

It also remains unknown how this shift in word use is related to the intentions of policy makers behind the framing of environmental issues. Ecosystem services could be taken up because it presents a useful concept to policy makers (Daily *et al*. 2009). We can conjecture that since ecosystem services promises to take economic and social needs into account, it is easier to justify the protection of ecosystem services than precise nature conservation goals based on ecological indicators, but the motivations behind framings remain obscure. In addition, as expanded upon by Mace (2014), ecosystem services are part of a framing of nature conservation that in scientific literature is currently being subsumed by a new framing that focuses on social-ecological resilience. It remains unknown whether this new frame is in turn being adopted in policy language.

3.3 Difficult to reconcile economic valuation with ecological measures of successful conservation.

So far in this discussion, economic valuation of ecosystem services is seen as a potential threat to nature conservation in the first study, and the second study showed that some of those fears may be warranted. The third study investigates how ecological science could still play an important role in maintaining a focus on nature conservation in the case that economic valuation informs management practices. There is perhaps no better illustration that economic valuation of nature may not be in service of nature conservation by showing the tortuous theoretical route one must go down to reconnect economic valuation with ecological notions of resilient ecosystems. Ecological knowledge is essential for effective nature conservation, but economic valuation complicates taking action on this knowledge. Nature conservation based on ecological science must now be defended and justified in a new arena of argumentation that economic valuation has brought up.

The third study is very much connected to the debate of how biodiversity relates to ecosystem services (Mace *et al* 2012). Building on a lot of background theory, the whole idea of a biodiversity portfolio can be likened to a bridge connecting two shaky towers of theoretical ideas that can both be attacked at their very foundations. One tower represents the approach of economic valuation of ecosystem services

in its current disguise as Total Economic Value (Dziegielewska, 2009), and the other tower the idea of an insurance value of biodiversity (Baumgärtner, 2007; Loreau *et al.* 2002) that is directly connected to a debate within conservation biology about ecological resilience and stability (McCann, 2000). In a way, the chapter looks at these two towers as two ways of thinking and climbs the stairs, to see where they might be bridged. The portfolio idea is such an bridge between ecology and economics and therefore holds merit for both conservationists and economists (Figge, 2004). The greatest merit of this investigation is that it introduces a call for precaution about using or optimizing the ecosystem services idea for production, so that the resilience of ecosystems is not undermined.

From the perspective of welfare economists, a lack of ecological knowledge is an information problem for informing and satisfying consumers of ecosystem services (Chee, 2004; Ludwig, 2000), and the bio-portfolio idea could address this. From the perspective of nature conservation however, a lack of ecological knowledge is a danger to successful conservation (Sutherland *et al.* 2009), and the portfolio approach is a tortured, roundabout way of arguing for conservation. This study posits biodiversity as a supporting ecosystem service (*cf.* MEA, 2005): an insurance service for safeguarding the provision of ecosystem services (Perrings et al. 2009; Naeem, 1998). However, the value of doing so still refers to economic values and to desired ecosystem functions from an anthropological point of view. Jax and Heink (2015) see different motives for treating biodiversity as an ecosystem service or not: from the perspective of a resource protection motive it is sensible, but from a conservation motive it might not be. It creates a necessity to talk about resilience and insurance value and functional diversity for conservation motives. Even as you do this, you lose focus of the protection of rare species that don't offer much benefit (Ridder 2008). The selection of diversity that you would choose for your bio-portfolio as a necessary baseline in the end depends on what kind of services you desire from the ecosystem. It will be the particular desires from stakeholders that drives how much diversity and stability is required, much like the introduction of plant diversity in agriculture to maintain profitable production (Isbell et al. 2011), and not out of any other ethical consideration. The portfolio approach remains a highly anthropocentric approach.

3.4 A biodiversity label to uphold ecological goals in market oriented approaches.

The fourth study investigates a second approach how ecological science could still play an important role in maintaining a focus on nature conservation in a market-based approach. In this study, the research question concerning biodiversity indicators for farmer's performance in biodiversity conservation is essentially addressing the question of quality control in an environmental management scheme that could be considered a payment-for-ecosystem-services (PES) scheme, following the definition by Wunder (2005). The search for biodiversity indicators is meant for the potential creation of a biodiversity-related label, which provides information to consumers or retailers, so that they act on this information and hence that the market stimulates environmentally-friendly production methods. The study concludes that all stakeholders in the production chain agree about the content of this label and which indicators should be partof it: environmental preconditions for biodiversity and biodiversity results.

