Ecosystem Services: an analysis of its ethical implications in conservation

Felipe Bucci Ancapi

MSc Thesis in Urban Environmental Management

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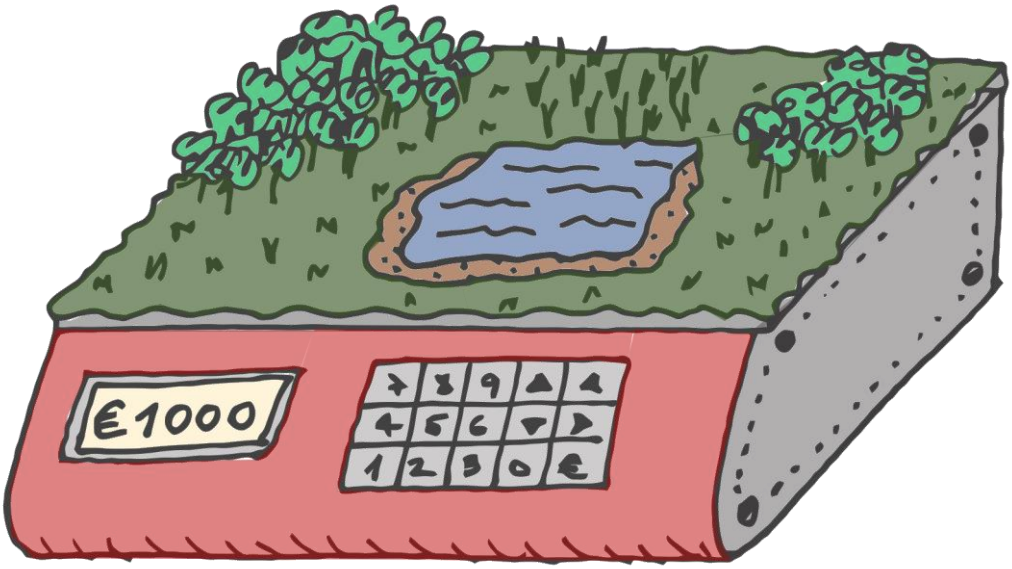

Supervised by: Dr. Andre van Amstel

Dr. Bernice Bovenkerk

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Supervisors:	**Examiners:**
1) Dr. Andre van Amstel (ESA)	1sr: Dr. Andre van Amstel
2) Dr. Bernice Bovenkerk (CPT)	2nd: Dr. Rik Leemans

Preface

This project emerged as a means to personally understand the way both environmental scientists and managers conceive nature and to find a way to deepen the relation humans have with nature. I come from the south of Chile and part of my ancestors belong to the Mapuche people, from them I have learned that different worlds coexist in this planet. For instance, that there are some cultures where ideas are capable of building up realities in which money has not a central role in our social and ecological relationships.

I was not alone along this learning process. I want to thank dr. Andre van Amstel and dr. Bernice Bovenkerk to guide me and serve as inspiration every time we met up and discuss about my thesis project. I also want to thank the ESA group staff, they contributed to make the last six months and easy and nice time when I went to work at Lumen.

Friends' support is always remarkable. I want to thank all my friends in Wageningen. Specially those I met when living in Ede, those from my master and from Saonda. Without their friendship this last year would be meaningless.

Finally, I want to thank my parents, Veronica and Manuel, for being with my even though physical distances are immense. I am a product of their unconditional love.

Table of Contents

Summary

Ecosystem Services (ESs), which are the benefits humans obtain from ecosystems (MA 2005)– emerged as a metaphor to reflect the interdependent relationship among humans and nature. After just a few decades ESs became one of the most used environmental management concepts to value ecosystems around the world. Its success in raising awareness among policy-makers also enabled its introduction in nature conservation. Although ESs comprehend multiple valuation methods originally, its narrow focus on economic valuation through cost-benefit analysis, and implications for nature conservation and other fields raise several ethical questions.

The context posed by the Anthropocene, which is the latest geological era where human activities are seen as a major geological force, makes me wonder whether or not ESs, in terms of economic valuation, are appropriate to value and conserve ecosystems, from an ethical perspective. To answer this question, I reviewed scientific literature, gathered examples of ESs' application around the world and developed both arguments and counter-arguments for its use in nature conservation. Finally, I provide a new way to value ecosystems in the Anthropocene based on ideas developed within ecology, law, ethics, and conservation. Besides, progress is listed to make the proposed approach both as feasible as possible and seductive to decision-makers, scientists and the public.

My results highlight, first, the insufficient scope in ecological research conducted for ESs purposes. Second, I claim ES-based conservation effectiveness is not analyzed seriously or supported by examples of ESs valuation. Third, I point out two critical uncertainties underpinning ESs analyses, namely: ecological uncertainty and economic uncertainty. For example, assuming that humans act as economic agents, who both have perfect information and purely motivated by self-interest.

The main conclusion is that ES is a useful concept capable of internalize environmental externalities in the economy, derive the utility humans obtain from ecosystems and raise awareness for sustainable management of ecosystems. But its use for nature conservation purposes raises both serious ethical implications and consequences.

Chapter 1: Introduction

In the last two decades Ecosystem Services (ESs), a concept which reflects the benefits humans obtain from ecosystems (MA 2005), has become very popular among scientists and policy makers as a concept for environmental management and conservation. This is due to the idea that it, as Bull et al. (2016) state: could improve decision-making related to natural resource use, and interpret the complexities of human-nature interactions and Comberti et al. (2015) also complements its success in raising awareness of the value of ecosystems and their importance for mankind. Just in fifteen years, more than two thousand articles have been written on ESs and major international environmental NGOs, such as the World Wide Fund and the Wildlife Conservation Society, have incorporated ESs into their programs and strategies (Kull et al. 2015). Finally, authors claim that despite a long list of achievements in terms of conservation and protection of endangered species and habitats, traditional conservation approaches have had little impact to halt biodiversity and habitat loss (Gomez-Baggethun & Ruiz-Perez, 2011).

Nonetheless, ESs has been subject of a variety of criticisms. First, different authors claim that it depicts a one-way flow of services from ecosystems to people, being an overly simplistic and inaccurate representation of the reality of human-nature interactions (Comberti, Thornton, Wylliede Echeverria, & Patterson, 2015), obscuring ecological functions or leading to unjustified simplifications (Kull et al., 2015). Second, ecosystem valuation by ESs lacks data for serious analysis. In many cases, ESs analyses are based on just a few characteristics of an ecosystem, privileging some services over others. A research by Delgado & Marín (2015) points out that using current knowledge databases, only half of all reviewed articles are interested in specific geographic areas and only few on specific ecosystem types. Third, different authors (Bull et al., 2016; Danley & Widmark, 2016; Fisher & Brown, 2015) criticize the strong link between ESs and economics, due to its anthropocentric and utilitarian conceptualization (Fisher & Brown, 2015), as well as losing its initial intention of understanding the complexity of human-nature interactions. Finally, even though in the beginning the ESs concept was developed for educative purposes, it is highly political and the ways it has been used in the last decades seem, according to Kull et al. (2015), to gather environmental concerns in a way that aligned with the human-centered and neoliberal tendencies of policy-makers. As one may notice, a central aspect in this discussion has to do with the concept and value of nature, which, according to Castree

(2013), is commonly defined as the physical world in absence of human agency or what remains once humans have already altered natural processes[1].

Hourdequin (2015) points out that two groups have dominated the conservation debate on nature's value: those advocating the intrinsic value of nature –value for its own sake– and those advocating for the instrumental value of nature –value for its contribution to human wellbeing. The first group claims that conservation by means of utilitarian approaches does not reflect the real value of nature, obscuring some values –i.e. those held by indigenous communities– while highlighting others –i.e. those appreciated in the market arena. Besides, some authors recognize a double intention beyond ESs: more than conservation it gives way to capital accumulation and the commodification of nature. Therefore, economic valuation approaches –utilitarian's favourite tool– as ESs should not take place in conservation aims. In contrast, advocates for instrumental valuation of nature affirm most of environmental problems come from an economic system which does not internalize environmental externalities. Therefore, concepts as ESs are desirable, since old-fashioned conservation tools have not succeeded when it comes to stopping ecosystem and species damage and degradation out of protected areas.

This classical discussion finds new challenges in the Anthropocene, which is the current Earth's era in which humans are a major geological and environmental (Corlett, 2015) force (Baskin, 2015), responsible for changes in greenhouse gases concentrations, nitrogen (N) cycles, extinction rates, and the spread of novel ecosystems, among others (Corlett, 2015). The Anthropocene poses a new question: what is it that conservationists are trying to preserve? More than three-quarters of the Earth's land surface has been degraded to some degree and witnessed human alteration (Hobbs et al. 2009). The traditional intrinsic versus instrumental value discussion reaches a new stage when climate change and the increasing extant of novel ecosystems, those altered to an extent that makes its restoration to a historical stage impossible, as evidence of the Anthropocene are considered.

Ecomodernists, future-oriented advocates of conservation, claim that since the global environmental crisis has reached points of non-return in ecosystem degradation, conservation aims should have a new horizon. According to Marris (2009) conservationists should discuss

[1] For the purposes of this research, it is important to note that while the ESs concept relies on the concept of "ecosystem" set by the Convention on Biological Diversity (CBD), which denotes it as "a dynamic complex of plants, animals and micro-organism communities and their non-living environment interacting as a functional unit" (Article 2 of the Convention), in conservation philosophy discussions normally use the concept of nature as core.

how they want ecosystems to be in the next fifty years, instead of focusing the attention on no longer existing ecosystems, looking for wellbeing for the greatest number of people, specially the poor. Novel ecosystems, she says, have been proven to offer even more ESs than historical ones under certain conditions and have received too little attention. So, the aim of conservation should be the creation, management and sustenance of healthy ecosystems through ecological modernization and technology including geoengineering. They change the focus from conservation and restoration to management and development of ecosystems. On the other hand, advocates for the intrinsic valuation of nature warn about the consequences of what they call 'playing god'. First, that future-oriented approaches run over too much uncertainty, its use depends on knowledge about nature conservationists lack. Besides, they criticize the strong connection among this new approach and corporations as means for reaching their goals, turning it into a re-shaped utilitarian idea that insist in the traditional western understanding of humanity over nature, the one brought humanity to this critical point.

On this, one idea is important to note: ESs are just one of the available and/or possible concepts to assess the relation between humans and the environment. All criticism around the ESs concept make me wonder whether or not ESs are an appropriate way for valuating nature in the Anthropocene from an ethical perspective. Is it a good means for understanding the complex relationship between humans and nature? Or does it just serve as an excuse for putting market values on ecosystem elements that were not marketable before? Or put from a Political Ecology perspective, who wins and losses when ESs are implemented (Kull et al., 2015)?

Research design

General Research Question:

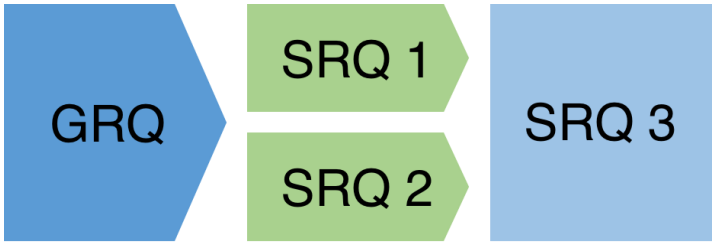
- Is Ecosystem Services an appropriate way to conserve nature, in the context of the Anthropocene? (GRQ)

Specific Research Questions:

1. What are the advantages and disadvantages of using the ES concept in nature conservation? (SRQ 1)
2. How ESs have been used for purposes of nature conservation? (SRQ 2)
3. How to conserve nature in the context in the Anthropocene? (SRQ 3)

This research focuses on the ethical implications of ESs, in terms of economic valuation of ecosystems, in nature conservation. To answer RQ1 I do literature review to outline a series of arguments for and against ESs in conservation, considering different perspectives such as: ES as a bridge between ecology and economics; ESs as a brand new global field of research; ESs as quantifiable and scientifically-based assessment through economic valuation; ESs as reconnection to the biosphere; and ESs as a successful concept for conservation. By doing this, I also demonstrate the existing gap among considered and non-considered nature's values in ESs valuations. To answer SRQ 2, I review cases in literature in which ESs has both been successful in nature conservation and raise ethical critiques. I also criticize cost-benefit analysis as a means for decision-making in nature conservation, the idea of ESs as an 'eye-opener' metaphor in the human-nature relation, the effectiveness of ESs' valuation for conservation purposes and the role of Free-Market Environmentalism in nature conservation. Finally, to answer SRQ 3, I propose an alternative way to market-based conservation based in different ideas from philosophy, ethics, law and nature conservation, considering the context posed by the Anthropocene.

Figure 1. Research Design



Chapter 2: Ecosystem Services

Genesis of a new conservation approach

Few environmental management concepts have got such an impact as ESs. In the last two decades ESs have become very popular within scientists and policy makers as a concept for environmental management. Using databases available in 2014, authors identified an exponential growth in terms of published articles in the field, from one article in 1991 to 1500 in 2013 (Delgado & Marín, 2015).

