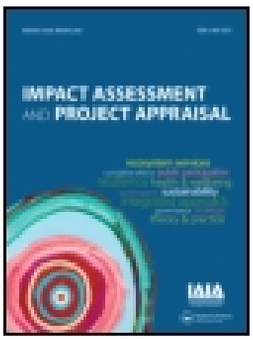

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PROFESSIONAL PRACTICE PAPER

# Ecosystem services in SEA: are we missing the point of a simple concept?

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**ABSTRACT**

In spite of a wealth of scientific literature, the concept of ecosystem services (ES) has little uptake in the worlds of planning and related environmental assessment. This paper is a personal search for the reasons of this lack of uptake, based on 20 years of consultancy experience in natural resources management, combined with a (non-exhaustive) survey of recent literature and an IAIA 2015 conference workshop. The paper takes stock of available lessons and ends with a simple and straightforward stepwise approach to use ES as an integrative concept in SEA. The paper also is a plea to stop complicating life and maybe for a while forget about computational models and monetary valuation, and first start asking stakeholders and decision-makers, listen to their language and find out what kind of information is relevant to *them*.

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Ecosystem services; strategic environmental assessment; SEA; regional planning; spatial planning



## Introduction

This paper is a personal search into the reasons why the concept of ecosystem services (ES), since the early 90s extremely helpful for me as a consultant to describe and unravel complex natural resources management questions, has so little uptake in the worlds of planning and related environmental assessments. A review of recent publications supports my own personal experience and conviction that ES can work in practice to cross boundaries between sectors and between stakeholders, planners and decision-makers (Slootweg & Mollinga 2010). I do not pretend to provide a complete overview of the scientific literature and arguments, but moreover try to make a personal statement, motivated by my bewilderment why so much scientific evidence has so little impact in practice. The paper explores available practical lessons in an attempt to define principles for the effective use of the ES concept in SEA and ends with a simple and straightforward stepwise approach to use ES as an integrative concept in SEA.

## Context

Biodiversity underpins all life and life support systems on earth; without properly functioning ecosystems, human life in its present form would not be possible. Biodiversity therefore needs to be better taken into account in planning and decision-making processes in order to turn human development towards a more sustainable[1] path of development (Slootweg et al. 2010). ES have been promoted as an effective concept to translate biodiversity into understandable language for planners, decision-makers and the public at large (CBD 2006; CBD Secretariat & NCEA 2006; Geneletti 2013; Partidario & Gomes 2013). By translating biodiversity into terms of products and services for present and future stakeholders, the multiple linkages between humankind and its living environment can be described in understandable language (Baker et al. 2013). ES may be quantified, even when we do not have complete ecological knowledge of all involved species and their roles in the delivery of a service (Slootweg et al. 2010). ES provide a holistic and integrated consideration of the socio-ecological system, moving away from the traditional silo-based approach of the environment (e.g. soil, water and air) to one that focuses on the interconnectivity of the social-ecological system (Baker et al. 2013; Reyers et al. 2013). In spite of these apparent advantages of having an ES approach, over the last decade, the concept of ES has only very slowly been adopted in the practices of planning and strategic environmental assessment for planning (Slootweg & van Beukering 2008; Geneletti 2011, 2013; Baker et al. 2013; Laurans et al. 2013). Honrado et al. (2013) consider it 'striking how EIA and SEA miss the opportunity of exploring how ES can improve local well-being'. So, either the concept doesn't work or the efforts to make it work are ineffective.

## Why no uptake of ES?

Summarising many workshop outputs, and the scientific and grey literature, I can see three main causes for

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the lack of uptake of ES in (SEA for) planning: (i) unwillingness; (ii) silo thinking and (iii) an ineffective science–policy interface.

### Unwilling decision-makers

As one of the anonymous reviewers of an early version of this paper put it, the paper is written 'for a situation in which politicians, planners, managers and CEOs want to do a good job. Unfortunately, however, there are also many circumstances in which government/business explicitly does not want to know all these things, or does not want it to be known in the public domain.' (S)he further emphasises that 'SEA is a legal tool explicitly meant to also operate in negative contexts.' I totally agree with this notion of SEA as a stick for the unwilling. To be clear on my intention for this paper: I am addressing the willing, not using a stick but trying to provide a carrot for better SEA and planning, even though I do have stick-like case experiences, where ES assessment made a difference in the play of power. But that's another story.