There are two important aspects about these conclusions to expand on. The first aspect is the agreement among the stakeholders, which shows that all parties in the production chain can enter a PES scheme with the same environmental goals in mind. This is a promising conclusion for the establishment of PES schemes in general. Wunder *et al.* (2008) gives an inventory of PES scheme experiences and notes that a frequent weak spot, especially among government-run PES schemes, is that the link between stimulated land use changes and the desired ecosystem services can be very weak and scientifically unfounded, and that biodiversity conservation itself is seen only as an implicit positive side-effect in these schemes. Agreements among the indicators of success could strengthen these weak spots. The second aspect to note is that the indicators that are regarded as most important are those informed by ecological science. Not only could ecological science make indicators scientifically rigorous, but it also gives ecological indicators themselves an important role in a financial scheme. A biodiversity label based on accepted ecological indicators would therefore be a promising way to combine economic valuation of nature with ecological knowledge for biodiversity conservation.

For conservationists, a recurring debate concerns the values behind economic valuation of nature and hence a feared 'selling out' on nature (McCauley 2006). One underlying fear in these cases is that economic imperatives would override the values behind biodiversity conservation. It is therefore promising that all stakeholders seem to consider ecological indicators as the most valuable to judge conservation performance. This suggests that a biodiversity label based on ecological indicators would be a promising way to maintain a strong presence of ecological knowledge and ultimately conservation values in PES schemes. In the previous study about combining ecology with economic valuation of nature, one solution was proposed to give ecological knowledge a stronger presence in PES schemes: the portfolio theory applied to biodiversity. A biodiversity label based on ecological indicators would be an alternative or supplementary solution to this. Where portfolios of biodiversity are meant to protect ecosystems from regime shifts and uphold ecological resilience, biodiversity labels give an indication whether the ecological goals for protecting ecosystems are actually upheld. Both solutions could help to give voice to values underlying biodiversity conservation.

3.5 About personal motivations versus institutional motivation

The final study explores the motivations of successful biodiversity activists to act for nature conservation. The results help us understand why the debate surrounding economic valuation is focused so strongly on personal values, as is seen in chapter 2 on the discourses.

As the final study shows, biodiversity conservation seems intimately connected with committed actors seeking meaning in their lives, and with how their work in nature conservation plays a role in that quest for meaning. The approach of ecosystem services can theoretically conceptualize these meanings and statements of morality as so-called cultural ecosystem services (MEA 2005). Services such as spiritual services or cultural identity services seem to touch on the meaningful life element. However, the results of the study suggest that ecosystem services misrepresent the relationship between humans and nature, which can be characterized in multiple ways (van den Born 2008). According to Flint et al. (2013), ecosystem services only touches upon a subset of human-nature relationships. Values of biodiversity in

the form of services are expressed as a kind of object or flow that is separate from the actual source. Economic valuation then goes a step beyond and presents a further abstraction of that connection, and further solidifies the relationship between humans and nature as that of a consumer and a producer. As is seen in chapter 2 in the study on discourses, a main critique is that certain values are not represented well in this relationship, and the strong emergence of the element of a meaningful life in chapter 6 helps us understand why. It seems that in the transformation of this element of a meaningful life to the abstract level of a service, the motivation that people ascribe to the meaningful life for their conservation work is somehow not acknowledged anymore when it is described as a service.

