Ecosystem services as technology of globalization: On articulating values in urban nature

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ABSTRACT

The paper demonstrates how ecosystem services can be viewed and studied as a social practice of value articulation. With this follows that when ecosystem services appear as objects of calculated value in decision-making they are already tainted by the social and cannot be viewed as merely reflecting an objective biophysical reality. Using urban case studies of place-based struggles in Stockholm and Cape Town, we demonstrate how values are relationally constructed through social practice. The same analysis is applied on ecosystem services. Of special interest is the TEEB Manual that uses a consultancy report on the economic evaluation of Cape Town's 'natural assets' to describe a step-by-step method to catalog, quantify and price certain aspects of urban nature. The Manual strives to turn the ecosystem services approach into a transportable method, capable of objectively measuring the values of urban nature everywhere, in all cities in the world. With its gesture of being universal and objective, the article suggests that the ecosystem services approach is a technology of globalization that de-historicizes and de-ecologizes debates on urbanized ecologies, effectively silencing other—and often marginalized—ways of knowing and valuing. The paper inscribes ecosystem services as social practice, as part of historical process, and as inherently political. A call is made for critical ethnographies of how ecosystem services and urban sustainability indicators are put into use to change local decision-making while manufacturing global expertise.

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"You cannot manage what you do not measure."

The Economics of Ecosystems and Biodiversity (TEEB), http://www.teebweb.org/, January 15, 2012.

"Everything is politics."

Thomas Mann, The Magic Mountain, 1924.

1. Introduction

Rather than as a signifier of objective value, when ecosystem services are studied as one of several social practices of value articulation, they are opened towards debate and contestation on how to value nature and ecological complexity. This article focuses on such practices and uses the urban landscape as the quintessential place for such elaboration. Indeed, as cities continue to grow in size and numbers, increasing intellectual energies have been mobilized to develop analytical and policy tools that can be used to sensitize urban decision-making to complex biophysical processes. Alongside parks, greenbelts, urban gardens and areas of food production, with a history going back decades and

in some cases centuries (Barthel et al., 2010), there have in recent years been an upsurge of initiatives such as green dispersal corridors (Tannier et al., 2012), urban nature reserves (Borgström, 2009), and urban biospheres (Alfsen-Norodom, 2004), building explicitly on ecological knowledge. In this plethora of urban nature protection initiatives there has also been a growing interest in economic approaches, prominently that centered on ecosystem services, below ESS. ESS has been described as the biophysical processes that benefit society and human well-being (Daily, 1997; MA, 2005) and there is considerable expectation that an ESS approach[1] to the economics and management of

[1] We will use the expression 'ESS approach' when we refer to the integrated project of using the idea and concept of ecosystem services for a designated application. This means that we include the underlying scientific thinking, largely derived from ecology and economics (and ecological economics), related concepts, methodologies, principles as well as texts, documents, websites which codify these ideas and principles, the institutions and organizations set up to promote and implement them, including research institutions, designated educational programs, emerging consultancies, and, notably, the practices of researching, using, and applying ESS and the practitioners that are involved in this by now quite major undertaking. This admittedly wide definition has been chosen in order to include both the ideas—in the case of ESS we might even talk of an ideology, a certain belief-system to which we will return below—the institutions, and the practitioners. This is in some distinction from previous analyses which has talked about the ESS 'framework' (Norgaard, 2010) which is similar but in our view signifies a somewhat more static, readymade structure of institutions and principles. Our take on this is that the ESS approach is dynamic and plastic, evolves quickly and will continue to do so. Evidently our concept, the ESS approach, subsumes under it 'ecosystem goods and services' (MA, 2005) and methodologies like Total Economic Value (TEV) and Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST; Daily et al., 2009) as methods for economic evaluation of ecosystems.

space and resources will be able to significantly enhance the potential for nature protection and sustainability in cities and urban regions (Bolund and Hunhammar, 1999; Elmqvist and Maltby, 2010; Ring et al., 2010; TEEB, 2010).

However, there are also indications that this might not be the case and the literature that expresses concern with the ESS approach has been growing considerably over the last few years, not least in this journal (see below). We are at present in a situation when it has become increasingly urgent, therefore, to analyze the ESS approach. How can we understand its appeal in discussions of urban green planning and how shall we regard its potential function in the ongoing quest for urban sustainability? This paper aims to contribute to a timely and critical reflection upon the concept of ecosystem services and the academic and political project in which it has been embedded.

ESS has made a rapid career as a concept and in urban sustainability discourse. It started as a heuristic metaphor, alluding to a difficulty to operationalize and elusive, still essentially economic value. However, since the late 1990s, there has been a gradual turn towards a framework for defining 'value of nature', with quantification and pricing as a standard practice of what became increasingly referred to as ecosystem services (early publications are Costanza et al., 1997; Jansson and Nohrstedt, 2001; and now a dedicated journal exist called Ecosystem Services). Why the concept became ecosystem services is not entirely clear—'nature's services' was used still in the late 1990s (Daily, 1997)—although it certainly reflected the hegemonic role of ecologists, and of environmental and ecological economics, in the ESS approach, despite the fact that the range of services go far beyond ecological expertise, for example productive soils or clean water (clearly the expertise of soil scientists, agronomists, hydrologists, biogeochemical experts, etcetera), not to speak of 'cultural ecosystem services' including aesthetic appreciation and spiritual experience.

This transition from metaphor to operationalized and institutionalized framework, which has been presented in the ESS approach as a science-based development, is crucial for the understanding of ESS in current urban decision-making. One of the key points in this article is to demonstrate that when ecosystem services appear as objects of calculated value—guided by the ambition to attain influence in decision-making—they cannot be viewed as reflecting an objective biophysical reality, but should be understood and researched as a social practice to articulate value. Indeed, we aim to show how ecosystem services are socially and culturally embedded, and how they can be researched as such. This is done in three steps. After having reviewed the growth and critique of ESS, we first demonstrate how the ESS approach can be viewed as one among several ways to articulate value in urban environments. We here position the ESS approach against a backdrop of literature on urban contestations over green space. Through case studies of place-based struggles we describe other practices of value articulation, animated by local, or in-place ways of knowing and valuing. We then apply the same analysis on the ESS approach, showing how this type of value articulation is distinct through its gesture of being quantitative, universal, objective, and science-based. In a third step, we strive to account for the emergence and function of the ESS approach in contemporary discourse on urban sustainability by interpreting the ESS approach within recent processes of globalization, drawing in particular on the literature on new public management (NPM). Most commentators would have it that the increasing use of ESS is due to an ecological crisis and a perceived need to handle complexity. We argue that an often overshadowed reason lies in that the ESS approach simply fits well with a different type of change, namely a particular transformation of governing over the last thirty years towards standardizing management and accountability. This transformation has matured within other fields of governing (e.g. water billing, medical care, and even library services) and now finds a partner in the ESS approach to include, within its realm, the governing of ecological complexity. Thus, the paper's main contribution lies in showing how ESS can be viewed and researched as a relational practice to articulate value, and how the ESS approach is part of globalization, embedded in a wider historical and political process of change in governing. In conclusion, we suggest certain effects that the ESS approach brings, and how those could be researched. Throughout we will use some conceptual tools derived from Science and Technology Studies literature, and its use of actor-network theory (Latour, 2005; Law, 2009; Sismondo, 2004).