Ehrlich and Mooney (1983) were the first authors to mention ESs. Nonetheless, Danley and Widmark (2016) also refer to a paper published by Westman (1977) about the impact of human intervention in stabilizing and rehabilitating degraded ecosystems functions[2]. Before the current industrial societies, ancient societies had recognized some correlations between the use of natural resources by humans and its impacts on the environment. Plato's concerns, for example, about the quality of soils in the polis or the Aymara culture's metaphor of Mother Earth and the harmonious equilibrium that should be kept by humans when interacting with her. Nonetheless, the contemporary emergence of ESs took place, as stated by Chaudhary et al. (2015, p.29) within "a resurgence in environmental concerns [which] emerged through the influential work of Carson's (1962) Silent Spring, Ehrlich's (1968) The Population Bomb, Hardin's (1968) Tragedy of the Commons and Meadow et al.'s (1972) The Limits to Growth. Each emphasized the detrimental impacts of environmental degradation on humans". ESs was primarily a metaphor to reflect the dependence of humanity on ecosystems (Gomez-Baggethun & Ruiz-Perez, 2011) from a human perspective. Danley & Widmark (2016) point out that the first policy agendas that used the phrase 'ecosystem services' were characterized as ones focused on making the case for policies emphasizing the careful preservation of ecosystems and the populations and species that function within them. Chaudhary et al. (2015) add that even though these texts did not directly argue for ecosystem valuation, their core messages provided rationales for those who do. De Groot (1987) published a study "Environmental Functions as a Unifying

[2] MA (2003) defines ecosystem functions as the set of conditions and processes whereby an ecosystem maintains its integrity (such as primary productivity, food chain, biogeochemical cycles) (p. 210).

Concept for Ecology and Economics" was published under his premise that "only when ecological principles become an integral part of economic planning and political decision-making there is a change of achieving a 'happy global village' based on harmony between man and nature" (de Groot, 1987, p.109). Thus, the article linked the functional interrelations between ecosystem processes and components and human needs and activities in the other. The same study points out how when calculating the Gross National Product (GNP) of a country, its ecosystem services were being disregarded. This results in a reduction of human welfare due to the loss of ecosystem functions in the long term.

From 1990 on, ESs reached international policies. The Convention on Biological Diversity in 1992 included ESs as an aspect of ecosystems needed to maintain. It is included in the Ecosystem Approach established by the Conference of the Parties (COP 5 Decision V/6), which is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way to help reaching a balance of the three main objectives of the Convention: conservation, sustainable use of resources and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. Later, according to Gomez-Baggethun and Ruiz-Perez (2011), the consolidation of the ESs concept continued through the development of frameworks and methods for the identification, classification and valuation of ESs (e.g. de Groot et al., 2002). Even more, for Chaudhary et al. (2015) the last years of the 1990s and the beginning of the 2000s marked an important period for main-streaming and institutionalizing the concept, reinforced by the work of Costanza et al. (1997), who calculated and presented the monetary values of world's ecosystem services.

The first two decades of this century witnessed the building process of international reports on ES. The Millennium Ecosystem Assessment (MA, 2003; www.maweb.org) and The Economics of Ecosystems and Biodiversity (TEEB, 2010; www.teebweb.org) were launched with the participation of more than a thousand scientists around the world. Thus, a global framework for ESs was developed. The MA synthesis saw light in 2003, reporting the degradation of over half of the world's ES in the last half century (Chaudhary, McGregor, Houston, & Chettri, 2015). This report also set the most used concept of ESs, understood as the benefits people obtain from ecosystems (MA, 2003) and defined four ES-categories, namely supporting, provisioning, regulation and cultural services. Finally, in 2011 the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES; www.ipbes.net) was established as the intergovernmental body for assessing the state of biodiversity and the ESs ecosystems provide to society, under the auspices of four United

Nations entities: UNEP, UNESCO, FAO and UNDP. Nevertheless, when it comes to ES conceptualization, Danley and Widmark (2016) claim that a shared concept does not really exist, and that even though some proposals as the one made by MA, are commonly accepted, the debate about how to define and apply ESs centers around a variety of approaches (from *natural science* as the internal processes of nature that create the possibility for human welfare, to an *ecology-economics* hybrid as a link between nature's structure and processes to benefit the creation of human welfare, to *economics* as natural capital). The following aspects are at the core of that discussion (Danley & Widmark, 2016):

- the physical components of the ecosystem (structure),
- the functioning of and interaction between those components (process or function), and
- the resulting contribution to human welfare from the ecosystem (benefit or benefit-providing service).

Ecosystem Services, a useful tool

De Groot (1987) was one of the first scholars that explained the benefits of this approach. He realized there were some obstacles to the conservation and sustainable utilization of nature, pointing out that "current economic planning and policy making only (or mainly) deal with man-made goods and services, in spite of the fact that most economic production processes heavily depend, in many ways, on natural processes and components" (de Groot, 1987, p.105), neglecting the negative impacts of production in the environment when calculating national economic indexes. Thus, he claimed that ecosystem evaluation methods would help eliminating this gap, as well as indicating that those methods should be elaborated for providing systematic information about the services provided by ecosystems (de Groot, 1987). Costanza et al. (1997) backed de Groot's opinion adding that ES are often given too little weight in policy decisions, even though they provide an important portion of the total contribution to human welfare on this planet, being oftentimes neglected.

Chaudhary (2015) adds another perk of the ES framework given by the Millennium Ecosystem Assessment (2003), which is its evolution from early concerns about environmental degradation and depletion to a formal body of knowledge, policy and research, oriented at valuing and protecting valuable ecosystems. This perk contains two different aspects, namely the construction of a new field of research and its application. First, as much knowledge has been produced and accumulated over the last decade. This resulted in networking, articulation, reporting and institutionalization of ES research and applications. Bull et al. (2016) surveyed the members of the Young Ecosystem Services Specialists, which

is an international network for young doctoral and post-doctoral researchers on ESs, and identified through a Strength, Weakness, Opportunities and Threats (SWOT) Analysis that its interdisciplinary approach was the most important strength of the ES framework, followed by its ability to support improved decision-making and its capacity for improving decision-making related to natural resource use, and interpretation of the complexities of human-nature interactions. Second, the outcomes the ES framework offers, Chaudhary (2015) points out, are oriented at valuing and protecting valuable ecosystems, giving way for quantifiable and scientifically-based assessments, which are essential for sound decision-making (Daily & Matson, 2008) and easy to understand by policy-makers and other stakeholders. The MA (2003) uses the Total Economic Value (TEV) Framework to derive the utility humans obtain from ecosystems. TEV works and distinguishes between *use values*, those used by humans for consumption or production purposes, and *non-use values* or existence values, the values humans ascribe to resources because they exist (MA, 2003). Even though the MA (2003) offers different alternatives for ecosystem valuation (see MA 2003, Chapter 6), values are obtained mainly by economic valuation through cost-benefit analysis (CBA). Schröter et al. (2014) add that despite its methodological shortcomings, economical (monetary) valuation enables the calculation of the total sum of multiple ESs because it poses a common unit of measurement. At the same time, they warn that thinking that monetary valuation is the only method to compare ESs is a misconception. However, Dempsey & Robertson (2012) pointed out that highlighting economic value in nature is the distinctive characteristic of the ES framework. I will come back to this discussion in the next chapter.

So far I have highlighted three different features of ESs that authors in the field identify as worthy of consideration, namely: ES as a bridge between ecology and economics, ES as a brand new global field of research, and ES as quantifiable and scientifically-based assessment through economic valuation. Nonetheless, perhaps the most distinctive features represent: (i) what Folke and Gunderson (2012) call, part of a 'reconnection to the biosphere', and (ii) a new conservation tool that triumphs where others have failed. A step forward from societies picturing people and nature as separate actors to one where they are seen as mutually-dependent (Folke & Gunderson, 2012), ES represents a desire and promise (Schröter et al., 2014) of improving humans' relation with nature by including reciprocal feedbacks between humans and their environment (Borgström et al. 1999; Folke et al., 2011; Raymond et al. 2013), and enables humans to identify important aspects of the natural world for science and policy (Danley & Widmark, 2016). The ES framework has been successful in raising awareness of the value of ecosystems and their importance to humanity (Chan et al.

2012).

The second ES's feature has to do with ES's strengths compared to earlier conservation tools and strategies. Gomez-Baggethun & Ruiz-Pérez (2011) refer to this issue claiming that, even though there is a long list of achievements in terms of conservation and protection of rare endangered species and habitats, traditional conservation approaches have had little impact to reverse or stabilize metabolic patterns of the global economy (e.g. the ever-increasing demand of natural capital stocks, ESs and biodiversity by humanity). Thus, the ES concept is a human-centric view of the biosphere and managing and preserving key components of ecosystems should result in better long-term health of ecosystems with consequent continued delivery of services critical for our survival and of other species as well (Sandifer et al. 2015). Therefore, the ES concept offers an opportunity for moving away from the logic of 'conservation versus development' towards a logic of 'conservation for development' (Folke, 2006; Gomez-Baggethun & Ruiz-Perez, 2011).

Latent skepticism, counterarguments to its usefulness

Criticisms to the ES concept have different origins (e.g. political sciences, ecology, biology, economics, environmental ethics and even ES specialists). In order to give coherence to all different criticisms we will use the categories used in the previous section, namely: ESs as a bridge between ecology and economics, ESs as a brand new global field of research, ESs as a quantifiable and scientifically-based assessment through economic valuation, ESs as a reconnection to biosphere, and ESs as a success tool for conservation.

Though connections among disciplines are seen as positive in science and policy-making, and concepts have been created (i.e. interdisciplinary, multidisciplinary, transdisciplinary), the relation between economics and ecology has detractors. The problem is not the relation itself, but the ways it works and the outcomes it provides. Scholars critique the way in which the ESs concept, despite its merits, reflects and reinforces certain market-based models of society and underlying ideologies (Gómez-Baggethun et al. 2010; Kull et al., 2015). The emergence of ESs in the 1990s was not a direct response nor a new approach for coping with the emerging global environmental crisis, but reflects two social and political trends developed in the twentieth century. On the one hand, the growing dominance of neoliberal ideas supporting markets as the most efficient management and regulatory tool (Brenner et al. 2010) and the 'ecological modernization' which sees the solution to the modern environmental crisis not in fighting against the industry and consumption practices that cause it, but in modernizing the technologies, sciences, and economic institutions, among

others (Kull et al., 2015). Robertson (2004) pictures neoliberalism as the latest attempt by capital to 'colonize and dominate' both political and ecological systems. Similarly, McCarthy & Prudham (2004) claim that neoliberalism is the most powerful ideological and political project in global governance and that political activism has indicted neoliberalism as both political economic and environmental debacle. For others two premises remain central: ESs are both a utilitarian and anthropocentric concept (Fisher & Brown, 2015; Kull et al., 2015), as it relates to commodification and payment schemes. This is highly controversial among the conservation community (Fisher & Brown, 2015). Following these ideas, some conservationists see ESs as human-centered and warn that such approach will be insufficient to protect biodiversity since anthropocentrism is the main cause of the environmental crisis humanity faces these days (e.g. Myers 1997; Redford & Sanjayan 2003; Chan et al. 2007). Then, a one-way human-nature relation is depicted as a result of the dominant role of materialist-oriented economists and ecologists in ES research (Comberti et al. 2015). This is far from the interpretation ES supporters have about the concept.

The framework MA (2003) gives for ESs analysis has not been exempt from criticism. From vague concepts to lack of scientific knowledge to insufficient scope in research processes, the ES concept and framework received a variety of different counter-arguments. For many, the science of ES is not comprehensively understood and is insufficiently developed for significant, predictive modelling (i.e. Daily & Matson, 2008; Carpenter et a. 2009; Norgaard 2010; Fisher & Brown 2015). Bull et al.'s (2016) SWOT analysis showed that the main weaknesses in the ES framework are both its incomplete scientific basis and the inconsistent application of divergent ranges of available ES frameworks. According to Danley & Widmark (2016) generalized definitions such as the one provided by MA, but concluded that although convenient for public and policy audiences, they do not reflect the way ESs are conceptually defined in academic literature. Perhaps the greatest problem among ES researchers is their dissemination, addressing ES independently (Lafortezza & Chen, 2016). Approaches and methods vary a lot among ES studies (Brander et al., 2006; Nahlik et al. 2012), resulting in, as stated by Nahlik et al. (2012, p.29): "inconsistent lists of services, a disconnection between identified ecosystem services and human well-being, inability to cross disciplinary boundaries, and double-counting of services". In line with these arguments, Plieningen et al. (2014) point out that the ES concept does not realistically picture human-ecosystem interactions authentically. This gives way to unintended and potentially negative consequences due to lack of critical connections and feedback (Patterson and Coelho, 2008; Norgaard, 2010; Comberti et al., 2015).

