

Paper title: An empirical analysis of institutional demand for Valuation Knowledge

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Abstract

The ecosystem services literature rests on the premise that an increased understanding of ecosystems, ecosystem services and, in particular, the value of ecosystem services will feed to decision-making. Yet, there is little evidence for the assumed demand and applicability of valuation knowledge in real-life policy and decision-making processes, and the use of such knowledge has received little in-depth analytical attention. Motivated by these observations, we have conducted an empirical analysis of ecosystem service value knowledge use. Our analysis of policy actors' experiences and expectations regarding value knowledge in Finland's peatland policy draws on eleven interviews with policy actors. Focusing on the usefulness and uses of valuation knowledge, we analyze the ways in which values are framed and value knowledge is expected to influence the rights to use ecosystem services. Our analysis shows that policy actors expect a better understanding of ecosystem service values to support the consideration of benefits. Yet, what they view as crucial knowledge needs aligns with their sectoral or organizational position as well as the interests they represent. Hence, valuation does not provide a solution to distributional debates or conflicts over rights, but it can have an important function as the provider of background knowledge.

Keywords: Ecosystem services, valuation, decision support, institutional demand, rights, interests

1. Introduction

The ecosystem services literature makes the assumption that, as new knowledge is produced, the increased understanding of ecosystems, ecosystem services and in particular the estimated value of ecosystem services will feed into decision-making (De Groot et al., 2010; Potschin and Haines-Young, 2011). Similarly, research efforts directly targeted at policy are justified with the assumption that insufficient understanding of the value of ecosystem services constitutes a major bottleneck for integrating ecosystem service considerations in decision-making and policy (e.g., MEA, 2005; TEEB, 2010; IPBES, 2016). Yet, there is little evidence for the assumed demand and applicability of valuation knowledge in real-life planning and decision-making processes. Environmental philosopher John O'Neill has provocatively said already in 1997: "Environmental managers manage without prices" (O'Neill, 1997, p. 546). Advocates of ecosystem services valuation should be interested in challenging such claims, but it appears that they have little to draw on. In an extensive review of ecosystem service valuation knowledge use, Laurans et al. (2013) find that only a minimal fraction of analyses of ecosystem service values have paid any attention to operational use of valuation knowledge. This observation has motivated our study.

The expected uses of ecosystem services valuation knowledge include awareness-raising, evaluating the status and trends of ecosystems, ranking different alternatives for decision-making as well as policy instrument design, litigation and compensation (TEEB, 2010; Gómez-Baggethun and Barton, 2013; Schröter et al., 2014). Echoing these potential uses, Laurans et al. (2013) organise the intended uses of valuation analyses into informative, decisive and technical. The limited detailed empirical analyses of ecosystem knowledge use have, however, shown that the intentions and expectations exceed what is observed in practice (Fisher et al., 2008; Laurans et al., 2013). Indeed, decision-makers rarely apply the concept of ecosystem services even if they are aware of it (e.g., Plant and Ryan, 2013;

Rinne and Primmer, 2016) and it has even been found that those who have worked with the concept see less applicability than those who lack direct experience with it (Albert et al., 2015). Recent systematic analyses have shown that settings, where the ecosystem service assessment has been designed in collaboration with the potential users and where users consider the produced knowledge legitimate are more likely to make use of ecosystem service knowledge into use (Ruckelshaus et al., 2015; Posner et al., 2015; Dick et al., 2017). Despite the unclear diffusion of knowledge on ecosystem services and their values, decisions on ecosystem services are made every day, based on those knowledge sources and knowledge management practices that decision-makers have readily at hand (Primer and Furman, 2012; Primmer et al., 2015).

The more critical literature on valuation emphasizes the difficulties in measuring and comparing different value dimensions and the problems of placing a price tag on biodiversity. Examples are found in economics and philosophy already in the 1990s (Vatn and Bromley, 1994; O'Neill, 1997; Martinez-Alier, 1998). The rise in ecosystem services research has resulted in heightened criticism against valuation, highlighting incommensurability and the problems with commodification (Gómez-Baggethun et al., 2010; Kallis et al., 2013; Schröter et al., 2014; Chaudhary et al., 2015). This criticism draws attention to the difficulty in capturing the complexity of ecosystems (Norgaard, 2010) as well as different assessment or valuation domains, or value plurality (Martín-López et al., 2014; Chan et al., 2016). Value plurality and incommensurability are indeed somewhat related. In both cases, values might reflect goals that cannot be measured on a uni-dimensional scale – even with the smartest analytics – and hence trade-offs cannot be defined on a single utility function. However, while incommensurability means that a common measurement unit does not exist, the notion of value plurality might allow some deliberation or negotiation (Smith, 2003). Further, such deliberation could reveal that values might be experienced by different beneficiaries or stakeholders in ways that cannot be assessed without addressing the rights of these groups to the ecosystem services (Fisher et al., 2008).

The above criticisms can be read as indications of the need for caution in developing and interpreting the assumptions, methods and outcomes of valuation. Another recent critique is even more pronounced and confrontational. Renown ecologists have voiced a strong plea against pricing, drawing on a mix of arguments on intrinsic value and the inherent anthropocentric and utilitarian nature of the ecosystem services concept (Morelli and Møller, 2015; Silvertown, 2015). In particular, these ecology-driven papers convey concerns over valuation knowledge being used by decision-makers and influencing practice.