2. Emergence and Growth of ESS

Although the idea of economically beneficial services in nature is in itself more than a century old, used frequently among the first generation of nature conservationists who quickly learned that money was a convincing argument (Barrow and Mark, 2009), ESS (or nature's services) as a concept was coined only in the 1970s (Westman, 1977). It generated emerging interest in the 1980s and saw a rapid increase in usage in the following decades (Norgaard, in press). Since the middle of the 1990s there has been an exponential use of the concept in wide strands of ecological, resilience, landscape, and planning literatures, and since the late 1990s increasingly also in urban research (Bolund and Hunhammar, 1999) (Fig. 1).[2]

Early attempts to operationalize the ESS concept were carried out by prominent ecological economists, aided by ecologists, and were focused on estimating through a kind of thought experiments or simulations what the economic value of a given ecosystem service might be, with the manifest aim to solidify otherwise elusive or contested values. The ambition was normative; through the language of economics, nature's values should become less contested, better cared for and the life-sustaining properties of Earth maintained. These thought experiments were, needless to say, both vague and conditioned on a number of unknown factors such as future supply and demand, regional scales, available technologies, etcetera. They were also provided on any given scale, from the local, which were the most common, to the global, where nothing less than the 'economic value' of the entire bio-productive capacity of the world was heroically (and controversially; see e.g. Sagoff, 1997; Nature, 1998; Bockstael et al., 2000; WSTB, 2004) calculated (to be a minimum of 33 and up to 65 trillion US dollars; Costanza et al., 1997). The normative motivations were explicitly stated already in the introductory chapter of Gretchen Daily's pioneering collection Nature's Services (Daily, 1997) and has become a core message in the now formalized attempts to mainstream ESS as a principal means to safeguard preservation of nature and human well-being through high-powered initiatives like The Millennium Ecosystem Assessment, sponsored by United Nations (MA, 2005), The Natural Capital Project, sponsored by Stanford University, The Nature Conservancy and the World Wildlife Fund (Daily et al., 2009), and The Economics of Ecosystems and Biodiversity initiative (TEEB), hosted by the United Nations Environment Programme (UNEP; Ring et al., 2010)[3]. This has included

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[2] For search string (a) on 'ecosystem services' the number of articles found was 3 820 of which top scoring institutions were the Chinese Academy of Science (with 102 articles), Stanford University (100), Wageningen University (99), and Stockholm University (90). Most articles were published in Ecological Economics (231), followed by Shengtai Xuebao Acta Ecologica (112). For search string (b) on 'urban ecosystem services', 449 articles were found with top scoring institutions being Chinese Academy of Science (42; including Research Centre for Eco-Environmental Science), Beijing Normal University (18), and Stockholm University (17), with most articles published in Shengtai Xuebao Acta Ecologica (37) and Landscape and Urban Planning (22). Of all records found, only those recognized as peer-reviewed articles and reviews were used, leaving out for instance conference proceedings.

[3] The aim to mainstream the ESS approach is stated in many documents. For instance, as stated boldly in the multi-authored article in Frontiers in Ecology, lead by ecologist Gretchen Daily and ecological economist Stephen Polasky: "The goal of the Natural Capital Project—a partnership between Stanford University, The Nature Conservancy, and World Wildlife Fund (www.naturalcapitalproject.org)—is to help integrate ecosystem services into everyday decision making around the world. This requires turning the valuation of ecosystem services into effective policy and finance mechanisms—a problem that, as yet, no one has solved on a large scale." (Daily et al., 2009: 21). The project is "developing a software system for quantifying ecosystem services across land- and seascapes, called inVEST" that "uses a flexible, modular, and 'tiered' modeling approach to ensure that the models are useful world wide" (p. 22).
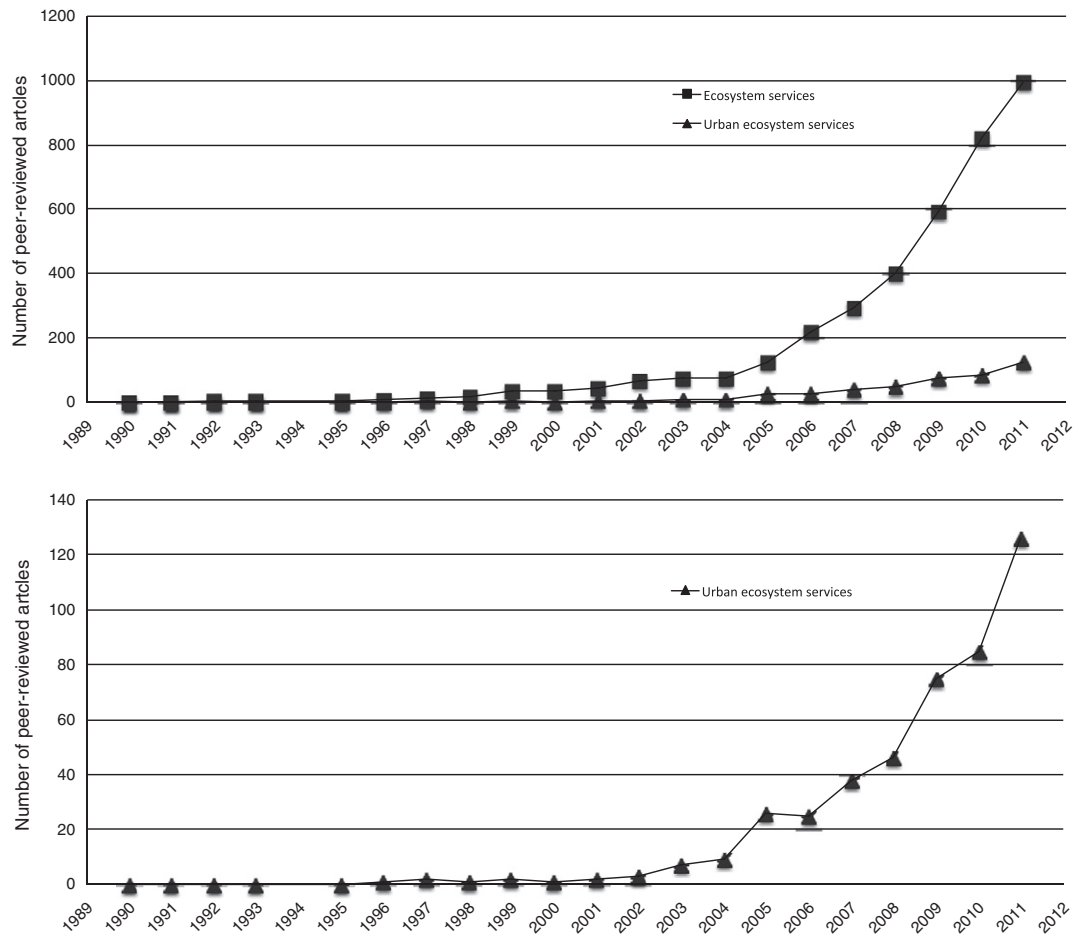
Fig. 1. The rapid growth of ecosystem services in academic literature. These figures indicate an increasing trend to use the concepts 'ecosystem services' and 'urban ecosystem services'. Articles were found by searching all published peer-reviewed publications in the SCOPUS SciVerse database up to 2011. The following search strings were used to find matches in all titles, abstracts and keywords: (a) "ecosystem services"; and (b) "ecosystem services" and ("urban" or "city"), including singular and plural of these words. More descriptive data in footnote 2.

urban areas with the publication of a TEEB Manual for Cities—instigated by ICLEI being a world-spanning organization gathering 1220 member cities—that declares that the use of ESS will help cities "to make some very positive changes, saving on municipal costs, boosting local economies, enhancing quality of life and securing livelihoods" (TEEB, 2011: 1).