### Silo thinking

The world is organised according to sectors, each having its own educational background, its own working environment, its own language and culture and its own silo. Where silos do not meet, it works well. However, in an increasingly crowded and interconnected world it creates problems. Kolhoff and Slootweg (2005) provide a nice example. Their study on the treatment of biodiversity in SEAs for spatial plans in the Netherlands demonstrated that biodiversity in the Dutch perspective related to protected areas only. Conservation was the main objective of such areas; a systematic overview of potential ES was something unknown at the time, although leisure activities, flood attenuation and biodiversity conservation, ES indeed, were thought to go well together. Non-protected biodiversity went totally unnoticed. Some parts of the territory were protected for other sector interests (water infiltration areas; coastal protection areas; also ES). Sector interests dominate the management objectives of these segregated areas. In this example of narrow silo thinking, the green silo was allowed to have its part of the territory, as long as it didn't bother too much with the rest.

Since that time, ES have appeared in thousands of scientific publications and in hundreds of valuation studies. Yet the impact of all these efforts on real-world planning and decision-making remains limited. Part of the explanation is that these studies are commissioned by, implemented by and aimed at green sector actors and audiences and not at audiences that govern economy and development. Furthermore, the ES concept is often restricted to 'natural' areas only to highlight the value of pristine nature in an attempt to promote the nature conservation agenda with economic arguments.[2] This creates the image of ES being a green sector thing.

The potential application of ES as an integrative framework to describe the dependency of humanity on the environment of course lies far beyond the green sector boundaries. Moreover, to have actual 'real-world' impact the concept should be applied in policy and planning processes in other sectors; it should be applied to all settings, be it a pristine forest or wetland, irrigated agricultural land, green or brown fields, reclaimed land, or urban areas for that matter. People need food, water, air, space, etc. now and in future; these products and services are provided in varying combinations by all types of landscapes.

A common trait in many ES studies is the absence of actual planning and decision-making issues for which these ES studies have been designed. These assessments have not been designed to answer specific policy, planning or decision-making questions and may go unnoticed or may provide inappropriate information. For example, do we need to know the present level of services delivery, or the potential future delivery, or the past pre-degradation level, or do we need to know the pace of change in service delivery, over time or over space. Last but not least, do we need to know the total economic value of services or do we want to know where services delivery changes and who will be the winners and who the losers. In summary, the what/who/where/when/how questions define the type of information needed. This can hardly be predefined. So, having a solution ready, without having a clear issue or problem seems to miss the point.[3]

Analysis of a number of cases where ES have been studied to solve real-life questions revealed the need for a concrete trigger for action. When addressed properly such a trigger, usually lying outside the green silo, can start a change towards sustainability. Such a change

> can start in many situations; 'zero' starting points (i.e. a pristine planning environment) do not exist and the road to sustainability knows many complex starting points. Recognise the 'trigger' and use this as the starting point. A trigger is often a real or expected resource problem, or conflict of interests, perceived as such by involved stakeholders. (CREM, SevS & IVM 2011)

**Conclusion**. Find a trigger that may provide an entry point for a different planning approach, reach out beyond one's sector boundaries and define the right questions and information needs in relation to the trigger.

### Science–policy interface does not work

In a systematic review of peer-reviewed scientific literature Laurans et al. (2013) show, based on over 1419 sources, that little attention is given to take up of the information in planning and decision-making, even though such use is frequently referred to as founding the goal and justification of the work. Earlier work by

Slootweg and Van Beukering (2008) had a similar conclusion. An inspiring paper by Ruckelshaus et al. (2015) provides views on the wide gap between the rapidly developing scientific knowledge on ES and real-world decision-making. The authors drew lessons from some 20 cases, where an ES approach was used to inform decision-making. I further elaborated on their cross-cutting lessons, appearing in **bold** below.

**It's the process!** The process in which biodiversity and ES information is embedded is at least as important as the scientific tools and outputs. To be used in decision-making, information has to meet three requirements; it has to be scientifically valid (credible), socially accepted in the sense that it addresses stakeholder concerns in a procedurally fair manner (legitimate[4]), and it has to be relevant for decision-makers (salience[5]) in the sense that the right kind of information is presented within the broader policy context, at the right moment in time (Cash et al. 2003 in Slootweg & Mollinga 2010). In decision-making context 'the recurrently experienced problem is that decision makers are not getting information that they need and scientists are producing information that is not used'. An interactive science–policy process, meaningfully involving scientists, local experts, stakeholders and decision-makers, enhances the credibility, salience and legitimacy of the information (Ruckelshaus et al. 2015). This can be read as a strong plea for the use of SEA as a means to convey the information on ES to the decision-making arena.