It is important to make a distinction here between personal motivation that says something about why an individual person chooses to act for something, and institutional motivation that says something about humans working in groups. When discussing how economic valuation of ecosystem services relates to personal motivation, it should also be mentioned that the techniques used to value nature in this way, such as contingent valuation, hedonic pricing etc., (see Gatto & De Leo (2000) for an overview) are not meant to motivate people personally. Instead, they are used to 'elicit' the values that people hold about nature and express these in a monetary way, working from the assumption that human welfare from experiencing nature can adequately be expressed in money (Bockstael et al., 2000). And these monetary numbers are then a decision support tool for policy makers. The numbers, supposedly roughly reflecting what should be the preferences of people as consumers of ecosystem services, assist policy makers in a couple of ways, such as making a list of stakeholders and envisioning alternative plans for the future of certain areas (Laurans et al., 2013). In other words, economic valuation as a decision support tool is meant to motivate decisions made on an institutional or governance level. Research into payment for ecosystem services schemes, such as by Midler *et al.* (2015), suggests that economic rewards can stabilize collective action. Also, Dedeurwaerdere et al. (2016) showed that in biodiversity conservation projects, internal and non-economic motivations of participants in the projects are compatible with the involvement of private parties and with goals of economic benefits for society. Chapter 5 on biodiversity performance indications also shows that a market-based approach can fulfill a motivating role by aligning stakeholders when it comes to indicators and judgments of performance.

However, a danger remains that those personal values and motivations on which nature conservation rests are then only expressed on the personal level of practitioners, without receiving recognition or legitimacy in policy and social constructions. The argumentation for nature conservation in policy will then not match with personal values and motivation, creating a situation of cognitive dissonance which may not benefit or might even endanger successful nature conservation. An institutionalized demotivation for nature conservation may be a consequence.

4. Conclusions

Using the answers to the research questions, we come to a deeper understanding of the role economic valuation of ecosystem services could play in nature conservation and where it creates problems.

1. To lay out the debate, the first study illuminates that within the ecosystem services community, the debate about economic valuation is polarized into one discourse of enthusiasm and a couple of negative discourses whose concerns refer to personal and societal values that are perceived as ignored or under threat. The arguments for and against economic valuation refer to different understandings of hypothetical consequences, while empirical evidence is lacking.
2. One perceived danger of economic valuation of ecosystem services is the crowding-out issue, which describes a fear that non-anthropocentric reasons for nature conservation and the personal values underlying these reasons will be crowded out by economic values and therefore will not be acknowledged. This danger becomes more tangible as chapter 3 on EU research programmes shows that nature conservation as a goal itself disappears from higher policy levels while during the same period the ecosystem services idea becomes the foremost way to express the value of biodiversity.
3. If nature conservation goals are henceforth repackaged as ecosystem services provision goals and economic value goals, can ecological knowledge still inform environmental policy? The third study shows that economic valuation of nature can still be combined with notions of ecosystem resilience. The proposed solution of portfolio theory is however only a partial solution in the grand scheme of ignored values, because it still refers to economic values and to desired ecosystem functions from an anthropological point of view.
4. The fourth study shows a second route to combine ecological knowledge with market schemes. Within a market-based approach, stakeholders can come to agreements such as over the right indicators for biodiversity success. Indicators based on ecological indicators offer a promising way to strengthen the ecological knowledge in financial schemes and its focus on ecological values is supported by all stakeholders.
5. Concerning personal values that are seen as under threat by economic valuation, the strongest motivations for nature conservation refer to values that are either difficult to describe and to value as services, such as care for future generations and intrinsic value, or not part of a services framework, such as living a worthwhile life. Consequentially, using economic valuation to come to a decision will not reflect the personal values and motivations of people working for nature conservation. The argumentation for nature conservation in policy will then not match with personal values and motivation, creating a situation of cognitive dissonance which may not successfully motivate nature conservation.

Based on these conclusions, economic valuation of ecosystem services should be embedded in a social context where both clear nature conservation goals and personal motivations for nature conservation are given a stronger acknowledgment. The recommendations in section 5 offer suggestions from literature to shape this context.

5. Recommendations

5.1 Recommendations for researchers

The conclusions to the research questions invite a couple of recommendations for future research. In the search for a proper role for economic valuation of ecosystem services in nature conservation, knowledge gaps remain.