3. Emerging Critique of ESS

The substantial institutional backing has not prevented critique of ESS, which can be grouped into a few major categories. One is conceptual and has to do with the skewed and biased view of the concept 'service'. The ESS framework is selective; it does not acknowledge 'disservices' from nature. Wetlands do not only mitigate flooding, they also attract mosquitoes giving rise to illness and nuisance. A second category of critique is about the lack of concern with equity, social diversity, and distribution. The ESS approach speaks of services as if they can be valued uniformly, from an imaginative non-place devoid of history and politics, whereas in reality the relative value of ESS are clearly different depending on location, income, livelihood, gender, culture, and many other social and cultural factors. A third category of critique concerns the difficulties of measurability and comparability of 'services'. This is particularly apparent in what has been termed 'cultural ecosystem services', including aesthetic, spiritual, educational, and recreational values (MA, 2005: vi). It becomes a real problem of commensurability to compare for instance the quantity of gaseous air pollution that urban trees can remove to improve air quality and the symbolic dimensions of (the same) trees to certain cultural or religious groups. A fourth type of

critique is to do with the presentist definition of services. The value in economic terms of a range of ESS must vary over time. If value of green space is calculated with the help of the tourist and film industry's income (as in (TEEB, 2011)), and these industries have a downturn, by implication the value of the ecosystem services will drop as well. In a growing economy the value of most things, including ESS, will increase with time but the rates of change in value of the different services cannot be predicted. Then, how should they rightly be valued today?

These are only a few out of a larger number of critical points that have been raised against ESS over recent years. It has, for example been noted that if there are few ESS, or if they are lowly valued, this could function as a disincentive for nature protection. It has also been argued that an ESS framework risks "blindfolding" society of the complexity that make up the intricate relations between animals, plants, chemical compounds and humans, as other (scientific) ways of knowing complexity—for instance evolutionary theory or population theory— cannot be coded into a "stock-flow" model of nature (Norgaard, 2010). Similarly, if the complex relations providing for benefits are hidden away for citizens, consumers and society, some worry that an ESS approach, especially if monetized, will lead to "commodity fetishism" (Kosoy and Corbera, 2010), which could additionally privilege single or a few ESS while other dimensions of nature will be unduly disregarded. A more comprehensive critique argues that instead of enhancing nature's values, the ESS approach will degrade nature to the mundane and crass reality of demand and supply consumerism (Robertson, 2000, 2004, 2006), effectively becoming a vehicle to expand capitalism into ecosystems (Castree, 2008a,b). An underlying theme of

many, if not all, of these strands of critique is the concern with the universalizing pretentions of the ESS approach, the assumed non-place position from which a set of standardized methodologies can be constructed and used for deducing 'true' values of ecosystems for any place, or any city, anywhere, at any time.

Against the background of the profound critique, it seems necessary to ask sincerely how we should understand ESS as a contemporary phenomenon, expanding rapidly in the scientific literature and, increasingly, making its way into science advice and real world policy for urban regions around the world. Our way of doing this is to regard the ESS approach as one of many processes through which value in nature has been established. These can be thought of as processes of social articulation of value (Ernstson and Sörlin, 2009; Sörlin, 1998, 1999), emphasizing that values emerge and vary over time. In this perspective values of nature, or ecosystems, are not, indeed cannot be, absolute or given; rather, values are attributed to natural phenomena over time and through historically traceable processes (Barthes, 1957 [1972]; Cronon, 1995; Sörlin and Warde, 2009). Articulation is an empirical body of practices that is played out in e.g. science, media, policy, and through the action of identifiable social actors that make use of technologies and artifacts to establish, or articulate values. This process is indeed social insofar as all processes through which value is established are social which also means that they are empirically observable through the study of society. Research on social processes of value articulation emerged in the 1990s as a way to deepen the understanding of the formation of national parks, reserves and other forms of designated areal nature protection (Pyne, 1998). It was founded on a long standing geographical and historical literature (Fèbvre, 1922; Schama, 1995) and the literature on the role of place and space in social memory (Connerton, 1989; Halbwachs, 1992 [1952]; Nora, 1989), and important contributions came from practical and theoretical work on landscape restoration and constructed landscapes (Baldwin et al., 1993) and from insights on the pluralism of resource management practices worldwide (Ostrom, 1990). The research, carried out across the humanities, social sciences, and the environmental field sciences, resulted in growing insights of the historically negotiated, constructed and contingent value of nature and its properties, which is necessary for understanding the highly varying attitudes to natural and environmental phenomena in different societies in different time periods.

Essentially, we regard the ESS approach both in general and as it has been presented for cities as one out of many practices of social articulation of value in nature and we attempt to understand it as such. This is important to emphasize since it is assumed by its practitioners and proponents, that values as determined through the ESS approach are particularly important and useful since they are derived through a putatively scientific method and will therefore be particularly useful in the governance of cities. To pursue our analysis we will understand the ESS approach itself as an empirical social phenomenon with actors, interests, ambitions, tools and technologies that has an emergence in time and with a historical trajectory and a possible future.

4. Understanding Value Through Practices of Articulation: Urban Cases of Nature Protection

A defining character of cities lies in the contested character of how to use limited space. The allocation and use of space—for anything from transport and sewage systems to housing, offices, and urban parks—turn space itself into a commodity, which different actors compete to use (Harvey, 1996; Lefebvre, 1991 [1974]). The social articulation of nature's values has been an emerging and integrated part of this ongoing competition for space and also for the properties and qualities of the urban. There is now a growing literature that can demonstrate that natural—or to use anachronistic concepts, green, or ecosystemic—properties of the urban fabric were significant in the formation of cities for a very long time, possibly since cities

started to occur (Sinclair et al., 2010), and are now a rapidly expanding feature of urban planning (e.g. Beatley, 2011; Mostafavi and Dohert, 2010; Newman et al., 2009). In his historical analysis of the San Francisco Bay Area from 1890 to the present, Walker (2007) accounts for how the Bay Area's high ratio of urban green space for farming, recreation, and nature preservation resulted from an active civil society that contested short-sighted economic land-use. Ever changing constellations of social groups and interests, including Sierra Club naturalists, suburban housewives, Berkeley architecture students, grassroots' movements, and the sprout of urban NGOs and think tanks in the late 20th century, all contributed to enhancing the perception of the Bay Area's nature as valuable.

What this growing literature on urban regions across the world demonstrates very clearly is that the values of urban nature have not just been out there, waiting to be discovered, or disappeared with urban growth, but that they have been relationally constructed through practices of value articulation (Ernstson and Sörlin, 2009; Sörlin, 1998). The materiality of the city, including the ecological functions constituted through it, can thus be viewed as historically constituted by a series of place-based social negotiations and contestations. To get a closer view of how such relationally constructed values emerge and stabilize, we present two case studies from Stockholm and Cape Town before we bring the same tools of analysis to bear on the EES approach itself.