**Keep it simple.** Where scientists proposed to start with quantitative Tier 1 models, intending to move towards more complex Tier 2 and 3 models during the study period, decision-makers insisted on developing Tier 0 models, based on semi-quantitative ranking methods. Ranking models allow for an iterative process to rapidly develop and compare alternatives in a transparent manner and allow stakeholders to actively engage in the debate. While in the eyes of the scientists the information may be less than optimal (credibility), the legitimacy and salience of the information is significantly enhanced, thus making the obtained information more relevant for decision-making. Partidario and Gomes (2013) argue that the complexity related to strategic planning requires methodologies less based on quantification of ES and more on dialogues, agreements and commitments to broader policy objectives that set actions.

**It's not always about the money**. Valuation models that provided estimates of monetary benefits were less important than anticipated (Ruckelshaus et al. 2015). For traditional market commodities decision-makers are interested in monetary terms. For non-marketed services a host of non-market benefits is used. In many cases stakeholders have asked to *not* attach a monetary value to key benefits (e.g. existence of orangutans). Decision-makers often want to understand how alternative decisions might affect *where* ES are supplied and to *whom*; monetary value information does not provide this information. Ruckelshaus et al. (2015) emphasised the translation of changes in ecosystem service delivery to how it affects human well-being. Moreover, absolute values may not be that relevant, rather it would be more feasible to assess the relative magnitude of changes across different options (Baker et al. 2013).

**Involve local experts**. In spite of several decades of participatory planning, action research, development cooperation lessons, and endless pleas for involvement of local experts and traditional knowledge, apparently a part of the scientific world still ignores these lessons. Christie et al. (2012) report that half of the biodiversity valuation research they reviewed failed to involve local researchers or policy-makers. In everyday practice, too many plan and impact studies are carried out behind desks without experts even making an effort to visit the area they are supposed to work on, let alone to talk to directly affected people.

**Conclusion**. The process is as important as the content, so make the best use of the available process instrument to assess the consequences of plans for sustainability, i.e. strategic environmental assessment. And what many SEA practitioners already know for a long time, the simpler – the better, as long as the information is of good quality, relevant to decision-makers and reflects the interests of stakeholders. Maybe forget about computational models and monetary valuation for a while and first start asking local people and local experts and listen well to the language they use.

## ES in SEA

Many authors have suggested that SEA provides the best opportunity to integrate ES in planning (e.g. Geneletti 2011; Barral & Oscar 2012; Viglizzo et al. 2012; Honrado et al. 2013). SEA can play different roles. The 'traditional' role of SEA is a re-active one; the planning process is in the lead and the SEA assesses the consequences of the plan (and alternatives if available). Partidario (2012) describes this as the EIA-type of SEA as it resembles the typical procedural set-up of environmental impact assessment for projects. She opposes this to a 'strategic use' of SEA. In such an approach, SEA is used to proactively inform the planning process. Rather than assessing the direct or indirect impacts of plans, the rationale for this approach is to use SEA to inform the planning process from the start towards more sustainable solutions (Partidario 2012). This approach also helps to avoid the perception of environmental assessment being a hindrance to development.

By describing a region in terms of ecosystems and their services, a pro-active SEA can picture the supply side for a development plan. In SEA, this supply of goods and services can be assessed against the demand for development, thus providing a good knowledge base

to assess whether a region has the potential to facilitate human development ambitions. Opportunities and constraints for development can be identified and addressed. When used in a pro-active manner, an ES assessment can thus define options for sustainable development. As Baker et al. (2013) point out, an ES assessment should form the basic framework for a planning process, rather than serve as a mere tool or set of techniques. In such an approach, the strengths of the ES concept can be used to its full extent (Baker et al. 2013, adapted):