From the critical literature, and from more decision-making and governance oriented analyses we know that value expressions and measurements range from verbal statements of worth to quantitative and single-metric monetary estimates (e.g., Spash, 2007; Kenter et al., 2015; Schultz et al., 2017). They reflect individual preferences and socially construed meanings (Vatn, 2005; Vatn, 2009). Indeed, the values of individual decision-makers have been shown to only partially align with the dominating collective values (Primmer et al., 2017). In practice, decision-makers are likely to hold values shared in their immediate professional context and advocate the interests of their organizations (Oliver, 1991; Scott, 2013). While the ecosystem services literature has addressed organizational interests and values rather sporadically, the ability or inability of valuation to consider public interests and the public good character of ecosystem services has been a major target of analysis – and criticism – in valuation studies (Spash, 2007; Gómez-Baggethun et al., 2010). Whose values are represented in decision-making and who would benefit from valuation is an important consideration when designing applicable valuation studies.

As a response to the criticisms, increasingly integrated approaches to valuation are developed, engaging stakeholders and drawing on the accumulating conceptual work in the area (IPBES, 2016; Jacobs et al., 2016; Pascual et al., 2017). Placing ambitious normative

targets on valuation, Kallis et al. (2013) suggest that valuation should harness sensitivity to value plurality and a consideration of ecosystem services as public goods and, further, advance environmental improvements and a more equal distribution of rights to ecosystem services. Although this kind of ambition might seem radical, it goes hand-in-hand with the older consideration of whether valuation knowledge can be used at all (Vatn and Bromley, 1994; O'Neill, 1997). The inclusiveness of valuation would, however, need to be built on a solid understanding of who the relevant stakeholders are: whose interests should be secured, and whose interests would need to be strengthened?

Against this backdrop, we have designed an empirical study to analyze the demand for value knowledge in a specific policy setting. The context is a National Peatland Protection Program in Finland (Ministry of the Environment, 2015), a country where more than a quarter of the land surface is mire or peatland. This carefully designed program followed the Peatland Strategy (Government of Finland, 2012) that addressed peatland ecosystem services explicitly. The Peatland Protection Program was tabled by the Minister of the Environment in 2014, and the program is now constrained to focus on the nationally most valuable sites. The controversy that followed this political move grew further with the following government's ambitious bio-economy goals that implied a rise in the use of bioenergy, relying also on peat as a source for fuel (Government Programme, 2015). Finnish peatlands have been shown to produce a range of ecosystem services, for which there are trade-offs and sustainability thresholds in particular with peat mining (Kosenius et al., 2014). The inhabitants of peatland-rich areas value the partly incompatible uses in divergent ways, reflecting their interests towards either conservation, or production of peat and timber (Tolvanen et al., 2013). The actors involved in preparing the Peatland Strategy and the ensuing National Peatland Protection Programme included relevant ministries, agencies and NGOs representing ecological, economic and social goals, or interests. Our study takes these national level policy actors to represent the potential institutional demand for value knowledge.

We seek to understand the ways in which the actors involved in the policy processes described above have used ecosystem service value knowledge for informative, decisive and technical purposes, and their expectations regarding the use of value knowledge in future planning and decision-making processes. We examine the assumption that lack of ecosystem service value knowledge is a bottleneck for integrating ecosystem services in decision-making and, in particular, pay attention to different societal interests related to ecosystem services.

The qualitative analysis of interview data aims to answer two descriptive questions:

1. How are ecosystem services and their values framed in national peatland policy?
2. What expectations do policy actors place on value knowledge?

Drawing on these, and searching for connections between theory and practice, the analysis aims to answer also an analytical question:

3. In what ways can value knowledge influence the allocation of rights to ecosystem services?

In the following, we describe the decision-making context in which our analysis takes place, and our research design. We then report the interview results and discuss our findings against the ecosystem service and valuation literature, and draw conclusions about the match between valuation analyses and the needs of decision-making.

2. The ecological and institutional context: peatlands

With peatland and mires representing clearly over a quarter of Finland's land surface, the over 9 million hectares host a range of different land-uses. Two thirds of the peatland area is used for forestry and 0.3 million hectares are in agriculture use. This area is largely

drained but the drainage of the least productive forested peatlands will not be maintained in the future (Government of Finland, 2012). Although new draining has almost stopped, the existing ditches generate impacts on surrounding peatlands and their maintenance continues to influence the water balance, maintaining an altered ecosystem (Nieminen et al., 2017). Half of the peatland habitat types, in particular the fertile ones, are endangered because they have been attractive for conversion (Auvinen et al., 2007; Government of Finland, 2012; YM, 2015). Current protected areas cover 1.2 million hectares of peatlands, while 0.07 million hectares are used or assigned for peat extraction, mostly for energy production. Some of the peat production reservations are on areas that have been evaluated to have high nature values, but the recent decisions ease this potential source of conflict by clarifying the status of nature values (Government of Finland, 2012; Environmental Protection Act, 2014).

Since 2014, the Environmental Protection Act has mandated an evaluation of the nature values of national or regional significance unless a master plan or zoning of the area already protects these values. According to this law, peat mining is forbidden in case it deteriorates these values. In areas that have been altered due to drainage, nature value evaluation is not required. In addition to the environmental permit, peat mining can be subject to a water permit as well as environmental impact and nature value assessments.