4.1. The National Urban Park in Stockholm

The protection of the Stockholm National Urban Park provides a thoroughly researched empirical case (Barthel et al., 2005; Borgström et al., 2006; Ernstson et al., 2010; Löfvenhaft et al., 2002; Lundberg et al., 2008). A series of infrastructure and housing projects were proposed in Stockholm in the late 1980s, prompting a set of activists to mobilize civic organizations to resist these projects. By 1995 a 27 km^2 park landscape had been protected as a National Urban Park. A key factor behind this success, apart from an efficient collaborative organizational network structure (Ernstson, 2011; Ernstson et al., 2008), was the construction of a protective narrative that helped to explain and legitimize the need for protection, and to build wider support within state institutions. In Ernstson and Sörlin (2009), we viewed this narrative as not only textual, verbal, and visual, but also as material and spatial. Our analysis demonstrated that as activists gathered, selected and organized certain artifacts that spoke about the values of the park landscape, they came to stabilize (Latour, 1988) a new frame of thinking by which the park landscape could be viewed, explained and valued.

The value articulation unfolded in an innovative and unpredictable way and involved key elements of collaboration and collective learning. While a civic ornithological association made a bird survey, university scholars and civil servants were mobilized to perform complementary habitat assessments, which in turn produced maps and scientific reports that activists could circulate to strengthen the notion that various park areas were ecologically connected. This in turn demonstrated that motorways, and a hotel conference center would disturb or destroy local habitats for animals and hinder the movement of species across the landscape. Both ecological and cultural properties of the park could be combined to underpin the argument. History was essential. Maps of an English park from the 18th century were found in the National Archives showing how marked 'sight lines' connected green areas on both sides of a lake, and consequently that new buildings would disturb intentions of the original landscape design. The old oak tree stands, for instance, came to play a part in both these realms of knowing; while contemporary biologists had produced reports that showed that they were home to many endangered species, the oak trees had also been preserved by the state-centered historical management of forests and parks since at least 200 years, with full royal ownership since 1540.

Although early activists did not have any clear plan to start with, the two broad scientific dimensions of conservation discourse, biology and cultural history, were increasingly brought into coherence under what became referred to as "The Ecopark" (Sw.: Ekoparken). A narrative, emerging verbally and materially out of a relational practice of linking different artifacts, spaces and organizations, was taken into social arenas created by the activists—exhibitions, debate forums, op-ed articles, and Internet pages—or retold by journalists in newspapers, and forming part of parliamentary bills and debates. This Ecopark Narrative became a standardized part of speeches and small-talk, reaching new audiences and mobilizing and uniting the more than 60 clubs and associations—from NGOs to outdoors-, riding, and boating clubs—that used the park on a daily basis. Together, this integrated multi-layered practice of value articulation created a solid identity for what had previously been viewed as separate and not terribly important park areas. In fact, The Ecopark came out as a single park, with its distinct holistic values, and in less than ten years the park went from insignificance to a parliamentary decision on the highest level of protection in the country.

4.2. The Princess Vlei in Cape town[4]

A civic-led ecological rehabilitation at the Princess Vlei in Cape Town provides another case of value articulation in an urban wetland and green open space area (vlei means wetland). In August 2008 the project called "The Dressing of the Princess" started as an extension of a civic-led ecological rehabilitation project among residents at close by Bottom Road (Ernstson, 2012). Soon after, an old plan to build a shopping center at the Vlei resurfaced. While Stockholm National Urban Park bordered highly affluent areas and could draw upon a royal past and scientific reports to articulate values, Princess Vlei was considered as having the lowest class of "wetland ecological importance" in the Cape Town Biodiversity Map (Laros, 2007, see Appendix C), and also "unsafe" with stories of murders and criminal activities in the local press. However, in similarity to Stockholm, it was the coming together of various actor groups and the interweaving of different stories—about biological rehabilitation, slave legends, and memories of Apartheid-era oppression—that proved instrumental for the relational construction of value at Princess Vlei.

First and foremost, and following lessons learnt at Bottom Road, the project grew around the planting of fynbos species, an endemic plant community to the Western Cape region. While Cape Town is heavily marked by Apartheid-era segregation, the city is also a world-acclaimed location for extreme plant diversity. This has gathered enormous resources in state organizations like the Working for Water/Wetland (Turpie et al., 2008). In collaboration with local and national authorities, the project Dressing of the Princess managed to access machines and low-paid workers for landscaping, removing of "alien" species, and planting indigenous fynbos species, and also involve school classes to "adopt-a-plot". The practice aimed to articulate the Princess Vlei as a suitable space for biological rehabilitation; that fynbos could grow and be protected also at so called non-protected and degraded sites in historically marginalized areas of Cape Town (Ernstson, 2012).

Just as in the Stockholm case, culture, history and narrative proved to be of crucial importance. An old myth about the aboriginal Khoi people started to circulate, arguably told by slaves since the arrival of the Dutch to the Cape in 1652. Among those most active in the project, and who referred to themselves as being Cape Coloureds (some claiming Khoi descent), held that the story had always been around. The legend tells of how European sailors had raped and killed a "Khoi Princess" over 500 years ago up in the Elephant's Eye Cave, and that her tears had flowed down the mountain to fill up the Princess Vlei.[5] Through circulating this legend—soon to be taken up in both local and national press (Groenewald, 2009; Kotze, 2011; Pitt and Boull, 2009)—the growing fynbos, and the project's name, the Dressing of the Princess, received a layered meaning with emotive powers to mobilize people and organizations far beyond Grassy Park. Indeed, protest lists in 2009 gathered 2200 signatures, and an objection letter day in 2010 had up to 24 different postal addresses, most from areas that during Apartheid was classified for "Coloureds", but also from previously "White" classified areas.

The practice of arranging objection letter days at the Vlei worked furthermore as a vehicle for articulating the significance of Princess Vlei. Visitors expressed in writing how Princess Vlei was a cherished recreational place during Apartheid for especially Cape Coloureds; one reason for this being that most coastal beaches had been classified for "Whites only", turning the shore of the Vlei into a venue for barbeques and celebrations among primarily the Cape Coloured community. With the objection letters and intensifying resistance, a wider scale of the articulation process was in the making, and after two years, a partnership of civic organizations had been consolidated. The result was evident in November 2011 when a City committee on spatial planning, which three years earlier had arrived at supporting the building of the shopping center, now made a U-turn, urging the City not to support the development. In their public report (Spelum, 2011a: 37–39,b), which was referenced in the press and on civic associations' websites, many of the arguments were those that had been relationally stabilized over time, in and through Princess Vlei, its plants, and its supporters. Khoi heritage had entered their reasoning, alongside the possibility to ecologically rehabilitate fynbos and wetland ecological functions.[6]

5. The ESS Approach — The Globalization of Urban Ecosystems

What the cases above demonstrate, with admittedly almost stylized clarity, is that 'nature's values' is a socially defined category.[7] We can see, almost step by step, how they emerge and become realized in relational processes and require social articulation to become perceived and stabilized, which in turn impacts on how they are treated and acknowledged in procedural decision-making, or indeed moves them from having, as it were, no value at all to become part thereof. The role of knowledge is crucial in both cases, both local knowledge and expert knowledge from scholars, scientists, architects, planners, although the articulation also involves artists, designers, policy makers, and the media. The formation of the San Francisco Bay Area's rich tapestry of green urban space with its acclaimed values testifies to similar processes (Walker, 2007). These are recent case studies from only three, albeit major urban regions, but the urban studies literature

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[4] The methodology for this case study is described in Ernstson (2012) and is based on extensive participatory observations in Cape Town between 2008 and 2011, following the logic of ethnographic and historical work as described in actor-network theory, ANT (see Latour, 2005: 133–135).

