

Université Libre de Bruxelles
Institut de Gestion de l'Environnement et d'Aménagement du Territoire
Faculté des Sciences
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Integrated Ecosystem Service Valuation: From Theory to Practice

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HECK Anna
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Promoteurs:
Prof. Tom BAULER
Sander JACOBS

We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to treat it with love and respect. There is no other way for land to survive the impact of mechanized man, nor for us to reap from it the esthetic harvest it is capable, under science, of contributing to culture.

Aldo Leopold, *Foreword to Sand County Almanac*

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RÉSUMÉ

Le concept de services écosystémiques a fait l'objet d'une attention croissante sur le cours des vingt dernières années. À partir de ses origines dans l'écologie et l'économie, il a évolué pour devenir un objet-frontière, qui ne présente pas seulement un intérêt pour les diverses disciplines académiques qui l'étudient, mais aussi pour les domaines institutionnels et politiques. Il a été aussi bien adopté par des organismes gouvernementaux internationaux que par des organismes intergouvernementaux indépendants, dans l'objectif d'une meilleure conceptualisation et gouvernance des interactions humain-environnement.

Le concept de services écosystémiques n'est pas sans polémique. Une des controverses principales qui l'entoure concerne la manière dont la valuation des services écosystémiques est opérée. Au cours des dernières années, un consensus a commencé à émerger dans la sphère académique, consensus voulant que la valuation monétaire, aussi bien la valuation basée sur un seul service, ne peuvent refléter à elles seules les multiples bénéfices que les services écosystémiques fournissent. Une revendication pour une valuation intégrée des services écosystémiques se fait entendre de plus en plus. Cette évaluation intégrée prend en compte les champs des valeurs économiques, sociales et biophysiques, aussi bien que les multiples perspectives, acteurs et types de savoirs requis pour pouvoir déterminer plus justement les valeurs que nous assignons aux bénéfices que nous obtenons de la nature.

Dans la première partie de ce mémoire, nous traçons le développement historique du concept de service écosystémique, identifiant comment ses racines écologiques et économiques ont contribué à former ce concept et les différentes manières dont nous concevons les valeurs de la nature. De plus, nous examinons les différentes critiques qui entourent le concept et sa valuation, avant d'explorer le pluralisme des valeurs et la valuation intégrée. Nous abordons également le nouveau concept de «nature's contributions to people» tel qu'il a été adopté par le IPBES.

Dans la seconde partie de ce mémoire, nous examinons de plus près les services écosystémiques en Belgique. En premier lieu, nous donnons un aperçu sur le projet BEES et sur la communauté de pratique sur les services écosystémiques qui en est issue. En second lieu, nous nous entretenons avec les acteurs qui sont ou ont été attachés à cette communauté de pratique. Au travers d'interviews semi-structurés et exploratoires, nous visons ainsi à analyser comment les tendances et les débats présentés dans la première partie ont été perçus par les acteurs en question. Nous examinons comment les concepts théoriques de pluralisme des valeurs et de valuation intégrée de services écosystémiques sont utilisés en recherche et en quelle mesure ils sont mobilisés dans l'élaboration de politiques environnementales en Belgique. Nous visons aussi à identifier quelles sont les barrières potentielles que les acteurs rencontrent dans la pratique, barrières qui viendraient compliquer l'utilisation de la valuation intégrée de services écosystémiques en sciences et dans les politiques.

Nous concluons que les acteurs confirment les tendances principales, tout en dégageant certaines nuances. De multiples barrières affectent l'utilisation de la valuation intégrée des services écosystémiques dans la pratique, mais il est apparent que la valuation intégrée de services écosystémiques gagne lentement du terrain comme outil d'aide à la décision, ainsi que comme moyen apte à sensibiliser aux dépendances qui existent entre les écosystèmes et le bien-être humain.

ABSTRACT

The concept of ecosystem services has garnered increasing attention over the past twenty years. It evolved from its roots in ecology and economics and has become a boundary object, not just of interest in various academic disciplines but crossing over into policy arenas. It has been taken up by international governmental bodies as well as independent intergovernmental bodies with the aim to conceptualize and govern human-environment interactions.

The concept of ecosystem services is not without debate. One of the main controversies surrounding it is the way valuations of ecosystem services are concluded. In the last couple of years, there is a consensus emerging in the academic sphere that monetary and single service valuation alone cannot reflect the multiple benefits that ecosystem services provide. Increasingly, there is a call for integrated valuation of ecosystem services, meaning valuations that take into account economic, social and biophysical value fields, but also that multiple perspectives, stakeholders and other types of knowledge need to be included to more accurately reflect the values we assign to the benefits obtained from nature.

In the first part of the paper, we trace the historical development of the ecosystem service concept, identifying how its ecological and economic roots have shaped the concept and how we conceptualize the different values of nature. We further examine the different criticisms surrounding the concept and its valuation, before exploring value pluralism and integrated valuation. We also examine the concept of nature's contributions to people as it has been proposed by the IPBES.

In the second part of the paper, we take a closer look at ecosystem services in Belgium. First, we give an overview of the BEES cluster project and the ecosystem services community of practice that emerged from it. Second, we interview actors that are or have in the past been attached to this community of practice. Through exploratory and semi-structured interviews, we aim to analyze how the debates and trends laid out in the first part are perceived by the actors. We examine how the theoretical concepts of value pluralism and integrated ecosystem service valuation are utilized in research and to what effect they are mobilized in Belgian environmental policymaking. We further aim to identify what (potential) barriers are currently encountered by actors in practice that could prevent the successful use of integrated ecosystem service valuation in science and policy.

We conclude that the actors confirm the overarching trends but with nuances. Multiple barriers affect the use of integrated ecosystem service valuation in practice, but there is a general consensus that the integrated valuation of ecosystem services is slowly percolating, as a useful tool to aid decision-making as well as a way to raise awareness of the dependence on ecosystem services for human well-being.

TABLE OF CONTENTS

Résumé.....	3
Abstract.....	4
Table of Contents.....	5
Table of Figures.....	7
Introduction.....	8
Part I.....	10
1. What are Ecosystem Services?	10
2. Evolution of the Ecosystem Service Concept.....	14
3. Debates surrounding the concept.....	22
4. The Issue of Monetary Valuation.....	24
5. Value Pluralism and Integrated Valuation.....	26
6. The IPBES and Nature’s Contributions to People.....	28
7. Preliminary Conclusions.....	31
Part II.....	32
1. ES services in Belgium: The BEES project.....	32
2. Exploratory Study.....	34
2.1 Goal of the Study.....	34
2.2 Methodology.....	34
2.3 Selection of participants.....	36
2.4 Results.....	37
On ecosystem services.....	37
On the concept of value pluralism.....	41
On the integrated valuation of ecosystem services.....	43
On the BEES community and interfacing.....	49
2.5. Discussion.....	51
Conclusion.....	53

References.....	55
Appendix.....	60

TABLE OF FIGURES

Figure 1: The cascade model: going from supporting services (from structure or process to function) to final services to goods and benefits (from benefits to value). (Potschin and Haines-Young 2011, as cited in Potschin and Haines-Young 2016, 26).	12
Figure 2: “Beyond the cascade: a dynamic system capturing the complex interactions needed to produce ecosystem services at the regional scale, driven by the flows of energy, matter, and information through the system.” (Constanza et al. 2017, 6).	13
Figure 3: The discursive-institutional spiral of ecosystem services (Pre-1977 to 2013) (Chaudhary et al. 2015, 32).....	19
Figure 4 : Illustrating the constant valuation and critical reflection at every step of an integrated valuation. The who, why, what, how, where. (Jacobs et al. 2020)	27
Figure 5 : The IPBES Conceptual Framework: The grey boxes and arrows are the main areas of focus in nature and society for IPBES. Categories of western science are marked in green, the equivalents for indigenous or other knowledge systems in blue. Anthropocentric values are represented in the boxes “nature’s benefits to people” and “good quality of life”, while intrinsic values are represented in the box “nature”. The various arrows denote links between these elements (Díaz et al. 2015, 5).	29
Figure 6: List of participants in order in which the interviews took place.	37

INTRODUCTION

The concept of ecosystem services serves as a way to illustrate the multiple benefits that human beings perceive from nature. It is vital to recognize that “[t]he human species, while buffered against environmental changes by culture and technology, is fundamentally dependent on the flow of ecosystem services” (MEA, 2005a). Now more apparent than ever, it seems as though these buffers are no longer safeguards as the state of our ecosystems only degrades further. Yet, we continue to push far beyond the safe planetary boundaries of the earth system (EEA, Status), and thus not just the conditions for human survival in the future are threatened, but many people are already negatively impacted today. Among the boundaries that have been pushed well above the safe threshold is biodiversity. Yet, biodiversity is an integral aspect to the continued provision of the ecosystem services on which we crucially depend.

The valuation of ecosystem services is no longer a novel concept and has been well established in research as well as environmental policymaking. However, in the past couple of years it has become clear in ecosystem service research that the loss of biodiversity, the decline of ecosystem services across the globe as well as the environmental problems faced by many people today are symptomatic of a larger problem, namely the fact that the values held by different groups of stakeholders are poorly, if at all, represented in decision making processes (Jacobs et al. 2016). In ecosystem service valuation, ecosystems and the multiple benefits they provide are assigned a value, making it possible to judge the processes at play and their importance, and thus to balance trade-offs in resource management and land use decisions. This can be done through single value approaches, for instance in assigning forests a monetary value for their carbon regulating service.

In ecosystem service research, the limits of such an approach have been recognized. A consensus has emerged amongst ecosystem service experts that, in order to redress the issues that arose out of single value approaches and successfully use ecosystem service valuations in research and as an aid to decision making, a more inclusive and pluralistic approach concerning values needs to be adopted (Jacobs et al. 2016). This concept of integrated valuation has gained momentum both in research contexts as well as the science-policy interface, with the aim to provide a better understanding of the multiple types of values of nature and of the trade-offs that need to be balanced between these plural values. Integrated valuation of ecosystem services also aims to include different types of stakeholders in these processes, advocates for transdisciplinarity and an openness to other knowledge systems, as well as aims to bridge the gaps between science and policy. The integrated valuation of ecosystem services is underpinned by participatory processes that can in theory address issues such as sustainability, resilience, and fairness (among others), but also holds many challenges in its practical application.

In order to examine the concept of integrated valuation of ecosystem services in theory and practice, the scope of the following paper is twofold. On one hand, we aim to understand how the concept of ecosystem services and their valuation have emerged and evolved, and the way in which this evolution has led to the development of the integrated approach. On the other hand, we intend to explore how the integrated valuation of ecosystem services fares in practice and to discuss value pluralism in an applied context. We examine how integrated valuations are perceived by practitioners, what barriers are encountered when conducting this type of valuation and if the systemic and holistic approach these valuations propose lead to better environmental policies when used as a decision-making tool.

In order to answer these questions, we proceed as follows. In the first part of this paper, we give a state of the art of the concept of ecosystem services and their integrated valuation. We first examine the concept of ecosystem services, trace its evolution from its ecological and economic roots to the place it now occupies in international research agendas and policy arenas and give an overview of the main debates that emerged around its conceptualization and use. We then home in on the debate surrounding monetary valuation and examine how the focus has shifted from a single value approach to value pluralism. We examine how these plural values are reconciled in the integrated approach. Furthermore, we explore some of the theoretical underpinnings to the integrated approach in practice. Lastly, we examine current debates surrounding the IPBES' shift away from the ecosystem service concept to their adoption of a new concept, nature's contributions to people.

In the second part of this paper, we take a closer look at the state of ecosystem service discourse and practice in Belgium. First, we will give an overview on the Belgian Ecosystem Service Cluster Project and the community of practice that emerged out of this project (BEES). We then move to the exploratory study that was conducted as part of this paper. Through qualitative interviews with nine Belgian actors in the field of ecosystem services, we aim to explore the evolutions, criticisms, and theories laid out in part one. We seek to understand if and how the integrated valuation approach is used in Belgium to shape ecosystem service research and environmental policy. We explore the opportunities and challenges that value pluralism and integrated valuation hold in the applied context. We then focus on how the transition and translation from abstract concept to practical use is performed. We also examine how a community of practice like BEES shapes and furthers research and science-policy interfacing capabilities of ecosystem services and their integrated valuation.

PART I

1. WHAT ARE ECOSYSTEM SERVICES?

In her introduction to *Nature's Services: Societal Dependence On Natural Ecosystems*, Gretchen Daily (1997) illuminates the importance and complexity of ecosystem services through a simple thought experiment inspired by John Holdren. If humanity were to relocate to the moon, assuming in her experiment that all basic atmospheric conditions paramount to our survival were already met, what exactly would we need or want to take with us onto our spaceship in terms of animal and plant life to thrive there as we do on earth? As she starts to list various species, from those providing economical goods to those fulfilling basic life-support functions, the hypothetical stock-taking escalates quickly, culminating in the conclusion that “the spaceship would be filling up before you’d even begun adding the species crucial to *supporting* those at the top of your list” (Daily 1997, 3). It becomes clear that all human life on this planet depends on complex biogeochemical cycles and natural interactions between species, which she sums up under the concept of ecosystem services. As Daily (1997, 3) puts it, “ecosystem services are the conditions and processes through which natural ecosystems and the species that make them up, sustain and fulfil human life”.

The seminal Millennium Ecosystem Assessment, that popularized the term, gives a similar definition of ecosystem services, namely “the benefits people obtain from ecosystems” (MEA 2005a, 40). The report also introduces a more precise classification for the different types of ecosystem services that ecosystems can provide:

- Provisioning services: being the products that can be obtained from ecosystems, such as food and fresh water, resources like fiber or fuel, those used in medicine or biotechnology, and other products ecosystem services supply that we can benefit from, such as resources used for ornamental reasons.
- Regulating Services: being the benefits that can be obtained from the regulation of ecosystem processes, such as water, climate, soil, and air quality regulation. Other services in this category are pollination, water purification and waste treatment, as well as disease, pest and natural hazard regulation.
- Cultural Services: being the nonmaterial benefits that can be obtained through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences. This category includes spiritual, religious, educational, aesthetic, or cultural heritage values. Other cultural services are the influence of ecosystems on cultural diversity, on knowledge systems, social relations and what the MEA (2005a, 54) calls a “sense of place”. Lastly, the inspiration

we can draw from nature as well as recreational values (for instance ecotourism) fall into this category.

- Supporting Services: being the services that support all other three categories of ecosystem services, which are necessary for their continued output. Unlike the other three ecosystem service categories, supporting ecosystem services have an indirect impact which is measured over long spans of time. They describe key processes such as water and nutrient cycling, photosynthesis, primary production, and soil formation.

The concept has been redefined by a variety of actors and publications. Braat and de Groot (2012, 5) identify several other key definitions, which “evolved through the various publications, with varying attention for the ecological basis or the economic use”:

- “Ecosystem services are the benefits human populations derive, directly or indirectly, from ecosystem functions” (Constanza et al. 1997, as cited in Braat and de Groot 2012, 5).
- “Ecosystem Services are components of nature, directly enjoyed, consumed, or used to yield human well-being” (Boyd and Banzhaf 2007, as cited in Braat and de Groot 2012, 5).
- “Ecosystem Services are the aspects of ecosystems utilized (actively or passively) to produce human well-being” (Fisher et al. 2009, as cited in Braat and de Groot 2012, 5).
- “Ecosystem Services are the direct and indirect contributions of ecosystems to human well-being” (TEEB 2010, as cited in Braat and de Groot 2012, 5).