Farley (2012) connects the immaturity of the ES framework with human's ignorance about all different processes, connections, feedback and flows taking place in a certain ecosystem. From his point of view, human's knowledge of ecosystem functions is plagued by uncertainty and even a well-informed scientist could never describe the entirety of all benefits provided by species and ecosystems nor the impacts of human activities on those highly complex natural systems. Vatn and Bromley (1994), suggested that the contribution of a functional element in the ecosystem is not known –indeed is probably unknowable– until it ceases to function. Comberti (2015) continues, claiming that even then, with a sample size of one unique ecosystem, the resulting knowledge is merely anecdotal. This critique gains importance when considering that ecosystems provide multiple services, but when quantifying them researchers typically address only one or a small selection (Kull et al., 2015). This can lead to a disproportional focus on certain, pre-selected aspects of ESs, thus risking and undermining the understanding of ecosystem as a whole (Raymond et al., 2013). Consequences vary from hiding other services, functions and characteristics of ecosystem, and pushing decision-making process towards the maximization of just one or a few services. Comberti et al. (2015) links this with the insufficient treatment of the cultural services in ES research, choices among ES being highly political (Kull et al., 2015). Last but not least, studies on the scope of ES studies showed that when consulting the Web of Science (2014), only half of the studies (235 articles) had information about the geographical area in which the studies took place and only 3% considered specific ecosystem types (Delgado & Marín, 2015). This leads to inadequate context-specific data and limits relevance to public policy (Chan et al., 2007). This presents serious limitations in the use of ESs analysis, considering the uniqueness of every ecosystem around the world, and the arguments presented above.

Economic valuation is also regarded with suspicion. Most of the criticism emerges from the concern of seeing how conservation every year is being absorbed by neo-liberalism trends. Dempsey & Suarez (2016) warn about the intention of conservationists, bankers and entrepreneurs gathered in the Third Biodiversity and Ecosystem Finance Conference and the promotion of *for-profit biodiversity conservation* trends, understood as "biodiversity conservation financed through and undertaken with the aim of generating profitable returns for its investors" (Dempsey & Suarez, 2016, p.654). Conservation could become not only a tool to 'save nature' but also about finding new sites of capital accumulation. There is also the concern that economic valuation would lead to 'selling out on nature' by commodification (Schröter et al., 2014; Sullivan, 2010). This critique is taken by ES supporters when they suggest that even though monetary valuation cannot be directly equated

to commodification of ES, it paves the way to commodification (Gomez-Baggethun & Ruiz-Perez, 2011). Farley (2012) hesitates about the role of markets, since expected market outcomes depend on certain rigid assumptions as the *axioms of consumer choice*. This, picture humans as selfish, consistent in choices, non-satiable, and able to allocate a limited income among desirable goods in order to maximize their total utility. Schröter et al. (2014) agrees that there are reasons to be hesitant about ESs that are only focused on the regulating power of markets due to potential impacts on the poor, for instance.

The problem of missing values

The last two selected features of ES –as a reconnection to biosphere, and as a successful tool for conservation– can be funneled in what I call the 'problem of missing values'. This gives way to the central issue in my research, the ethical discussion around the value of nature.

The use of the ES concept raises a number of questions of fundamental ethical significance (Jax et al., 2013). For Kallis et al. (2013) the study made by Costanza in 1997 divided ecological economists among those who accept valuing nature in monetary terms and those who reject it on methodological and ethical grounds. The former warns that the increasing interest for nature's instrumental values –in economic terms– could erode public interest in nature's intrinsic values (Davidson, 2013). Chan et al. (2012) claim that the ES concept is not accidentally closely linked to prevailing political norms, witnessing the need for economic decision-making frameworks that does not apply equally to the alternative approaches. This, because ESs operate within neoliberal legal, economic, and political institutions, tending to misunderstand ecosystem functions and biodiversity required to provide ESs to humanity (Peterson et al., 2010).

One important criticism is related to the importance of willingness-to-pay methods in ES for stating ecosystems' economic value. Some authors state their concerns about its capacity to portray different kinds of values. This, is because willingness-to-pay is bound to be affected by ability to pay, and when (say) faced with identical destruction of a specific ecosystem or function, a poor community and a rich one are likely to come up with hugely different totals (Attfield, 1998). Therefore, valuation studies would likely fail to reflect the full contributions of ES to human welfare (Farley, 2008). For Kallis et al. (2012) monetary valuation techniques as willingness-to-pay are not neutral, they frame the society-nature relationship as one of utility. Attfield (1998) raised the question about how these kinds of techniques approach the problem of undiscovered or barely known species when there is little

doubt about the fact that human awareness and preferences are highly affected by advertising, turning critical when considering that we know little about what elements of natural capital are critical (Farley, 2008). Put in other words, how can a utilitarian tool take into account the unknown when the unknown itself may be of more utility than the known?

Schröter et al. (2014) offer a catalog of different criticisms towards the ES concept stating arguments and giving counter-arguments to each one. Thus, they claim some scholars criticize ESs to exclude the intrinsic values of nature. He gives a counter-argument claiming that cultural ESs –one of the core four categories in the approach– includes values with elements of intrinsic values (i.e. existence value) (MA 2005), even though the philosophical discussion about the difference or similarity among intrinsic and existence value is still unfinished. However, Chan et al. (2012) state that the ES framework has failed to recognize the importance of different kinds of values for decision-making, portrayed in the insufficient treatment and little attention in ES assessments. Comberti et al. (2015) point out that the inclusion of indigenous and other minority perceptions of culture –with a likelihood of high dependence on natural systems for they livelihoods– in efforts to conceptualize cultural ES are rare. Turner et al. (2003) explain that when cultural functions are under consideration, such as the spiritual values of a certain species, it is highly possible that those values exist on a completely different 'moral plane', with no acceptable substitute, comparable monetary measure or acceptable compensation. Jax et al. (2013) gives the example of the people of Dongria Kondh in Orissa, India, and their relation with the Niyamgiri Hill. For them the hill is sacred and has no instrumental nor intrinsic value, but is regarded as a basic condition for the people to define and understand themselves, and also to underpin their concept of a 'good life', it holds fundamental value, instead. How to measure that relation? Merely instrumental language is not adequate to capture this complexity or relation to the Hill (Jax et al., 2013; Muraca, 2011).

Brown (1994) claims that value can refer to both ideals (held values, such as bravery or fairness) and solely the relative importance of things (assigned values, such as monetary values of goods). In this context, how many different values are left out in ESs valuations? If cultural ESs are to gather all values different than economic/utilitarian ones a good example of its typology can be found in Chan et al. (2012, p. 10). They give eight different classifications starting from those values that emerge purely from ethical theory, namely: principle-based (deontological), preference-based (consequentialist) and virtue-based (Aristotelian). Second, they mention the distinction among market-mediated (through money) and non-market-mediated values (independent of markets). Thirdly, they name self-oriented

(concern for oneself) values versus other-oriented (for others) values. In fourth place, those individual-based (held by individuals) and holistic/group-based (held by groups) values. In fifth place, existential (those depending on one's experience) versus metaphysical values (independent of one's experience, for their existence). Sixth, supporting (instrumental) versus final (inherent) values. In seventh place, transformative versus non-transformative values, this distinction is quite tricky and comprehend those things or processes that can be valued for its contribution to a transformation in values and perspective. Finally, they distinguish among anthropocentric values (only humans matter, hierarchic) versus biocentric values (held by the living, in a horizontal relation). Even though this list seems to be quite complete other authors can deny, add or mix values –for example *fundamental value* understood as the value held due to be a fundamental and substantial for life on Earth (Jax et al., 2013)–. It is possible that in the future new understandings give way for new value categories.

Kallis et al. (2013, p. 98) compiled four theses by which ecological economists have criticized the limitations of monetary valuation of ecosystems to answer the question whether or not nature should be valued with money. In their perspective (i) because ecosystems are highly complex and interconnected; (ii) because there are multiple values and relevant languages of valuation other than those expressed in monetary terms; (iii) because no unique value for environmental goods and services exists that is independent of the distributional and institutional settings within which such values are expressed; and (iv) because social processes of valuation are value articulating institutions (VAIs), nature's value cannot be compressed in one simple metric. Thus, understanding why ESs valuations in general and ES experts in particular are so stuck with purely economic valuation methods, which is the subject of Chapter 2.

Thus, the last two features of ESs, namely: ESs as a reconnection to biosphere, and ES as a successful tool for conservation are highly doubtful. Can one really think of ESs as a successful concept when considering all the different deficiencies in the valuation process? Moreover, can a purely anthropocentric approach towards ecosystems or nature be considered as a real reconnection to the biosphere?

Conservationism: what are we preserving?

ES emerged as a response to the inadequacies of natural resource management. For some scholars, traditional conservation approaches seem to have failed in preserving nature for its own sake. Instead, changing the focus from nature to human interests sounded as an effective way for tacking this global problem. But, what is that the conservation movement

tries to conserve? If nature was a sculpture one could say it is a static well-known and defined thing, one could create a mold and preserve all traits, and even copy and distribute it to different places. But this is not the case. Ecosystems are dynamic, they change through time even without human intervention. For instance, Wilson (2012) explains how 130 million years ago a change from gymnosperms to angiosperms or 'flowering plants' gave way to one of the most incredible revolutions in nature: the rise and evolution of social animals as ants and new species of wasps essential for pollination. Therefore, there is no single-sized mold for nature. Let's now add human intervention, as pointed out by Hobbs et al. (2009) around eighty percent of all ecosystems excluding ice-covered lands show evidence of human alteration. What does the picture look like now? These are the dilemmas conservationists have been trying to handle in the last decades.

Even though the conservationist movement does not have a birthdate, the work of Aldo Leopold in the 1930s is commonly taken as a starting point. Since that time conservationists have struggled to elaborate a generic concept for ecological restoration. After its establishment in 1987, the Society for Ecological Conservation has revised and proposed different concepts of ecological conservation. The most recent attempt was in 2002 understanding it as the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed (Clewell, Aronson, & Winterhalder, 2004), taking the ecosystems condition prior to human intervention as a baseline for restoration (Hourdequin, 2015). As one can expect, this concept found several critiques among conservationists and philosophers. For Elliot (1982) any attempt for conservation through restoration is fake, and will never replace the generic ecosystem. His classical example is the one of a painting painted and given by a grandmother to her grandson before her death. The painting is stolen and replaced by an exact replica, impossible to differentiate from the original one. Finally, the grandson realizes it is fake. Elliot argues that even though the replica is perfect he would feel a deep sense of loss, invalidating the replica. This, is because the value derives from the work of his grandmother, not from the painting itself. Likewise, the value of ecosystems come from the fact that it was nature, not humans, who created it (Hourdequin, 2015). Elliot (1982) calls this 'restoration thesis', the false idea that restoration can emulate damaged or lost ecosystems exactly as they were before human intervention. Katz (1992) goes even further, saying that restoration –as technological fix and modernization– demonstrates the arrogance of humanity and its oppression over nature. The result of restoration is not more than an artifact created for human use. He also warns about conservation as means for altering more ecosystems. If it is possible to restore an ecosystem, then, why would we care

about pristine, untouched nature; we are not restoring nature nor making it whole and healthy again, he claims.

While Elliot (1982) and Katz (1992) label conservationism a falsification, philosopher Andrew Light (2000) sees restoration as an effort to restore not only nature but our relationship with nonhuman beings, and in his *Ecological Restoration and the Culture of Nature* he gives a list of arguments against Elliot's assumptions. He is critical about the role of Katz, Elliot, and other exponents of environmental ethics. From his view, their work, even though seminal and necessary, does not contribute to restoration practices, instead they are dedicated to endless, abstract debates. Perhaps, Light's greatest contribution is the distinction among malicious and benevolent restoration, the first depicting the restoration thesis –or restoration as a way to excuse the destruction and exploitation of ecosystems– while the second depicts those restoration processes undertaken to fix the harm provoked to ecosystems in the past –or restoration as a mitigation tool, but not serving as excuse for further degradation. Thus, restoration depending on the context makes sense (Light, 2000). Coming back to the ideas put in the first paragraph of this section, how do we face and tackle the consequences of degradation when it compromises vast territories around the world, when the Anthropocene is real? Hobbs et al. (2009) pointed this argument out. What is the aim of conservation in highly intervened ecosystems? Humans live in mixed landscapes (Hourdequin, 2015) since millennia, we have domesticated animals, plants, and even bacteria. For Hobbs et al., depending on the extent of change an ecosystem can be categorized into natural, hybrid or novel, the first preserving historical characteristics, species and relations among them, the last depicting a completely transformed system where species composition and/or function have nothing to do with its history (Hobbs et al., 2009). Faced with this reality Choi (2007) claims the need for a future-oriented restoration approach. He acknowledges the fact that we cannot restore an ecosystem to its generic state, giving a point to Elliot and Katz. Our real capacities, he says, are to rehabilitate some ecological functions and structures, but even though limited that should not be taken as an argument for 'irrestoration' or inaction. This approach should: (1) establish ecosystems that are able to sustain environments in the future, not in the past; (2) have multiple alternative goals and trajectories for unpredictable endpoints; (3) focus on rehabilitation of ecosystem functions rather than decomposition of species or cosmetics of landscape surface; and, (4) acknowledge its identity as a "value-laden" applied science within economically and socially acceptable frameworks (Choi, 2007, p. 351).