The preparation of the above described formalization of the consideration of nature values in the governance of peat production aligned with two important policy programs; one focusing on ecosystem services and the other one on biodiversity. The first one was the Government 'Decision-in-Principle on the Sustainable and Responsible use of Mires and Peatlands' in 2012 (Government of Finland, 2012), often referred to as the 'Peatland Strategy', which was the outcome of a long and inclusive preparatory process. The strategy used the ecosystem services framework to outline the range of benefits that peatlands produce, and to acknowledge the role of biodiversity in peatland ecosystems. As such, the strategy was a frontrunner policy in applying the ecosystem services concept and classification. The strategy noted the water quality impacts of farming and peat production, but justified the continued peat mining with the energy security that a domestic fuel source would provide. The Peatland Strategy identified a need to exclude the areas with high biodiversity values from conversion. It included a suggestion for a classification system of the natural status of sites to guide land-use planning and an assessment of nature values on peatlands to operationalize this grading. The Strategy also proposed advancing restoration and developing a new national protection program.

The second important program, a follow-up from the Peatland Strategy, was the Supplementary Programme for Peatland Protection (Ministry of the Environment, 2015). This program, labelled 'Peatland Protection Programme' was based on a careful spatial assessment of conservation values and was exposed to a public hearing, which ended up polarizing biodiversity conservation and ecosystem services on the one hand and production of peat and timber, on the other (Salomaa and Paloniemi, 2014). The discussion reflected also a heated debate on whether voluntariness would work in peatland conservation (Salomaa and Paloniemi, 2014), drawing on the experiences of the popular biodiversity conservation scheme called Southern Finland Forest Biodiversity Program (METSO) (Primmer et al., 2013). The Peatland Protection Program was tabled by the Minister of the Environment in 2014, and its preparation was narrowed down, with a focus on the nationally most valuable sites in 2015.

These program preparation processes represent a typical natural resource policy process in Finland. Nature conservation and forest policy have been prepared through broad-based consensual programs for decades; peatland specific protection programs have been accepted already in 1979 and 1981. In particular, the broader programs represent compromises between competing interests but, at the same time, they generate a predictable institutional environment for more specific policy design and implementation

(Primmer and Kyllönen, 2006; Primmer et al., 2013; Harrinkari et al., 2016). Making use of this type of processes represents a Nordic model, in which consensual national programs link sector specific issues to adjacent sectors through broad-based consultations, often preceding legislation (Kettunen and Kiviniemi, 2006). Our analysis targets this type of national policy context, which is why we have selected our interview sample to represent those actors who have participated in the recent program processes.

3. Methods

Our study focused on national level actors who were involved in the peatland program processes. With the aim to understand how ecosystem service values were recognized, what expectations the actors had for new valuation knowledge, and how valuation knowledge could influence the allocation of rights to ecosystem services, we designed an interview protocol (Table 1). The first question was about the decision-making processes, in which the interviewee had been involved. Questions 2-5 were about the ways in which ecosystem services and their values had been addressed in the interviewees' experience, and questions were 6-10 about how systematic ecosystem services value information could feed to decision-making and what impacts it would have. We did not distinguish between monetary and non-monetary values or valuation methods in our interviews.

Table 1. Interview questions.

1. Which decision-making processes have you been involved in?
 2. What benefits or ecosystem services are identified in decision-making?
 3. Does decision-making consider ecosystem service values?
 4. What ecosystem services are appealed to in decision-making?
 5. Whose values are recognised in decision-making?
 6. Would systematic ecosystem service value knowledge be useful in decision-making?
 7. Which decisions could value information influence?
 8. Who would use value information?
 9. Who would benefit from systematic value information?
 10. Would someone suffer from systematic value information?
 11. Could value knowledge change behavior, power relations or rights?
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The interviewees were chosen from among national level actors who had played a key role in the recent peatland program processes as stakeholders (representatives of NGOs) or public authorities (representatives of the Ministries of Environment, Agriculture and Forestry, Commerce and Industry) (Table 2). The ten interviews with 11 interviewees (one interview session involved two interviewees) were conducted between mid-January and mid-March 2016. All contacted actors agreed to give a face-to-face interview and to the interview being recorded. The interviews lasted 30-70 minutes and produced 4-11 pages of transcribed text each (the recorder failed in one interview, but notes were taken).

The material was analyzed following the ideas of Laurans et al. (2013) searching for informative, decisive and technical ways in which notions of values had been used as well as the ways in which potential systematic valuation knowledge could be used. We also looked at benefit distribution and rights because they are themes in conceptual literature on ecosystem service valuation, as summarized in the previous section. After this, we analyzed the emerging themes of interest and positioning in a grounded fashion. The analyses were led by the lead author and they were iterated with the co-authors.

Table 2. The 11 interviewees, the sectors they represented and the decision-making processes in which they had been involved.

	Sector				Decision-making process¹			
	Nature & enviro-ment	Agri-culture & forestry	Energy/peat industry	Re-creation	National Peatland Strategy	Peatland protection progr.	Permits and legal proced.	Zoning & land-use planning
Env admin	2				2	1		
Agric & forest admin		1			1			
Forest admin		1						1
Industry admin			1		1		1	
Peat industry			1				1	
Env NGO	2				1	1	1	
Landowner NGO		1			1			
Bioenergy NGO			1					1
Recreation NGO				1				1

¹Includes also all processes that the interviewees listed themselves.