First of all, empirical evidence is lacking about either the dangers or the effectiveness of economic valuation and Payment for Ecosystem Services (PES) schemes. This lack currently leads to a polarization of opinion, dividing opinions into enthusiasm or different flavors of criticism. Underlying this polarization are a number of assumptions about the long-term consequences of using economic values for nature conservation. There is an assumption made that the use of economic valuation leads to financial schemes such as biodiversity offsetting. A common argument is that ecosystem services thinking is a slippery slope towards economic valuation (Gomez-Baggethun & Ruiz-Perez, 2011) and economic valuation a slippery slope towards financial mechanisms such as biodiversity offsetting (Silvertown 2015). It is hard not to draw this conclusion when organizations such as the Nature Conservancy advocate the use of biodiversity offsets (Kaveira *et al*. 2012), whatever the reasons this organization may have for this strategy and whatever the underlying motivations. According to critics, this is highly undesirable, but what remains unknown is how often economic valuation leads to these practices and under what conditions, and what the precise consequences are of offsetting schemes. Payment for Ecosystem Services schemes' effectiveness in conservation also remains unclear and so does its impact on the intrinsic motivations of stakeholders. Further research could either resolve some of the worries of critics or support the validity of their critiques.

A core issue of the debate around ecosystem services revolves around the long-term consequences of using the anthropocentric values and so 'selling out on nature' (McCauley 2006) or 'selling' nature as a policy-relevant topic (Armsworth *et al.* 2007; Rose 2014). Since our investigation into word use discovered that the ecosystem services framing replaces other frames that could stand alongside it, then ecosystem services could no longer be seen as just an extra tool in a toolbox of strategies for nature conservationists. Further investigation into whether this trend is replicated in other policy documents would be very important to investigate the usefulness or danger of ecosystem services as a frame for nature conservation. Such an investigation could give more empirical evidence that intrinsic values and concrete conservation goals need protection against a crowding-out effect by ecosystem services.

Secondly, the two solutions proposed in this thesis to give ecological knowledge an important role in PES schemes, namely the portfolio approach and the use of ecological indicators for a biodiversity label, also lack empirical evidence about their feasibility. In a sense, portfolio techniques are already applied in agriculture when monocultures are replaced by a slightly larger set of species for sustainable harvests (Schläpfer *et al.* 2002). The same approach is applied to fisheries (Perruso *et al.* 2005). The challenge remains whether this technique can be expanded to PES schemes for goals of biodiversity conservation. Research is currently expanding about spatial overlap between biodiversity and ecosystems, and about whether ecosystem management can focus on bundles of ecosystem services. Conceivably,, payment for ecosystem services schemes may be set up to provide multiple ecosystem services simultaneously. To manage a stable and resilient provision of bundles of ecosystem services, the portfolio approach may inform the management of such schemes, but its usefulness and applicability remains unknown. In

addition, a successful application of portfolio approaches rests on ecological knowledge; especially on the relationships between biodiversity and ecosystem functioning. A deeper understanding of these relationships remains essential.

The efficacy of a biodiversity label in practice is also unknown. Biodiversity labels could function as a quality control within PES schemes, but it remains unknown in what kind of schemes they are most effective. We can hypothesize that farmers would feel more motivated to protect biodiversity on their land once such a label is in place, because a label for judging performance speaks to motivations of reputation within a community and of financial benefits. On the other hand, such motivations were not rated highly in chapter 6 on motivations for nature conservation. Research on farmers' willingness to work on biodiversity could instead investigate ways to speak to values of living a worthwhile life and intrinsic values in addition to financial values.

The great pressing question remains how to motivate society to protect nature. The economic valuation of ecosystem services promises a solution, but simultaneously creates complications. The research question about the motivations that underlie successful biodiversity conservation concluded that economic values tell only a small part of the story when it comes to motivating people. Morals based on intrinsic values and especially the concept of living a worthwhile life, also known as eudaimonia, appear to play a much more important role. But will stressing the eudaimonia concept for nature conservation lead to more effective action? It might be the case that eudaimonistic values are effective to motivate people on an individual level, but will be less effective than economic values when it comes to motivating organizations to cooperate in nature conservation. People's sensitivity to different values of nature may differ according to the environment in which they receive them, for instance at work in a role of policy maker or at home as a member of a family. Also, if eudaimonistic values are communicated alongside economic values, will those economic values crowd out the eudaimonistic ones?