Novel ecosystems and ES

Ecomodernist Marris (2009) discussed how all these ideas collide in the current global ecological context. She starts with the fact that 35% of all lands are covered with novel ecosystems, defining them as lands without agricultural or urban use incrusted within agricultural and urban regions (Marris, 2009). Also she links novel ecosystems with ES, pointing out that contrary to what some conservationists think these kind of altered ecosystems can provide even more services. Researchers, she continues, have found in Puerto Rico some plantations more diverse than natural ecosystems, that use nutrients more efficiently, something completely ignored by conservationists. She also criticizes the idea of 'Eden pristine ecosystem', something some conservationists defend. There are none, she claims, because of their dynamism. For Choi (2007) this idea sets another complication for past-focused conservationism: where to set the baseline of a historic system? 200 years ago? 3000 years ago? Considering a highly depleted world, rather talking about what to save, humans should talk about what do they want the world look like in 50 years (Marris, 2009).

I face a value dilemma. All these scholars make explicit their opinion about the validity and/or goals of conservation, and doing so they picture a desired world: one possible of being saved based on its history and the concern about the uncertainty and lack of scientific knowledge –that I categorize as 'do not touch it if you do not know how it works'–, or; one possible of being saved through manipulation based on current knowledge and evidence of healthy altered ecosystems –a 'damage is already done, look to the future' perspective–. Thus, value is in the center of the discussion, depending on how humans understand and see nature are the options they can possibly take today. How do ESs participate in this context? The advantages and disadvantages of using the ES concept for these purposes is discussed in the next chapter.

Chapter 3: Ecosystem Services and Conservation

The valuation of ecosystems has been a difficult affair in environmental philosophy (Hourdequin, 2015), and as I reviewed in the previous chapter all different approaches for conservation guide us to a question of values. Questions as what to conserve, why to conserve and how to conserve ecosystems or nature are rooted in ethical perspectives. The state-of-the-art in ESs shows us the predominance of one-ecosystem-service valuations by means of contingent valuation techniques (e.g. willingness-to-pay) and the use of cost-benefit analysis (CBA; Farley, 2012; Gomez-Baggethun & Ruiz-Perez, 2011; Hourdequin, 2015). In this chapter I will center my analysis and discussion on the narrow focus of ESs in economic valuation through CBA and its possible ethical implications for conservation. For doing this, three different sets of arguments for and against the use of ESs in conservation are given, and discuss different cases around the world, where ES approaches for conservation have failed, been successful or raised ethical questions.

a. Ecosystem Services: an eye-opener metaphor or eye-limiting myopia?

Argument

In the last years several ES initiatives have framed global environmental problems in economic terms and conducted local and global CBAs (Gómez-Baggethun et al., 2010) to address issues like climate change, biodiversity loss, creating markets for environmental commodities and payment schemes for ESs. My focus on CBA is because CBAs are favored in market economies and their institutional and economic frameworks (Gomez-Baggethun & Ruiz-Perez, 2011). This is pragmatic when dealing with these complex environmental issues. The need to solve macro-allocation problems (i.e. the non-internalization of environmental externalities) has also motivated economists and ecologists to use monetary values of ESs to internalize these values through CBA or other economic incentives such as taxes, subsidies (Farley, 2008) and payment schemes. Chee (2004) claims that one of the advantages advocates to this idea find is that it makes decisions emphasizing individuals' preferences instead of those of political representatives. Therefore, the aggregation of vis-à-vis preferences shapes CBA as an objective decision-making tool, leaving just normative decisions to politicians (Farley, 2008). Then, the idea of the ES concept as an eye-opener metaphor was conceived: through markets and economic valuation, people would be able to see and understand the importance of ecosystem services in humans' well-being. Costanza (1997) went even further, posing ESs as a remake of the human-nature relation: through the

internalization of environmental externalities in the economy, the value of nature is protected and observed in decision-making.

Hourdequin (2015) points out that even though there is no single rule for conducting a CBA, costs and benefits monetarily quantified are often assumed to indicate preference satisfaction of individuals or groups. Its extensive use in investments, projects and policies places CBA as an accepted method for organizing relevant data on costs and benefits to achieve efficient allocation of resources (Chee, 2004). Thus, taking this success to the conservation arena, market decisions can determine –in theory– how much conservation is appropriate (Farley, 2008). A basic condition for it to work properly in conservation is, as one can expect, that economic values attached to conservation must be greater than the values of alternatives uses of what one tries to conserve (Figueroa & Pasten, 2008).

Thus, for non-market services, those that represent ES except for so-called provisioning services, which normally do have market values (e.g. apples, timber, palm oil), many possibilities to estimate benefits exist. Hourdequin (2015) distinguishes two common approaches or methods, namely *hedonic pricing* (or "shadow pricing") and *contingent valuation* (or "willingness-to-pay"). For the first one, she posits the example of difference in housing prices among two neighborhoods with different air qualities. Thus, by comparing the prices of similar homes in similar neighborhoods with different air-quality levels, hedonic pricing will assign the different price to the difference of air pollutant concentrations. For contingent valuation, she gives the example of the Grand Canyon and the willingness of visitors to pay for improving air quality and visibility in that landscape. Through surveys a researcher could highlight visitors' preferences and then decant a monetary value for its conservation.

Counter-argument

Economist Norgaard (2010) argues that even though the Millennium Ecosystem Assessment (MA 2003) provides a general framework based on ESs, when this framework is used, the greatest difficulty is that too little ecological research has been conducted under ES aims. Capra & Luisi (2014) refer to ecosystems as bearer of several different boundaries, namely the atmosphere, the soil, boundaries among small nesting ecosystem residing within larger ones. They also acknowledge scientific knowledge on the interactions between these boundaries and its effects on the ecosystems –more specifically about the flows of materials through them– is still poor. It is interesting to link these critiques with the ones exposed in Chapter 1 when Farley (2012) describes our knowledge of ecosystem functions as full of

uncertainties, and that even the best informed scientists would never be able to describe all processes taking place in an ecosystem nor all the benefits it provides, and the human impacts it receives (Costanza et al., 1997).

This poses a strong criticism against CBA in conservation: taking into account that half part of all ES analyses rely on just one ES out of all possible services provided. How can the result of such a CBA be an accurate representation of nature's values and components? Seppelt et al. 2011 conducted a quantitative review of ESs analyses worldwide. Their results showed that: first, less than a half of the studies derived their result on primary data from observations or measurements, while two-thirds based their results on (mainly invalidated) secondary data. This does not more than support Norgaard's (2010) claims on the insufficient amount of ecological research for ESs analyses. Second, half of the studies analyzed ESs in isolation (i.e. without considering any feedback or interrelations), while the other half considered only five or fewer ESs simultaneously. This fact buries all attempts of validating the ES framework from an ecological perspective, showing how non-linear, dynamic and complex systems as ecosystem are represented and analyzed in linear explanations. Finally, the research shows that none of the studies investigated any flow or exchange of ecosystem services (either through external effects or through trading) across the predefined system boundary. Important questions thus remain unanswered:

- how can a CBA that is based on so few and even invalid information, indicate people's intentions towards a certain ecosystem?
- How does conservation through ESs ensure that preserving one service does not compromise the availability of others?

Norgaard (2010) states that ecology in fact is very rich, and much of the ecology we know does not support ESs.

Willingness-to-pay methods suffer from inconsistencies too (Atkinson, Bateman, & Mourato, 2012). Spangenberg & Settele (2016) claim that these methods are essentially 'opinion polls' in which results do not realistically match consumers' behavior when tested in the field. Gonzáez-Cabán & Loomis (1997) state that the obvious concern about its use is validity: whether respondents would actually pay the dollar amounts they state in the survey. Besides, the data obtained do not represent the value of the object, in this case an ES, representing suggested but not real prices. This is due to the context-dependent nature of the methods (Spangenberg & Settele, 2016). For instance, differences in income among people from a developed and less developed countries probably play a crucial role in decision.

González-Cabán & Loomis (1997) studied in Puerto Rico people's willingness to pay to protect two rivers from dam and reservoir construction. Almost one-third of the population answered that their economic situation does not allow them to pay while only one-third agreed to pay. Is it possible on the basis of these outcomes to say that people do not want to conserve the ecosystem? I think it is not. The dam was finally built up between 2000 and 2006 by the Water and Sewage Authority (AAA) of Puerto Rico. The fact that it provided the water supply for three surrounding communities made it impossible to avoid[3]. Therefore, Norgaard (2010, p.1219) is probably right in stating that "the metaphor of nature as a stock that provides a flow or services is insufficient for the difficulties we are in".

b. ES is effective for conservation purposes

Argument

Ingram et al. (2012) give a series of arguments for ES-based conservation. ESs, they claim, have a significant potential for achieving conservation goals, through different approaches, namely: (1) Broadening constituencies for conservation and informing decision-making, (2) Increasing the value of areas prioritized for biodiversity, and (3) Supporting sustainable management of ecosystems outside of protected areas.

The first approach (1) may make visible ecosystem values in decision-making processes where they were previously ignored, therefore, for instance, new business could replace unsustainable practices by sustainable ones. This point was supported by Albrecht & Ratamäki (2016). Through content analysis they examined how effective different arguments are in peatland conservation in Finland. They concluded that ES and legal arguments are more effective than other (i.e. climate change or purely economic related) arguments. Besides, it could provide opportunities for engaging communities that otherwise would not participate in conservation projects, for instance, through Payment for Ecosystem Services (PES), which is a program based on payment schemes that provides direct incentives to ES providers to act in accordance with desired environmental benefits. In this way, for instance, land owners or entire communities can be offered to avoid practices that could end in ecological damage (i.e. palm oil plantations in Indonesia) by being paid for the benefits they do not anymore receive due to such avoidance, in other words their opportunity costs are covered (Van Hecken & Bastiaensen, 2010). As one can see, ES is a valuation process, while PES is environmental trade. Ingram et al. (2012) also conclude that PES programs are likely to have the greatest positive impacts on biodiversity due to its positive impact on landowner.

[3] http://www.acueductospr.com/AAARepresas/reservoir?i=11

Increasing the value of areas prioritized for biodiversity (2) is another opportunity given by ES in the conservation arena. In this sense, knowing the ES provided by protected areas can give more reasons to maintain them, thus avoiding the loss of services due to simplistic analysis of the area. This turns critical, they continue, when considering increasing land pressure, periods of economic austerity or increments in human population that could threaten such protected areas.

Since the total area of protected areas in the world only covers 12% of planet's surface, ES-based conservation could support sustainable management of ecosystem outside protected areas (3). They give the example of oyster reef restoration in the United States, where protecting a provisioning ES (oyster fisheries) gave way to the protection of related ES as water quality and biodiversity of food and non-food marine species. Finally, they suggest that if ESs are integrated in conservation projects, planners and managers should take three considerations into account: (a) species without utilitarian or economic values; (b) ecological processes that do not directly benefit people; and (c) the ecological functioning that may be undermined amidst attempts to optimize key services (Ingram, Redford, & Watson, 2012, p.5).

Counter-argument

Arguments supporting ES-based conservationism are vast. Yet, while environmental economists, ecologists and conservationists promote the introduction of ESs in ecosystem assessment and conservation, the effectiveness of ESs in conservation is not contemplated explicitly (see TEEB 2010; Naeem et al. 2009), and even though Ingram et al. (2016) provide some approaches through which ES effectiveness could be visualized, general analyses on its verified effectiveness lack.

ES and conservation

The crisis of pollinators in the United Stated shows some possible ethical implications of using ES-based conservation. Kremen et al. (2002) studied crop pollination from native bees being at risk from agricultural intensification. They mention that farmers rely on <11 of 20.000-30.000 bee species worldwide for pollination. In some cases, native species cannot provide sufficient pollination services, so farmers rent (exotic) honey bees colonies to obtain the desired yields. Optimistically, researchers claim that under positive circumstances native species could still provide enough services for certain kind of crops (i.e. watermelons) and that, collectively, farmers could help saving and restoring bee habitats by reducing honey bee rentals 15-50%. Chan et al. (2007) point out that for USA farmers European honey bees –the

ones they rent– are more economical than North American native species. If non-native species can provide a better ES than natives (Chan et al., 2007; Marris, 2009), how much does conservation gain from CBA? Following this utilitarian-rooted approach what matters is benefit, which in business means higher productivity and utilities. Hypothetically talking, one could also think about the possibilities of technological developments and substitution of pollinators by people (i.e. brushing flowers to pollinate, although considerably more expensive) or cheaper technologies; what would the reasons for conserving species and restoring their habitats be if it is not economically favorable anymore?

Another example for this dilemma is the case of fast-growing non-native monoculture of trees as eucalypts, which can be considered ideal for forestry and carbon sequestration but useless in terms of biodiversity protection (Chan et al., 2007). In Chile, the National Forestry Corporation (CONAF in Spanish) conducted a research to find out how much CO_2 are forestry tree species able to capture in the country. The results point out that in the top three of CO_s sequestration two non-native species have the largest extent. In the first place, *Eucalyptus nitens* –a non-native species from Australia– is capable of capturing 30 tons of CO_2 per hectare per year, while in the third position *Pinus radiata* –non-native species from North America– 17 tons of CO_2. The research was meant to value the contribution of these species and facilitate the application of carbon emission trading, so landowners are encouraged to reforest their lands with these species (ODEPA, 2010). This substitution of ES by non-native species can be fostered by single-service valuations, in which the bigger ecological picture is not taken into account.