4. Results

4.1 The framing of ecosystem services by different actors

All the interviewees were familiar with the concept of ecosystem services. Many said that the concept had been used in the policy processes they had been involved in, in particular in the Peatland Strategy (Table 2). Additionally, some of the interviewees were following the discussions on ecosystem services in the European Union. Most interviewees used the ecosystem service terminology (e.g., provisioning, regulating and cultural services), while some repeatedly used the more traditional terminology of impacts, drawing on examples of environmental and water impacts, or referring to local or social impacts. Together with these traditional framings, attention was paid to products, such as timber, peat, berries, fuel or medicines, as well as recreational and multiple uses of peatlands. The ecosystem services framing was used by all types of interviewed actors, while the more traditional description of impacts and products were used by the more production oriented interviewees, from both NGOs and administration. Also the environmental NGOs expressed their concerns with impact framings.

Consistent with the goals of the Peatland Protection Programme, the environmental administration interviewees emphasized the importance of protecting ecologically valuable and endangered peatland habitats and species. They framed ecosystem services in the peatland context mainly as cultural services, highlighting recreation, which they considered

important particularly for regional and local level policy and decision-making. They also emphasized the role of peatlands as a carbon sink and referred to the role of peatlands in controlling floods and maintaining good a quality of water bodies. Other administration interviewees, representing natural resource management and industry, used the ecosystem services concept to organize the range of different types of services of peatlands. They emphasized provisioning services, including peat for energy, timber and other products as well as a broad range of their different uses in long value chains, up to cosmetic industry. These interviewees also recognized the role of peatlands in recreation, carbon sequestration, and water quality regulation, but in their view, the large amount of peatland in Finland allowed peat extraction and other economic uses without these functions being seriously harmed. Some pointed out that peatlands would have a capacity to provide services also after peat extraction, e.g., as farmland or artificial wetlands. One natural resource administration interviewee suggested the term 'services' denoted something that forest and farmland owners could provide to markets; for example, beautiful landscapes, recreational opportunities, or carbon sequestration.

The environmental NGO interviewees framed ecosystem services essentially as life-supporting regulating services, referring to carbon sequestration, water purification or flood control. They regarded cultural services such as berries and recreation important, but pointed out that also these were ultimately dependent on healthy and functioning ecosystems. They also referred to the crucial role of biodiversity in ecosystem functioning and resilience: "It is a question of drawing a line at how many species you can remove until the house of cards collapses, you never know in advance." The recreational NGO interviewee put emphasis on human well-being when addressing ecosystem services and highlighted the health benefits derived from peatlands. The accessibility of peatlands as attractive landscapes was a key concern.

The NGO interviewees representing peat production and land-owners were more oriented towards provisioning services. They framed the concept of ecosystem services as co-produced by ecosystems and humans who shape their environments and create cultural landscapes and other cultural ecosystem services. One interviewee pointed out that as farmers had a long tradition of living in close interaction with nature, the notion of ecosystem services served to make this role visible. It could give farmers the due credit for providing essential provisioning services and maintaining ecological processes and cultural landscapes. Coupling the connection to land with a framing of ecosystem services as a source of income and livelihood, one interviewee said: "We are not asking money but it would be important that the society appreciated the effort. And of course, if there will be business, like nature tourism, then the land owners should have their share for keeping the paths clear." An industry interviewee was wary of the ecosystem services concept, worrying that it would pose yet another constraint on peat extraction, on top of already existing heavy restrictions from protection programs, environmental legislation and appeal processes. The interviewee said: "If there is a balanced view of ecosystem services, and also production services are included, then it is fine. But unfortunately I am afraid that they are often overlooked and only these preserving and regulating services are included [in ecosystem service considerations]".

Some interviewees emphasized the unavoidable trade-offs in peatland ecosystem service provisioning and the need to find an appropriate balance between the conflicting uses of peatlands. These were also those actors who saw most need for ecosystem service value knowledge to support planning and decision-making. The different framings clearly influenced the ways in which the actors perceived the need for ecosystem service value knowledge in awareness-raising, decision-making and operative management decisions.

4.2 Use of value knowledge

4.2.1 Awareness-raising

The interviewees who embraced the concept of ecosystem services shared a view that a better understanding of the links between ecosystem structures and processes, and the benefits that people derive from ecosystem functions, would increase the appreciation of biodiversity and ecosystems. Ecosystem services and their values were considered complex and hard to communicate, especially to ordinary citizens. The effort of addressing ecosystem services was nevertheless seen as beneficial: "It is complicated, but even just admitting the complexity is good". There was an idea of informing or even educating citizens. In one interviewee's words: "We want them to understand ecosystem services, as understanding will lead to consideration". Information was also seen as a tool for combatting current ignorance of the role of biodiversity in functioning ecosystems: "Only a fraction of people understand that species cannot be gradually eradicated". Several interviewees nevertheless pointed out that the concept and terminology of ecosystem services is very complicated and hence not amenable for awareness-raising campaigns as such. Instead, ecosystem services need to be communicated in simple terms that resonate with people's everyday practices; in one interviewee's words: "The ecosystem services from aquatic ecosystems are very concrete to citizens, like whether the water at the shores of your own cottage is filthy, whether you have to take a shower after you swim, whether you can catch any fish in your lake, or rent your cottage to German tourists." Some brought up the need to raise awareness among land-owners and others emphasized the need to raise awareness about the role of land owners in producing ecosystem services.