[5] In the fieldwork for this case study, the first author recorded variations of this legend. A written account holds for instance that the Princess was never killed, but "abducted" and taken on a ship and that a rain, which fell shortly after at the nearby Little Princess Vlei, was interpreted as being the tears of the abducted Princess (Burman, 1962). Others have claimed that the Khoi never had princesses at all. What remains though, is a strong and emotive legend, which has existed for a long time and that now has worked to mobilize civic associations and media.

[6] In April 2012 the Western Cape Province decided to override the decision taken by the City of Cape Town and allow the building of the shopping center. This intensified resistance into the formation of the Princess Vlei Forum, gathering also faith based organizations, small business holders, hip hop artists and designers. Civic associations have responded by developing a 'Peoples Plan for Princess Vlei', and a court case is being prepared in wait of a final decision.

[7] As shown by our analysis of social articulation in these cases, we refer to the social in the Latourian or ANT sense, as also consisting of things, artifacts, and nonhumans that participate with humans in producing, or making possible 'social' processes (e.g. Latour, 2005). This re-assembling of the social is also referred to as sociomateriality, socionature, hybrids, or cyborgs (Castree and Braun, 2001; Swyngedouw, 1996). Indeed, Ernstson (2013) refers to ecosystem services as contested hybrids to emphasize that for ecosystem services to exist in decision-making, or in the public arena, it is required a great deal of work to negotiate or stabilize relations between humans, things and biophysical processes. Certain values will be articulated through these performative hybrids, other values will not. All forms of value articulation can be analyzed as hybrids, using ANT.

contains similar examples that can be analyzed with the same conceptual and analytical instruments that we have used here (other examples, see e.g. Diani, 1995; Mitchell, 1995).

At first glance the ESS approach, with its standardized methods and science-imbued language, will seem totally different from these complex, on the ground, social processes of articulation that are socially pluralistic but also interest driven and purpose oriented. To begin with, social processes and collective action do not figure in the self-understanding of the ESS approach. A review of the urban ESS literature demonstrates, on the contrary, that these other, clearly important forms of value articulation and defense of urban nature play little if any role in ESS thinking. There is hardly any mention of alternative ways of protecting or regarding nature, neither in TEEB's manifesto-like article from 2010 (Ring et al., 2010), nor in the TEEB Manual for Cities (TEEB, 2011). The Natural Capital Project (Daily et al., 2009: 21–22) states firmly "ecosystem services must be explicitly and systematically integrated into decision making… Without these advances, the value of nature will remain little more than an interesting idea, represented in scattered, local, and idiosyncratic efforts." Ring et al. (2010: 1) write: "A major reason for the decline of ecosystem services is that their *true* values are not taken into consideration in economic decision making" (our italics). This is reiterated in the TEEB Manual for Cities, which talks of 'stakeholders' and 'decision-makers' and how these should all be made more aware of the true values of ecosystems, using quantification and ultimately money as the fundamental unit of translation of complex values into a single currency, in terms of: 'cost benefit analysis' and 'monetized benefits', all translated into a 'single matrix' (TEEB, 2011: 26). What these 'stakeholders' already do and did in the past to defend and articulate the value of urban nature is, in reality, nullified. The relative value or merit of proceeding along other lines than those prescribed in the TEEB Manual for Cities is not considered, which casts doubt on its usefulness; how could it be proven best practice, which is the claim it makes, if alternative value articulation is not evaluated?

The self-privileging of the ESS approach warrants scrutiny. When examined in sharp detail, it too comes across as no less interest driven and purpose oriented than actors in other social processes. In the following, we shall attempt to show that the ESS approach in its universalizing language and methodology belongs in a wider family of phenomena that have emerged over the last few decades and that are characterized by concepts such as globalization, mainstreaming and 'New Public Management'. This should come as no surprise since a unifying language, using economics and monetization, are key features of these and it would seem odd if one did not find similar globalizing tendencies in nature preservation as one has seen in other policy areas. Yet, so far, very little research has been done on understanding the economic valuation of ecosystems as part of globalization.

5.1. The Ecosystem Services Approach in Practice

The growing literature on ESS (Fig. 1) can be used to characterize how the ESS approach is also a social practice of value articulation. Here we pick three studies, chosen as stylized but representative versions of the whole genre, and because they aim to establish values in Stockholm and Cape Town. These practices in many ways resemble scientific practices, although they depart from conventional science in the essential sense that they are used to establish value.

Working at Stockholm University, systems ecologists Jansson and Nohrstedt (2001) quantified the value of how trees in Stockholm County—mainly Norway spruce and Scots pine—accumulate carbon emissions from traffic and other activities by "the county population". They first extracted data from the Swedish Statistical Yearbook of Forestry 1999, which had recorded forest growth within Stockholm County from 1993 to 1997. By referencing forest scientists, they used a factor to multiply the Yearbook-number to attain "carbon accumulation". Similar arithmetic was repeated for the county's wetlands, lakes and forest soil. They then used statistics from the Stockholm municipality to estimate total "anthropogenic CO_2 emissions" in the county, including emissions from traffic. Thus, in pulling together Yearbook data, previous forest science studies, and basic arithmetic, they concluded—or articulated—that the "Stockholm County ecosystems can potentially accumulate about 41% of the CO_2 generated by traffic [within the county]", of which trees accumulate 31% (Jansson and Nohrstedt, 2001: 361).

Similarly, Hougner et al. (2006), located at the Beijer Institute of Ecological Economics in Stockholm, assembled bird count data, Swedish labor salaries, and expert-opinions to calculate the monetary value of how Eurasian jaybirds support the regrowth of oak trees in the Stockholm National Urban Park. Citing scientific papers, they make the case that jays, in hiding their food for later, dig down between 4500 and 11,000 acorns per year. However, some 63% are never consumed, standing a fifty–fifty chance, according to a local forester, to sprout and grow. Using a "replacement cost" method, and based on one biologist's count that there are 84 jays in the park, they make a thought experiment—to substitute the "seed dispersal service" of the jays, with salaried humans digging down acorns. They estimate that the human labor costs would be 1.5 million SEK (USD 210,000) over 14 years, or that the replacement cost "per pair of jays in the park is SEK 35,000 (USD 4900) [over 14 years]" (p. 364). The oak seeding value of a jay is estimated to 175 US dollars per year. The figure is, however, far from exact (even if you accept the method). Assumptions abound, especially when calculating the likely number of adult oak trees that have been dispersed by jays (and not through other means), i.e. to gauge the effectiveness of the jays' planting method. There is frequent referencing to "personal communication", from foresters and managers that provided ballpark figures for some variables in the authors' equations. Thus, the purportedly universal non-place from which the ESS approach aims to speak, is—just like other value articulating practices—highly embedded in social and place-specific relations.