5.2 Recommendations for policy makers

5.2.1. In search for an appropriate role for economic valuation of nature

Laurans et al. (2013) created a topology of uses for economic valuation of ecosystem services, and identify three categories and eight subcategories (see Table 1 for a complete overview). First, the valuation could be incorporated in a cost-benefit analysis, on which basis an informed choice can be made between alternative visions. Secondly, economic valuation could be used after such a choice is already made, for instance for the design of a financial instrument for ecosystem services provision. Finally, economic valuation could play a broader role in informing and awareness-raising about the value of nature. This possible use is most frequently communicated in influential papers by Costanza et al. (1997) and Daily et al. (2009).

Category	Subcategory	Recommendation
1. Decisive EV, used in a CBA, for	*EV for trade-offs.* Using EV for making an informed choice between alternative visions of environmental management.	Replace by alternative methods.

ex ante decisions.	*Participative EV.* EV as a negotiating language, where the valuation forms the basis for discussion. Discussing the parameters and assumptions behind the valuation exercise forms a negotiation between stakeholders.	Replace by alternative methods.
	EV as a criterion within environmental management. It could be used to prioritize certain conservation efforts within an organization when budgets are increasingly limited.	Replace by alternative methods.
2. Technical EV, for designing an economic instrument.	*EV used for establishing levels of damage compensation* that a project is expected to cause. This could guide administrative decisions and court rulings.	Partly useful while safeguarding conservation goals.
	EV for price-setting. On the basis of willingness-to-pay or willingness-to-accept arrangements between stakeholders, EV can make the calculations.	Partly useful while safeguarding conservation goals.
3. Informative EV, for broader communication.	*EV for awareness-raising*. Communicating the calculations may influence support for conservation initiatives, even if the specific numbers are not used in those initiatives	Partly useful if made part of a more inclusive message of values.
	EV for justification. The calculation could demonstrate an economic rationality behind a choice. Alternatively, it could verify whether a made decision is effective.	Replace by alternative methods.
	EV for green accounting. For keeping decision makers informed about the state of natural capital	Partly useful while safeguarding conservation goals.

Table 1: categories of use of economic valuation of nature for policy makers. Categories and subcategories are taken from Laurans et al. (2013).

Using the conclusions of this thesis, we can now reflect on these various uses of economic valuation and narrow the list down to a possibly appropriate role for the method. Considering the first category of decisive uses, the three subcategories of decisive uses all suffer from the complication that the personal values of stakeholders are not adequately expressed in valuation methods, while we conclude that practitioners themselves note this lack (conclusion 1). Therefore, in making trade-offs, in negotiating between stakeholders and in making strategic decisions about environmental management, the economic valuation approach seems better replaced by an alternative method that creates space for these values.

From the perspective of decision makers, economic valuation of nature is useful if it can bring rationality to the process of coming to a decision, and whether it has power in the procedure to be influential for advocating or justifying decisions (Laurans and Mermet, 2013). Alternative valuation methods such as multi-criteria decision analysis, participatory methods and deliberative mapping arguably fill the same criteria (Knights et al, 2013). Deliberative mapping, for example, is an option appraisal process that brings citizens and specialists together for a method that combines a variety of participatory techniques to explore options. It has been used before for the topics of organ transplantation (Davies et. al. 2003), nuclear waste disposal (Burgess et. al. 2004) and climate change mitigation (Bellamy et. al. 2014). The critiques about economic valuation on the other hand undermine economic valuation's power of justification in the decision process.

The second category of technical uses shows more promise, while concerns remain. Financial instruments may still crowd out the intrinsic values and motivations of people to engage in conservation activities. Also, the valuation methods such as willingness-to-pay or willingness-to-accept leave no space for the expression of intrinsic values. Technical uses in the form of financial instruments may however lead to cooperation on an institutional level, but the sustainable use of ecosystems and conservation goals will need safeguarding (conclusions 3 and 4).

The final category of informative uses also shows promise, while concerns remain. Using economic valuation for awareness-raising and general motivation is a truncated method that is better used in combination with two other messages: that of intrinsic value of nature and the role of nature in a meaningful life (conclusion 5). However, if the economic metaphor crowds out the other two messages, as is visible for example in the EU research programmes (conclusion 2), motivating people may only be partially successful. Economic valuation to justify decisions or verify them for their effectiveness seems misguided when a wider social context is needed to appraise decisions for their appropriateness (conclusion 1). Finally, in the case of green accounting of natural capital, again conservation goals will need safeguarding so that they are not replaced by the ecosystem services provision goals in higher policy levels (conclusion 2).