- The question 'what are the most important ES provided by the area?' is a positive way of framing the situation as the environment is described in terms of service provision rather than as a backdrop to absorb impacts. The description of environment moves from things to benefits.
- Stakeholders and public are well placed to engage with this description.
- A description of the environment in terms of ES reflects on the impact of the environment on the plan; opportunities as well as constraints for development can be described and even quantified.
- A shift from things to benefits communicates to decision-makers the value of new or enhanced green infrastructure. Such a positive planning approach (IAIA 2005) focuses more on opportunities for positive enhancement, less so on mitigation of negative impacts.
- Using ES to assess the effects of policies improves the understanding of the spatial distribution of such effects and the related issues of equity among different regions and/or different social groups (Slootweg & van Beukering 2008; Helming et al. 2013).
- The bundled nature of ES (each ecosystem provides multiple services) counteracts the spatial planning tradition of assigning classes of space to one type of land use (demand-driven); it invites planners to plan for multi-functionality (supply-driven) and multiple use.
- Stakeholders learn about benefits associated to ecosystems and find a reason for their conservation and enhancement leading to a sense of ownership. Knowing that multiple stakeholders have an interest is a good motivation for local authorities to also wish to maintain and enhance ecosystems (Partidario & Gomes 2013).

International Finance Corporation Performance Standard 6 requires private sector lenders to 'maintain the benefits from ecosystems' (IFC 2012). A number of ES assessments have appeared in EIAs since, where quantitative ES assessments simply were a parallel add on to the existing EIA structure, not adding much to the available information and definitely not taking advantage of the integrative character of ES (Rosa & Sánchez 2015). Baker et al. (2013) state that it is important for ES not to become pushed into a separate assessment. This is exactly what has happened in the EIAs trying to follow the IFC requirement; i.e. ticking the box of things to do without actually understanding the real purpose of it. Rosa and Sánchez (2015) concluded that the challenge of such assessment is to integrate the ES analysis in such a way that it does not duplicate other analysis. The authors state that if ES are used as an integrative approach to all usual activities of impact assessment, from scoping to follow up, as recommended by current guidance, it could mean an opportunity to improve the impact assessment process and its outcomes.

**Conclusion**. The ES concept provides an integrative framework, describing the environment in terms of human well-being and thus providing essential knowledge on the capacity of the environment to facilitate human development ambitions, articulated in policies and plans.

## Basic principles for effective use of ES

ES do not have to appear in all SEAs. But any plan influencing areas that (potentially) provide bundled, multiple ES can benefit from an ES approach, be it in urban (e.g. Söderman et al. 2012), agricultural (e.g. Abdel-Dayem et al. 2004), 'natural' or even degraded environments with restoration potential (Aral Sea Wetland Restoration Strategy; case description on TEEBweb). Based on the lessons above, the following basic principles can be applied to effectively use ES in SEA.

**Recognise ES triggers.** Biodiversity underpins ES but the relation between biodiversity and the delivery of ES remains difficult and has a high degree of uncertainty. Several authors have stressed that complete knowledge of biodiversity in impact assessment is not needed (and not to be strived for) to be able to recognise potential triggers that may result in significant biodiversity impact and thus a potential change in ecosystem service delivery. Any activity that fundamentally affects one of the following three aspects of biodiversity may serve as a trigger for special attention (LeMaitre & Gelderblom 1998; extensively elaborated in CBD Secretariat & NCEA 2006 and Slootweg et al. 2010):

- *composition* – what is there and how abundant is it (e.g. selective fishing or logging of a few species may upset the system);
- *spatial and temporal structure* – how is it organised (e.g. disrupting a foodweb, seasonal floods, or ecological corridors will upset the system);
- *key ecological processes* – abiotic, biotic or human processes of key importance for the maintenance of ecosystems (interfering with sediment flows in mangrove areas, grazing patterns in savannahs, agricultural practices in heath meadows may upset these systems).

Knowledgeable local ecologists will immediately recognise the risks of certain activities without necessarily knowing the exact species composition or conservation status of the ecosystems.

**Stakeholder participation.** A fundamental condition for success is to ensure that different stakeholders are engaged earlier on to set preferences and trade-offs with respect to the use of ES (Partidario & Gomes 2013). Failure to include stakeholders could lead to ES being mis- or under-represented in any decision-making process (Sheate et al. 2012). Different viewpoints on the value of ES are one of the key reasons for complexity in ES and SEA. Because well-being is not necessarily measured in quantifiable monetary terms, ES inclusive SEA should be grounded on this fundamental stakeholder engagement principle and not necessarily on the market valuation of ES (Partidario & Gomes 2013). Stakeholders can be private or public entities; involving these in the planning process leads to ownership and responsibility for the outcomes.