One of the most comprehensive attempts to showcase monetary values of ecosystem services for an entire urban region, is the policy-oriented "TEEB Manual for Cities: Ecosystem Services in Urban Management" (TEEB, 2011), which deploys a case study of Cape Town to describe general principles—or step-by-step methods—on how to quantify and evaluate biological diversity and ecosystems for any city.[8] The Manual builds on a report by consultants commissioned by the City of Cape Town's Department of Environmental Management to build a "business case" for investment in Cape Town's "natural assets" including "land, coast, biota, atmosphere and water bodies" (de Wit et al., 2009: 1; see also de Wit et al., in press). Pressed to claim sufficient funds in the City budget, the report targeted the city's departments and leading politicians, in particular the department of budget and finance. The Manual is a prime example of the ESS approach, which is why we use it here, along with the fact that it is sponsored by the international TEEB initiative—especially their report for local and regional decision-makers (TEEB, 2010)—with institutional backing from UNEP. The Manual is furthermore aimed to be read by many civil servants and decision-makers, presented as such at Rio + 20 in 2012, which further prompts an examination of how it is written, and why.

Firstly, the reader of both the Report and the Manual cannot but be perplexed by the odd history of Cape Town that is presented here. The city's unequal geography—one of the most extreme in the world (OECD, 2008)—and its Apartheid history and legacy, is more or less completely lacking from the accounts. The evaluation is also not situated in relation to the massive population growth of the city, the increase in economic turnover, the growth of tourism and business, or its increasing ecological footprint, during the last 50–100 years (OECD, 2008). While the city and its nature come out as dehistoricized and decontextualized—perhaps as a way to better serve as an example for

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[8] Three interviews with involved persons were made in Cape Town in January 2012 to support our interpretation of these documents; with a civil servant at the Department of Environmental Management, a consultant involved in writing the Report, and a representative of ICLEI involved in writing the Manual.

other cities—it is precisely urban growth that will come to enhance the economic value of nature through the methods of evaluation used.

The argument in the Report, and repeated in the Manual, is straight-forward: given the high plant diversity of the Western Cape, there has been massive loss of biodiversity and other environmental values in Cape Town's past. Better methods are needed since those that have been used seem to have failed. The environment has been taken for "free", leading logically to the development of a "business case" for the environment to protect it better (de Wit et al., 2009: iv). The first and fundamental step is therefore to translate nature's values into a strictly economic language that can fit budget discussions. This reasoning portrayed the ESS approach as crucial—in fact the only method available—for turning the tide of environmental destruction in Cape Town.

The Report outlines the advantages of the ESS approach carefully and proceeds in a comprehensive way to quantify ESS in Cape Town. This was based on a process of workshops with various city departments aimed to reach consensus on which ESS to focus on, and which methods of economic evaluation to use, a process that spanned over a year and a half. The Manual, paying scant attention to the long process of workshops, uses the Cape Town case study to present "The TEEB Stepwise Approach", a step-by-step method developed previously by TEEB (TEEB, 2010; Appendix A). In spite referring to "local context" and that "the reader can formulate an idea of how to approach the relevant step in each specific context" (p. 11), the Manual brings out the ESS approach as a panacea for stopping continued destruction of ecosystems. Its ability to serve as such rests on its purported capacity to on one hand simplify society into stakeholders, and on the other, to translate complex natural and cultural phenomena into separated ecosystem services, quantified and prized, regardless of context.

In the Manual, this objectification and commodification of nature is most striking when it is applied to what is called "cultural ecosystem services". The Manual's authors cite a number of sources in support of their claims. One is a review article on studies of monetary value of green space in cities in China and the USA (cited as Elmqvist et al. 2011, still unpublished), where the combined recreation and health effects were calculated at an average of 30,000 USD per hectare of green space per year (p. 4). Preserved coral reefs used by tourism in Hawaii, it is claimed, are worth 97 million USD per year (citing Beukering and Caesar 2010) (p. 4). Where there is a chance, aesthetic and other properties of urban landscapes (although never the built environment) are transformed into economic opportunities. Water and other "natural features" are mentioned in relation to income from tourism and leisure (p. 10). Where landscapes are built, they could be turned back to some original state, again with a profit. Ecological restoration may result it is claimed, in an "increase in adjacent property prices" (p. 15). The Manual goes on to mention a wide range of human activities where nature plays a role—art, religious practice, recreation, sports—and where its role in the activities can be given economic value, "despite difficulties of measurement" (p. 4). That these dimensions are at all included among ecosystem services may seem odd — if the entire planet is painted by an artist it will somehow become a service — but the entire ESS approach should by no means be regarded as haphazard, it is claimed: the "comprehensive list of ecosystem services … is based on science" (p. 19).

Although various methods for economic evaluation are briefly described—from "simple" to "very complex" (p. 22)—one stylized method used in Cape Town was to let recognized economic activities rub some of its economic value onto the 'natural assets' be that scenic, coastal, recreational or biodiverse areas. The economic activity purportedly rubbing off most of its value was tourism, but also the film and advertising industry, alongside rich people buying expensive property on the coast and mountainsides (and then paying municipal levies). Another method was to calculate the replacement cost of the infrastructure function that a certain piece of ecosystem provides, be that wetlands, sand dunes or coastal features. Both techniques is a way of solving the problem—inherent to the method—that there are no actual markets of ESS, so

these are constructed by the authors in a thought experiment to deduce value.

In summary, by digging out city statistics, cleaning the data, and asking for expert advice (for instance, asking "film and advertising industry role players" how much of the total industrial film expenditures is due to Cape Town's natural beauty and scenery (de Wit et al., 2009: 130)), the Report and Manual conclude for Cape Town: that tourists travel here "as a result of the attraction of natural features" to the value of 137–418 million USD per year; "local recreational values" amasses 58–70 million USD per year; film industry expenditure "ascribable to natural asset locations" reaches 18.8–56.4 million USD per year; natural hazard regulation is worth 0.65–8.6 USD million per year etc. etc. In triumphantly bringing these figures together, the 'business case' is made that to bring 1 South African Rand (ZAR) of benefit to the City, only 16 cents are needed to be spent on "Cape Town's natural capital assets", "compared to between ZAR2 and ZAR5 for investments in water supply infrastructure" (TEEB, 2011: 26).

5.2. Technologies of Globalization

The practices of the ESS approach are universalizing and totalizing. The studies cited, often with reference to articles in science journals or consultancy reports from around the world, are presented as providing evidence of a quantifiable value, often a monetary value, and when no such value is identifiable, it is suggested that with more developed methodology, it will be some day (Ring et al., 2010). These practices avoid locality, process, social anchoring, and history in order to suggest universality and comparability of value, gestured to better assist in taking the 'right' choices in decision-making. We interpret this as a distancing from the social, although of course the ESS approach is itself social.

The ESS approach, taken as an integrated whole, can be seen as a technology whereby the articulation of values in urban nature is conducted in a way that is seemingly not reducible to the views or actions of local people or individual events, nor to the personal views of ecologists or economists, but possible to identify scientifically. Thus, the overall ambition seems to be to disconnect the value of urban ecosystems from the realm of social affairs, human shortcomings, and social conflict, in one word: the polity. As such, the ESS approach shares many features with other phenomena that since the 1980s have marked the era called globalization (Beck, 1997; Castells, 1996; Falk, 1999; Held and McGrew, 2007; Sassen, 1998). Similar approaches to societal steering—or governance—have been used in economic recovery programs in the former Communist states and in IMF and World Bank Programs for development of the global South. They have also been applied in reform programs to turn around economies and governmental management systems in Europe and other parts of the industrialized world. More commonly these have been summarized under concepts such as 'managerialism' or New Public Management, introduced originally as an attempt to increase efficiency in public administration, but which has also been given at least partly ideologically (neo-conservative or neo-liberal) interpretations (Pollitt and Bourckaert, 2011, Kjaer, 2004: Ch. 2).