As ways of raising awareness, the interviewees brought up the importance of making use of biophysical knowledge about the state of the environment and the changes in it, rather than value knowledge. One interviewee said directly: "It is the knowledge about the environmental change [...], not the value [knowledge] that matters". Some interviewees spoke about the need for decision-makers to learn from citizens through valuation, but not in monetary terms: "More than monetary values or a price tag, we need [knowledge about] people's appreciation of recreation opportunities and their experiential, often long-term connection [with nature]."

In connection with awareness-raising arguments, many interviewees expressed concerns about the balance in the evaluation of ecosystem services and their values. Several interviewees said that there was a tendency to recognize and highlight the well-known provisioning services, peat in particular, and to some extent also berries, while the less obvious benefits like water purification and carbon sequestration or medicinal products, would still go unnoticed. Others considered that environmental issues like endangered species and habitats had already received too much attention at the expense of natural resources and production, and feared that awareness-raising would be skewed towards biodiversity values.

4.2.2 Decision-making

In terms of utilizing ecosystem service valuation to support decision-making, most interviewees pointed out that information on the flows of ecosystem services was not sufficient for quantifying them, even in biophysical terms. Some interviewees emphasized the need for quantifiable information for reasoned decision-making, but maintained that biophysical indicator knowledge would often do the job better than monetary estimates: "Numbers are needed, but not necessarily euros." It was also pointed out that despite the 'hype' around ecosystem services, some of it was based on assumptions that had not been practically proven or scientifically shown. For example, the assumed capacity of peatlands to provide flood protection was questioned with references to studies showing that Finnish peatlands could not absorb significant water masses, especially during the spring floods when the peatlands were already saturated. The value of such ecosystem functions could not be estimated, in monetary terms in particular. The need for a better understanding of the

biophysical processes was clearly connected with the ideas of valuation supporting decision-making: "If it was somehow science-based, so that you could show it is more facts than fiction, it should start to have an impact on decision-making, even on economic decisions."

Some felt that value information would be useful for decision-making through concretizing benefits, such as water purification. These interviewees used practical examples. For example, the drainage waters from forestry operations could be lead through peatlands, which could absorb nutrients, like artificial wetlands constructed for the same purpose. It would be possible to calculate a monetary estimate for a ton of removed phosphorous. As another example, the (economic) value of ecosystem services was said to be increasingly recognized in nature tourism, which was described to be a rapidly expanding sector, exceeding the extractive sectors in generating income in some areas. The interviewees referring to concrete decision-making settings also recognized the potential of systematic valuation for decision-making: "We live in a world of scarce resources so we need sacrifice something to achieve something else, and money is one unit to measure these [trade-offs]".

Even those interviewees who saw some potential in value knowledge supporting decision-making – which most interpreted as monetary value information – readily pointed out the potential problems or dangers in monetization of ecosystem services. For example, one interviewee who maintained that monetary estimates would carry more weight than verbal statements of value was nevertheless very sceptical about the valuation instruments to capture all kinds of values: "[Decision-makers] tend to think that if you can show us the euros, then we will take them [ecosystem services] into account. But I don't think that everything can be monetized. You might be able to measure the value of health in euros—how much your illness will cost to the society in terms of absence for work, for example—but you cannot measure general well-being."

Several interviewees said that nature could not be valued in money terms. In particular the environmental NGO and administration interviewees based these reservations on ethical reasons: the intrinsic value of nature or planetary boundaries: "Some ecosystem services are invaluable, like producing oxygen and nutrition, water purification, and would have an infinite price." These interviewees also warned about commodification of nature, for example: "If nature has a price tag, this implies that it is for sale, if someone can afford to pay for it." Ethical reasons against monetary valuation were evoked also from the land owner perspective. Some interviewees pointed out that decisions over privately owned natural resources should not be based on individual citizens' preferences expressed in hypothetical markets because survey respondents did not have a direct stake on the issue; as one interviewee said, "Willingness-to-pay research is interesting as such but it is quite fictional. You will not want to pay the amount when you are faced with the decision in practice." Also when considering the uses of valuation knowledge, the non-existent markets for pricing were brought up as a problem: "You do not really have the demand side for these things. The buyer is the government anyway."

4.2.3 Technical decisions

At an even more technical level, i.e., in the design and implementation of specific policies and plans, the interviewees brought up both doubts and positive examples of ecosystem service value knowledge.

Some interviewees mentioned valuation processes that they had been involved in, or exposed to, which had supported management decisions. For example the Northern Ostro-Botnian Master Plan had compared the provision of different natural resources. At a very practical level, some kind of assessment was considered to be a part of the existing practice, even if it was narrow: "Every time a forestry operation is conducted on peatland,

assess costs and benefits.” However, most frequently the concrete examples mentioned by the interviewees were of uses of traditional criteria in decision-making, rather than valuation. These included inventorying endangered species for protected area targeting and assessing water impacts in permit evaluation: “We do terribly many assessments, we need to know the species and habitat types, so in these cases endangered status is the value, not to mention if the species is protected by the Environmental Protection Act. And similarly, ground water is secured with a very strict precautionary principle.”