PES and conservation

As exposed above, authors commonly resort to PES effectiveness as a proxy of ES effectiveness. Therefore, I gathered some examples showing how PES strategies also are both prone to fail and many times dispensable in conservation. Chen et al. (2014) studied forest conservation in China and the effectiveness of PES schemes given by the Natural Forest Conservation Program (NFCP). For doing so, they use scenario analysis comparing situations with and without PES intervention. The situation in the Wolong Nature Reserve in China, they claim, could be improved from the current 337 km^2 in 2007 to 379 km^2 or even 435 km^2 in 2030 depending on the kind of PES strategy. Nonetheless, the authors also acknowledge that the effectiveness of what they call 'conservation investments' may not be sustainable due to uncertain human responses to policy interventions. Finally, Chan et al. (2007) allege that forest protection in China shifted logging pressure to Russia, so what may be seen as

successful in one place may represent new problems in other regions or countries.

In Costa Rica, Sierra & Russman (2006) analyzed the impacts of PES schemes paid by the government in agricultural lands comparing areas with and without intervention. After five years, the impacts of PES schemes were positive, almost all farmers receiving PES had abandoned agriculture. However, the authors pointed out that similar outcomes can be reached without PES schemes in the medium-long term as abandonment of agricultural lands seems to be a generalized practice in the area they studied.

In Los Negros valley, Bolivia, 46 farmers are paid for protecting 2774 ha of a watershed containing the habitat of 11 species of migratory birds. PES schemes were planned for ten years, and are working positively. Local government is financing the schemes, even though studies claim that pre-stated water users' willingness-to-pay in the short-term must run *de facto* in order to improve its implementation. Doubts exist as long-term conservation plans are not included, which could risk its sustainability (Asquith et al. 2008).

Concluding, ES advocates believe one could assess the effectiveness of ES by analyzing what the effects of PES have been for the purposes of conservation. In the previous chapter I showed how ES advocates make clear that ES does not equal commodification (see Costanza et al., 1997; Gomez-Baggethun & Ruiz-Perez, 2011; Schröter et al., 2014). I believe that equating ES effectiveness to PES undermines the concept many ES advocates have about the services' approach. This, since it seems there is no serious analysis of ESs effectiveness in conservation without using PES as proxy. In other words, without money in between no effectiveness analysis seems to be possible. ES conservation ends being money dependent, so is biodiversity.

c. Free-market environmentalism reflects the complexity of human-nature relation

Argument

ES emerged strongly in the last quarter of the twenty-first century. Its discourse is market-based and thus pretends to solve some aspects of the current environmental crisis. Some think its exponential explosion around the world and through different institutional scales has to do with the transition of national economies and international state organizations to neoliberal institutions. For Kull et al. (2015) the neoliberal discourse leads the understanding of the society-environment relationship in a particular way. They also argue that it is highly political since ES creates new markets, property and power relations. ES advocates agree to this point, and add that neoliberalism includes economic practices such as privatization, state reduction and intervention, and expansion of market valuation to spheres

where it had no place before (Gomez-Baggethun & Ruiz-Perez, 2011). Anderson and Leal (2001) are the most predominant defenders of the so called Free-Market Environmentalism (FME). For them, the ideas of sustainable development and conservation as has been traditionally understood –opposed to the one of FME– are naive as they have four arguments underpinning their wrongness: (1) it depends on omniscient, benevolent experts for determining solutions (2) those experts must set asides their self-interest for the benefit of present and future generations (3) that those experts will do the "right thing", despite political influence (4) sustainable development violates ecological principles every time it looks for static solutions to dynamic problems (Gruen & Jamieson, 1994). They continue by claiming that markets with producer and consumer sovereignty record immense improvements in the quantity and quality of goods and services produced; so, expanding these ideas to environmental and natural resources management offer the same outcomes, plus a conciliation among economic growth, allocation efficiency and environmental conservation (Gomez-Baggethun & Ruiz-Perez, 2011).

Counter-argument

Dempsey & Suarez (2016, p. 665), who doubt neoliberal, market-based interventions since they often fail in their own performance requiring "substantial public funding, command-and-control legislation, and other elements seemingly anathema to 'truly' market-oriented approaches". Chee (2004) tackles the underpinning assumptions of the economic agent as 'rational actor', which is the backbone of neoclassical economics and neoliberalism. He points out that the axiom of economic agents as both omniscient individuals with complete/perfect information, and rational actors seeking utility maximization has been demonstrated to have clear restrictions and limitations. Farley (2012) also critiques the axiom that people are always self-interest oriented, different authors have demonstrated that people are frequently altruistic and cooperative, and that valuation studies could reduce the likelihood of cooperation. Wilson (2012) has dedicated his life to the study of social animals. He explains how mistaken our common understanding of individual selection is as a base for these kinds of arguments. First, he claims that although for our species individual selection is core –shaping in every *Homo sapiens* fundamentally selfish instincts in our relations with each other– so it is social selection –consisting in the competition among societies– a distinctive feature responsible for our observable, altruistic interpersonal behavior. Second, he names an 'iron rule' in genetic social evolution: "selfish individuals beat altruistic individuals, while groups of altruists beat groups of selfish individuals (…) If individual

selection were to dominate, societies would dissolve" (Wilson, 2012, p. 243). Third, Wilson makes clear that human beings act morally and are prone to moral behavior and decision-making. We try to do the right thing, and we even offer help sometimes even at personal risk. This is because individual and social evolution has favored the reproduction of individuals given to benefit the group as a whole, making cooperation[4] the more important trait of human nature. Economists Ernst Fehr and Simon Gächter published in Nature an article titled 'Altruistic punishment in humans':

> Human cooperation is an evolutionary puzzle. Unlike other creatures, people frequently cooperate with genetically unrelated strangers, often in large groups, with people they will never meet again, and when reputation gains are small or absent. These patterns of cooperation cannot be explained by the nepotistic motives associated with the evolutionary theory of kin selection and the selfish motives associated with signaling theory or the theory of reciprocal altruism (Fehr & Gachter, 2002, p.137).

Following this argument, economists Bowles & Gintis (2011) argue that even Adam Smith's idea of the invisible hand is a clear example of mutualistic cooperation. In a world where collusion and price-fixing existed, Smith created an economic system based on the idea of a 'invisible hand' capable of controlling market interactions among thousands of self-interested individuals, as well as the division of labor. Bowles & Herbert (2011) acknowledge the fact that this economic system portrays an important part of human interactions in the economic arena, but according to new scientific knowledge it is also clear how societies formed by purely self-interested individuals provoke the collapse of the economic structure. This is the case of the *tragedy of the commons*, presented by ecologist Garett Hardin (1968). His theory shows how entire societies following purely self-interested objectives contrary to the common good may result in the complete depletion of common resources (i.e. fish stock, rivers). Besides, the idea of free-riders –as individuals benefiting from others' contributions while themselves contributing less or nothing– was conceived and quickly spread in the economic world, showing how purely self-interested individuals may damage cooperative social institutions, resulting in social dilemmas which outcomes are *Pareto inefficient*.

[4] Cooperation is understood as the engagement with others in a mutually beneficial activity. It also represents a form of *mutualism* or an activity that confers net benefits both on the actor and on others; but, also confers net costs since not cooperating could increase their fitness and other material payoffs. Examples of cooperation are political and military objectives, and every day life's activities as collaboration among employees, exchanges in markets among sellers and buyers, and neighbourhood amenities. (Bowles & Gintis, 2011, p. 2)

FME advocates Anderson and Leal (2001) would insist that the free-market approach is consistent with the principles of ecology. FME accepts, they continue, the fact that individuals are unlikely to leave out self-interests in economic decisions, just as other species do. Nonetheless, Bowles & Gintis show how by means of experimental games this assumption can be also denied. Many researchers have used *Prisoner's dilemma* –an anonymous, non-repeated non-cooperative game– to show how despite strong temptations to defect out, participants prefer to cooperate instead of defecting in the Prisoner's dilemma under different circumstances, and real monetary payoffs (see Clark & Sefton, 2001; Kiyonari, Tanida, & Yamagishi, 2000; McCabe, Smith, & LePore, 2000; Morris, Sim, & Girotto, 1998; Sally, 1995; Watabe, Terai, Hayashi, & Yamagishi, 1996). Finally, they claim that opposed to what biologists and economists have said in the last decades, empirical research has demonstrated that cooperation among individuals beyond family bonds is a natural and common thing. What has not been demonstrated empirically, they continue, is the opposite, and appears self-evident instead. Thus, the self-interest axiom was commonly accepted by default under mistaken understandings of evolution by natural selection (Bowles & Gintis, 2011). This poses a great criticism against one of the central, underpinning assumptions of Free-Market Environmentalism and CBA as an objective tool, or at least in the way CBA are conducted in ES valuations: what may be beneficial on the individual scale would not be in the social scale. The simple aggregation of interests does not represent social intentions. Besides, it puts in doubt the sufficiency of market-based tools when it comes to analyze, portray and guide complex societal issues as climate change and ecosystem depletion.

We can see how ES works underpinned by two different and critical uncertainties: (1) ecological uncertainty, based on the scarce knowledge we have about ecosystems' interactions –the ES approach in particular–, critical ecosystem functions, and the effects of human impacts on those systems, which can be categorized as an epistemic uncertainty (what do we really know about ecosystems?); (2) economic uncertainty, based on the fact that basic assumptions on economic agents are that they have perfect information and are always motivated by self-interested aims, which are not true. This can also be categorized as an ontological uncertainty (who is the one valuing nature? If, as we showed, economic agents are not purely self-interested). This poses another criticism towards CBA: taking into account that a great part of all ES valuations rely on just one service out of all a single ecosystem provides, how can the result of a CBA be an accurate representation of nature's values?

They end claiming that it was sometimes difficult to judge the scientific quality and

validity of certain studies, which is certainly a strong critique. Linking this criticism with FME, the case of wetland mitigation banking in the United States is for Robertson (2004, p.362) 'actually existing [environmental] neoliberalism'. By the restoration of sufficiently functional wetlands, those required to execute compensatory mitigation would buy 'wetland credits' instead of creating the wetland themselves. From this case, Robertson elaborates a bridge among businessmen and science claiming that banking as market-based tool through 'highly sophisticated arguments' is a means for expanding market relations to the environmental sphere, exemplifying the domination of capitalist logics over science and its ability to induce ecologists and other scientists to create assessment measures that 'work' for capital accumulation (Robertson, 2004). Examples supporting Robertson's claims can be found when looking at manipulated Environmental Impact Assessments (EIA) and their role in making highly polluting investment projects possible all over the world in the last decades. Table 1 shows a summary of the arguments and counter-arguments exposed above.

Conclusions

Table 1. arguments and counter-arguments for ES in conservation

Ecosystem Services: an eye-opener metaphor or eye-limiter myopia?
Argument The internalization of environmental externalities in the economy through economic valuation would enable people to see and understand the importance of nature in humanity's wellbeing. Cost-Benefit Analysis pops up as an objective tool that allow decision makers to take people's preferences into consideration instead of those of politicians.
Counter-argument Insufficient ecological research has been conducted for ES aims, while great part of all ES valuations rely on one ES out of all a single ecosystem provides. Besides, economic valuation attempts to picture complex, dynamic, non-linear systems –as ecosystems– in linear ways. Therefore, economic valuation of ES in terms of Cost-Benefit Analysis do not represent nature's values accurately.
ES is effective for conservation purposes
Argument ES-based conservation may achieve important conservation goals through (1) Broadening constituencies for conservation and informing decision-making, (2) Increasing the value of areas prioritized for biodiversity, and (3) Supporting sustainable management of ecosystems outside of protected areas
Counter-argument Even though the introduction of ES in conservation is highly promoted, there are no serious analyses on ES-based conservation effectiveness. Cases as the one of honey bees in the USA and introduced non-native tree species in Chile show the negative implications of using market-based approaches and single ES valuations in conservation. Even though in the short term PES seems to be quite effective conservation tool, serious doubts remain on its dependence of money flows in the long term.
Free-market environmentalism works as a win-win approach
Argument Producers and consumers' sovereignty in the market context ensures improvements quantity and quality of goods and services. Taking this principle into conservation, market-based approaches offer conciliation among economic growth, allocation efficiency and environmental conservation.
Counter-argument Due to its market-based essence, ES works underpinned by two critical uncertainties. (1) ecological: just

a few ecologic research has been conducted for ES purposes, therefore, its scientific base is doubtful. (2) economic: basic assumptions on economic agents as that they have perfect information and are purely motivated by self-interested aims, have been proven wrong.