Among the commonly accepted components of globalization, we will here emphasize two. One is the intensification of contacts and communication between all parts of the world, i.e. making the world smaller and increasing the sense of simultaneity. The second is to make the different parts of the world more like each other, reducing or leveling local ecological, cultural and social diversity. A globalized similarity needs a common language that has often been economics, which is why globalization is also conspicuously a spread of markets and a market logic into regions and social spheres where this logic was not (so) present in the past. Most reforms in public management since the early 1980s, for example, tend to reduce complexity and seek readily quantifiable and accountable outcomes; they are focused on performance and try to relate budgeting (public funds) to accountability, incentivizing 'good' behavior and punishing 'bad'; they tend to disaggregate management and

seek to establish agencies or institutions in government that focus on one or a small number of outcomes or processes and thus move away from complex responsibility-taking departments; they wish to increase distance to policy and politics, giving wide leeway to managers to handle their responsibilities towards clear and explicit success criteria. Clearly, these criteria are inherently political but once established they tend to take on a life of their own and are hard to change (Pollitt and Bourckaert, 2011: Ch. 1–2). Applying stylized, and almost always quantitative, criteria of success therefore means in practice a de-politicization of complex social issues and a shift from democratic and collective decision-making to the use of standardized criteria typically set by experts. The postpolitical (Swyngedouw, 2009, 2011) is a concept that has been used to denote this phenomenon that has spread to several branches of government and administration, including the environmental realm.

Just as historians of technology and communications have identified the material means through which universalizing control and development schemes were conducted under previous technological regimes, so called 'tools of empire' (Adas, 1989; Headrick, 1981; Latour, 1987; Law, 2003), we regard the standardizing economic methods of the last thirty years as 'technologies of globalization', creating uniformity of action, and of values, into parts of the world and domains of societies where previously diversity and local particularism were in command. These are technologies precisely because they offer certain prescribed routines, techniques, and practices whereby the standardization and the ensuing comparability is achieved, which in turn opens up the possibility to move issues and dilemmas, for example of controversial urban planning, from the mess of local claims and into the clarity of numbers, that is from the sphere of politics to that of science (or quasi science).

Given their universalizing and totalizing character, technologies of globalization have developed a set of characteristics that follow from the above. They tend to be abstract, objective, transportable and not attributable to individual or social interests but rather standing, as it were, 'above' such interests speaking about values from a point of no-where, i.e. what we have above termed a non-place. These characteristics fit squarely with the ESS approach.

Consequently, the Manual, analyzed above, represents not only a significant point of maturation of the ESS approach, especially for its urban direction, but also for how the ESS approach—in practice—can be spread to be used elsewhere, to be a material part of a technology of globalization. The Manual was authored by representatives of ICLEI—Local Governments for Sustainability—an organization gathering "over 1220 local governments from 70 countries" to support local governments "in the implementation of sustainable development" (http://www.iclei.org/ on 2012-01-15, 23:00 CET). The Manual was also peer-reviewed by Swedish and German "TEEB scholars" and openly acknowledged by TEEB Coordination Group: "This is an excellent publication that builds upon the TEEB reports and tailors the information specifically for an urban context. […] [W]e hope this handbook will take its place alongside the TEEB reports as an essential tool for local and regional policy makers everywhere." (TEEB, 2011: i). The Manual can therefore be viewed as an explicit attempt to codify the ESS approach into a script, make it transportable to be applied everywhere (cf. Latour, 1987; Law, 2003). With its step-by-step methods to measure economic values of ecosystems in cities, it aims to prescribe action elsewhere. Although the growing number of scholars (Fig. 1) are part in spreading the ESS approach through their forums of peer-reviewed journals and conferences, and in developing ever more sophisticated techniques for quantification and economic evaluation (involving Geographical Information Systems (GIS), forecasting, and 'econometric land-use modeling' (Daily and Matson, 2008; Nelson et al., 2008)), the Manual represents one step further towards spreading and enfolding this rule-based method of evaluating nature's complexity into practice and policy in urban decision-making.

On a more general level, the ESS approach is a technology of globalization in that it talks to all places and citis in the world in the same language. It is therefore by necessity abstract - although fully material and performed in-place, as we have seen - while proclaiming that its ability to translate particularities into generalities is a hallmark of good governance. It is objective; or else ecosystem services could not be applicable in other places—after all, the ESS scheme, as codified already in the Millennium Ecosystem Assessment, claims to be valid everywhere (MA, 2005). ESS are transportable; they are scripted and can be summarized, turned into bullet points, or even encoded into software (Daily et al., 2009) so that practitioners ideally can be able to just follow instructions, rather than understanding in depth—or needing to know—how nature and ecological complexity is embedded in and through cities and society. Practitioners in turn can effectively be made into traveling and circulating "emissaries" (Law, 2003) who have learned the ESS Method and in principle can apply it anywhere, almost like global consultancies, which do precisely this: apply standardized text book methods to streamline and improve performance in line with globalized success criteria. For this there is, typically, a globally acknowledged Manual, which is now also the case in the ESS approach.[9] Hence, the ESS approach performs a remarkable gesture, as coming from no-where, a non-place, but arranging itself so as to be able to talk to all places, claiming to have the tools to correctly measure the values of nature for any part of the world.[10]

In summing up, while the ESS approach represents just another practice of value articulation, we can now also conclude how it stands in sharp contrast to those practices that worked in-place at Stockholm National Urban Park and the Princess Vlei in Cape Town. Through our analysis of the Manual and other documents of the ESS approach, we can identify in some detail the rhetorical, strategic and very practical micro-technologies that are put into action to achieve the overall result of moving contested nature out of the political, and into the managerial— the quantified and (quasi)scientific. This mode of de-politicization is construed through a number of universalizing elements:

- De-historicization—the decoupling of objects of analysis (ecosystems, parks, cities, neighborhoods, etc.) from real world actors, events, and processes.
- De-contextualization—disregarding social realities, conflicts, interest driven contestations and actual use of ecosystems on the ground.
- De-ecologization—focusing on the measurable services of individual species or single systemic effects, paradoxically disregarding traditional holistic and interactive dimensions of ecology (Norgaard, 2010).
- Silencing—privileging particular strands of expertise (Bocking, 2004; Sörlin, in press), marginalizing voices that are local, including those that represent traditional ecological knowledge (Howitt and Suchet-Pearson, 2003; von Heland and Sörlin, 2012).

6. Conclusion

This paper has critically reflected on the 'ecosystem services approach', which was viewed as including both a scientific framework—purportedly erected from a non-place, but valid everywhere—and the

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[9] There is also a move to develop globally recognized indexes. The City Biodiversity Index (CBI; also referred to as the Singapore Index) is promoted by ICLEI and "consists of 23 Indicators grouped under three sub-headings: Native Biodiversity, Ecosystem Services, and Governance and Management, which result in an overall score for the city which can be monitored over time." (ICLEI website http://www.iclei.org/index.php?id=12482, retrieved 2012-01-02 at 17:30 CET). Another is the Green City Index sponsored by the German company Siemens and measured by the Economist Intelligence Unit (http://www.eiu.com/Default.aspx).