**Top down also needed**. 'Bottom-up' participatory approaches give the best guarantee for broadly accepted and sustainable solutions; it can create 'champions of change'. Yet 'top-down' regulatory frameworks provide necessary mandates and boundary conditions to guide the process. A participative, bottom-up approach can create an effective mechanism to make optimal use of principally good polices and legislation that lack effective implementation. A prerequisite is the availability of interested parties to take the lead in implementation (a 'champion') (CREM, SevS & IVM 2011).

**Drivers of change and scale**. According to the Convention on Biological Diversity (CBD) Impact Assessment Guidelines (summarised by Honrado et al. 2013), the design of an environmental assessment process must be such that: (i) the full range of factors that cause changes in biodiversity and the environment is considered, i.e. direct and indirect drivers of change; (ii) differentiation is made between those drivers that can be influenced by a decision-maker (endogenous driver) and others which may be beyond the control of a particular decision-maker (exogenous drivers); and (iii) the temporal, spatial and organisational scales at which a driver of change can be addressed, are defined. Development planning ideally is done at the scale of the problem or opportunity at stake. Scale is defined by biophysical environment and stakeholder interests, not so much by administrative boundaries. Where possible, define the sensitivity of ES to these drivers of change.

**Precautionary approach.** Gaps in information can rule out a conclusion on the severity and irreversibility of potential impacts. If this relates to prioritised ES and consequences are potentially unacceptable and impossible to mitigate, a precautionary approach should be followed. This doesn't mean the proposed measure has to be cancelled, but it does require an adaptive management approach. This may imply incremental implementation of activities. Active monitoring provides information to better assess the consequences and possibly adapt the activity. A precautionary approach requires planners (i) to be explicit about the uncertainty and the potential risks; (ii) to be proportionate, i.e. keep a reasonable balance between stringency of precautionary measures and seriousness/irreversibility of the potential threat, and (iii) propose adaptive management measures (Peel 2005).

## Stepwise approach

Below a simple straightforward series of steps is suggested to provide a complete overview of ES, their stakeholders, their quantitative importance and the development opportunities or constraints they represent. This should be embedded in existing procedural frameworks for SEA.

(1) **Define boundaries of study area**. Plans usually are defined by administrative boundaries. One should realise that these may be widely different from ecosystem boundaries defining the area that delivers a particular bundle of ES, and again widely different from the social boundaries defining the whereabouts of groups of users of services (see following steps).

(2) (*Iterate 2 to 5*) **Identify and map ecosystems** (or landscapes) within the study area, including semi-natural ecosystems or man-made landscapes. Describe potential linkages with areas outside the study area. There may be interdependencies between different areas, for example linked to surface and groundwater flows, wildlife migration patterns, movements of cattle, or migration of people. Ecosystems may cross administrative borders, while the size of the ecosystem may define its capacity to deliver services. So, also the part of the system outside the administrative boundaries then contributes to service delivery (e.g. flood attenuation).

(3) **Identify (groups of) stakeholders** of each ecosystem service. Stakeholders can be local communities, direct users (e.g. farmers, fishermen) or organisations speaking on behalf of users (e.g. user associations), on behalf of a service (wildlife conservation), or having governmental responsibility for a service. Stakeholders may be found outside the administrative planning boundaries (for example people depending on water provision from a planning area in the upstream catchment of a river). Make sure that future generations have a voice; usually their

interests are linked to sustainability and conservation policies.

(4) **Identify and quantify ES** for each ecosystem. In an iterative process experts and stakeholders verify each other's inventory until a commonly agreed set of ES has been defined and given understandable names. Services should wherever possible be quantified in terms of the service itself (e.g. amount of sustainably harvestable water for irrigation; surface area of wood production times productivity per hectare, similar for grazing area, fish production in tonnes/year, number of wildlife species, etc.)

(5) **Prioritise and value ES** for each (group of) stakeholder(s). Values of services can be expressed in social, monetary or ecological terms. Examples: market values for agricultural produce; numbers of households depending on subsistence fisheries; numbers of red-listed species. The definition of values can best be done in a participatory manner; for quantification local knowledge and expert input may both be needed. A ranking in priority is needed to be able to focus an assessment on relevant issues; the most important ES can be considered criteria against which a plan is assessed (e.g. critical factors for decision-making; Partidario 2012). Keep in mind that ES can be perceived widely different by different stakeholders (for example fishermen appreciate seasonal flooding as it enhances fish reproduction; farmers prefer double-cropping and may prefer flood prevention).