The identified challenges of valuation supporting management decisions had to do with standardization and comparability. As one interviewee pointed out, [Monetary valuation] “would have to be very easy and light, we can’t have experts conducting the assessments every time... Valuation knowledge would need to be comparable and generally understood and produce the same result everywhere and be very clear; as clear as forest income loss.” The scale at which valuation would be conducted was another challenge for standardized valuation and management support. Comparing or thinking of values in an explicit fashion across scales was difficult: “Some bathing peat extractor will consider the value [of peat] as a matter of life and death, even though it is provisioning value. They will use the couple of acres for 10 years. ... if someone looks at this site from the landscape level, it will make absolutely no difference.” Scale was also an issue for what would be detected. Some were concerned that too many nature values could be detected in a fine-scale site specific analysis, as every site would have some nature values. Others thought that detailed analysis would be needed, as it would be the only way to capture nature values.

Overall, the interviewees talked more about potential uses than practical experiences in management decisions: “Perhaps the hydrological and chemical ecosystem services could work as an opener. We could compare how much these services are worth compared to artificial purification. The same could work for climate if we realize that the cheapest way to reduce emissions is to avoid land-use change. But we are far from this.” Regional land-use planning, zoning by municipalities and forestry or restoration plans were mentioned as examples of potential uses. Administration at different levels, or land-owners and companies needing permits, were foreseen as users of valuation knowledge.

4.3 Benefit distribution and rights

Throughout the interviews, policy actors were clearly emphasizing those values that aligned with their organizational goals. The peat and energy sector interviewees would promote peat extraction and use values. One interviewee said explicitly: “We appeal to economic and employment values because it is our mandate.” Interviewees representing agriculture and forestry spoke for drainage to support timber and food production, interviewees from the environmental administration and NGOs promoted conservation values and the recreational NGO interviewee would advocate and justify the recognition of recreational values. The representatives of the various administrations would describe the acknowledgement and weighing of different values in more holistic and nuanced terms than the NGO representatives, and they also highlighted balancing between different interests and uses, as one interviewee said: “Politicians and public servants hear the full range of stakeholders and then look for compromises.”

The NGO interviewees repeatedly positioned the values that they represented in minority, making a claim that the values reflecting interests other than theirs had been emphasized recently and weighed more in current decision-making. They feared that also new valuation knowledge would be used against their interests. Depending on what interest the NGO represented, they worried that new knowledge would benefit mostly either conservation or peat extraction. When asked who would suffer from systematic value knowledge being available, a natural resource use representing interviewee said: “those producing and using provisioning services” and an environmental sector interviewee said: “The benefits might

be reaped by those who want to sell the last habitat as long as there is someone to pay.” However, there were examples of interviewees also acknowledging that their own interest had been represented in decision-making thus far. Peat extraction was considered to be the starting point even among many of the natural resource use sector interviewees and some of them said that market values for provisioning services had gained most weight in decision-making thus far.

The interviewees identified some fundamental conflicts over the rights that they thought valuation could potentially help resolve. Some interviewees pointed out that peatlands might be more straightforward for addressing rights with systematic valuation information than many other ecosystems, e.g. forests or shores. Compared to these ecosystems, peatlands were considered abundant, peripheral and of low in economic value. The discussion about rights to different peatland ecosystems was experienced to be very polarized. One interviewee said “We talk about something like the non-drained peatlands and quickly end up in an open fight.” Partly this was considered to be about long-standing grudges between conservation and use. One interviewee said: “Land-owners hate [nature] protection so badly that what they have conserved at their own will for generations, risks getting destroyed as soon as it is assigned to a protection program.” This kind of behavior was, however, considered to be “an outdated claim” by another interviewee – and several said that nature values and recreation were increasingly appreciated and taken into consideration also by landowners.

The rights of private landowners were brought up by several interviewees representing natural resource use. These interviewees highlighted land-owners’ rights to the ecosystem services on their land, and also their responsibility and role safeguarding the value. Some feared that new value information would be openly accessible and this could reduce the autonomy of land-owners. One interviewee pondered about these issues as follows: “private land-owners might lose some of their rights if someone says that the nature values constrain production - or should the land-owner be compensated for not being allowed to use the land?” Also one environmental sector interviewee brought up land-owners’ rights – but with a view that land-owner rights kept on being strengthened all along. Another argumentation line drawing on claims about rights was simply justifying the use of peat and peatland for production as an important part of the local and national economy.

The interviewees considered benefit distribution through examples of policy instrument applications that might make use of ecosystem service valuation and redistribute rights. The range of identified potential applications was broad, including industry paying for the use of provisioning services, land-owners paying for water or for the loss of recreational value, and land-owners being paid for providing recreational or scenery values. Water pricing was brought up as an example that might put land-owners’ livelihoods at risk. Some of these comments were quite puzzled: “So if someone loses their berry picking site because the land-owner is draining the area, should they be obliged to compensate for it, or if they cannot do the drainage because of the berry picking, who should compensate in that case?” Some were provocative: “Even the Chinese who has money to buy it all would have to invest in restoration, to apply a precautionary principle.” The justifications for feeding valuation knowledge to new regulation were less heated and more straightforward: “Clearly all the new considerations would need to be somehow legally supported.” Perhaps echoing the argumentation leading to the recent environmental Act amendment, one administration interviewee said “Behaviour usually changes only once there is regulation in place.” Despite these exemplary ways of addressing the distribution of ecosystem services, benefits and rights in ways that could relate to ecosystem values, the interviews showed that policy actors consider rights in their operating contexts all the time.