[10] The parallel to John Law's (2003) analysis of the 15th century Portuguese empire, is instructive. He suggests that the empire's long-distance control depended upon the creation of networks, through which "emissaries"—documents, devices and drilled people—can "circulate from the center to the periphery in a way that maintains their durability, forcefulness and fidelity".

scholars, organizations, consultants and their techniques and networks that are increasingly enacting a prescribed way of attributing value to nature. The paper demonstrated how the ESS approach has traveled rapidly from metaphor to an increasingly stable framework, and now into urban policy. Our analysis adds new dimensions to the growing critique of the ESS approach and raises concern on how the ESS approach works within democratic procedures towards more just, sustainable and resilient cities and societies. In this broader sense, we have contributed towards an unpacking of one of the most popular concepts within Environmental Economics and Ecological Economics, which contributes to calls for wider critical reflections (Spash, 2012) on how (e)valuation, knowledge and politics are intertwined, especially at the intersection of ecological complexity and urbanization.

In particular, we have argued that the ESS approach, just as any other practice of value articulation, is embedded in social, cultural and historical processes, and should be studied as such. In that sense, the ESS approach is equivalent to such mundane value articulation practices that are engendered by, for example, the struggle to stop a shopping center at a wetland area in Cape Town, or the formation of a protective narrative for a vast urban park area in Stockholm. Just like these are about particular actors using what they have at their disposal—the planting of indigenous species, a slave legend, historical maps, massive popular use of green space—so is the economic evaluation of Jay birds in Stockholm, or coastal protection in Cape Town about particular actors—called experts, consultants, economists, or ecologists—relationally constructing particular values for particular purposes. However, we have also argued that the ESS approach is different since in contrast to other value articulation practices, it claims to be universal and possible to use everywhere, and therefore gestures to stand above the other practices of value articulation that we have described. Building on this, we propose that the ESS approach comes with a set of effects, which we suggest can organize further debates and critical research.

A first effect is how the ESS approach seems to silence localized ways of knowing places, ecosystems, and nature(s). The multi-faceted cultural embedding of a wetland in post-Apartheid Cape Town has scant possibilities of being scripted into the technologies of articulation used by the ESS approach. From within the ESS approach, among the tools at hand, the computers and algorithms to produce quantified values, the value of the cultural embedding of a wetland cannot by default exist. It is silenced since it is non-codifiable. Consequently, the ESS approach can be viewed as creating a particular way of knowing and organizing 'the world', a certain cosmology or belief-system. Just like anthropologists and ethnographers have studied the cosmologies of 'local' practices of knowing, the same set of repertoire for research can be used to study those working with the ESS approach (see e.g. Monfreda, 2010). Following our approach, what seems necessary for Ecological Economics and associated fields, is to provide space for critical ethnographies that traces how the ESS approach is enacted in-place, in various cities and locales, rather than yet another article that re-packages the gesture of objectivity and universality in trying to come up with the ultimate ecosystem services framework (e.g. Nahlik et al. 2012). Here we drew upon actor-network theory (Latour, 1987; Latour, 2005; Law, 2003, 2009) that can effectively be used to understand how the ESS approach, and other technologies of globalization in the environmental realm, are integrated into a "new global knowledge" (Monfreda, 2010) that manufactures global expertise.

With the silencing of the local follows a second effect. Often in the ESS literature, claims are made that the ESS approach can be used as a complement to other practices of value articulation. Through ethnographically studying ESS as an in-place social practice, such statements can be questioned. Can the ESS approach live respectfully side-by-side with other ways of knowing and valuing ecological complexity? If not, what type of politics does the ESS approach engender? Here politics should be understood as going beyond the analysis of 'choice' as it has been put forward by the ESS approach—a Habermasian ideal where

stakeholders (chosen by experts) can negotiate trade-offs among ecosystem services (as defined and calculated by experts). Rather this research needs to take an interest in the ontological politics that follows from a plurality of practices of knowing and valuing (Mol, 1999). Drawing on actor-network theory (Mol, 1999), but also on literature on indigenous knowledge (Nadasdy, 2003; von Heland and Sörlin, 2012) and ontological pluralism (Howitt and Suchet-Pearson, 2003), we can analyze how reality is shaped within practice, to make certain ways of knowing and valuing legitimate, while others are erased.

In relation, Norgaard (2010) adds a third effect; that the ESS approach silences other scientific practices of knowing ecological complexity, like evolutionary or population biology that do not fit within a stock-flow model of nature. This would not only blindfold society and prevent radical institutional changes, Norgaard argues, but could change the structure of knowledge production (cf. Levins and Lewontin 1985) since stock-flow model fares better in attracting research funding, something possible to study through data on research funding in e.g. USA, Europe and China.

A fourth effect is how the ESS approach can be viewed as a necessary step towards a marketization of ecological complexity (Castree, 2008a, 2008b), with pricing, markets, and schemes for payment of ecosystem service (Kosoy and Corbera, 2010). However, for this to occur, there needs to be a development of organizations, indexes, manuals—a refinement of the technologies of globalization—but also political struggles, no doubt, when markets are created, which can be traced and researched through various social scientific approaches, not least that of (urban) political ecology (Castree, 2008a, b; Heynen et al., 2006).

Finally, there is a profoundly political effect in that the ESS approach gestures to be built on scientific grounds and originates from a non-place—a place where petty or mundane politics do not exist and consequently that the ESS approach is not tainted by social interests that might influence its localized practitioners. From this non-place, it purports to have discovered objective technologies for measuring nature's value that can be transported around the globe and inserted into decision-making processes to bring order and truth, preparing the stage for stakeholders to rationally deliberate on how to make trade offs between the different ecosystem services presented by the ESS approach. What once was political is through the ESS approach translated into a scripted set of non-political acts of management, just as the literature on New Public Management has demonstrated. Drawing on political ecologist Erik Swyngedouw and his long research of technology, cities and water politics, ecosystem services comes into view as yet another element of a conspicuous managerialism that since the 1980s increasingly has constituted a postpolitical condition whereby the politics of equality tends to be evacuated through technomanagerial practices (Swyngedouw, 2009, 2011). In playing part in broader shifts of knowing and governing, ecosystem services should receive increasing critical attention.

These effects come into view when ecosystem services are inscribed as social practice, as part of historical process, and as inherently political. Through such a lens we hope to spur broader interdisciplinary debates and research within and beyond Ecological Economics to better understand the political implications of how values are formed in the midst of our socioecological crises.

Acknowledgments

Appendix A

The TEEB Stepwise Approach as quoted in the TEEB Manual for Cities (TEEB, 2010, p. 11):

Step 1 Specify and agree on the problem or policy issue with stake-holders.

Step 2 Identify which ecosystem services are most relevant.

Step 3 Determine what information is needed and select assessment methods.

Step 4 Assess (future changes in) ecosystem services.

Step 5 Identify and assess management/policy options.

Step 6 Assess the impact of the policy options on the range of stakeholders.

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