It is particularly interesting here to take a closer look at TEEB (The Economics of Ecosystems and Biodiversity), as they propose in their typology of ecosystem services an updated version of the typology used in the Millennium Ecosystem Assessment to “[make] a finer distinction between services and benefits and explicitly [acknowledge] that services can benefit people in multiple and indirect ways” (TEEB 2010, 19). The four categories they use, provisioning, regulating, habitat, and cultural & amenity services, are similar to those employed in the MEA typology, albeit with two important differences, one being the “omission of Supporting Services such as nutrient cycling and food-chain dynamics, which are seen in TEEB (2010, 19) as a subset of ecological processes” and thus not included in the ecosystem service typology and the other being the emphasis on the “importance of ecosystems to provide habitat for migratory species [...] and gene-pool “protectors””, which leads to the creation of a distinct fourth category of habitat services, which is seen to replace the omitted category, supporting services, in their typology.

It is acknowledged that the precise definition of the concept is subject to many debates (Constanza et al. 2017, 3). Braat and de Groot (2012, 5) posit that, in the definitions cited above, “the term Ecosystem Services contains both the “work done” component as well as the “product” component (traditionally called “goods”)” and “that in the next stage of development of the concept, the distinction between

goods and services should be re-established”. They suggest that the concept of ecosystem services might be more accurately reflected if the notion of “flux of contributions” were introduced into the TEEB definition of ecosystem services (Farley, as cited in Braat and de Groot 2012, 5). Similarly, Potschin and Haines-Young (2016, 25) point to the amalgam made of goods and benefits in the MEA and TEEB definitions but acknowledge that there exists a multitude of perspectives on what exactly constitutes ecosystem services. They however underline that “all agree that there is some kind of ‘pathway’ for delivering ecosystem services that goes from ecological structures and processes at one end through to the well-being of people at the other” (Potschin and Haines-Young 2016, 26). To represent this pathway or “production line” as they call it, they propose the conceptual framework of the cascade model pictured below (Figure 1), which aims to clearly delineate the different notions in the “ecosystem service paradigm”, and to show the relationship not only between those notions but also between the environment and the social and economic system (Potschin and Haines-Young 2016, 26).

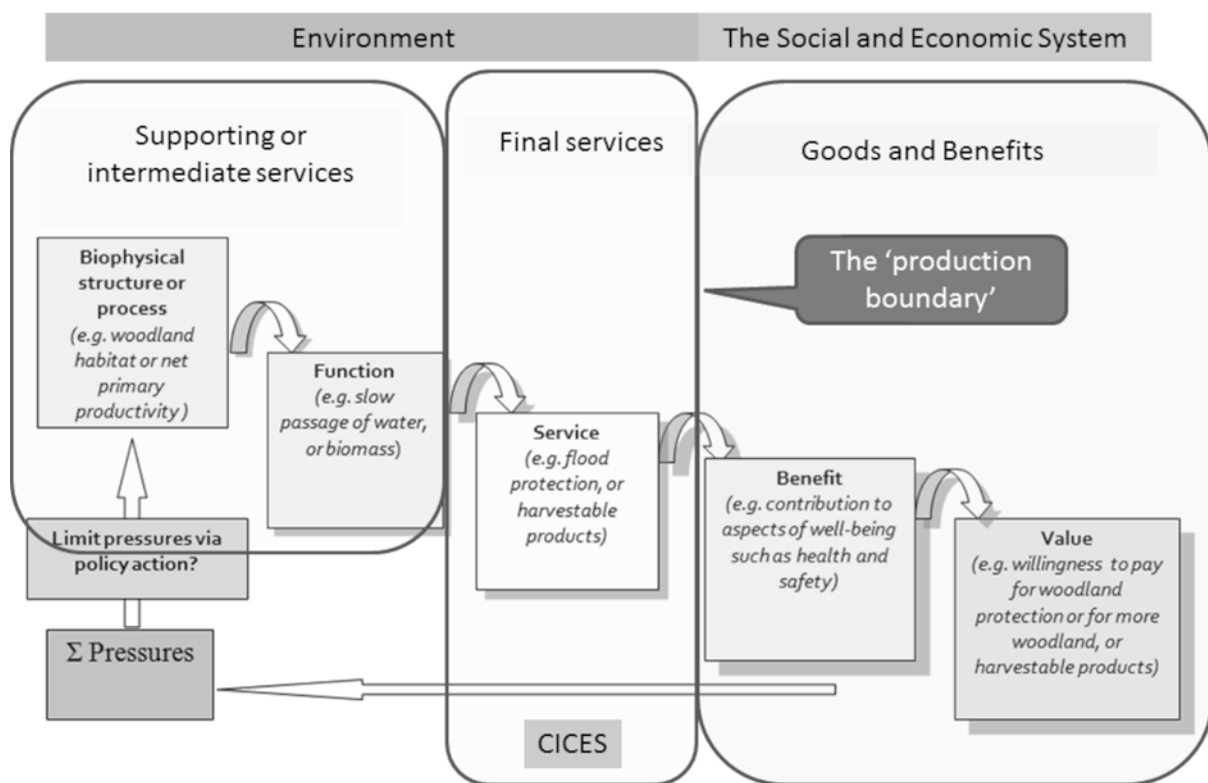


Figure 1: The cascade model: going from supporting services (from structure or process to function) to final services to goods and benefits (from benefits to value). (Potschin and Haines-Young 2011, as cited in Potschin and Haines-Young 2016, 26).

While they recognize the limits of this type of modelling, namely that the “rather linear relationship between ecological structures and processes on the one hand, and benefits and values at the other” cannot be truly reflective of the immensely complex connections found in “real world” settings, they nonetheless argue that such a model can be helpful to “represent and understand the richness of these relationships” (Potschin and Haines Young 2016, 28).

Constanza et al. (2017, 3) also acknowledge that one of the key debates in the definition of ecosystem services concerns the need for a distinction between ecosystem processes, which “describe biophysical relationships that exist regardless of whether or not humans benefit” and ecosystem services, being “those processes and functions that benefit people, consciously or un-consciously, directly or indirectly”, or have the potential to do so. They however criticize the approach of the cascade model as proposed by Potschin and Haines-Young, deeming it “at the same time an oversimplification of a complex reality and an unnecessary complication of what is essentially a very straightforward definition” (Constanza et al. 2017, 5). They posit that the distinction made between ecosystem services and benefits is quickly made redundant if one defines ecosystem services as the *direct* and *indirect* benefits that humans perceive from ecosystems, thus forgoing the need for a further distinction based on value, which they deem rather reductionist in this case, as only direct benefits to people seem to be taken into account. They also criticize the linear aspect of the cascade model, stating that it fails to capture that “connections between ecosystem processes, functions, and benefits to humans are complex, nonlinear, and dynamic” and propose in turn a different representation (Figure 2), in order to “emphasize the interaction between natural, social, built, and human capital necessary to produce these services” (Constanza et al. 2017, 5):

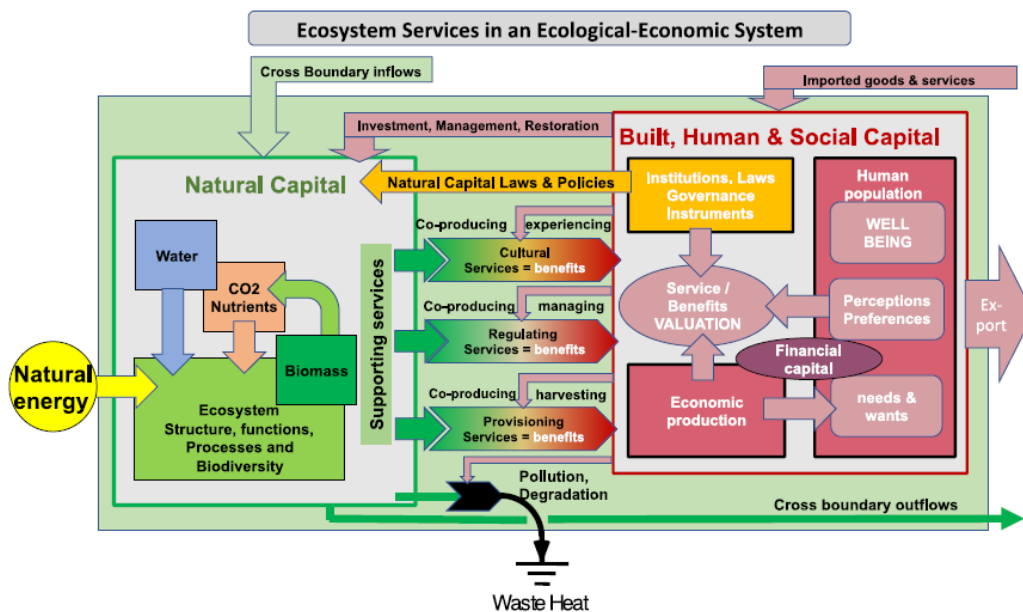


Figure 2: “Beyond the cascade: a dynamic system capturing the complex interactions needed to produce ecosystem services at the regional scale, driven by the flows of energy, matter, and information through the system.” (Constanza et al. 2017, 6).

Similarly, Groot and de Braat (2012, 8) criticize the cascade model for its unidirectional downward flow, which “[implies] that ecosystem services flow effortlessly from ecosystems to human well-being, just like water in a cascade waterfall” and thus obfuscates that a “combination of natural (ecosystem processes based) energies with human energies” is needed to deliver most ecosystem services, at least as far as provisioning and cultural services are concerned.

It is important to note that many other types of visual representations of ecosystem services exist in the context of the various conceptual frameworks that have been proposed. For the purpose of this paper, we felt the need to primarily mention the cascade model, and to give a brief overview of the debate surrounding it, as this model introduces the notions of value and valuation, as well as the interactions between natural, social and economic systems, natural and human capital, which will be discussed in subsequent chapters of this paper. Furthermore, it is apparent that the cascade model remains influential today. It has been used and expanded upon for a number of conceptual frameworks such as the ones used in TEEB, CICES, OpenNESS, MAES and others.

Since its conception, multiple definitions and conceptual frameworks for ecosystem services have evolved and coexisted alongside each other. Some (Potschin and Haines-Young 2016, citing Abson et al. 2014) see ecosystem services as a “boundary object”, capable to “be adapted to represent different perspectives while retaining some sense of continuity across these different viewpoints”. Some differences in the conceptualization of ecosystem services can be attributed to the historic development of the concept, which will be explored in the following chapter.

2. EVOLUTION OF THE ECOSYSTEM SERVICE CONCEPT

The term ecosystem services did not appear as such in academic literature until 1981 with the publication of *Extinction: The Causes and Consequences of the Disappearance of Species* by Ehrlich and Ehrlich who are generally credited with coining the term (Gómez-Baggethun et al. 2010, Braat and de Groot 2012). However, an understanding of the benefits that we obtain from nature and the influence of human activity on those outputs date back millennia. Daily (1997, 6) sees an awareness of ecosystem services through their loss in Plato’s musing on the effects of deforestation and subsequent soil erosion on formerly arable land. In similar fashion, the authors of TEEB (2010, 7) allude to an understanding of the relationship between an increasing population and a corresponding decline in ecosystem services in writings stemming from the Roman times.

In examining the historical developments that led to the modern conceptualization of ecosystem services, Braat and de Groot (2012) identify ecological as well as economic roots of the concept. Understanding how the concept emerged out of these two distinct academic disciplines not only provides better grasp of some of the debates surrounding the definition of the concept, but also shows how ecosystem services gained the potential to “become an effective bridge between ecological and economic approaches” (Constanza et al. 2017, 13).

Braat and de Groot (2012) identify several key elements that contributed to the ecological roots of the ecosystem service concept as it is used today. In 1864, Marsh’s *Man and Nature* first expounded on the finitude of natural resources and the impact of human activity on these resources. In the 1940s, authors such as Leopold, Osborn or Vogt “explored the role of nature in economic and social dynamics” (Braat

and de Groot 2012, 5). In the late 1960s and 1970s authors such as Carson, Ehrlich or Meadows sought to “[highlight] the value of nature’s functions to human society” (Braat and de Groot 2012, 5). It becomes evident that these different ideas inform the way we now conceptualize and utilize the concept of ecosystem services.

We can also see the ecological roots of the concept reflected in the distinctions made between ecosystem processes, functions, and services. In the 1950s, authors like Odum expanded upon Tansley’s original definition of the ecosystem by introducing “thermodynamic and energy flow dimensions to the concept” (Braat and de Groot 2012, 6). These ideas of transformation and flow are crucial when seeking to understand the necessity of distinguishing between ecosystem processes, functions, and services. As Braat and de Groot (2016, 6) explain, “it is therefore important to distinguish ‘functions’ from the fundamental ecological structures and processes, in the sense that the concept of functions not only describes the above mentioned combinations of structure and processes, but at the same time represent the potential that ecosystems have to deliver a service”. The idea of potential is reflected in the notion of direct and indirect contributions to human wellbeing, which is found in almost all formal definitions and conceptualizations of ecosystem services. The notions of flow and transformation of energy have also been discussed above as key notions in the conceptualization of ecosystem services.

According to Braat and de Groot (2012, 6), the late 1960s and 1970s mark a turning point, with a number of natural scientists aiming to “[address] the notion of the usefulness of nature for society, other than an object of ethical concern” and examining “the way particular “functions of nature” served human societies” (Gómez-Baggethun et al. 2010, 1213). This development culminated in 1981, when Ehrlich and Ehrlich coined the term of “ecosystem services”. A growing body of scientists then began to include the concept in their work. According to Gómez-Baggethun et al. (2010, 1213), the “rationale behind [this] use of the ecosystem service concept was mainly pedagogic, and it aimed to demonstrate how the disappearance of biodiversity directly affects ecosystem functions that underpin critical services for human well-being”.

Before examining the evolution of the concept of ecosystem services post 1980s, we shall now turn our attention to the economic roots of the concept. According to Gómez-Baggethun et al. (2010, 1210), “precursory notions of natural capital and ecosystem services” can already be identified in key works of Classical economics. Natural resources were regarded as an important and separate aspect in the “production line”, due to the free nature of their “services” and their nature as a “non substitutable production input” (Gómez-Baggethun et al. 2010, 1211). Examples of this thinking can be found in the concept of diminishing returns on land (Ricardo), concerns over population growth and its effect on resources (Malthus) or the advocacy for a stationary state (Mill). It is however important to note that natural resources were only included in Classical economics as far as their use value was concerned. As Gómez-Baggethun et al. (2010, 1211) explain, “nature’s services” were generally denied “to play

any role in the conformation of (exchange) value, as they were taken as free, non-appropriable gifts of nature”. This understanding of the role of nature stems from a turning point in economic thought, wherein Classical economists, contrarily to the earlier Physiocrats who believed the source of wealth of a nation to be found in land and thus agriculture, “emphasize labor as the major force backing the production of wealth” (Gómez-Baggethun et al. 2010, 1211). To apply this logic to nature meant that its value was not drawn from itself but rather came “from the rent derived from its appropriation” (Gómez-Baggethun et al. 2010, 1211). Braat and de Groot (2012, 6) observe here that “only scarce resources have an exchange (marginal) value” and since “ecosystem services were abundant (i.e., enough for all desired uses), their marginal value (hence exchange value) was zero”. Marx, though he recognized “value to emerge from the combination of labor and nature”, emphasized that only labor is capable to create exchange values and deemed it uninteresting to even consider the part nature played in this equation, nature’s services being understood as free gifts that gain value only through the labor used to obtain and transform them. Gómez-Baggethun et al. (2010, 1211) thus identify three important changes in economic thought to have begun in the 19th century, triggered by unprecedented growth in industry, technological development and wealth: a gradual shift of focus from land to capital and labor, the move away from physical towards monetary analysis, and a change in emphasis from use value to exchange value, changes which paved the way for a “temporary emancipation from land”.