In conclusion, it is recommended to policy makers that the use of economic valuation of nature is restricted to two instances. First, as a facilitation for financial schemes for nature conservation, but only if clear conservation goals are set and respected, for example about the protection of rare but economically hard to value species, and if both those goals and the personal values of participants are clearly expressed and at the foundation of the scheme. Second, as a communication of the value of nature, but only if it is framed in a combination with other values that reflect human-nature relationships in which nature has intrinsic values and plays a role in living a meaningful life.

5.2.2. Maintain a strong focus on nature conservation goals in environmental policy.

Ecosystem services will probably be here to stay as a piece of the puzzle in environmental management for its usefulness to address the social and economic aspects of environmental policy. However, embracing ecosystem services in environmental policy as a replacement concept for nature conservation may not necessarily help to support that nature conservation. Chapter 3 shows that the Horizon 2020 documents, for example, do not mention economic valuation in their environmental research plans, but their embrace of ecosystem services has nevertheless replaced direct calls for nature conservation to vaguer anthropocentric goals. Therefore, a detachment seems to be in order, detaching nature conservation goals from ecosystem services goals. As Schröter and Van Oudenhoven (2016) and Wilson and Law (2016) argue, ecosystem services has a lot to offer to modern nature conservation, but ecosystem services as a concept is so broadly useful that any pretense of using it for nature conservation, or indeed any other goal such as equitable management of services, should be regarded with scrutiny.

Wilson and Law (2016) argue that nature conservation practitioners should be on the lookout for so-called perverse outcomes if they operate within an ecosystem services framework for conservation, and suggest six steps to safeguard a positive outcome for biodiversity objectives. Spash and Aslaksen (2014) as well call for a stronger ecological rhetoric in environmental policy, in which ecological indicators inform our environmental management. It is a call back to earlier times in which the goals of nature conservation itself were not yet obscured by ecosystem services and economic language.

In addition, a growing body of literature now aims to reframe or reposition ecosystem services in such a way that its positive aspects are maintained, while human-nature relationships are given a stronger expression. For example, Laurila-Pant *et al.* (2015) suggests an ecosystem-based management framework, in which socio-cultural preferences and ecological indicators are both given a clear and present role, and economic valuation is only used to make understandable comparisons of values on a global level. According to Mace (2014), this literature is part of a new trend of framing conservation in a narrative that links nature to cultural structures and resilient societies. In a similar vein, Folke *et al.* (2010) explore how to think about resilient social-ecological systems. Part of this new trend is the recognition that ecosystem services is just one metaphor and should find its place among multiple metaphors about human-nature relationships, and that each metaphor could be granted space in ecosystem management. Following Raymond et al. (2013), the *economic* metaphor contributes to cost-benefit analyses, the *stewardship* metaphor identifies non-monetary behavior that enables conservation, the *web of life* metaphor identifies important natural drivers of change and the *ecocultural community* metaphor describes cultural connections with landscapes and local narratives. As argued by Spash and Aslaksen (2014), in using only the *economic* metaphor, we may lose sight of structural causes of environmental degradation in our political and economic systems, and ecosystem services should therefore be embedded in a new social-ecological economics approach that gives voice to both various human-nature relationships and illuminates structural causes of environmental degradation.

5.4 Final word

A sign of current trends in nature conservation is that the research topic for this thesis might become rare in the future. The research was done as a part of a European FP7 research project, BIOMOT, and this same project lit up as a data point in chapter 6, which was about the word use in FP7 research programmes. As chapter 6 clarified, the thematic emphasis of the BIOMOT project away from ecosystem services and towards other expressions of value has proven to be unique among the accepted research projects in FP7 and Horizon 2020. In the years following the start of BIOMOT, the open call descriptions of FP7 and the objectives of accepted research projects have fully embraced ecosystem services as a working and adequate expression of the value of biodiversity. Scrutinizing this development, as BIOMOT attempted, seems a final effort of a bygone era in this particular policy circle. If this thesis raised your interest or your concerns about whether we are on the right path on higher policy levels, then this is an unsettling realization.

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