5. Discussion

Our analysis has been motivated by the observation that lack of ecosystem services value knowledge is seen as the bottleneck for sustainable decisions (De Groot et al., 2010; TEEB, 2010; Potschin and Haines-Young, 2011; Schröter et al., 2014), but the use of this knowledge in decision-making has received little analytical attention (Laurans et al., 2013). The ecological-institutional context where we empirically analyze the recognition of values, the expectations for new systematic value knowledge and the consequences valuation might have on policy, is the Finnish peatlands. As the concepts of ecosystems and nature values have entered the framings of Finnish peatland policy – ‘nature values’ even in legislation – the national level policy actors who have worked with these processes are tuned to thinking about values and valuation ideas. According to our interviews, peatland policy actors show an understanding of, and familiarity with, the ecosystem service concept and the practical opportunities and constraints of valuation. Interestingly, indeed, the most practically oriented policy actors who have connections to local level decision-making processes appear most skeptical about the operational use of valuation. Drawing on examples of existing management systems and decision-making debates, they doubt valuation knowledge could feed to practice in a systematic, yet meaningful, way. At the same time, those actors who operate mostly at national level are more optimistic, yet recognizing challenges that have to do with ethical and political considerations.

Our analysis shows that use values are typically contrasted with protection values. Indeed, the discussion surrounding decision-making is quite focused on the conflict between the extraction of peat and protection of biodiversity and water, as has been shown in earlier analyses of peatland values in Finland (Tolvanen et al., 2013; Kosenius et al., 2014). The polarization between biodiversity values and use values is apparent; even described as an open conflict. The valuation literature is based on the idea (monetary) valuation resolves trade-offs (De Groot et al., 2010; Martín-López et al., 2014) and ideally produces balanced ecosystem service provision and generates impacts (Ruckelshaus et al., 2015). However, according to our interviews, trade-off analysis has not been conducted, nor is trade-off analysis proposed as a potential use for valuation knowledge. The stalemate between the opposing positions of protection and use seems to have the capacity to distort, if not override, the different potential uses of valuation knowledge, in particular awareness raising and decision-support.

Our results point to interests driving the expectations regarding the use of valuation knowledge. It has been recognized already valuation should address the distinct and conflicting interests as well as the strategic use of value arguments (Spash, 2007; Primmer et al., 2015). Valuation could be used to illustrate different uses and impacts and to prioritize them in policy processes, in a negotiating fashion, which is what Ruckelshaus et al. (2015) suggest as one impact pathway for ecosystem service knowledge. Although deliberative valuation techniques have been developed to mimic the systematic parts of real-life negotiations between interests (Howarth and Wilson, 2006; Lo, 2011), interest negotiation is not at the core of valuation analyses. Ecosystem services valuation aims to solve trade-offs and match multiple values through formal and systematic processes (De Groot et al., 2010; Lo, 2011), while deliberation in policy processes places emphasis on arguments and interests (Smith, 2003; Primmer and Kyllönen, 2006). A genuine deliberation process would allow plural values to co-exist and their relative weight to be determined merely through negotiation (Smith, 2003), rather than through making them commensurable or relying on systematic participant weightings (Saarikoski et al., 2016; Mavrommati et al., 2017). The ecosystem services valuation literature, including literature on deliberative valuation, mostly ignores the strategic interest considerations and interest-driven arguments for balancing values that we observe through our interviews.

Our results show that even some of the already identified valuation challenges that might be considered foremost theoretical or analytical, translate to interest issues. These include scale and incommensurability (Gómez-Baggethun et al., 2010; Schröter et al., 2014). Clearly all policy actors know that peat extraction alters the ecosystem, but their views of

this alteration and its scale differ markedly. For example, those wanting to protect endangered species look for detail, while those who represent use in particular sites would prefer landscape level approaches with less details. Similarly, incommensurability and ethical challenges are illustrated through examples that relate to, and demonstrate, the actors' organizational goals. Those managing and using the natural resource highlight sustainable management and care as normative starting points and hope valuation would provide tools for acknowledging these. They find it problematic, perhaps even ethically risky, to question rights to use peatland. On the other side, those whose position is closer to nature and environmental protection take refraining from use to be the ethical choice and seek support for these arguments. They appeal to incommensurability with apparent fear that measurement and monetization lead to marketization. Based on these findings, it appears that different valuation approaches and different scales of analysis are likely to support different interests, which is why particular methods would always be favored by only a fraction of the policy actors. Although different stakeholders have been recognized to derive different benefits at different scales (Hein et al., 2006; Vatn, 2009), the partially biased use of seemingly neutral arguments is a noteworthy finding. The argumentation of the actors can be seen as strategic in the way that they reason their interest-driven preferences with practical methodological arguments and support them with more abstract terms of incommensurability and scale.