The end of the 19th century marked the end of the period of Classical economics, and with the marginalist revolution came a different understanding of value. In this novel view, it was no longer labor that determined value but rather utility. According to Gómez-Baggethun et al. (2010, 1211), “[n]eoclassical economics gradually restricted its analysis to the sphere of exchange values”, which “would have deep effects in the subsequent economic analysis of nature”. This interest in exchange values in regard to natural resources can be observed in the concepts of the rebound effect (Jevons) or that of externalities (Pigou). Gradually, natural resources became of less and less interest in economic analysis, unless they “had been previously valued in monetary terms leaving outside the scope of analysis all those objects of the ecosphere bearing no exchange value”, in other words “non-marketed ecosystem services” (Gómez-Baggethun et al. 2010, 1211). By the second half of the 20th century, concerns over natural resource scarcity caused by economic growth were quickly mitigated by way of a proposed recourse to new technologies, which “would allow for increased substitutability between production inputs such as land and capital” (Gómez-Baggethun et al. 2010, 1212). If no substitute could be found, economists such as Solow advocated for the “self-regulatory capacity of markets, arguing that as a particular resource becomes scarce, rising prices encourage consumers to move to alternative consumption goods” (Gómez-Baggethun et al., 2010, 1212).

However, with the advent of modern environmentalism in the 1960s, a growing number of economists sought to analyze how economic science could be used to better address environmental problems. These economists founded the Society of Environmental and Resource Economics out of which emerged the

discipline of Environmental economics, which “expands the scope of analysis of orthodox Neoclassical economics by developing methods to value and internalize economic impacts on the environment into decision making” (Gómez-Baggethun et al. 2010, 1212). In Environmental economics, the main issue lies with the fact that “ecosystem services are not fully 'captured' in commercial markets or adequately quantified in terms comparable with economic services and manufactured capital, they are often given too little weight in policy decisions” (Constanza et al. 1997, 253). To remedy this, these services are identified and “captured” through multiple methods, often by comparing them to goods and services that are internal to the market (through cost-benefit analysis, hedonic price method, travel cost method, and others).

As Constanza et al. (2017, 1) notes, “these two streams of work proceeded in parallel, with limited contact and cross-fertilization: the ecosystem ecology community, on the one hand, and the environmental and resource economics community, on the other”. In the late 1980s however, two main dissensions resulted in a split in the Society of Environmental and Resource economics, and, “[i]nfluenced by the work of systems ecologists and heterodox economists concerned with human–nature interaction” (Gómez-Baggethun et al. 2010, 1212), led to the formation of a new sub-discipline, Ecological economics. One of these divergences concerned sustainability. The proponents of Environmental economics favored the “weak sustainability” (i.e. Neoclassical) approach, meaning that natural capital could be substituted by manufactured capital (see above) to ensure the intergenerational equity demanded by the Brundtland report. Ecological economists advocated for a “strong sustainability approach”, meaning that natural and manufactured capital should be regarded as complementary, since natural capital is always in some shape or form required in the production of manufactured capital. Another debate centered on the manner in which ecosystem services should be valued. While some Ecological economists “recognized the appeal that framing ecological concerns in economic terms could have for decision makers” (Braat and de Groot 2012, 7), they maintained a critical standpoint regarding this type of valuation, since not all values could be captured through economic terms. This will be further explored in subsequent chapters of this paper.

It becomes evident that Ecological economics did not aim to expand on the notions advanced by Neoclassical economics but rather to challenge them. According to Gómez Baggethun et al. (2010, 1212) Ecological economics “conceptualizes the economic system as an open subsystem of the ecosphere exchanging energy, materials and waste flows with the social and ecological systems with which it co-evolves”. As mentioned above, the Ecological economists sought to expand economics “to the issues of equity and scale in relation to biophysical limits and to the development of methods to account for the physical and social costs involved in economic performance using monetary along with biophysical accounts and other non-monetary valuation languages” (Gómez Baggethun et al. 2010, 1212). Ecological Economics emerged as a transdisciplinary field, seeking to connect ecology and economics, and beyond that, include other disciplines as well as other types of knowledge. And

ecosystem services, according to Constanza et al. (2017, 2), “were an explicit part of the research agenda of ecological economics from the beginning”.

In the early 1990s, the concept of ecosystem services started to gain traction in research agendas, stimulated for instance by the Beijer Institute’s Biodiversity Program (Gómez-Baggethun et al. 2010). Ecosystem service adjacent language can also be found in the statement of forest principles¹ adopted during the United Nations Conference on Environment and Development in Rio de Janeiro in 1992, where “Principles 2 and 6 of the document refer to the “services” supplied by forests” and “Principle 6 recognizes that “a comprehensive assessment of the economic and noneconomic values of forest goods and services and of the environmental costs and benefits” should be used when taking decisions about forests” (Pesche et al. 2013, 80).

1997 is generally regarded as the milestone in the mainstreaming of the ecosystem services concept, due to the publication of the aforementioned *Nature’s Services: Societal Dependence on Natural Ecosystems*, edited by Daily, stressing the importance of ecosystem services for our wellbeing. The same year also saw the publication of a seminal paper by Constanza et al. (1997) titled “The value of the world's ecosystem services and natural capital”. In this paper, Constanza et al. undertake what was at the time considered to be novel task; namely identifying and estimating the economic value of 17 separate ecosystem services in 16 biomes taken to represent the entire biosphere. According to Braat and de Groot (2012, 7), “[t]he monetary figures presented resulted in a high impact in both science and policy making, manifested both in terms of criticism and in the further increase in the development and use of monetary valuation studies”. Following these developments, ecosystem services slowly moved beyond academic research and into policy.

Conducting a discursive-institutional analysis, Chaudhary et al. (2015) identify four pivotal moments post 1997 that cemented the ecosystem service concept into discourse. They lay out how, in the timeframes between those moments, different ideas and initiatives stemming from academic spheres or policy arenas progressively influenced and shaped subsequent developments using the spiral metaphor (Figure 3). Through the spiral, we can observe how ecosystem services slowly percolated into different academic disciplines, moving from national to global interest, finally resulting in the operationalization of the concept and the creation of the intergovernmental body on biodiversity and ecosystem services (IPBES).

¹ Exact name: Non-legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of all Types of Forests.

Key actors (based on article's citation)	Key institutions & their initiatives	New discipline in each time frame		Remarks
Pre-1997 <ul style="list-style-type: none"> • Marsh (1965) • Westman (1977) • Ehrlich and Ehrlich (1981) • Ehrlich and Mooney (1983) 	<ul style="list-style-type: none"> • SCEPT, 1970 • Beijer Program on Biodiversity 1992 • UNEP's Global Biodiversity Assessment, 1995 	<ul style="list-style-type: none"> • Ecology • Economics • Impact assessment 		The term 'ecosystem services' was first used in 1981
1997- PES launched				National interest in ecosystem services
1997-2000 <ul style="list-style-type: none"> • Costanza et al.1997 • Daily(ed) 1997 • Bolund & Hunhammar (1999) • Rapport et al.1998 • Daily et al.2000 	<ul style="list-style-type: none"> • International Geosphere and Biosphere Program, 1997 • Ecosystem Approach, 2000 • Millennium Development Goals, 2000 • TNC 2000 	<ul style="list-style-type: none"> • Agriculture • ES Assessment • Forestry • History • Hydrology • Marine biodiversity • Sociology • Sustainability 		Discursive expansion and response
2001- MEA officially launched				Global interest in ecosystem services
2001-2004 <ul style="list-style-type: none"> • Tilman et al. 2002 • De Groot et al. 2002 • Tilman et al. 2001 • Folke et al. 2002 • Balmford et al. 20 	<ul style="list-style-type: none"> • Earth Summit 2002 • Launch of MEA Framework, 2003 • Recognition in MDG, 2000 • World Wildlife Fund 2004 	<ul style="list-style-type: none"> • Adaptation • Agroforestry • Coastal • Environmental law • Environment • Integrated (ecology + economics) • Planning and decision making • Urban ES 		Discursive expansion and response
2005- MEA Synthesis report launched				Global reporting on ecosystem services
2005-2009 <ul style="list-style-type: none"> • Costanza et al. 2006 • Foley et al. 2005 • Worm et al. 2006 • Balvanera et al. 2006 • Costanza, R., 2008 	<ul style="list-style-type: none"> • TEEB • IMoSEB • Ecosystem Services Partnership • Biodiversity Indicators Partnership • DIVERSITAS • ICSU, IUCN 	<ul style="list-style-type: none"> • Governance • Human wellbeing • Landscape management • Political ecology • Poverty reduction • Restoration ecology • Vulnerability 		Discursive expansion and response
2010- Establishment of IPBES approved				Establishment of an intergovernmental body on biodiversity and ecosystem services
2010-2013 <ul style="list-style-type: none"> • de Groot et al. 2010 • Muradin et al. 2010 • Gomez-Baggethun et al. 2010 • Norgard et al. 2010 • Kosoy & Corbera, 2010 	<ul style="list-style-type: none"> • IPBES established 2012 • CBD's Strategic Plan 2011-2020 • International Satoyama Initiative, 2010 • ESPA 2010 	<ul style="list-style-type: none"> • Food security • Geography • Multidisciplinary 		Discursive expansion and response

Figure 3: The discursive-institutional spiral of ecosystem services (Pre-1977 to 2013) (Chaudhary et al. 2015, 32)

As mentioned above, 1997 was a crucial year for the institutionalization of ecosystem services into discourse. Alongside the publication of the Daily's book and Costanza et al. paper, 1997 also marked the year when the first national payment for ecosystem service (PES) scheme was launched in Costa-Rica (Chaudhary et al. 2015). It is important at this junction to underline that ecosystem services should not be confounded with PES, the former being "closely linked to a desire to attract official attention to the threats to ecosystems posed by human pressure" and the latter having "stemmed from a concern to

ensure funding for conservation in tropical countries over the long term” (Pesche et al. 2013, 71). Both emerged out of different processes and concerns and are currently being operationalized through different frameworks (Pesche et al. 2013). For the purpose of this paper, it is however interesting to note that they are not entirely independent of each other and that interactions between the two can be observed. For example, one such interaction is the preparation and setup of the PES in Costa Rica, for which Constanza was a crucial actor. Chaudhary et al. (2015, 30) point out that the launch of this PES can be seen as “the first instance when an ecosystem services approach was institutionalized at national level and progressed from a conceptual idea to implementation”. This PES emerged out of long negotiations that gathered many different stakeholders (government, scientists, international bodies, economists, businesses, etc.) in an effort to redress the country’s harmful forest policies, “[normalizing] a construction of nature that suggested that parts of nature could not only be given an economic value, but these economic values could guide effective management decisions” (Chaudhary et al. 2015, 30). The popularity of this approach leads to a noted increase in interest for ecosystem services in economical sciences and policy arenas.

According to Chaudhary et al. (2015), the launch of the Millennium Assessment (MEA) under the umbrella of the United Nations Environmental Programme umbrella in 2001 is another key moment in the institutionalization of ecosystem services. The aim of this study was to “assess the consequences of ecosystem change for human well-being and the scientific basis for actions needed to enhance the conservation and sustainable use of those systems and their contribution to human well-being” (MEA 2005b, 1). In the early 2000s, global interest in ecosystem services grew exponentially through the uptake of the terminology of ecosystem services by a variety of global actors (such as WWF or the World Bank for instance) and the creation of new research networks such as ALTER-net (A Long-Term Biodiversity, Ecosystem and Awareness Research Network). In parallel, increasing attention was also devoted to the development of market-based instruments and how they could be used to value particular ecosystem services, such as the measuring of carbon services of forests led by the United Nations Framework Convention on Climate Change, which was then later articulated through various REDD (reducing emissions from deforestation and forest degradation) mechanisms (Chaudhary et al. 2015). As we can see in Figure 3, a new stage had been reached and just as after 1997, a host of new disciplines were now concerning themselves with ecosystem services, which “strengthened [the] robustness of ecosystem services in academia and increased its potential to inform policy makers and underpin action oriented at improved ecosystem management” (Chaudhary et al. 2015, 30).

The publication of the MEA report in 2005 marks another important moment in the evolution of ecosystem services. As we saw in chapter one, the report provided for the first time a comprehensive classification of global ecosystem services as well as a globally accepted definition. As Chaudhary et al. (2015, 30) explain, “nature at the center of ecosystem services discourse was no longer compartmentalized into separate parts but was conceptualized as a whole system, a fragile and depleting

system whose services to humanity were rapidly degrading”. It is acknowledged that the report was not merely important for its findings but also due to the nature of the process by which it was created, that is through the inclusion of not just scientists but policymakers and other stakeholders on a global scale. This process proved to be tremendously influential in its global impact and dissemination and spawned other multilateral initiatives in its wake (Chaudhary et al. 2015). One of these initiatives was The Economics of Ecosystems and Biodiversity study (TEEB), which was commissioned by the G8+5, and launched by Germany and the European Commission in 2007, building on the MEA to demonstrate the “economic significance of biodiversity loss and ecosystem degradation in terms of negative effects on human well-being” (TEEB for local and regional policymakers 2010, 3). Internationally, discussions were underway to launch an “IPCC-like mechanism for biodiversity” in order to bring biodiversity into policy (Chaudhary et al. 2015, 31).

In 2010, these discussions culminated with the launch of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). By involving academic and non-academic actors, the platform was founded with the aim to “[bridge] the gap between science and policy”, to “advise governments on how to halt further degradation”, and to “involve governments in scientific work for public benefit” (Chaudhary et al. 2015, 31). When looking for instance at the CBD (2011, 126) strategic plan 2011-2020 and its vision that “[b]y 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people”, it becomes clear that the concept of ecosystem services had now achieved institutional recognition on a global policy level. And, as Chaudhary et al. (2015, 31) point out, the concept was “also consolidated in academia with over 5000 articles being published from a wide variety of disciplines”.

While the concept of ecosystem services has now percolated through a wide variety of disciplines (see Figure 3), Chaudhary et al. (2015, 31) nonetheless suggest that the main output in research regarding ecosystem services still comes from ecology and economics, and that these original influences, as we have laid them out at the beginning of this chapter, “[weigh] heavily”, with other disciplines operating at the margins of the dominant ecological and economical discourse. Through the creation of the IPBES “a particular construction of human–nature relationships in which the services ecosystems provide are prioritized over other, less anthropocentric, interpretations” was institutionalized and according to Chaudhary et al. (2015, 31), in “reifying particular meanings it necessarily excludes others and over the years the concept has attracted increasing criticism as it becomes more mainstreamed”.

As we have seen over the course of this chapter, the concept of ecosystem services emerged out of a complex history, and as a boundary object, was subject to different influences. Throughout its development, various actors, disciplines, organizations, initiatives, and other stakeholders have continuously shaped the further developments and priorities set for the ecosystem service concept.

Looking at the next step in the discursive-institutional spiral, Chaudhary et al. (2015, 33) identify “an urgent need and opportunity for a wider array of academic disciplines to join in efforts of activists and policy makers to influence the next phase of institutionalization, if issues of poverty, justice, commodification, governance, ethic, rights, biodiversity and social–environmental relationships are to take center stage in the next institutional spiral of this important and influential discourse”. While we will explore this in subsequent chapters of this paper, it seems judicious to first examine some of the criticisms and debates surrounding ecosystem services.

3. DEBATES SURROUNDING THE CONCEPT

As we have alluded to in the previous chapters, the concept of ecosystem services has been subject to many debates in its definition and throughout its conceptualization. Some debates emerged out of the historical development of the concept; some others concern the application of ecosystem services. Schröter et al. (2014) identify three types of critical debates surrounding the concept, the first debate centering around ethical considerations and the manner in which human-nature interactions are framed, the second concerning the sustainable use of ecosystem services and nature conservation and the third regarding the state of ecosystem services as a scientific discipline.