Some ES counter-arguments contained in Chapter 1 claim that ES economic valuations could obscure services due to its narrow focus on CBA and single-service studies. Now, we can certainly say that they do. Few ecological research supports ES attempting to depict ecosystems' inner interaction. One can also point out how the core assumptions of classic economics undermine the validity of ES and the resulting understanding of complex living systems, and conservation. Besides, the way ESs valuations center their analysis in those services that already have markets, clearly create a link among conservation purposes and trade. Finally, doubts about CBA's scientific validity pose caveats on the way ES is currently used.

Nonetheless, worthy of consideration are the claims of some authors every time they acknowledge that economic valuation shaped as ES can be a good information tool when not used as the only decision making criteria (e.g. CBA), and since this kind of tool is blind to the value of ecological life-support systems, the need for other decision-making tools is essential (Gómez-Baggethun et al., 2010; Gomez-Baggethun & Ruiz-Perez, 2011). The utility of the ES concept also truly depends on the arena where it is used (Kull et al., 2015). But, from a conservation perspective –where artifacts, as human production, are not the core but nature–, what are the alternatives? If one does not agree with market-based approaches as well as accept that last-century conservation approaches 'failed', what should one do? Is it beneficial to reject these approaches completely? These are part of the questions I will analyze in Chapter 3.

Chapter 4: How to value nature in the Anthropocene

After an extended and deep analysis of (1) ESs as a concept for environmental management in Chapter 1, and (2) the ethical implications of ESs in natural conservation in Chapter 2, we now proceed to provide new insights and perspectives for nature valuation away from markets, in the context of the Anthropocene.

The Anthropocene has come to change the rules of the game in multiple spheres (i.e. politics, science, philosophy, economy, etc.). Nonetheless, it also arrived in a momentum where both science and technology play two roles in the current global environmental crisis: (1) the increasing capacity of technology and science for satisfying social needs, create wealth and new social dynamics (i.e. the invention of the fuel engine, intense monoculture, over-fertilization, and giant amounts of waste) (2) has also brought, mainly in the past fifty years, tools to understand Earth's ecological dynamics and processes. In other words, never in history humans have had both such an environmental crisis and knowledge about the environment, at least from a western perspective.

A new scientific era: the systems view of life

Science has changed understandings about the world humans live in. The Newtonian, mechanistic perspective of the world, in which reductionism and linear mathematics were understood as a means for predicting the behavior of particles and bodies in the universe gives way to a new paradigm. The newest paradigm shift in science, held by pioneer research in physics, biology, chemistry, cognition, ecology, non-linear mathematics, cybernetics, among others sciences, pictures a world in which that traditional scientific epistemology cannot any longer give an accurate representation of the relations among living beings and their environments.

Capra (1996), physicist and director of the Center for Ecoliteracy in Berkeley, California, points out a shift from physics to life sciences as one of the central points of this new paradigm. From his point of view physics has lost its role in guiding and providing ultimate descriptions of reality, even though it is not a generalized idea among the scientific community yet. He continually claims that biology and ecology have been key disciplines in this transformation. The understanding of living systems as interconnected, always-changing (Capra, 1996), self-organizing, self-maintaining (Maturana & Varela, 2006) networks whose components are recycled and replaced by one another took down the previous conception of living systems as simple mechanic machines, whose behavior could be completely predicted

by solely understanding the functioning of its parts. The new scientific era receives, then, the name of system thinking, or, as Capra puts it, the systems view of life.

Biologists Maturana and Varela revolutionized the way living beings are understood in the 1970s. Through different experiments with lizards they concluded that living beings can be understood as self-organizing, self-maintaining systems. They gathered these ideas under one single concept: *autopoiesis* –in which 'auto' stands for self, and 'poiesis' stands for building (Maturana & Varela, 2006). They also identified *cognition* –the process of knowing– as the very process of life. Thus, they began to understand life as both autopoietic and cognitive, and living beings/systems began to be understood as intricate *networks* of components, instead of the simple sum of parts proposed by reductionism in science and philosophy.

Lovelock (1979), went even further and proposed the understanding of the Earth as a living system, an interconnected network of living organisms capable of self-regulating Earth's processes from soil formation to the composition of the atmosphere. Lovelock called this idea the *Gaia hypothesis*. In their perspective, life is a property of planets and not of individuals, it is through cooperation and networking that life emerged on earth 3.5 billion years ago, not through competition. As one could expect, this idea has been deeply criticized. Some authors claim the theory proposes a *teleological* world, a world following a purpose; but Lovelock (1979) has pointed out that their idea of Gaia is not to be understood that way. They claim, instead, the living world must be understood as result of internal, local, and globally chaotic, complex interactions among living systems far from equilibrium, in an always-fluctuating and changing world.

These new ideas and paradigm have epistemic and ontological consequences: the world is seen as a *whole*. There is no more room for dichotomies such as organism-environment, body-mind, or human-nature. Through a continuous flow of energy beings are both individuals and environments, organisms and environments conform ecosystems. Just take yourself as an example. You live in a certain place on Earth, participating in a network of interaction with other human, nonhuman beings and the nonliving world –Earth's crust–, but at the same time, your stomach and skin serve as the environment for different bacteria (Capra, 1996; Lorimer, 2015). On the other hand, mind is not anymore understood as a thing but a *process*, the process of cognition, in charge of bringing up not *the* world but *a* world. This is completely perception-dependent. Humans are finally understood as a component of a bigger interconnected, interdependent living network, in which to know equals to live: *the web of life* (Capra, 1996).

From nature to natures

Closely linked to this new idea of the world, since all living beings and specially humans, are cognitive beings, Hourdequin (2015, p. 181) noticed that "our views of nature, culture, and their interactions are inevitably value-laden", thus, context-dependent.

Human Geographer Lorimer (2015), has investigated the concept of nature in the last decade. He acknowledges the existence of two visions of nature, labeling them as: the 'dream of mastery' and the 'dream of naturalism', both having different consequences in conservation. The former, focused on the capacity of humans to shape and manage nature and ecosystems at will (i.e. seeing the Anthropocene much more as an economic opportunity for development than an environmental tragedy) and the latter, pictures nature as pristine, untouched and a-temporal, neglecting all other different ideas of nature. However, Lorimer (2015), instead of keeping this discussion going endlessly, takes the ideas discussed in the last section about the systems view of life, and merges them with the new challenges posed by the Anthropocene. He claims nature in the Anthropocene is a hybrid, neither social nor natural, and there are multiple ways for natural knowledge. Different perspectives, different ways of *living with the world* emerge from the Anthropocene as a geo-political era, and from that point on the Anthropocene is *Multinatural* (Lorimer, 2015). Our understanding of nature, thus, comes from a complex interrelated network of cultures, ontologies, epistemologies, landscapes, and the decisions humans take to live in the world. Finally, Hourdequin (2015, p. 212) noticed that our "relationships to the natural world are concrete, place-based, and mediated in significant and complex ways by my social relations, the institutions and infrastructure that surround me, and the buildings in which I live and work".

Lorimer (2015) thus claims that the Anthropocene requires new forms of interspecies responsibility, in which politics, science, and the relationship between them should be re-thought. He opts for an ontological change in conservation, from *Nature* to *Wildlife* as core. Wildlife, he says, is everywhere; not only in fenced protected areas, in the middle of the forest or zoos, but even in our stomach, skin, streets and houses. It is multinatural, ever-changing, immanent, concerned less with the current biodiversity and more with its unruly potential of become otherwise. Therefore, humans have to improve their relationships to nonhuman organisms since they are all part of the same system, biotic world. He finishes by suggesting *Cosmopolitics* as a way forward. Cosmopolitics is a "politics of dynamical processes, diverse agencies, and conditional, contingent, and unstable outcomes" (Lorimer, 2015, p.183), as well as it is a condition for *bio-security*: nurturing the relationship between

human and nonhuman living beings humans make sure future biodiversity finds a place to flourish and sustain itself.

A matter of values: alternatives to market-based conservationism

Costanza et al. (1997) and other ES advocates are accurate when conceiving valuing as something that is always done, in every context and circumstance. Humans value everything, from interpersonal relationships, to shoes, to weather, to species. Although they are right, their belief on the capacity of market values to picture the values of –now– natures and ecosystems' integrity as ES are doubtful. I demonstrated in Chapter 2 that ESs and market-based solutions cannot gather or highpoint all values of nature or ecosystems since they rely on serious ontological and epistemological misunderstanding of both humans and nature. This, in addition to the new paradigm in science I have been discussing throughout this chapter, puts humans in a context in which new, different ideas and actions must be undertaken to cope with the global environmental crisis.

In the next pages, I propose an approach to capture the value of ecosystems and nature taking into consideration new knowledges and approaches from ecology, philosophy, law, conservation, politics, and economics and others. To do this, I apply what I have been discussing in this chapter so far, as well as mixing ideas based in the work of different philosophers, and both social and natural scientists. First, I start by briefly explaining the ideas of the authors I reviewed, and, second, I merge them to come up with a new approach for conservation in the Anthropocene.

1. Principles of Ecology

The starting point of my approach is to learn, accept and live accordingly to the principles of ecology. This is the epistemic basis of my proposal. Valuing nature out of markets means to understand its intrinsic value, the value natures, living beings, and ecosystems have because of their own sakes, being part of the web of life. Edward O. Wilson explains how important the conservation of the biosphere, Gaia as he also likes to call it, is by pointing out how invertebrates –beetles and flies, among many, many others– are more important than us for sustaining the web (Pierce & VanDe Veer, 1995, p. 140):

> "The truth is that we need invertebrates but they do not need us. If human beings were to disappear tomorrow, the world would go on with little change. Gaia, the totality of life on Earth, would set about healing itself and return to the rich environmental state of a few thousand years ago."

Homo sapiens' supremacy is, then, a fallacy. Moreover, ecological science has increased its understanding enormously in the last decades, and even though there is still a long path in the understanding of ecosystems and life, some principle or patterns in nature have been recognized and accepted by the scientific community. Capra and Luisi (2015, p. 353) did not create the principles of ecology, but present a useful and clear list of them. These are:

1. Networking, the relationships among the members of an ecological community are nonlinear, involving multiple feedback loops.
2. Recycling, living systems are open systems and produce waste, but what is waste for one is food for another, ecosystems have no waste really. A crucial difference between natures which are cyclical and industrial systems, which are linear.
3. Solar energy (and renewables), as plants transform solar energy into chemical energy by photosynthesis, sustainable communities do not generate emissions.
4. Partnership, the tendency to associate, live inside one another, and cooperate is essential in life. Evolution occurred in interdependence.
5. Flexibility, since living systems are disturbed by the environment, ecosystems adapt themselves to new or temporal conditions in order to reach balance again.
6. Diversity, diverse systems are resilient, containing many different species ecosystems ensure overlapping functions, reinforcing its structure and organization. The more diverse an ecosystem is, the healthier it is.

One idea needs to be clarified to prevent possible misconceptions when following the principles of ecology: accepting and living according the principles of ecology does not imply to fall into the naturalistic fallacy, in which all that was created by nature is good per se. The above principles of ecology, in my opinion, pose ecosystems as ever-changing, adaptive systems far from being static or in equilibrium. The principles allow us to manipulate, improve, take advantage, and even keep commodifying certain aspects of nature; nonetheless, under a new perspective: understanding our existence as part of a bigger system, in which the human species is an integral part of nature. To avoid the naturalistic fallacy, I propose to think about the human mind. Human minds are as part of nature as the flight of the eagle or the bloom of the roses, they are a result of an evolutionary process, and through it the human mind committed a lot of mistakes causing the disruption of many ecological processes –which can be seen as nature doing the bad thing–, but at the same time many minds in the last decades started to realize the effects of our own actions on Earth, and also

have found feasible approaches and actions to try to solve the problem. Some of these approaches and actions are discussed in this thesis.

2. Duties to Endangered Species

Rolston (1985) is interested in developing an interspecies ethics. To do this, he acknowledges the need for understanding why species themselves are 'bigger events' than individual interest or sentience. He starts from pointing out that supporting a human species supremacy is not any longer possible. It became a fallacy (because of its bias in favor of humans) once the science of ecology emerged. He blames the human species of being a superkiller, responsible of the sixth massive extinction taking place in the world, at the same time that he highlights humans' capacities to understand the world and its processes, to predict and foresee the consequences of our actions and reverse non desirable consequences, which give us the opportunity to heal damages committed and to commit. Therefore, our duty to other species is "not to cause ecological disruption, a duty not to waste species" (Pierce & VanDe Veer, 1995, p. 316). Humans can still meet our needs sacrificing animals and plants, but without altering both species' and ecosystems' unfolding. A practical case for these ideas may be found in the concept of Maximum Sustainable Yield (MSY) in fisheries, which means extracting as many fish as possible without compromising species' integrity and ecology.

3. Bio-regionalism

Environmental philosopher Hourdequin (2015), criticizes the traditional role of environmental philosophy and ethics in nature's conceptualization and conservation. As discussed in Chapter 1, authors critique the fact that traditional environmental philosophy is mostly kept in a theoretical ground, not helping conservation practices really (Light, 2000). Therefore, she claims for a local, place-based environmentalism as a concrete way for reconnecting people and their environment. This is what Hourdequin (2015, p. 213) calls *Bioregionalism*: "becoming native to a place, which requires, unsurprisingly, understanding in detail its character and particularities". It is a call for responsibility and involvement with a certain place and context. Let's link this perspective with the rise of novel ecosystems in the Anthropocene: it does not matter where you are –in the middle of a forest or in New York's suburbs– there is always a need of looking after ecological processes, and live as ecologically friendly as possible. It is important to remark that Hourdequin (2015) claims for a global stewardship when it comes to environmental ethics –we need to develop a culture of care and

be aware of the global environmental crisis taking place– but local actions are the only way to involve people in effective conservation of natures. It is not about choosing between local or global, but an effective balance of both approaches.