As regards application of valuation knowledge in technical and routine decision-making, our interviews provide many exemplary potential uses, but draw attention to difficulties in systematic use. The interviewed national level policy actors describe many regionally or locally relevant routines that could potentially make use of valuation, including land-use planning, zoning, permit granting as well as restoration and forestry operations planning. However, those with most practical experience identify several challenges. They highlight the sheer difficulty in moving from complex and conceptually driven ideas to concrete and usable transparent tools that would enjoy legitimacy and serve decision-making. The required simplicity has not been at the forefront of the recent developments of ecosystem service valuation for decision-support, other than notions of time and resource requirements (Bagstad et al., 2013), and the concerns of commensurability. The recent analyses of the use of the biodiversity and ecosystem assessment tool, InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs), have also concluded that simplicity and legitimacy are preconditions for usefulness of assessments (Posner et al., 2015; Ruckelshaus et al., 2015). Yet, it remains unclear whether technical simplicity would meet the multi-dimensional expectations of the ecosystem service valuations (Jacobs et al., 2016). Simplification has also been identified as one important risk in ecosystem services valuation, functioning as a 'complexity blinder' (Norgaard, 2011). In any case, our analysis shows that transparency requires direct conceptual links between the phenomena measured and the indicators used for their status. Policy actors indeed repeatedly question the need for monetary values for environmental impacts that can be assessed directly. Based on our findings, it is clear that valuation cannot substitute biophysical impact assessments and that valuation aiming to support technical decision-making should be developed with those who are engaged in such decisions.

An empirical analysis shows that national level policy actors address rights to ecosystem services and benefit distribution with ease. These are issues that they regularly face. Valuation, however, appears more cumbersome, abstract and distant. The administration and NGO representatives differ somewhat as to how they foresee valuation to relate to rights. NGO representatives justify valuation with an economic rationale or a public good and altruistic rationale. They are direct about their position and advocate their goals and concerns with examples of changes in rights that would follow from the application of valuation knowledge. Administration representatives show a more holistic and mediating approach, yet recognizing which rights might become apparent through valuation and perhaps be strengthened or limited as a result. In this consideration of interests, national level policy actors differ from local level and regional planners who have been shown to

frame their work as neutral (Albert et al., 2014; Rinne and Primmer, 2016). The policy processes our interviewees have been involved in have addressed rights to peatlands in a range of ways, including some fierce debates. The legacy of traditional positions of natural resource use versus nature conservation, and property rights versus public goods (Primmer and Rantala, 2003; Salomaa and Paloniemi, 2014; Albrecht and Ratamäki, 2016; Harrinkari et al., 2016), sets the scene for these actors. Dominantly, the interest-conscious national level policy actors see risks in the weight that the application of valuation might bring to the opposing interests. Risks are portrayed as either an increasing marketization or additional conservation.

In addition to valuation indirectly assigning rights through placing emphasis on particular ecosystem services, an important consideration for decision-makers are those steering mechanisms that could re-distribute rights. Policy actors use policy instrument type examples to illustrate how rights might be altered as a consequence of new value knowledge. Compensations and payments for ecosystem services type arrangements familiar from literature (Kosoy and Corbera, 2010; Tallis et al., 2015), are considered by actors, and their redistributive implications are portrayed as opportunities and risks in integrating valuation knowledge to decision-making. On the other hand, the peatland strategy and peatland protection program are quite different policy instruments that already exist. They steer administration and private sector actors in a rather subtle fashion, framing the allocation of rights through regulation. The deliberation on ecosystem services and nature values having resulted in the inclusion of nature values in the Environmental Protection Act (2014), illustrates the power of the national program in setting the scene for changes in binding legislation, which would directly influence peat mining rights. Interestingly, the interviewed policy actors take the newly established legislation for granted and acknowledge the effectiveness of governance through regulation, without identifying apparent uses for valuation knowledge in law drafting.

6. Conclusions

Our empirical analysis of the use and usefulness of ecosystem service value knowledge in Finnish national-level peatland policy shows that the different uses and benefits of ecosystems are framed through ecosystem service conceptualizations, but traditional product and impact framings have not been replaced. The formal acknowledgement of nature values in Finnish legislation and the use of ecosystem service concepts and classifications in policy processes have played a crucial role in generating information and awareness of such values.

Policy actors expect a better understanding of ecosystem service values to support the consideration of benefits. Yet, what they view as crucial knowledge needs aligns with their sectoral or organizational position as well as the interests they represent. Conservation-oriented actors expect valuation to draw attention to regulating ecosystem services and ecological functions so that these aspects would be noted and prioritized more in decision-making. At the same time, production oriented actors expect a more balanced consideration of provisioning services and co-benefits as well as the human activities contributing to these. The new efforts on developing valuation should be sensitized to this kind of interest based demand and use of valuation information. Ecosystem service valuation should consider abandoning the assumption of neutral balancing of different ecosystem services.

The allocation of rights to use or to benefit from ecosystem services, are key concerns of policy actors. Policy-making necessarily deals with conflicting goals and includes negotiating the rights of different ecosystem service dependent and managing actors. Expectations for new knowledge production therefore draw attention to the opportunities for and risks in shifting priorities and, further, changes in rights. Valuation does not provide

a solution to distributional debates or conflicts over rights but it can have a background knowledge generation function.

Rather than as a tool for balancing ecosystem service provision, valuation should be promoted as necessary back-ground knowledge for policy-making. Adding this kind of realism to the expectations is justified also by our finding that actors do not depend on valuation knowledge for making their decisions. As actors rather doubt the operational feasibility of valuation, understanding the institutional demand as expressed in real-world policy-making should be a starting point for any valuation analysis.

Acknowledgements

This analysis has been conducted in the project 'Potential and Pitfalls of Alternative Approaches to Ecosystem Service Valuation (ValuES)' funded by the Academy of Finland (project number 275772). We wish to thank the interviewees for their time and input, without which this analysis would not have been possible.

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