In the first debate regarding ecosystem services from a standpoint of ethical concerns, the anthropocentric and utilitarian framing of the concept is often regarded as problematic. Schröter et al. (2014, 515) also identify in certain scholars a fear that the “economic production metaphor of ES could promote an exploitative human–nature relationship”. Some (McCauley 2006; Redford and Adams 2009) have argued that the concept of ecosystem services fails to capture the intrinsic values of nature by focusing only on the way that nature serves human needs. McCauley (2006, 28) states for instance that “Nature has an intrinsic value that makes it priceless, and this is reason enough to protect it” and argues that nature conservation should be based on moral arguments rather than financial ones. Constanza et al. (2017, 3) do not share this view, arguing instead that this line of argument “ignore[s] the fact that humans are a biological species and, like all other species, they ‘use’ the resources in their environment to survive and thrive”. Because the concept of ecosystem services aims to bring awareness to the fact that the human species is intertwined with and dependent on the health of ecosystems, they argue that “rather than implying that humans are the only thing that matters, the concept of ecosystem services makes it clear that the *whole system* matters, both to humans and to the other species we are interdependent with” (Constanza et al. 2017, 3). Jax et al. (2013, 262) also criticize this juxtaposition between “an (economically understood) ecosystem service perspective” and “an ‘ethical perspective’ on nature (referring to inherent values)”, and explain that this juxtaposition rests “upon overly narrow interpretations of both ‘ecosystem services’ and ‘ethics’”. Schröter et al. (2014, 515) show furthermore that intrinsic values could be integrated into the ecosystem service concept, particularly by way of the cultural values, stating that for instance “aesthetic contemplation of an ecosystem requires the valued

object to be valuable “in itself,” i.e., for its own purpose while at the same time being valued by a human being”. They also regard the domain of cultural services as an important asset in addressing the concerns that ecosystem services could contribute to an exploitative relationship between human beings and nature. According to them, “[n]onmaterial, intangible values that are important in holistic perspectives of nature can be captured by the cultural services domain, to include peoples’ diverse values and needs” (Schröter et al. 2014, 516).

The second type of criticism concerns ecosystem services in terms of sustainability and nature conservation. A recurring criticism is that steps taken to enhance specific ecosystem services do not necessarily benefit biodiversity but may in fact divert interest and concern away from the challenges facing biodiversity. Redford and Adams 2009 (2015, 785) advance that “there is a real risk that economic arguments about services valued by humans will overwrite and outweigh noneconomic justifications for conservation”. Schröter et al. (2014) take a contrary view, arguing that there are not only important conceptual convergences between ecosystem services and biodiversity, but that they can furthermore mutually reinforce each other. They find for instance that “the habitat service category of TEEB includes the maintenance of life cycles and migratory species, and of genetic diversity” (Schröter et al. 2014, 516). Similar concerns for biodiversity can be found in MEA and TEEB cultural and amenity service categories. They argue further that biodiversity is needed for the continued provision of ecosystem services, and that the restoration of ecosystems can conversely lead to an improvement of biodiversity. They thereby suggest that the relationship between ecosystem services and biodiversity could lead to an increased consideration for the latter within ecosystem services research. They concede however that the precise nature of the links between the two remains insufficiently explored and that “most ES-based projects do not monitor whether their actions also safeguard biodiversity” (Schröter et al. 2014, 516).

The third type of debate harkens back to the question of the precise definition of ecosystem services, a topic that was already alluded to in chapter one. This debate concerns the perceived vagueness and ambiguity of the notion of ecosystem services. A variety of conceptual frameworks and diverging definitions of ecosystem services have led some to question whether the term is a “catch all” phrase that encompasses contradictory elements. Schröter et al. (2014) argue that the concept is still in a developmental phase and that it is precisely this indetermination that makes the creative and flexible engagement with the challenges it seeks to address possible. It also allows the concept to function as a boundary object, thereby making space for a transdisciplinary approach which is necessary when considering the multitude of disciplines that are engaging with the concept, allowing it to remain “adaptable or vague enough for participants to maintain their identities across themes, contexts, and networks” (Schröter et al. 2014, 518).

Some have also argued that the concept of ecosystem services is imbued with a normative charge, through which “the positive nature of the ES concept remains largely unquestioned by environmental scientists” (Schröter et al. 2014, 518). McCauley (2006, 27) views this optimistic vision of a benevolent nature as problematic, stating that “[t]his reasoning ignores basic ecology: environments don’t act for the benefit of a single species”. Schröter et al. (2014) acknowledge this normative dimension of the concept and explicitly state that the intent of ecosystem services is to foster an interplay between socioeconomic systems and ecological systems. They further remark that total value freedom is impossible, and that the notion of ecosystem services is but one of many “umbrella concepts”, normative concepts that are frequently employed within environmental sciences. Such concepts are “postnormal, value-laden, and often strategic” (Schröter et al. 2014, 518) and are to a certain extent consciously chosen for their positive and relational connotations. It is important to note here that some authors recognize the importance of acknowledging “ecosystem disservices” for ecosystem management, particularly in urban green management (Lyytimäki and Sipilä 2009), however “a real integration of both concepts has not yet been properly developed” (Döhren and Haase 2015, 495).

As we will see later, these ongoing critical engagements with the concept of ecosystem services, be it regarding anthropocentric framing and intrinsic values, conservation and biodiversity or the normative nature of the concept, have fostered new ways of thinking about nature-human relationships and highlight the need for an integrated approach to ecosystem service valuation. However, a crucial point of contention remains yet to be mentioned, namely the way in which nature can be valued monetarily, and the criticisms put forth regarding monetary valuation and the commodification of nature. We will explore these topics in the following chapter.

4. THE ISSUE OF MONETARY VALUATION

The monetary valuation of ecosystem services has been a highly contentious subject. The debate surrounding monetary valuation of ecosystem services can be seen as an extension of the issues that arise with the economic framing that we discussed above. Some outright reject the economic metaphor of ecosystem services, viewing it as having “effectively sold out on nature” (McCauley 2006, 28). Ethical concerns also arise for instance in contingent valuations, where the respondents to these surveys often introduce “so-called protest responses (high individual bids, zero bids, or a refusal to bid)” which “have been interpreted by some researchers as respondents’ unwillingness to assign a monetary value to ecosystem components because they feel that this is an act of betrayal of a moral commitment” (Luck et al. 2012, 1023).

Commodification of nature is another issue that arises out of the monetary valuation of nature. According to Gómez-Baggethun (2010, 1214, citing Kosoy and Corbera, 2010), “the commodification process covers three main stages: i) framing an ecological function as a service, ii) assigning it a single exchange-value and, iii) linking providers and users of these services in a market exchange”. This

rendering to a single exchange-value proves problematic, as it cannot account for the “incommensurability in valuation” (Martinez-Alier 2002, 44) and “ may lead to neglect of other non-monetary values of nature, such as inherent, fundamental, and eudaimonistic values” (Jax et al. 2013, 264).

Some view the commodification of nature as an inexorable result of the application of neo-liberal market economics to ecosystems. Kill (2014) seeks to expose the discourse surrounding ecosystem services and their monetary valuation as an attempt to assimilate ecosystems into the logic of capitalist markets. They view ecosystem services as a hypocritical device, which on the surface might proclaim to pursue the goal of reducing or stopping environmental destruction, but in fact paves the way for the commodification of natural resources. They summarize this view by stating that “[t]he argument is that once capital markets, politicians and corporations can see the enormous economic value of these ‘ecosystem services’, it will become easier to demand that “nature” be protected. Following this logic to its natural conclusion, a “nature” that capital can see is all that is required to end environmental destruction. [...] Economists have developed initial estimates of the economic worth of ‘ecosystem services’, research and development aid grants are distributed to prepare for marketing these ‘environmental’ or ‘ecosystem’ services” (Kill 2014, 39).

Others have argued that one should defuse these stark dichotomies and carefully consider the dilemmas that monetary valuation of ecosystem services poses. For Gómez-Baggethun (2013, 103), the question whether one should value monetarily cannot be answered definitely, “independently of past experience, as well as the specifics and the political context and purpose of a particular valuation”, but should rather be considered on a case to case basis. They acknowledge that some instances of monetary valuation can lead to abuses, yet choose to adopt a pragmatic approach, positing that “while radical systemic change is necessary for sustainability, this may come about through intermediate transitory actions, free from absolutist dilemmas” (Gómez-Baggethun 2013, 103).

In a similar vein, Braat (2014) argues that biodiversity is inherently tied to the economic system and that it would be naïve to choose not to account for this. Braat (2014, 97-98) further suggests that much of the criticism pertaining to ecosystem services and their monetary valuation tends to conflate economic and monetary valuations, claiming that “[e]conomic valuations are widely misunderstood to be equal to monetary valuation, while money is only one metric to assess values to our welfare and well-being.”

It remains however clear that “[u]sed outside their appropriate domain and as an ultimate decision tool, monetary valuations risk being abused” (Boeraeve et al. 2018, 8). It has also been recognized that these single-value approaches are profoundly ineffective “to offer relief” in regard to the “current sustainability challenges” (Jacobs et al. 2016, 214). In order to mitigate these negative consequences of the limited scope of this single-value approach, other types of values need to be considered and

integrated. In the next chapter, we will explore the guiding principles of the integration of plural values in ecosystem service valuations.

5. VALUE PLURALISM AND INTEGRATED VALUATION

A vast majority of scientists in the field of ecosystem service research have arrived at the consensus that it is necessary to conduct integrated valuations of ecosystem services. Rather than look at the various frameworks that have been developed to operationalise the integrated valuation of ecosystem services, we want to explore, for the purpose of this paper, its theoretical underpinnings as well as the challenges it can pose.

It seems necessary to first address what valuation means in this context. As we have seen in the chapters above, valuation is often conflated with monetary or at least economic valuation. However, “[t]he word “valuation” can be defined as the act of assessing, appraising, or measuring value, as value attribution, or as framing valuation (how and what to value, who values)”, meaning that it is not necessarily a price that can be assessed but also a worth or meaning (Dendoncker et al. 2014, 4, in Jacobs, Dendoncker and Keune 2014).

In order to fully understand integrated valuation, we must also consider the normative stance that underlies it. This normative stance is value pluralism, the “idea that there are multiple values which in principle may be equally correct and fundamental, and yet in conflict with each other” (OpenNESS 2014, 7). These multiple values are categorized into value domains that vary between the different frameworks. For instance, the IPBES uses intrinsic, instrumental, and relational values as the basis for their integrated approach (Díaz et al. 2015). MEA, TEEB and OpenNESS employ the distinction between ecological, social, and economic values. But no matter how the distinctions are made between these value domains, “[u]ncovering and eliciting these diverse values necessarily requires integrating diverse valuation approaches” (Jacobs et al. 2016, 214).

To uncover these diverse values, participatory processes that lend a voice to all the stakeholders involved are an integral aspect of the integrated valuation of ecosystem services. Integrated valuations are viewed as a continuous process of revision and adaptation that aims to reduce conflict potentials that are occasioned by the heterogeneity of values expressed by the stakeholders. It also seeks to align societal goals in a manner that redresses power inequalities and gives every actor an equal voice in the formation of environmental decision-making processes. As Jacobs et al. (2020, 3) point out, “[v]aluation must therefore be supported by an explicitly articulated normative vision to effectively align various practices towards the common goal of sustainability and resolving valuation disputes.”

The integrated valuation of ecosystem services also implies a reflexive stance on the part of its practitioners, in order to account for elements and values that might have been left out of the analysis, as well as to generate transparency towards the stakeholders that participate in the process. As Jacobs

et al. (2016, 215) state, “reflexivity allows researchers to locate oneself in the research process in order to track down how knowledge is constructed, situated and shared, how power relations determine the research process and especially its outcomes. Integrated valuation encourages self-critical reflection, which is strongly required to raise our own [researcher] awareness about our background assumptions and normative orientations that shape our decisions regarding selection of value-types, social actors to engage, ecosystem services to value, or methodological tools to apply” (Jacobs et al. 2016, 215).

Another fundamental aspect of an analysis that seeks to integrate a plurality of perspectives is that “in order to represent the diversity of nature’s values held by different social actors in decision-making, integrated valuation should mobilize a diversity of methods that allows capturing the plurality of values present in the system” (Jacobs et al. 2017, 6-8). These methods stem from such diverse sciences as ecology, agrobiolology, sociology, economy, anthropology, geography and more. Concretely, they vary from quantitative to qualitative research techniques, from biophysical assessments to participatory workshops. According to Jacobs et al. (2017, 6), “the choice of the valuation method can strongly determine the value dimension that will be elicited (‘created’)” – thus the choice of methodology is a crucial part of the reflective process that is associated with integrated valuations. The expectations of various stakeholders, as well as the incommensurability of their respective value languages (Martinez-Alier, 2002), must also be considered here.

The process of integrated valuation is circular and iterative, in that every element and value is constantly reflected upon, which in turn affects the valuation itself. Jacobs et al. (2020, 3) state that in integrated valuation “valuation is not understood as a single, independent, and discreet step of a research or assessment process in a policy cycle, but rather as a deeper and more continuous process” (Figure 4).

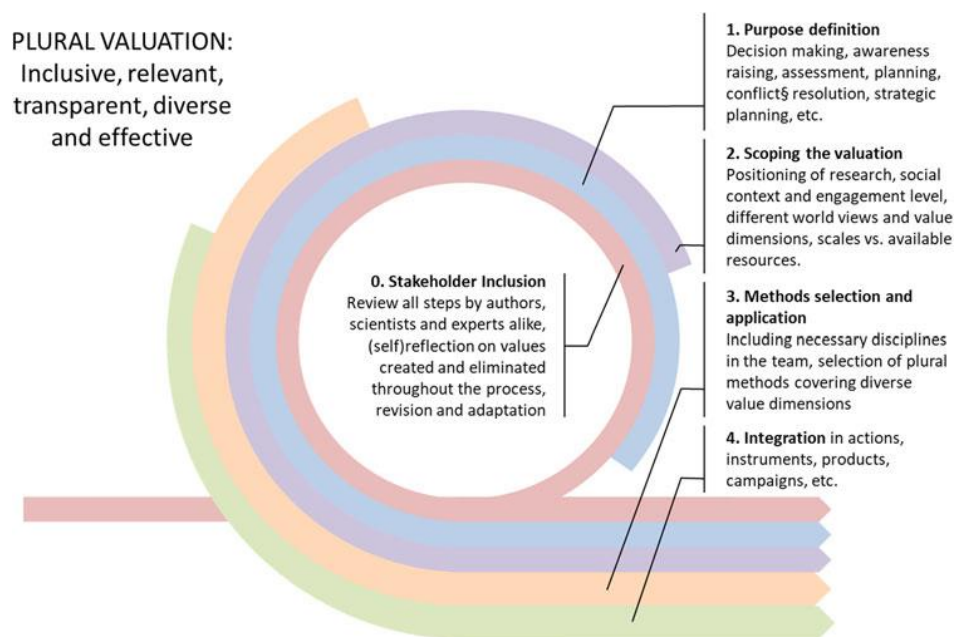


Figure 4 : Illustrating the constant valuation and critical reflection at every step of an integrated valuation. The who, why, what, how, where. (Jacobs et al. 2020)

The plurality of frameworks and methods employed in integrated valuations generate challenges for integrated valuations. Not only can the methodological differences between integrated disciplinary practices produce inconsistencies in the valuation (TEEB 2010), the multiplicity also presupposes a transdisciplinary basis to the project in question. Saarikoski et al. (2018) identify a number of institutional barriers within academia, research administrations and land management entities, barriers such as the “silo” effect, whereby researchers and practitioners are trained and work in environments where they do not necessarily come into contact with other disciplines. In order to effectively address this challenge, Saarikoski et al. (2018, 589) point out that “practitioners need training and education to develop and utilize new kinds of knowledge and competencies that transcend the established professional norms and codes of conduct. They also need support to uptake and maintain these new competencies in their daily practices”. If individual practitioners cannot combine all the needed knowledge and experience with different methodologies, adequate transdisciplinary teams can represent an answer to this problematic. There are however also institutional barriers in this regard, barriers that Saarikoski et al. (2018, 590) propose to address by instituting “new organizational procedures and management structures, such as cross-sectoral networks”.