4. Legal standing for Natural Objects

Hand in hand with the idea of duties to species and the environment, Stone (1974) in his book *Should Trees Have Standing?* Proposed to give legal standing to natural objects and finally to the environment as a *whole*. He starts his claim by giving examples of how throughout human history law has evolved in such a way that different objects that today have personhood obtained their legal standing. He mentions the case of children in the Roman empire, which were understood as mere things, possible of being sold or even killed. He also mentions the case of black people and women rights to finish with the idea of institutions, corporations and states as possessors of legal standing. "Throughout legal history, each successive extension of rights to some new entity has been, therefore, a bit unthinkable" (Stone, 1974, p. 6). He caveats to avoid silly interpretations of his ideas when thinking that by giving legal standing to nature we are willing to give all different rights humans possess or that giving rights to the environment will stop us for cutting down a tree or killing a cow. He gives as example the right to vote, which children nor corporations do not have. His intention is to turn nature into a 'holder of legal rights', for doing so, three conditions need to be gathered: (1) the thing can institute legal actions *at its behest*; (2) in determining the granting of legal relief, courts must take *injury* to it into account; (3) relief must run to the *benefit of it*.

Stone's approach to natural valuation is probably one of the best examples of both capturing nature's value outside the market, and practical environmental approaches. This, because if the environment acquires certain rights that already exist in other legal arenas –as those created for the legal standing of corporations and other legal persons– the way to make them effective, then, is quite simple. One of the example he gives is when a man is injured in a car accident, "we impose upon the responsible party the injured man's medical expenses" (Stone, 1974, p. 29). Therefore, when threaten and/or damaged the responsible party must pay environment's restoration expenses as may be restocking of fish, washing out impurities, etc. Here the total amount of money represents reparation costs, not the value of the man himself. He also suggests that nature's representation in court may be under the figure of *guardianship*, this, understood similarly as what happens when a firm faces bankruptcy, a

continuous supervision over the actions that could harm or disturb its wellbeing, getting over the litigation barrier to a more generic care.

5. Multinature Conservation in the Anthropocene

Lorimer (2015) proposes to use the Anthropocene as a platform towards a post-natural era, the *Cosmoscene*, which "would begin when modern humans became aware of the impossibility from extracting them from the Earth and started to take responsibility for the world in which they lived" (Lorimer, 2015, p. 4), one more time, it is about our duties towards nonhuman beings. He first claims the need for an ontological change in the concept of nature, he proposes better to talk about Wildlife (Lorimer, 2015, p. 7):

> "In wildlife I find an alternative ontology to Nature to inform future environmentalism. Wildlife lives among us. It includes the intimate microbial constituents that make up our gut flora and the feral plants and animals that inhabit urban ecologies. (…) Unlike Nature, wildlife also suggests processes. It describes ecologies of *becomings*, not fixed beings with movements of differing intensity, duration, and rhythm."

In his opinion, this approach serves to include the increasing number of novel ecosystems around the world. The purpose of his proposal is to develop a *more-than-human* epistemology of conservation, while acknowledging a multiplicity of natural knowledges and ways to live in the world. Finally, Lorimer understands the importance of seeing conservationists as emotional beings who love, care and hope. He values wildlife encounters as the hallmark of conservationism: conservationists find themselves in a world in which anthropocentric logics of ES cannot reflect interspecies' interconnectedness and interrelatedness every time they go to do fieldwork, observe and study wildlife. This *encounter value* resonates with the idea of place-based conservation defended by Hourdequin (2015).

Place-based Multinature Conservation in the Anthropocene: a framework

My proposal for natures' valuation starts, thus, from the ideas mentioned above, namely: Principles of Ecology, Duties to Endangered Species, Bio-Regionalism, Legal standing for Natural Objects, and Multinature Conservation in the Anthropocene. It also emerges from a deep sense of duty to my own species and all the others inhabiting the earth. I acknowledge the fact that natures in the Anthropocene are essentially political: they emerge from people's decisions and actions, dependent on values, epistemologies, ontologies,

cultures, paradigms, etc. in a context of global environmental crisis, resources depletion, and species massive extinction. That is why, even though the Anthropocene is real and taking place, humans can choose what kind of Anthropocene they want to see in the future, through ethics.

As mentioned before, my proposal comes from a range of different approaches from science to philosophy. I call it Place-based Multinature Conservation (PMC) and emerges as an iterative, interconnected approach for conservation in the context of the Anthropocene acknowledges that, in the Anthropocene:

I. There is no such a thing as "*the* nature" but "*a* nature" or natures, which are socio-natural constructions intimately linked to people's values and knowledges of nature.

II. There is no such a thing as "*a* humanity", even though all humans (as species) generate a certain extent of impacts in the natural world, there are substantial differences among those causing irreversible damage or alterations and those living in/with nature in coexistence –a clear example of this idea are the environmental impacts of highly-industrialized western countries compared to indigenous communities around the world. Moore (2016) points out that the concept of the Anthropocene may lead to misinterpretations of responsibilities towards environmental degradation and depletion, painting all humans with the same brush.

III. Conservation cannot be taken as an isolated enterprise. The maintenance and improvement of human wellbeing is interdependent to the maintenance of the web of life as a whole: the more diverse an ecosystem is, the healthier it turns. In a world where not only resources but species and ecological processes are endangered, conservation becomes an affair of public security. Therefore, conservation must penetrate the political, economic and social spheres, and become a core in a culture of care and interspecies citizenry.

IV. The coexistence of multiple forms of nature and ecosystem require different measures and strategies. Pristine, mixed and novel ecosystems must be equally integrated in conservation. In the case of *pristine ecosystems*, efforts must be guided towards their endowment with legal standing, in such a way that the roughly 12% of global land that represent protected areas on Earth can be effectively secured and kept. In the case of *mixed ecosystems*, the distinction made by Light (2010) between malicious and benevolent restoration may represent an effective way for improving ecosystem quality and health. Recall that benevolent restoration is that undertaken to remedy past harm to nature. In the case of *novel ecosystems* –increasing in amount and

complexity all over the world– ecological research must be guided towards a deeper understanding of its inner processes –which remains highly uncertain– and the way the can cause alterations in other ecosystem or regional ecological processes, keeping them as healthy as possible.

V. As human species we have duties to ourselves (i.e. understand our place in the biosphere and live sustainably so meeting our needs do not put in risk future generations'–, and to the other species living in this planet (i.e. understanding their importance in maintaining the web of life and their right to flourish and live on this planet.

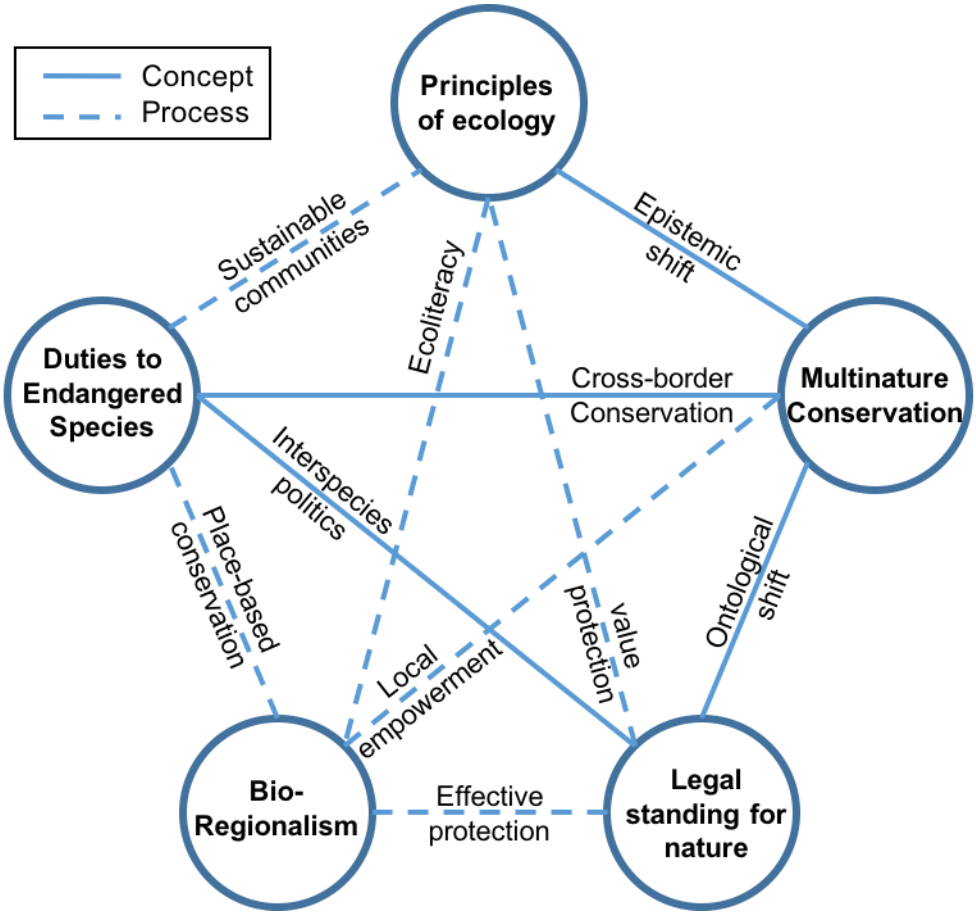


Figure 1. Iterative model for Place-based Multinature Conservation (PMC).

Figure 1 seeks to represent the epistemic basis of PMC. In it, one may find a representation of interconnectedness, as reflecting that complex issues (as ecosystems and species loss) require complex solutions. It is also an iterative process, in which nodes receive feedback constantly from one another. As Naess (2008) would rather to say, it represents more a platform than a catalog of principles, because the latter may be understood as rigid rules, instead of an invitation to understand life's ecological dynamics. At the end of the day,

these proposals for action are on the hands of the communities around the globe to decide and value all different aspects of nature/wildlife as they deem fit, but correctly: following the principles of ecology.

Some links in the PMC scheme (Figure 1) are provided just as an example of all possible kind of outcomes in valuing and conserving nature through this approach. Since it is an iterative, context-dependent approach, it is impossible to predict all different interactions among components nor people's values in the future. However, I will now explain the ideas and concept I put in Figure 1.

- Sustainable communities: When one accepts the principles of ecology and understands the duties humans have to other species, there is space to clearly get the importance of building sustainably, entering the dynamics of ecosystems. Nonetheless, I acknowledge that this idea may also serve as an argument for Ecomodernism efforts since "*other* species" not necessarily means *all* species.
- Place-based conservation: emerges from the relation between duties and Bio-regionalism. It tends to make conservation effective from a geographical point of view, because it focusses the attention not only over species but a common place for stakeholders: we are not only concerned about the state of pandas and elephants, but the little forest or park we used to use as playground during childhood: wildlife is everywhere.
- Effective protection: As we get involved with our territory and its ecology, we also realize the importance of rivers, mountains, wetlands, and species. Through legal standing nature reaches a status that equals its importance with that of people and other legal persons: commitment to a certain territory makes a guardianship approach possible. Nonetheless, the guardianship approach is not infallible, and in some cases and contexts could end up being used for different political aims than conservation and benevolent restoration.
- Ontological shift: it happens when nature enters the legal arena in different levels and territories: humans are not the only possessors of intrinsic value anymore; political decisions must consider nature's interests in decision-making. Besides, wildlife, being part of our daily lives, ´brakes the fences' of protected areas and turns conservation as a matter of, for instance, urban life.

- Epistemic shift: mixing the principles of ecology with the new understanding of nature as a context-dependent social construction we leave behind the naturalistic dream proposed by Lorimer.
- Ecoliteracy: Capra and Luisi describe it as the process of learning and accepting the principles of ecology, and from there onwards develop a new relationship among humans and all the other species. It is one of the most important aspects of my proposal since without this knowledge all other actions weaken.
- Value protection: the link between the principles of ecology and legal standing for nature free nature valuation from market, in principle: we can still commodify and trade goods and services extracted or obtained from nature, but without disrupting ecosystems' functioning and health. This idea of value protection may be seen by radical advocates of the intrinsic value of nature as weak since we would still kill massive amounts of species or intervene in ecosystems for resource extraction, but I think it also would mean a decisive step towards a responsible relation with the rest of nature, within the limits earth's ecology poses on us.
- Cross-border conservation: Our duties to endangered species are not any longer concentrated in maintaining protected areas or natural sanctuaries, wildlife as a ontological shift in conservation brakes the fences and brings conservation to cities and every human settlement. Nonetheless, protected areas must be kept and insured through legal standing.
- Interspecies politics: in Lorimer's words a more-than-human ethics and politics emerge when humans finally understand our responsibilities towards the environment, the *Cosmoscene*. Biodiversity –humans in it– finds a place to flourish and sustain itself.
- Local empowerment: people realize their role in creating and sustaining nature. Conservation is not seen as a task only for professionals. They start to know and understand nature's dynamics in their territories, deepening both their engagement in conservation and the intrinsic value of nature. Nonetheless, in this case empowerment depends deeply on the willingness of people to participate in conservation projects or initiatives, therefore, large governmental efforts will be needed to involve citizens in decision-making.