The challenges that integrated valuations of ecosystem services pose have elicited many different responses. One such response is the IPBES’ adoption of a new terminology that seeks to expand on the notion of ecosystem services and to allow for a more successful integration particularly of local and indigenous knowledge and knowledge systems, which we will further discuss in the next chapter.

6. THE IPBES AND NATURE’S CONTRIBUTIONS TO PEOPLE

Before we move to the preliminary conclusions and the second part of this paper which will examine how ecosystem services and integrated valuation are perceived and embedded into practice by members of the BEES community, we felt it necessary to briefly elaborate on the conceptual framework that has been proposed by the IPBES, their recent adoption of the concept of “nature’s contributions to people”, as well as the debates that surround this adoption.

Creating a new conceptual framework had been a key part of IPBES’ mission from the outset (Kenter 2018). This new framework (Figure 5) was ultimately adopted in 2013 by the second IPBES Plenary and “is mainly intended to provide common ground, to facilitate cross-disciplinary and cross-cultural understanding and inter-operability, and to identify options for action” (Díaz et al. 2015, 4).

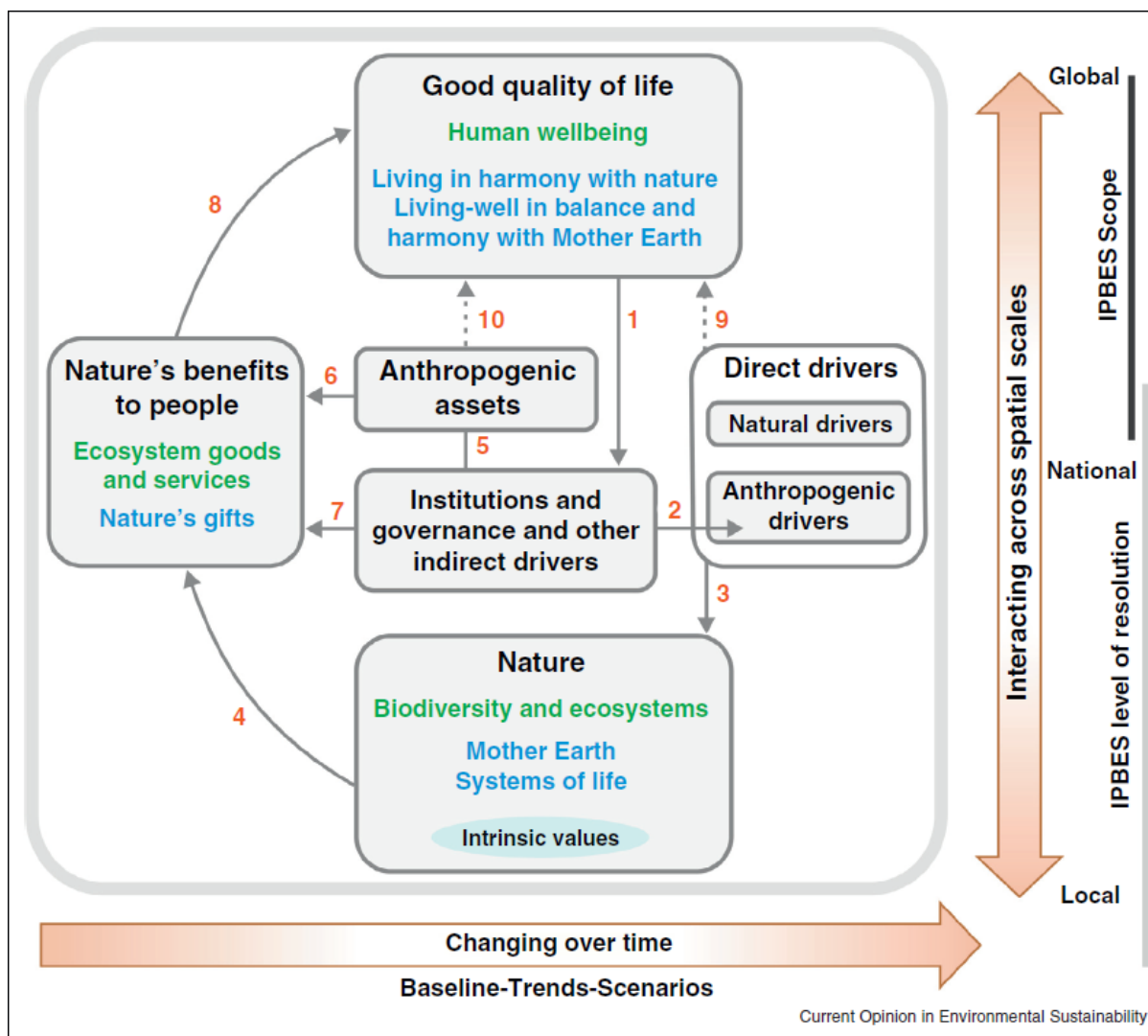


Figure 5 : The IPBES Conceptual Framework: The grey boxes and arrows are the main areas of focus in nature and society for IPBES. Categories of western science are marked in green, the equivalents for indigenous or other knowledge systems in blue. Anthropocentric values are represented in the boxes “nature’s benefits to people” and “good quality of life”, while intrinsic values are represented in the box “nature”. The various arrows denote links between these elements (Díaz et al. 2015, 5).

In this conceptual framework, six primary elements of natural and social systems, as well as the links between them, are represented across time and space: nature, nature’s benefits to people, anthropogenic assets, institutions and governance systems and other indirect drivers of change, direct drivers of change and good quality of life. The conceptual framework also adopts the distinction between intrinsic and anthropocentric values, identifying three different types of values: intrinsic values which are inherent to nature, instrumental (anthropocentric) values which are associated to the elements of nature’s benefits and good quality of life and finally relational (anthropocentric) values which are revealed through the “desirable” relationship between people and nature, regardless of whether that relationship procures benefits (Díaz et al. 2015).

In the scope of this chapter, we will not elaborate further on this framework. Two things are however interesting to note. Firstly, the understanding of different categories of ecosystem services, as they could

be found in various other frameworks (see chapter 1) are no longer used in the IPBES framework, the rationale behind this being that “IPBES recognizes that many services fit into more than one of the four categories. For example, food is both a provisioning service and also, emphatically, a cultural service, in many cultures, ...” (IPBES, Glossary).

Secondly, ecosystem services are presented as a sub-concept of the element “nature’s benefits to people”, which in 2017 was renamed to “nature’s contributions to people” (Pascual et al., 2017). The concept of nature’s contributions to people is defined as “all the positive contributions, or benefits, and occasionally negative contributions, losses or detriments, that people obtain from nature” (Pascual et al. 2017, 9). While this concept echoes many of the definitions included in the first chapter of this paper, the specific intent behind it is to “[go] further by explicitly embracing concepts associated with other worldviews on human–nature relations and knowledge systems (e.g. ‘nature’s gifts’ in many indigenous cultures)” (Pascual et al. 2017, 9).

However, the IPBES’ adoption of this concept is not without controversy. This debate is extensive and ongoing (Kadykalo et al., 2019). In order to provide an overview, we will only be mentioning some of the many people who have contributed to this discussion. Kenter (2018, 1) views the adoption of this concept as “a rebranding exercise more driven by politics than substance”, continuing further that if inclusivity and people’s plural values of nature were really to be centered instead of nature’s services or contributions, “the term should not be replaced, but its frame be made subsidiary, treated as one amongst diverse conceptualizations in broader, pluralistic, integrated assessments”. Responding to Díaz et al. (2018), Braat (2018) is amongst the most vocal critics, stating that the adoption of nature’s contributions to people as a novel concept ignores advances made in ecosystem service research as well as the fact that social science perspectives are included in the concept. He also posits that a pluralistic worldview (regarding culture, local and indigenous knowledge) is embraced in ecosystem service research while Díaz et al. (2018, 4) maintain that the concept of nature’s contributions to people “should help overcome existing power asymmetries between western science and indigenous and local knowledge”. Furthermore, Braat (2018) denies the claim made by Díaz et al. (2018) that nature’s contributions to people are more successfully incorporated into policy and practice, and states that while there is no evidence in favor of nature’s contributions to people in that aspect, the concept of ecosystem services has been successfully incorporated in many ways.

Díaz et al. (2018, 4) posit that the concept of nature’s contributions to people brings about a “paradigm shift”, through an “unprecedented effort to tap indigenous and local knowledge, from the literature and also from dialogues with indigenous and local knowledge-holders”. However, while Kadykalo et al. (2019, 16) acknowledge that the concepts of ecosystem services and nature’s contributions to people diverge partly due to nature’s contributions to people being broader, they state that “framing NCP as a ‘paradigm shift’ is probably unwarranted given that many aspects claimed as novel to NCP are captured

in ES literature”. They advocate for a way forward in which the emphasis is not placed on semantics but rather on viewing both concepts as complementary in future “people and nature assessments”. (Kadykalo et al. 2019, 16).

7. PRELIMINARY CONCLUSIONS

In the first part of this paper, we have seen that the concept of ecosystem services emerged out of a complex history and, as a boundary object, has been subject to many debates regarding its precise nature, use and usefulness. We have laid out how the historical development of the concept led to a conceptualization that is deeply entangled in ecology as well as economics and has been taken up by a wide variety of disciplines in the natural and social sciences, as well as percolated into policy arenas. In considering the debates surrounding the concept, we have come to understand the main concerns that the ecosystem service concept poses, may they be of ethical or practical nature. Furthermore, through looking at the limits of monetary valuation, we have seen that the evolution to a more integrated valuation of ecosystem services and the adoption of value pluralism is a logical and necessary step in redressing at least some of the concerns that were identified in the debates surrounding the concept. We have laid out the theoretical underpinnings of an integrated valuation, showing that value pluralism is an inherent part to this approach. Lastly, we have given an overview of the IPBES conceptual framework and the concept of nature’s contributions to people as it has been proposed by the IPBES as a replacement term for ecosystem services, as well as the criticisms this new terminology attracted from some members of the ecosystem service research community.

With this information in mind, we want to move now to the second part of this paper. In it, we look at the Belgian ecosystem service community of practice (BEES) and, through exploratory interviews with some of its members, aim to identify the main challenges and opportunities that the ecosystem services concept and their integrated valuation bring when used in practice.

PART II

1. ES SERVICES IN BELGIUM: THE BEES PROJECT

In line with the global developments of the ecosystem service concept that were laid out in part one, ecosystem services emerged in Belgian research projects during the 1990s and, spurred through the mainstreaming effect of the MEA, more and more researchers expressed interest in the concept. According to Segers et al. (in Jacobs, Dendoncker and Keune 2014, xxx), many of the research projects at the time were already interdisciplinary in nature but “the focus was mostly on a single habitat and a few services”. This was quickly recognized as a limitation to the sustainability aspect of ecosystem service analysis and was to be formally addressed through the project of a network.

Thus, in 2009, the cluster project Belgium Ecosystem Services (BEES) was created. It was funded by the Belgian Science Policy Office (BELSPO), coordinated by the University of Antwerp and had as its main objective to foster research on ecosystem services in Belgium. The broader vision behind this project was to create a national initiative that could structure ecosystem service research, more concrete objectives being networking and inventorying expertise, creating common methodologies and a “virtual” research institute, as well as formulating recommendations for science and policy (BELSPO, Belgium Ecosystem Services). A series of six workshops and a concluding conference were organized as the main part of this project between 2010 and 2012. Each workshop was dedicated to a different topic (ecosystem service inventory, methodological state of the art, biodiversity and ecosystem services, valuation, international trade of ecosystem services, ecosystem service research and policy), with the goal to co-author a common summary of the workshops that would then be presented at the final conference. Because of a similarity in approach and a desire to involve actors stemming from more economically driven sectors which had been poorly represented in the workshops, the decision was made to hold the final conference under the specific heading of TEEB. In turn, the “end-conference not only presented results from the BEES project but continued the formation of a broader community on the value biodiversity” (Jacobs et al. 2012, 22).

At the end of the project in 2012, there was a clear desire to build upon the project and use the advances made to create something with lasting impact, in two ways. On one hand, there had been an ongoing discussion during the workshops on what exactly to do with the various outputs. It was finally decided that a peer-reviewed book should be published, this format being the most apt at targeting the diverse public of “researchers, research administrations, informed and interested government officials and experts, local practitioners and students” that these results were aimed at (Jacobs et al. 2012, 29). The book format also allowed other members of the newly minted network to contribute and was finally published in 2014 under the title *Ecosystem Services: Global Issues, Local Practices*. As the title shows,

the contents of the book range from global reflections and debates on ecosystem services to observations and perspectives from practitioners in the field and reflects the expansive nature of BEES.

On the other hand, the necessity for the continued existence of an ecosystem service community of practice was also acknowledged in the final report. On 26 April 2012, this community of practice was established by ecosystem experts from both science and policy arenas. The BEES community is set up as an informal and voluntary community for scientists, practitioners and policymakers working with ecosystem services. It aims to facilitate capacity building and exchange, to develop and mainstream new tools, to encourage uptake of the concept in all societal sectors, and to provide an overview of knowledge and best practices. It also functions as the point of contact between Belgian experts and international initiatives like IPBES, MAES, TEEB and ESP (Jacobs et al. 2012, BEES 2014b).

In its first brief (BEES 2014a), the BEES community proposed the following recommendations for an effective use of the ecosystem service concept:

1. Acknowledge the significance of biodiversity and ecosystem services to society
2. Recognize the importance of ecosystem services in land use policy
3. Treat ecosystem resilience as paramount
4. Capture the value of ecosystems and their services
5. Support the mapping of ecosystems and their services
6. Acknowledge the existence of multiple values of biodiversity and ecosystem services
7. Promote transparency and equity in decision-making processes
8. Always consider bundles of ecosystem services
9. Adopt a transdisciplinary approach
10. Measure better to manage better

It becomes clear that the integrated approach has been a key part of the BEES project and the resulting community of practice from the outset. In the following chapter, we aim to investigate how various members of the BEES community view the implementation of integrated valuations and the underlying value pluralism in applied research contexts and in the various processes that shape environmental policymaking.

A variety of assessments have been made to see how the members of the BEES community value the relevance to policy of their work (Keune and Bauler, 2012), as well as to determine if projects that adopt an integrated approach are being carried out in Belgium (Dendoncker et al., 2018). While the latter assessment tended to look at the substantive components of the projects themselves, it is our aim in the following to draw attention to the people who carry out these projects, the members of the community. We will attempt to draw a picture of the evolution of the BEES community of practice, to see where its

members perceive it to stand now. We will also probe how the participants view the concept of ecosystem services and its evolution, how they understand the notion of value pluralism and how it informs the integrated approaches that they deploy in their work. We also focus on the practical utility and possible obstacles that integrated valuations generate.