Conclusions

Human impacts around the world have reached an extent that is, in some cases, impossible take back, but in others there is still space for both benevolent restoration and conservation. This is not to say that the Ecomodernist manifesto[5] won the battle, but to say that most of our previous paradigms should be replaced. Hardin (1968) in his *Tragedy of the Commons* claimed that no technological solution could solve the environmental crisis totally, and that ethical and political actions must be taken in order to make Humanity's prosperity possible (Pierce & VanDe Veer, 1995).

The proposal for nature conservation I present in this chapter is an attempt to picture nature from a refreshed scientific perspective, getting rid of both the naturalistic and Ecomodernist fallacies: (1) nature was never static and (2) technological innovation, though strongly required in the Anthropocene, is insufficient to cope with the effects of our activities and their impacts on the Earth. This proposal is responsible of issues that cannot be postponed anymore: massive extinction is a current problem, quite advanced in its consequences; anthropogenic climate change is real, accelerating the effects of our own decisions concerning the environment and time is our scarcest resource. Back in the 1990s, when I was a child, I would watch the news and see people talking about how the future generation was seen as the one in charge of bringing new ideas and solving all the problems discussed above, that were starting to be analyzed and recognized. I am in that generation, and surprisingly cynicism has no place any more.

So far, my proposal seems idealistic, too much ideas and no concrete actions, but that is not entirely true. Many examples for the alternatives I propose are already taking place around the world in different scales, involving different stakeholders. Chapter 4 provides concrete ways forwards and lists some of the questions this new global scenario, the Anthropocene, poses in the way I interact and value nature.

[5] See http://www.ecomodernism.org/manifesto-english/

Chapter 5: Ways forward, examples of a taking place transition

For PMC to happen, breaking the boundaries of traditional conservation to understand the interconnectedness of all main environmental issues that builds up the global environmental crisis that humans are and will be facing in the next decades. From pure romanticism we must take a decisive step into politics. José Mujica, former Uruguay president made it simple in the Summit on Sustainable Development (Rio +20) in 2012. The biggest issue, he said, is not the environmental crisis, but rather a political one. This, since the environmental crisis is the result of unintended consequences of humans' constructive and productive activities on Earth. Therefore, it is evidence of the world-wide political decisions over the last centuries.

To understand political decisions concerning nature, political ecology (as a new branch of ecological sciences) starts from a central premise (Robbins, 2004, p. 19): "environmental change and ecological conditions are the product of political processes". Thus, it involves the study of *power relations* between actors in specific environment-related decisions, in short, who wins and who loses with any decision (Kull et al., 2015). Political Ecology also depicts environment-related decisions as complex, multi-scale processes, in which a singular decision can have both local and international impacts. Globalization and the internationalization of markets make outsourcing possible. Thus, for instance, explicit or implicit decisions taken in Colombia can trigger environmental impacts in Indonesia.

I decided to start the last chapter with this reminder: political decisions brought us till this point in history, and only political decisions will make the sustainable transition possible. Usually, new approaches challenging tradition are highly criticized because they do not reach the public nor decision-makers, most of the time they have to compete against stable, though wrong, institutions. Even though this could work for my proposal for nature conservation, current trends in economics, law, planning, urbanism and agriculture prove the opposite. This strengthens possibilities for a real change. In the next pages I give examples of how even in highly neoliberal scenarios ecology opens its path and becomes a real and better option.

Re-locating nature and conservation

As mentioned in the previous chapter, isolation is not anymore an option when it comes to nature valuation and conservation purposes. Fencing works only until a certain limit: what it has made possible of being conserved and rescued is now being threatened by climate change, which emerges outside protected areas. Climate change has increased droughts in the Amazon rainforest, and with it wildfires. Therefore, conservation is not

anymore a task of conservationists exclusively, everybody plays a role in restoring the conditions needed to sustain and keep protected areas alive and safe. As I will present in this chapter, daily life practices are deeply interconnected in the way human's decisions shape their relationship with nature, and elaborating those relationships differently is needed to decisively head toward sustainable human communities and to sustain the web of life all over the planet.

Economics: from linear to circular economies

Circular Economy emerges from the Urban Metabolism Theory. During the last decades of the twentieth century the understanding of cities as metabolic systems, which take up resources, transform them into energy, and dispose them as waste started to be generally accepted. The main problem of human settlements was discovered from an ecological perspective. While ecosystem functions work circularly (i.e. one's waste is another one's resources), its waste does not exist except for the amount of heat loss and the consequent increase in entropy. Human settlements work linearly. Their waste finishes in landfills, rivers, oceans, streets, abandoned places and the atmosphere. The Circular Economy proposes changes in the way resources are obtained, products are produced, commercialized, and finally disposed. It attempts to create a zero-waste economy in which impacts on ecosystems decreases through recycling, reusing and redesigning of current and future products. Reducing impacts on ecosystems means saving ecosystems. Treating our waste differently way means to reduce the human impacts over nature too.

In 2016 the Netherlands launched the project *A Circular Economy in the Netherlands by 2050*[6]. Understanding the current global situation and the limits the Earth puts on production, the government of the Netherlands proposes to half the national use of raw material by 2030, and set sustainable sources for raw materials. All this through three principles: (1) smart design and thus fewer resources, (2) conscious use with extending products lives, and (3) more and better reuse with waste as a raw material (Dutch Ministry of Infrastructure and the Environment & Ministry of Economic Affairs, 2016). Following the ecological principles in economics is an opportunity to understand production and consumption in a different way, one that poses ecological functioning in the center and to respect the value of ecosystems. It can be a decisive step towards ecologically friendly human communities in the near future, a means to increase awareness of ecological processes even

[6] More information can be found in www.government.nl/circular-economy

from a market-based perspective. Circular economies are perhaps the most notable effort to link the allocation of resources with the ecological principles.

Law: endowing nature with personhood

Following the ideas of Stone (1974) about giving legal personhood to nature, some examples can be found in the international scene. The case of Te Urewera in New Zealand opens the path towards new understandings in the human-nature legal relationship. The area known as Te Urewera was declared a national park in the middle of the twentieth century and more recently became a Crown land managed by the Department of Conservation. But this situation changed drastically in 2014 when the Parliament of New Zealand declared it as a *Legal Entity.* From that moment onwards, Te Urewera has legal personhood and "all the rights, powers, duties, and liabilities of a legal person" (New Zealand Parliamentary Council, 2014, p. 16). As proposed by Stone (1974) the interests of this new legal entity are managed and secured by a *guardian*, or Board in this concrete case. It also ceased to be vested in the Crown and being a national park. Purposes of the Board are to act on behalf of, and in the name of, Te Urewera; and to provide governance according the act. This example also represents an effort to integrate the mind-set of native communities, namely Maori people. For them, Te Urewera is part of themselves, there is no separation between the land and their lives. The board resides in the Maori community inhabiting in there.

This example is a concrete and decisive way forward in the conservation of nature. It poses a serious alternative to market-based conservation, and it balances the balance in the relationship human-nature with the integration of new legal persons in legal affairs. We here witness a Parliament, a spectrum of political positions, agreeing on the importance of nature out of a utilitarian perspective and even though every country has its own legal mechanisms, the example is easy to be implemented world-wide following the principles Stone proposed decades ago.

Restructuring tax systems: sustaining the transition economically talking

Brown (2009) and Capra & Luisi (2014) gives alternatives to unsustainability in our socio-political-economic context, and thus stabilize the climate. All based in currently available technologies.

> "we need to restructure the tax system by reducing taxes on work and raising them on environmentally destructive activities. This restructuring is known as 'tax shifting' because it would be revenue neutral for the government. Taxes would be added to existing products, forms of energy, services, and materials, so

that their prices would better reflect their true costs, while equal amounts would be subtracted from income and payroll taxes" (Capra & Luisi, 2014, p. 419).

This shift in taxation would serve two different purposes: (1) guide people's behavior toward environmentally friendly practices and consumption, and; (2) serve as funding for science, innovation and sustainable infrastructure (Brown, 2008). I would also acknowledge the cognitive effect every time this tools reshape the human-nature relationship from a governmental perspective, also giving new responsibilities to State-Nations in the transition to sustainable human communities. Finally, this taxation shift must be understood as means to assume, as Holmes Rolston III put it: our duties to other species and the ecosystems they belong to, avoiding and healing ecological disruption. Through the active participation and proactivity of governments' economic institutions.

Greening the city: Urban Ecosystem Services and sustainable cities

The ES concept gives us the opportunity to increase the capacities of cities: they can become ES providers. That is the idea behind Urban Ecosystem Services (UES), to see urban settlement as an opportunity to solve part of the problems they have created in the last centuries. Gómez-Baggethun et al. (2015) claim that although urbanized areas cover just a little portion of Earth's surface (no more than 3%), they are responsible of vast of the impacts humans pose on nature. They support the idea of *ecology of cities*, as an approach to picture the total dependence of cities on their surroundings, and to understand cities as ecosystems.

Through this approach we can value urban infrastructure –for instance, companies, houses, neighborhoods, etc.– from the ecosystem services they provide as input. Gómez-Baggethun et al. (2015) give a list of examples. Provisioning services as urban food production in peri-urban areas, rooftops, backyards and community gardens. Regulating services as: (1) urban temperature regulation through environmental infrastructure, as parks and green roofs. (2) runoff mitigation, investing in environmental infrastructure decreases flood risk and its negative impacts in urban areas. Cultural services, "exposure to nature and green space provide multiple opportunities for cognitive development which increases the potential for stewardship of the environment and for a stronger recognition of ecosystem services" (Anderson et al., 2013, p. 185). In short, the greener the infrastructure the higher its economic value and the higher its positive environmental impact. Greening the cities can be seen as an example of applied Bio-regionalism. This, because it calls to action at the local scale: no matter where one lives, there are things to green. I have to acknowledge that applying the UES concept will not stop the global environmental crisis per se, but serves to

connect people to ecological processes and understand their importance in a context in which three-quarters of the global population are expected to live in urban areas by 2050.

Conclusions

Alternatives are possible. All these approaches are already taking place in decision-making processes all over the world. Business opportunities increase with any environmental innovation. UES is a clear example of how traditional economical thinking can also be beneficial in the construction of new societies living accordingly to the principles of ecology, at the same time that the value of nature is correctly captured. The call is, first, to all businessmen and decision-makers around the world: understanding the importance of nature does not need to be an attempt to restrict private market initiatives, but a change in processes and production must occur. Actually, circular economies open the path to wide variety of new businesses. Then, the call reaches the public: people must support initiatives attempting to solve the environmental crisis, seriously. There is no time for incremental measures, people need deep changes in their social relations and the relations between them and the rest of the biosphere. This is a call to think the unthinkable as Stone (1974) would say.

The central message behind my proposal is to see a deep sustainable shift as both necessary and possible. It is to re-understand our place within earth's biodiversity, to accept that there are multiple results of our current behavior that cannot be tolerated anymore. Money cannot buy or serve as proxy for valuing life all alone, and if it does it is as a result of power relations in which anthropocentric supremacy is underpinned by the fallacies discussed throughout this thesis. These fallacies are not affecting only ecosystems outside cities' borders, but the survival of a massive percentage of the biodiversity and ours as species. Our actions should work in harmony with nature, and not against it. This means to follow nature's principles, the principles of ecology in the development of human societies around the world. The reason to follow these principles is that it is rational: in the context of the Anthropocene to continue business as usual is to condemn future generations of both human and non-human species to hard and even impossible living conditions: there are no businesses nor wealth in a depleted world. The science of ecology has shown us a way forward, but we still prefer to look at each other and act as though nothing has happened.

Benevolent restoration must be understood as the only reasonable and acceptable way of restoration; we cannot keep altering ecosystems under the promise of re-creation after disruption. Allowing this to happen is how we got to this point in history, where after 200 years of prosperity and wealth we have to accept and witness the effects of "apocalyptic"

deadlines, closer every day. The needed shift in our relationship with other humans and nature does not need to be tragic, but to make it happen a deep and clear attempt to solve the situation must be taken. Thus, ES, for instance, must not be taken as a guide to re-understand our connection with the rest of nature nor as a dominant approach in conservation since it is just an incremental approach and it is underpinned by critical uncertainties. It changes some aspects of the problem to keep business as usual. It is important to keep clear that my opinion towards ES is not whether or not we should use the ES approach, but when and how to use it. Actually, even though it was not developed for conservation purposes, it has raised awareness among decision-makers, helping in the understanding of nature as something that is worth to save. But, in conservation it is insufficient to reflect the complexity of ecosystems, our relation to nature, and all the different ways by which people value nature.

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