2. EXPLORATORY STUDY

2.1 Goal of the Study

The goal of the study was to interview a variety of ecosystem service practitioners. The format of the interview was long-form and an open-ended questionnaire was employed to allow the participants to explore personal ideas and perceptions in an in-depth fashion. We firstly wanted to understand how the evolution of the concept and of its ramifications, as outlined in the first part, are understood, and perceived by the practitioners themselves. We deliberately chose to rely on the participants' perceptions and opinions, considering that to explore these topics alongside practitioners who have been involved in this field for significant amounts of time would provide precious insights. We particularly wanted to home in on the practical uses of the concept when designing or carrying out a project, as well as its range when dealing with different kinds of stakeholders, be they local actors or policymakers. Through this discussion of the uses of the concept, we also wanted to draw out the possible drawbacks and shortcomings of ecosystem services and integrated valuation as explanatory and operative concepts. To be able to gather relevant information, we chose to only speak to persons that are or have been involved with ecosystem services in some capacity. A further study on the perception of the notions of ecosystem services and integrated valuation by people who are not familiar with them remains to be done. While the participants of the present study partly provided insights into this aspect, it would have without a doubt also supplied grounds for a fruitful reflection.

2.2 Methodology

Nine interviews were conducted, which lasted between one hour and one hour and forty-five minutes. Due to the external circumstances of the ongoing health crisis, all interviews took place via videoconference over Microsoft Teams and were recorded with the permission of the participants. These interviews were conducted in English (four) and in French (five), based on the preference of the participant. They were subsequently transcribed in their entirety in the language in which they were conducted. There are 92 pages of transcriptions in total which can be made available upon request. We did not translate the entirety of the interviews conducted in French into English, but only those parts which we quote directly. Here, we took all precautions to stay as close to the original meaning as possible. No participants received the questions beforehand (only one person requested the questions, but due to the manner in which we wanted to conduct these interviews, we did not comply with the request).

With the exploratory aim of this study in mind, we chose to work with a semi-structured interview style in order to conduct a qualitative assessment. Our main intent with these interviews was not to receive statistically significant results, or definitive answers to the questions we asked. Rather, we kept the questions purposefully open-ended and vague, in order to gauge the interests and opinions of our interview partners on the topics we explored with them, and to afford them the freedom to lead the interview to the aspects of the topic they found most pressing or interesting. In preparation, we compiled a series of open-ended questions as our guiding structure for the interviews (see Appendix). The questions were structured into 4 thematic clusters:

- **Ecosystem Services:** Here we sought mainly to ascertain how actors position themselves towards the concept. We wanted to gain an understanding of its utility, its weaknesses, and strengths not just in theory but also in practice. Furthermore, we wanted to identify how the actors see the concept evolve.
- **Value Pluralism:** In this category, we wanted to probe how the actors understand value pluralism in relation to ecosystem services, in theory and in practice. We aimed to find out how the actors perceive the inclusion of multiple values concerning practice, as well as tried to get a sense of how value pluralism has percolated in Belgian ecosystem service research and policymaking.
- **Integrated Valuation:** Regarding the integrated valuation of ecosystem services, we mainly sought out two things. On one hand, we set out to get a better picture of how integrated valuation can work in practice, what advantages it brings or what barriers need to be overcome to successfully use it. On the other hand, we wanted to ascertain if there has been a change in practice in the last ten years trending towards integrated valuation and if the concept has percolated in Belgian ecosystem service research and beyond into policymaking.
- **BEES and the Science-Policy Interface:** In this last category, we wanted to examine how a community of practice shapes research. We also wanted to discuss with the actors the capabilities of value pluralism and integrated ecosystem service valuation in the science-policy interface, as connectors between disciplines, systems, etc.

As the goal for these interviews was to achieve a flowing discussion and to leave room for expansive answers, the formulation of the questions changed over the course of these interviews, as well as the order in which they were asked. We allowed space for us to probe more in-depth statements made by participants, if necessary or pertinent, and to ask follow-up questions. One of our goals from the outset had been to utilize our interview partners' expertise and experience in ecosystem service research to help us mitigate potential blind spots. Thus, we also progressively included remarks made by previous interview partners, that we found particularly interesting, to see if the subsequent interview partners

agreed, disagreed, or could expound on these statements. In adopting this methodology, we hoped to create a dialogical dynamic between the participants.

The transcripts of the interviews were analyzed according to the four thematic clusters identified above and salient sub-themes were distinguished. We proceeded by gathering answers, selecting emblematic statements, and contrasting opinions that diverged from the general tenor of the responses. As the four thematic clusters are closely intertwined, the participants often connected the various themes within their answers. Despite some overlap, we chose to retain the aforementioned analytical grid for better legibility.

We understand that there are certain limits to this qualitative approach and that the inclusion of a quantitative analysis might have provided supplementary information for certain topics of discussion. It is our belief however that this approach has permitted us to render of a variety of perspectives and opinions that have enriched the theoretical considerations presented in the first part of this paper.

2.3 Selection of participants

The participants for these interviews were chosen with a diversity of backgrounds and profiles in mind, in order to reflect multiple visions and opinions in the Belgian ecosystem service landscape. We aimed for a balanced selection between the Flemish and Walloon language community, as well as a balance between university and administration affiliated participants. All participants were either chosen beforehand in cooperation with our thesis advisors or contacted based on recommendations by other participants. We explicitly chose participants who have extensive knowledge and interest in the subject matter and who have worked or currently work with the concept of ecosystem services, as we felt that those individuals would be best equipped to share with us their perceptions and reflections on the topic. A list of all participants can be found below (Figure 6). As the questions were progressively adapted based on the input of the participants, we felt it necessary to reflect the list in “order of appearance”.

Name	Occupation	Institution
Paula Ulenaers	Expert, Ecosystem services and Climate Change	Vlaamse Landmaatschappij (VLM)
Nathalie Pipart	Doctoral Researcher, PES	KU Leuven, Division of Geography and Tourism
Fanny Boeraeve	Post-Doctoral Researcher, Ecosystem Services and Agroecology	F.R.S.-FNRS, ULG Gembloux Agro-biotech
Jeroen Panis	Expert, Climate and Ecosystem Services	Agentschap vor Natuur en Bos (ANB), Nature and Society

Nicolas Dendoncker	Professor	UNamur, Département de Géographie
Marc Dufrêne	Professor	ULG Gembloux Agro-biotech, Département Biodiversité et Paysage
Laura Maebe	Doctoral Researcher, ES and Resilience Assistant for ES courses	ULG Gembloux Agro-biotech, Département Biodiversité et Paysage
Jan Staes	Post-Doctoral Researcher	UAntwerpen, Ecosystem Management Research Group
Catherine Généreux	Expert, Water, Ecosystem services, Nutrient Cycles	SPW, Direction de l'Etat Environmental

Figure 6: List of participants in order in which the interviews took place.

2.4 Results

On ecosystem services

A concept in constant evolution

All participants clearly identify an evolution in the concept of ecosystem services, especially pertaining to the manner of their valuation. There is agreement on the current perspective that the participants' take on ecosystem services is largely informed their disciplinary backgrounds, as well as on the amount of time they have been researching or working with the concept. Some, who entered ecosystem service research at the height of the debate on monetary valuation, talk about a clear evolution from the debates surrounding monetary valuation towards an integrated approach to valuation. Researchers that have entered the field in last couple of years rather stated that the notion of performing integrated valuations seems evident to them and that this position now represents a consensus amongst ecosystem service researchers, that it has reached a certain mainstream there.

Many noted that there is a firm trend towards social and sociological valuations of ecosystem services coming to the forefront. They state that it has taken a certain amount of time to develop adequate methodologies in the social sciences that distinguish themselves from the methods initially adopted in environmental economics. As one participant noted:

There are a lot of advancements in the social domain. We're increasingly trying to take into the social aspect into account, next to the economic and ecological aspects, we're trying to make social evaluations of ecosystem services with more and more people who are trying to work with actors, with

questionnaires, with participative ateliers, etc. So that's the evolution that I'm seeing as far as ecosystem services are concerned, to try and include the social domain. (Laura Maebe)

This evolution towards the inclusion of social considerations and of the sciences that intend to study them is globally seen as a positive development, even if many participants pointed out that there also seems to be a rift between natural sciences and social sciences that must be constantly addressed in order to possibly reconcile the two in an integrated approach. Some participants remarked that the broadening of the types of participants and disciplines who take part in ecosystem services research can also have a detrimental effect on the general understanding of what drives ecosystem services, namely ecological and biophysical processes. One participant described the trend thusly:

I do see a trend where in the early conferences you would see a lot of ecologists and hydrologists, and you don't see them anymore. [...] let's say in the beginning it was environmentalists, environmental protection, which of course tried to use the word ESS in the negative, but there were a lot of ecologists there. And now it's economists, sociologists, and they tend to not look at regulating services, rather the recreational and cultural services. And often the ecological processes that drive those are not really always there anymore. (Jan Staes)

The perspective on the evolution of the concept notably differs when talking with practitioners, with people who work in Flemish and Walloon administrations. Remarking that there is still a long way to go between theory and practice, a participant describes that in the use of ecosystem services as a concept and particularly concerning integrated valuation, there is "almost an avant-garde, who definitely do that, but you still have the main body and the rear-guard, the rear-guard doesn't even consider ecosystem services" (Jeroen Panis).

Some participants also commented on the introduction by the IPBES of the concept of "Nature's Contribution to People", stating that while it represents an attempt to address some of the concerns surrounding the notion ecosystem services and to, in a certain measure, redress the negative connotations sometimes associated with it, it remains to be seen how "Nature's Contribution to People" will fare. As one participant comments:

I think they [NCP] also have their limits, even if they are intended to be larger [...] Them being larger, more encompassing, more systemic, you gain complexity and get closer to reality but you lose out on pragmatism. At one point, with so much information, you won't know what to do with it anymore. (Fanny Boeraeve)

A strong and useful concept

When asked about the usefulness and strengths of the concept of ecosystem services to address a variety of professional and scientific challenges, a number of participants highlighted the fact that ecosystem services are their principal analytic tool and that it allows them to structure and give direction to their analysis. Participants highlighted the fact that it is particularly useful in action research projects,

fundamentally informing and orienting the preparation, the research process, and the interpretation of results in projects that adopt it as a guiding concept.

They further present the concept as a means to integrate ecology and economy and thereby rally the different actors that live in a given landscape. The concept is also viewed as a way to reconcile the ideas of conservation of biodiversity with the development and wellbeing of human societies. The concept creates visibility for interdependencies between actors, but also for socioeconomic dependencies on natural systems that were not formerly perceived as such. As a participant explains:

The ecosystem service concept can build a bridge between what's called ecology and economy. But economy in the broader sense, in the direction of human society and between humans, it's more socioeconomic than just the understanding that people usually have of economy. That's the main strength. It also provides a way of looking at your environment which gives insight in the consequences of actions, positive or negative consequences, which is very handy if you want to have an efficient and well thought out policy. (Jeroen Panis)

Certain weaknesses and shortcomings

Many participants note the concept's utilitarian and anthropocentric framing. For some participants, this framing led to a deep mistrust of the concept, the effects of which are still felt. As one participant notes:

It's a bit of a consequence of the beginning of the ecosystem services, the fact that through the best known ecosystem service publications, the ecosystem service concept was linked to the monetary valuation of services of nature. So besides the fact that it misses a lot of the other types of values which are very important for the relation between humans and non-human nature, besides that, it made a lot of people distrustful of the concept. And I must say the first time I heard about the concept and they talked about trying to value nature, I thought: you can't value nature. Not monetary[sic] at least, you can value certain services for humanity, but even then, you can't monetarily value every value derived from those services, so that's an issue. (Jeroen Panis).

The concept does not capture the intrinsic value of nature and is generally not able to capture the totality of values that are held about nature. The fact that IPBES abandoned the ecosystem service terminology in favour of nature's contributions to people is interpreted by some as an attempt to broaden the basis of the concept, in order to capture more values and counter the mistrust that still lingers regarding the notion of ecosystem services. However, as one participant notes:

Even if you don't pay attention to all the intrinsic values and things like that, at least you will get the utilitarian arguments to protect certain things, which is basically better than nothing in plenty of cases. (Jeroen Panis)

Many participants note the ecosystem terminology as a weakness. The term is seen as too abstract and technical to be successfully communicated to a broader audience, which is why many participants need

to resort to didactical processes in order to facilitate communication. Breaking down the issues and communicating successfully with participants who are not trained in natural sciences can be a challenge for researchers, since this type of facilitation and communication is not an element that is covered in the typical training of natural scientists.

The vague nature of the concept is noted as well as a weakness by some, one participant referring to it as a concept that contains “everything but the kitchen sink”. They note that since it has such a broad appeal, researchers and practitioners with different disciplinary backgrounds tend to invest it with diverging categories and concerns. This can lead to problems when trying to dialogue across disciplinary divides. It also bears the risk that certain fundamental aspects, such as the biophysical basis of ecological processes, are neglected.

Another participant notes that the notion of negative ecosystem services (ecosystem disservices) is often overlooked in ecosystem service research and generally not considered, even when performing integrated valuations. The concept is such invested with a positive normative charge that sometimes obfuscates the fact that nature is not necessarily benevolent.

Strengths and weaknesses are mainly defined through use and context

When considering the previous points, it is crucial to note that all participants insisted on the fact that the strengths and weaknesses of the ecosystem service concept are mainly defined by the way in which the concept is used and the context in which it is mobilised. As one participant notes:

It is mainly the use of the concept that needs to be discussed and not the concept in and of itself. Of course, the concept is anthropocentric by nature, etc. but it's the way one uses it that determines if it is interesting or not. So, I use it because I really want to try to make a link between nature and human society, and really understand the interactions that people have with nature and between themselves. From that point of view, I think that the concept is very interesting because it provides insight into the relationships between everything, it is very holistic. (Laura Maebe)

Many participants regard the initial focus on monetary valuation and the resulting risk of a commodification of nature not as an inherent element of the concept, but rather as one that is brought about by misuse of the concept. One participant states:

It is not easy to arrive at this commodification, even in the context of a scientific study that aims to evidence the “willingness to pay” for a service, that does not automatically mean that something is automatically offered for sale, (...). But there can be abuse if the concept is hijacked to effectively commodify nature. Abuse of the concept can happen when you understand the ecosystem service concept as *nature being at our service* (...) But the concept just tells us, if you look at the terminology, that *nature provides us with services*, which is something very different. (Nicolas Dendoncker, emphasis our own)

To better illustrate the fact that use determines the strengths and weaknesses of the concept, one participant employs the analogy of a car and a driver's license:

I often use the example of the driver's license and the traffic regulations. A car is made to go from point A to point B, it's not made to kill people. There's a driver's license on one hand, traffic regulations on the other. There needs to be the same things for ecosystem services. There are abuses that one can fall prey too, abuses like the commodification of certain services. (Marc Dufrêne)

Another participant states that the successful use of the concept is also dependent on the society and culture in which it is used. While the utilitarian language of the concept works well in western societies, in societies that are accustomed to this kind of thinking and to a certain instrumental view of nature, it is much less likely to be successfully adopted in cultures that do not view nature and culture as rigidly separate realms. An example cited by one of the participants is the Pachamama, a figure that is widespread in South America and that represents earth as a single organism in which everything is interconnected. For people who consider nature from such a perspective, a notion such as ecosystem services would make very little sense.

Finally, most participants commented on the fact that the ecosystem service concept is inapt or at least not very useful for the preservation of rare species. But as one participant states, the concept of ecosystem services can nonetheless be a useful tool to mobilize and make people care about biodiversity, because it allows for decoding of the multiple links between people and their surroundings:

For me, it's the only way to speak positively about biodiversity. When you talk about protected species [...] you are in a logic of protection and exclusion of all other actors [...] Yet you should be creating links between people and nature and these links can be created via experience, via particular contact with nature, which furthermore helps reveal what purposes nature serves, because for example, many people don't realize at all what purposes trees in a forest have [...] And that [trees] guarantee them a large number of services that they don't have to pay for. And that [trees] help to regulate many negative externalities. To which they are attached, but they cannot understand it if they are not given a tool to decode all of this, if they are not taught how to describe a landscape, how to view a landscape and not just see a lot of green, but to see that there are functions that are being guaranteed. And for me, the concept of ecosystem services is that tool, the key to decode all of this. (Marc Dufrêne)

On the concept of value pluralism

Constructivism and positionality

When asked about the notion of value pluralism, many participants characterize their position as a constructivist position, which they oppose to a positivistic position. In its most common acceptation, value pluralism is immediately associated with a constructivist stance, a stance that understands reality as a social construct elaborated from a plurality of views. One participant clarifies:

There are still positivists (...) who will take as an assumption that there is a reality out there that you can reveal, and then there are more constructivist perspectives, people thinking that reality is constructed socially and culturally. So if you're more from this perspective, you already have a foot more into understanding this, or at least working on this value pluralism. Because there is not one value for an

ecosystem, an ecosystem service, a species or whatever. There are different perspectives on it that construct this object. (...) If you are more in a positivist perspective on research, knowledge creation, etc. you believe that there is one truth that you need to reveal, it doesn't matter what you think because there is only one truth! If you're more from the constructionist or post-positivist perspective, then you realise that actually, there are multiple perspectives, truth is constructed by people and you are part of the research, you have a position. (Nathalie Pipart)

While stating that their position is constructivist, the participants do not endorse a relativistic position and continuously underline the importance of an ecological and biophysical underpinning when performing valuations of ecosystem services. The professed constructivism is in fact a position that underlines the complementarity of social and natural sciences, the results of each being properly understood, contextualized, and ultimately integrated.

Asked how they view the incidences of own biases and personal viewpoints on their research on ecosystem services, the participants all pointed out the importance of the positionality of the researcher, and the necessity for the researcher to make his views transparent to the stakeholders that they address. As one participant says:

Considering the current socio-environmental emergency, I believe that we need more and more committed scientists, so I am for a normative stance de facto, from the outset. This is something I also teach in my classes; I am very explicit on my own position. I do also think that you cannot do action research while calling yourself an honest broker, you see "neutral" research positions but in fact we are advocates, we are issue advocates. Sometimes during the process you might need to switch hats, and adopt a more neutral position, but globally, at least as far as I am concerned, I am an issue advocate and I think that needs to be said. (Nicolas Dendoncker)

Other participants sought to add that while these debates can be important, they should not hold up the inquiry. Stating that as long as the positionality of the researcher is clearly presented to all persons associated at the outset, it can be plainly accepted without being necessarily problematic. One participant states:

The only contract that I have with society is to be transparent on the methods and the data that I use. This means that if someone else uses the same methods that I did, he must arrive at the same results. But the choice of methods, the choice of inventories that we'll establish, the choice of the topic on which we'll work... You have to stop asking yourself existential questions that stop any progress! [...] With the issues that we have to treat, we can't ourselves too many questions on the way we'll act along the way, we have to move forward. It's a pertinent question but it isn't necessarily important. (Marc Dufrêne)

On the integrated valuation of ecosystem services

Integrated valuations of ecosystem services reveal the true potential of the concept

As most participants note, the concept of ecosystem only proves truly useful when being used in an integrated approach and not in a single service valuation. As one participant says:

Ecosystem services are a good tool to give a broader perspective, when you do an integrated valuation and when you include all the different actors. For me, they are only interesting if you do an integrated valuation, because they afford a holistic and global vision. Otherwise you can say “we measured wood”, “we measured game”. But there you do not measure ecosystem services; you have just measured wood or game. (Laura Maebe)

This goes hand in hand with the importance of system thinking that many participants underline as being an essential part of the successful use of the ecosystem service concept. The broader perspective, the necessity to consider a multiplicity of perspectives when valuating ecosystem services is put forth by every participant. The perspectives of local stakeholders (farmers, hunters, fishers, forest managers, owners, tourists, etc.) that live and work in a given landscape and benefit from the ecosystem services that it offers must be taken into account in order to take correct decisions, to generate acceptance for these decisions and a broader awareness of the value of the ecosystem services in question. Many participants point out that it is important to accept that the decisions that are made on the basis of an analysis that considers the plurality of views and values of involved actors cannot satisfy all these views and values equally. In this regard the integrated valuation of ecosystem services is viewed as a tool to make informed decisions and find a compromise position that takes a maximum of the expressed views into account and balances the trade-offs. A participant explains this aspect further:

So you will have conflicts that are unresolvable, at least at the local scale. So in that sense, you can look at all the different values you want, they will never be aligned. But if you look at other complex things, without extremely clearly defined goals, it will be very helpful to get the maximum of societal benefits. If you look at all those different stakeholders, to get things moving. You can ignore plenty of those issues, but in the end they will come back to bite you. [...] As a government, you have to look at it in different ways, ponder, talk, take into account different stakes of different stakeholders, and look at their values... Which is a good thing, because normally you will end up with better decisions. You can't make everybody happy, of course, but it should at least maximise the benefit for society as a whole, which should be the goal of every government decision. (Jeroen Panis)

Facilitation and communication with stakeholders

The interview partners point out that the participatory dimension of a project or a research must be accounted for in the conception and execution of a project and not performed ad hoc. This complexity must also be recognized when communicating with the stakeholders. Many participants pointed out that local stakeholders cannot be confronted directly with the concepts and the complex data that is

employed by researchers in a project. These elements must be broken down, translated so the actors can understand the questions that are at stake.

I really think that using the concept can be very useful to talk about the system that you are working in, about the holistic system you are working in. [...] you have to translate it, so that all your participants see the same picture of the area you are working in, see the same project and they take into account that if you take one measure here [...] it can be very useful for this particular project, but it can also be useful for other ecosystem services. (Paula Ulenaers)

Several participants pointed out that facilitation skills, the ability to communicate with different stakeholders on a variety of levels of knowledge, isn't something that is a part of the training of many natural scientists. This is mostly learnt by trial and error in the field and one participant notes that "we're mostly lacking qualified people who can set up this kind of co-creation and participatory action research, action research in partnerships, those kinds of things" (Nicolas Dendoncker). While the scientific terminology is not evident to the stakeholders, the participants also pointed out that it is not always evident to make space for the concerns and values of the stakeholders, that the ecosystem service concept cannot reflect the totality of the views expressed. One participant explains this aspect:

When we ask people what they see in their landscape, which values they attribute to their landscape, what's important to them in the environment... They'll say things that we're not able to fit into the ecosystem service typology. They told me: "What's important to me is to create local jobs, that the farmers are respected ...". Those are things that you don't find as such in the ecosystem service typology. (Fanny Boeraeve)

Another participant focuses on the fact that time is a crucial factor and that participatory processes necessarily require time. They explain:

If you want to do a local consultation, it takes time, first you need a meeting to explain, the time that people react, think about it at home, during three weeks you let them go in the field with an analytical grid that they don't necessarily know, and then you take them back to value what they've learnt, teach them again, eventually correct certain interpretations that don't directly concern ecosystem services but rather social issues for example, to show them how to evaluate things correctly. (Marc Dufrière)

Obstacles to an integrated valuation of ecosystem services

Many participants commented on the fact that time, money and capacity are the main barriers when conducting an integrated valuation. One participant explains:

As you say in Dutch, "Koken kost Geld", cooking costs money – and you want to make some very complicated dishes. So yes, it will take time, and time is money. So it's inevitable. That's why in that guidance document I was talking about, we foresee an approach for projects on a small, medium or large scale. So you can target the issues of your project, you can target your approach and use different concepts and tools to make sure that you have the right means. If you have a very small budget, you can't do a

very huge stakeholder survey or something like that, if you don't have the money to do that you need to do something else. (Jeroen Panis)

Several participants point out that the pressure to produce results in the short time span afforded for certain projects does not always necessarily allow every branch of the inquiry to be satisfactorily followed, nor every method to be fully applied; “there are compromises that need to be found, between the means, the time, the methods, the data and the actors that are available” (Laura Maebe). They underline that in a research context, this lack of time is often a barrier to transdisciplinarity. As they explain, transdisciplinary projects such as an integrated valuation require not only a substantial time investment but often are carried out in larger research groups. But if researchers are mainly evaluated on their output as primary authors, this does not encourage participation in larger projects where the time and energy invested is not valued more than if one were to carry out a small project on their own.

While many researchers realize that there are material, as well as inherent, obstacles to the integrated valuation of ecosystem services, they argue that since a fully integrated evaluation is never quite possible, it should remain a guiding principle and an ideal goal towards which one aspires. One participant elaborates:

You still have to try to go to the maximum towards an integrated valuation, if you weren't able to integrate certain values or certain actors, you can't do anything about it - so the best thing to do is to be transparent and to explain why you weren't able to integrate them and how it can influence the result. You will never manage to do something completely integrated and holistic, it's an objective towards which you aspire but can't attain. The fact to have reflected on it and showing this reflection is important. (Laura Maebe)

Commenting on the social dimension of integrated valuations, others point out the potential risks of integrated valuations when insufficient time is allocated or when the motives to implement a certain measure are not properly elucidated.

So it's a cycle, it's an interaction. But it has to lead, it has to be a kind of cycle, to an interaction. The problem is that a lot of projects don't have the time for that, they say: “we have biophysical evidence, that's enough” or “we want to do this, we just need public support for it”, for example if they want to abuse ecosystem services. And they won't want biophysical models because they won't underpin what they want. So there is I think some risk that if you just want to use ecosystem services to get public support, at the expense the quantification or the real assessment, then I find it very tricky. Ecosystem services, if the scientific components are left out or ignored, can become a kind of alibi for certain projects. It depends of course, but there is this risk. A politician for example, he might be very pressed to address a certain problem and he might have little time, so he will promote something that's very achievable, but not very effective. (Jan Staes)

The challenges of transdisciplinarity

The increased complexity also stems from the transdisciplinary approach that many projects take, combining a variety of biophysical, social and economic aspects without necessarily having the time or the training to account for all these aspects properly. Transdisciplinarity is an important aspect when considering a boundary object such as ecosystem services and is one of the major challenges of an integrated valuation. A lot of different skills are needed to perform an integrated valuation of ecosystem services, as this participant stresses:

It takes a lot of time and one is confronted with themes that don't form a part of our academic background. We leave our comfort zone, which can be good, but it can also be dangerous, we can end up doing things that don't work without realising it because we're outside of our domain. So yes, today there is an agreement that value pluralism is important, however how that can be accomplished isn't so clear, and who really enacts it isn't very clear either. There's a whole discourse, you need to do this and that, etc. But if you look concretely at what those that say this do, it's very "small" value pluralism! (Fanny Boeraeve)

Finding a common language and an equal regard for the methodologies employed by different researchers and practitioners coming from different disciplinary fields has not always proved easy, particularly regarding the rising participation of social scientists in ecosystem service research, as a participant points out:

For a lot of people in natural sciences the social perspective is a black box, they don't know how to approach it yet. I feel that for people who are very monodisciplinary in their approaches, the perspective of the methodologies in social science are a bit unknown and don't seem to be rigorous to a lot of people before they enter into social sciences, where we can see that it has been developed for years and there is a rigour and a quality criteria there. So I think that there is still a difficulty for people from a natural science background to recognize social sciences as "real" science, compared to the "hard" sciences of nature. (Nathalie Pipart)

Other participants also stressed the importance of mono-disciplinary approaches and fundamental research, while recognizing the benefits of transdisciplinary research.

It's an approach that needs to be complementary to a disciplinary and deeper approach and I think you need a kind of back and forth between the two approaches. Clearly, integrated approaches are necessary, but one shouldn't shun more classical approaches, mono-disciplinary approaches, that will go further in the technical detail of things, on fundamental questions. Maybe integration has a vocation for pragmatism, for an answer to practical questions, for action research, etc. but fundamental research remains important and is the basis of research questions that are more practical and applied. So yes, [integrated approaches] are something important to obtain complementary information, it's a stage that allows you to have more applied sciences, things will be able to install themselves easier on the terrain

afterwards, but more “classical” or disciplinary approaches shouldn’t be dismissed, they remain very important. (Fanny Boeraeve)

Integrated valuation and resilience

Some of the participants advance that they conceive of ecosystem services and of their integrated valuation as being closely connected to the idea of resilience. In this view, the idea of resilience represents the evolution and the effort towards the maintenance and development of ecosystem services in time. As one participant states:

The idea is to orient oneself towards a logic of resilience, and in my mind the logic of ecosystem services really has to be accompanied by a logic of the analysis of resilience. When we analyse ecosystem services, we have a momentary analysis. At a given moment in time we have this appraisal. Now we have to ask ourselves what we have to do in the landscapes, how we have to manage them, how the actors have to intervene to manage them in the correct way, to guarantee the permanence of services in the long term, or at least to always have the freedom of choice in the future. (Marc Dufrêne)

These participants also point out that such a logic of resilience can only be successfully integrated when multiple values and all concerned stakeholders are involved in the process. A participant explains this reasoning as follows:

How do you make climate resilient landscape? Ready for the future, for the next 50 years for instance? What kind of measurement do you have to take now, not to guarantee, because nothing can be guaranteed, but at least to see the relationships and have now decisions and investments so that you can foresee the most resilient landscape for the future, taking into account nature, agriculture, cultural heritage, things like that. There you really need multiple values and all your stakeholders from the start of the project. (Paula Ulenaers)

Integrated valuation is slowly percolating

Participants from both sides of the language border noted that the recent declarations of regional policy in the Walloon region and the Flemish region contained the terminology of ecosystem services and that a slow trend towards the use of the concept in wider policy briefs can be observed. The participants stress however that the fortunes of the concept in policymaking largely depend on the political orientation of the cabinets who are in charge of environmental policy.

Regarding the dissemination of the concept of ecosystem services in the administrations, a differentiated picture must be drawn. While certain participants from Flanders advance that they struggle to interest colleagues and their hierarchy, there is a consensus that holds that the state of the question is more developed in Flanders than in Wallonia. One participant says:

In Flanders, there are more public administrations that are directly involved in project work, whereas in Wallonia, it’s the universities that form the bridge between research and administrations, simply because the administrations lack the time and the human means in Wallonia. There are not a lot of us who work

on ecosystem services, whereas in Flanders they have huge teams and much greater financial means. In Wallonia, it's the universities that are a kind of relay. (Catherine Génèreux)

Participants who work in administrations point out that they are still often performing their work in an experimental setting, their projects often being pilot projects whose success will dictate whether the approach will be replicated. Far from seeing this as an inconvenience or an obstacle, one participant stresses that it is the only way forward due to the highly differentiated types of landscapes that can be encountered within a region. They elaborate:

It's more important to have good pilot projects and experiments in a "safe setting". You have certain projects, you obtain money for carrying out pilots, you don't have to ask for permissions to take some measures, but just a really experimental "box". If we have money for that, to make several pilots, if you can show that the way you set up your projects and the way you work with participatory planning and multi-value approaches, then you can show that it's working and then you can have your legislation based on the tips and tricks in your project. Then you upscale these things into the legislation. For me that's a better way than making the legislation top-down. (Paula Ulenaers)

A similar sentiment is expressed by participants who work in the Walloon administration. With the recent restart of the Wal-ES project and adapting tools that have previously been introduced in Flanders (Nature Value Explorer), proponents of the ecosystem services approach are mainly trying to raise awareness by showing that ecosystem services work as an analytical tool and that there is a broader demand from other sections of the administration and research organisations at large. To this effect, one participant comments:

We're trying to set up a small project to raise awareness and convince them [cabinets], to show them that it works and that people are interested, before asking for more [money]. It also serves to raise the awareness of politicians, not only the research organizations, but also to show politicians that there is a demand from research organisations, from different services of the administration... It could be used on the political level, to make them interested in order to install something in the long run. (Catherine Génèreux)

The precise impact of integrated valuation on policymaking is unclear

It remains difficult to ascertain if the use of an integrated valuation of ecosystem services has had a beneficial impact or outcome on decisions taken. As one participant explains:

Has it been useful? Partially yes. Has it been very useful in concrete ways? This remains to be proven. There isn't, to my knowledge, a study that has attempt to verify if decisions that were taken, concrete decisions about land management, were improved by the concept of ecosystem services. It's something that's very difficult to test, to set up, to review. It's certain that an enormous amount of people use this concept by pretending that it can improve decisions, but they don't go to the end of it because they aren't in an action research process, they are not in the framework of directly applied research projects that are in service of policy, they don't go and verify the impact. For other reasons as well, the financing of

research, persons only being hired for short-term research, that aren't there ten years after to check if setting up their project that uses the concept of ecosystem services has led to a better management of the territory. (Nicolas Dendoncker)

As one participant explains however, it appears that some of the methods regarding the inclusion of multiple stakeholders used in their research project had been taken up by the local administration in an attempt to create a lasting impact:

So in the two workshops that I organised, I organised them with the municipality and the DNF, so the municipality also invited actors, took care of the practical organisation of the workshop and found it all really interesting. They would like to pursue this participatory process by creating a consultative commission of the forest that would allow to sustain my approach there. (Laura Maebe)

On the BEES community and interfacing

The power of a good network

There is a large consensus amongst the participants that the main advantage of a community of practice such as BEES is the opportunities for networking and collaborating it affords its members. As one participant notes:

It gives me added value for networking, and networking is the basis of so many things, it will allow me to know who to consult when I have questions because I know who does what. It will also allow to start projects together, to write, to publish together (...). Also, to open your mind, to talk to people who come from different trainings, different backgrounds, to create things together, be it publications, policy briefs as we did with the BEES, it's also an interdisciplinary exercise. (Fanny Boeraeve)

Another participant shares an interesting perspective on the difficulty to keep a diverse community like BEES active and interesting for all of its members, namely the fact that since members do not share a similar level of knowledge and expertise, it can be challenging to organise events that are interesting for all parties without being overly specific on one hand and too cursory on the other.

BEES as a connector between Flanders and Wallonia

Many participants from both language communities commented on the fact that the BEES community enables them to stay up to date with new ecosystem service projects and developments on the other side of the language border, which for most of them appeared difficult to do if it were not for the existence of this national community of practice. According to one participant:

It allows people to connect beyond the language border. It would be a pity to just have a Flemish community of practice. I think it's also interesting to see what other people are doing, even if it doesn't concern you directly. I think that I have quite a good view of what people are doing in Flanders, but to get that overview of what's happening in Wallonia, there the BEES community is very useful. (Jan Staes)

Some also explained that this awareness affords them the opportunity to garner expertise, practical experience and tools that would otherwise not be so readily available and that this can be an asset not just in research but also for project proposals. This seems to be the case particularly for those coming from the Walloon region. As many participants commented, the uptake of the ecosystem service concept and subsequent dissemination happened earlier in Flanders than it did in the Wallonia and thus a wider breadth of experience has been acquired. One participant notes for instance:

When I proposed the dossier of the Wal-ES platform, I asked my Flemish colleagues from the BEES community to come and present to the cabinet of the minister in question (...) how it works in Flanders, why they thought our project was important, as a way to reassure. And to show that we were mobilizing Flemish research, that we were not starting from nothing. (Marc Dufrière)

Policy is underrepresented in the BEES community

Many participants commented on the fact that policy is underrepresented at BEES events and in the BEES community at large. One researcher offered an interesting perspective on this topic, that was subsequently affirmed by other participants coming from administration. As they explain:

It's a part of the researchers job to go to meetings where they aren't obliged to go to in order to network, to start policy briefs, additional things on top of the projects for which they are payed, whereas the person in the administration, they have to go to their meetings, they have to manage their briefs, but getting out of the administration to go to a meeting where the objective isn't immediately visible (...) it's probably harder for them to justify it, in regard to their work, and to feel legitimate in coming as well. (Fanny Boeraeve)

As another participant explains, this seems to be like a chicken and egg problem; attendance of these types of meetings could lead to an awareness regarding their utility but without awareness that they are useful, one is not likely to attend, especially if it interferes with other obligations or if it is not encouraged or valued.

Social sciences are underrepresented in the BEES community

Another faction that seems to be underrepresented in the BEES community, according to some participants, are the social sciences. As one participant states:

You can't have your discussions and your integration if you don't mix it with social skills and social sciences. I think that this should be taken into account for those concepts and it has, but you never see those people within BEES, you never see those kinds of people within ecosystem service congresses, but if you really want to implement, you should have those kinds of people there. (Paula Ulenaers)

Ecosystem services are a bridge concept

All participants agree that the concept of ecosystem services, and by extension their integrated valuation, lends itself well to interfacing. When asked if the concept is an effective bridge between science and policy, different disciplines, and natural and social systems, one participant notes:

yes, and also between the different parts of the socio-ecological system (...) I do not see an equivalent concept that would lend itself better to create these junctions. (...) Right now, with the operational dimension of the framework for integrated valuation of ecosystem services, I do not know of an equivalent that connects above all the different scientific disciplines, the scientists to the actors in the field, including on the policy level. For me, this framework is highly promising. (Nicolas Dendoncker)

For another participant, it is the concept of ecosystem services that is the main connector between these different levels and systems and that the integration of multiple values is there as reinforcement, as the “icing on the cake”, to bring added benefit. Yet another participant agrees that ecosystem services and their integrated valuation have the power to connect but says that the answer is not so straightforward concerning the policy level. They explain that, while more information and multiple perspectives are very necessary to help make decisions that are better informed, added complexity also can render it harder to make decisions. The more trade-offs one needs to balance, the more multi-faceted a question becomes, the more difficult it is to find a satisfying answer.

2.5. Discussion

The participants identify many trends and developments that have shaped ecosystem services over the past years as they are an integral part of the ecosystem service research community. It is particularly interesting to note the emphasis that all participants place on the importance of the use and the context use when ascertaining the merits and shortcomings of the concept. Many have made the deliberate decision to use the concept of ecosystem services in a strategic manner. The concept is employed to raise awareness for human-nature interactions and to reveal connections between different systems to the actors involved in their specific projects, as well as within their research communities, institutional frameworks and in the political realm. Despite its utilitarian and anthropocentric framing that can present certain limits when considering issues such as the inherent value of nature and the heterogenous understandings of nature, it is precisely this framing that allows the concept to serve as an effective tool in order to conceive of human dependencies on natural systems and to inform decisions for better environmental governance. The concept has inherently pragmatic orientation that is viewed as an asset, one that does not necessarily generate an absolute consensus but points the way towards a tenable compromise.

It is clear to the participants that if a compromise is to be achieved, one must include a plurality of stakeholders and values. The inclusion and integration of multiple values is a kind of best practice, a guiding principle when working with ecosystem services and to some the only way in which to

meaningfully mobilize the concept to address the many challenges that the future holds. Many participants indicated that ecosystem service valuation provides a snapshot of a given ecosystem and that a diachronic dimension must be made evident by connecting the issue of the future availability of ecosystem services with the logic of resilience. It is only by doing this that good, long-term ecosystem management decisions and corresponding behaviors by the concerned actors can be successfully implemented.

Throughout the discussions, we have come to understand that the inclusion of multiple values brings many advantages but also poses certain obstacles in practice. For the advantages, the integration of multiple values and involvement of various stakeholders can ensure that the valuation becomes a better decision-aid, and allows for a more accurate reflection of reality and understanding of the various trade-offs that need to be balanced. It gives for a more holistic and systemic view for human-nature interactions and can ensure that decisions are more readily accepted by the stakeholders. Integrated valuation in practice also encounters certain obstacles. Insufficient time, money and human means were all identified by the participants, as well as the challenges that transdisciplinary collaboration can pose. It becomes clear that the integrated valuation of ecosystem services compels researchers and practitioners to step outside of their comfort zone, to challenge themselves and to critically reflect their own positionality. This is however not seen as inherently problematic by the participants and is even welcomed by some.

A further challenge that was identified is due to the way in which integrated valuations are necessarily set up, namely bottom-up. By eschewing top-down approaches, integrated valuations make space not only for carefully considered biophysical valuation, but also for heterogeneous values that concerned stakeholders of a given landscape express. This however poses a problem when attempting trying to apply the results of the analysis of that landscape to another; no two landscapes are alike, no constellation of stakeholders and values is entirely replicable. Thus the upscaling of good practices elaborated in one landscape sets forth challenges for sustainable policymaking, challenges to which conclusive answers remain to be formulated.

The concept of integrated ecosystem service valuation is slowly percolating in Belgium. It remains however unclear, or rather very difficult to ascertain to what extent it has influenced or currently is influencing policymaking. In addition, it remains difficult to understand if and how it has contributed to better environmental policy, should it have been influential.

Regarding the BEES community, the participants stress the importance of facilitation and capacity building that such a community of practice brings. Most importantly, this community brings the opportunity for exchange across the language border, which is felt as deeply necessary by all participants. It is however noted that policy as well as social science actors are underrepresented in this community and that their presence would further enrich the community.

CONCLUSION

In this paper, we attempted to give an overview on some of the developments, opportunities, challenges, and issues regarding the integrated ecosystem service valuation in theory and in practice.

On one hand, we sought to gain a better understanding of how nature's diverse values are conceptualized through the lens of the integrated valuation of ecosystem services. We felt it necessary to first discuss the various definitions of the concept of ecosystem services as well as its historical development in order to understand the multiple yet diverging interests that surrounded the concept from the start. Seeing how the concept emerged as a boundary object, between ecology and economics, and understanding how much the historical conceptualization of nature in economic thought influenced the concept, provided us with insight into why economic or monetary valuations of ecosystem services seemingly dominated the early stages of ecosystem service valuation. When looking at the key debates that surround the concept, it appears as though the introduction of the integrated approach was a necessary next step in redressing some of the epistemic and social justice issues that were remarked upon. This does not mean that the integrated approach is easily introduced, percolates readily or is even able to address all of the problems that arise out of the valuation of something ultimately so complex and intangible as nature and our relationships with it. However, the recent strides made in the conceptualization of integrated frameworks and the influence that the IPBES has on an international level shows that this avenue of research is far from sterile and will continue to shape international environmental policymaking.

Our own research and the interviews with the participants impressed on us the importance not only of recognizing ecosystem services and the use of their integrated valuation, but to particularly take into account how the concept is being mobilized, be it in policy outlines or in action researches in the field. They stated repeatedly and forcefully that the lynchpin, the key to the ecosystem service concept is the manner in which it is used and translated into concrete measures taken to preserve the services in question. This insight has guided the composition of the present paper.

It is particularly the necessity to connect ecosystem services to wider issues, across time and space, that was impressed upon us by the participants of the exploratory study. Developing a durable and long term view of the proactive maintenance and development of ecosystem services by tying the specific logics of this concept to the logic of resilience and sustainability will determine whether or not the human species will continue to benefit from the many services that nature provides. It will also determine whether or not these services are capable of satisfying the demands that are placed upon them. Finally, it poses the question whether or not the behaviors and values of our societies themselves need to evolve

towards being more resilient. The logic of resilience, associated to the concept of ecosystem services, permits the creation of a socio-systemic interface that ties social demands and ecological concerns together.

The spatial scales at play, between local and global levels, are deeply intertwined with this concern for the temporal sustainability of ecosystem services. While many projects are elaborated bottom-up and this is generally viewed in a positive light, this bears the inherent restriction that good practices and insights elaborated on the basis of one landscape, its specificities and its actors cannot be immediately reproduced in another. While it is not clear if such an outcome would be desirable, it nevertheless stresses the fact that integrated valuations of ecosystem services on larger scales are inextricably complex. By creating a network of practitioners, researchers and policymakers, communities of practice such as BEES are indispensable when trying to tame this complexity. Nowhere might this be truer than in a country like Belgium in which environmental research and policy initiatives are divided by a language border.

The participants of the exploratory study outlined different directions and areas in which they want to expand their commitment to action research projects and how they seek ways in which to ensure that financial and human resources are allocated to these kinds of projects. When speaking of future perspectives, they particularly stressed the necessity for a rethinking of academic and governmental institutions towards more transdisciplinary, in order to foster the appearance of qualified practitioners who would be at ease with the variety of discourses that integrated valuations require and who would possess the necessary facilitation skills that constant interaction with numerous stakeholders requires. They also placed an emphasis on the strengths of the ecosystem service concept when attempting to raise awareness for the multiple links that connect actors and ecosystems alike.

On a personal note, I would like to add that it is particularly this latter aspect that sparked my interest in ecosystem services and their integrated valuation. While my own academic background in literature sometimes proved limiting when approaching complex questions that pertained to biophysical and economic valuation, I would be remiss to ignore my own position. The capability of a successful integrated valuation of ecosystem services to create a compelling and common narrative around our relationship to nature captivates me and will without a doubt inform my future professional outlook. This enthusiasm is due in no small part to the enlightening and honest discussions I was able to have with the participants of my exploratory study.

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APPENDIX

Below you find the interview guide that served as a basis for all the interviews that were conducted for this paper. As mentioned above, these questions loosely guided the interviews and were often changed, left out if not applicable and/or supplemented through previous statements made by other participants or the interview partner in question. Other than the first questions regarding the personal information and background of each participant, which were always asked in the same way and at the beginning of the interview, all other questions varied in the order in which they were approached.

Interview Guide

PERSONAL INFORMATION

- What is your academic and professional background?
- What is your place of work and your main area of expertise?
- How does the concept of ecosystem services relate to your work?
- Can you briefly describe your involvement with the BEES community?

ON THE CONCEPT OF ECOSYSTEM SERVICES

- How do you position yourself towards the concept of ecosystem services and their valuation (monetary and other)? Do you find the concept useful/meaningful in your work?
- Where do you see the weaknesses/strengths of the concept?
- How have ideas/ notions on ecosystem services and their valuation changed over the years that you have been involved with this topic? How do you position yourself towards that change?

ON THE CONCEPT OF VALUE PLURALISM

- How do you understand the concept of value pluralism as it pertains to ecosystem services and their valuation?
- Where do you see the weaknesses/strengths of the concept?
- How do you assess the usefulness/utility of the concept of value pluralism in a practical context, i.e. in research or policy making?
- How can the abstract concept of value pluralism be rendered applicable to a specific research project or policy issue?
- How does the concept percolate in Belgian ecosystem service research and policy making?

ON THE INTEGRATED VALUATION OF ECOSYSTEM SERVICES

- How do you understand the concept of integrated valuation of ecosystem services? What do you associate with this concept?
- Have you observed a change in the Belgian community of practice regarding integrated ecosystem service valuation? If so, how would you describe this change and how do you position yourself towards it?
- What is the practical use of integrated ecosystem service valuation in your daily work? How do you include multiple values in your work? How do you assign importance, balance tradeoffs using this concept?
- Do you see barriers implementing these integrated valuations? If so where or what barriers?
- How do you assess the usefulness/utility of the concept of integrated ecosystem service valuation in a practical context, i.e. in research or policy making?
- How does the concept percolate in Belgian ecosystem service research and beyond research in policy making?
- What is your outlook on the practice of integrated ecosystem service valuation? Where do you think it is headed?

ON THE BEES COMMUNITY AND THE SCIENCE POLICY INTERFACE

- In your view, what role does a community such as the BEES community play in the exchange between scientists, researchers, policymakers, administrators, practitioners, etc.? How has the existence of the BEES community shaped ecosystem service research in Belgium in your opinion?
- In your view, are the concepts of value pluralism and integrated ecosystem service valuation well suited for interfacing between science and policy, between different scientific disciplines, between natural and social systems? If so, how? If not, why?