(6) **Present status and trends** for ES. What is the present condition of an ecosystem service? Does an ecosystem service represent a development opportunity (underexploited) or a constraint (already overexploited)? What is the past and expected future trend; what *drivers of change* are at work; at what scale do they work; at what scale can they be managed; what management options are available in the region; can drivers be influenced by the plan at stake or are they part of the autonomous development scenario against which a plan is assessed?

(7) **Regulatory or policy frameworks** applicable to ES. Existing legal or policy frameworks may apply to the use and management of ES, thus representing boundary conditions for future planning, or may point into the desired direction of development.

(8) **Gaps in information**. Quantification of services and their values will be based on existing information. It will most probably not be possible to find all necessary information so proxies or semi-quantified values may have to be used. Consequences of such choices for the reliability of information will have to be discussed, potentially resulting in the need for a precautionary approach. When comparing development alternatives semi-quantified information, expert judgement or stakeholder consent may very often suffice for comparison.

Depending on the nature and timing of the SEA the following step can be:

- **Opportunities and constraints analysis**: Pro-actively inform the planning process on development opportunities and constraints: what ES provide room for further development and what services are in need of proper management measures to avoid further or future over-exploitation. In short: *how does the environment influence the plan?*
- **Impact assessment**: Re-actively assess the consequences of proposed plans for the performance of ES and provide input for the developments of mitigation/compensation measures. In short: *how does the plan influence the environment?*

Ideally, an SEA will go through both phases, first by informing the planning process on the opportunities and constraints of the area, thus defining the boundaries of sustainability and provide pertinent input for the development of alternatives. Subsequently, the SEA will assess the consequences of proposed plan measures when these become more clearly defined. Further assessment should include the normal good practice SEA elements such as definition and comparison of alternative development options, assessment of potential cumulative effects and assessment of transboundary dependencies and impacts.

## Some personal final words

In this paper, I have tried to provide an overview of the existing experiences in applying the ES concept. It struck me with some surprise that the lessons from literature very much correspond with my own experience, summarised in: listen to people, be careful with 'behind-the-desk' studies using GIS, computational models and complex valuations techniques that people cannot relate to and look beyond one's silo. Yet, the practice of most present-day ES assessments and valuations is exactly the opposite.

**Crossing boundaries.** In my own 20 years of natural resources management experience, I have found ES to be a perfect concept to understand and describe complex situations, and cross the boundaries between sector experts, between experts and stakeholders and between experts and decision-makers. Of course, I often had to adopt different terminology, for example, because irrigation and drainage experts distrust the word 'ecosystem'

or architects and spatial planners prefer speaking about 'multifunctional landscapes'. So, adapting the language to the audience is a first step to bridge the divide. Stakeholder involvement in this respect is also about finding the right language, which resonates with their world and avoids unnecessary semantic discussions or negative perceptions.

**Information brokers.** Having been a scientist for 10 years before becoming a consultant, I am convinced that the gap between science and policy cannot be bridged without the help of intermediaries or intermediary mechanisms. Reinecke et al. (2013) refer to knowledge brokers and a hybrid knowledge brokerage domain, where interaction between scientists, policy-makers, interest groups, the media and citizens is deliberately sought. The incentives for scientists lie in innovation, developing new ideas that can be associated to their names in the scientific literature. Policy-makers need simple and generalised rules of thumb that they can use in complex decision-making processes; public praise of the quality of their decision is their incentive. So, the most interesting and thought provoking ideas for a scientist usually are a nightmare for decision-makers.

**SEA for a not-perfect world.** The literature is quite clear on the potential role that ES assessment can play in planning. The manner in which the concept can be conveyed to the world of planners is less clear. Of course, in a perfect world, planners could adapt the concept and strive for sustainable resource exploitation. Regrettably, the world isn't perfect; planning is often guided by economic motives and power play by influential sectors. This is where environmental assessment has to play its legally defined role in making sure that human development doesn't go beyond the boundaries of what an area can sustain, making sure that winners do not take all but also care for the losers, and making sure that potential problems are not exported to other areas and people, or towards the future. Evidently, this is the SEA practitioners' ideal world; practice again is less ideal.

**Why not simply do it?** So I end with a plea to integrate ES in SEA. The definition of working principles and practical steps hopefully invite practitioners to make effective use of ES in their day-to-day work. The ES concept is clearly defined, the SEA process instrument is there, available scientific and local knowledge usually are sufficient to set criteria for sustainability and compare alternative development options and with the application of a precautionary approach there are no reasons not to make a start with it.

## Notes

1. 'Sustainable' may be interpreted in its broadest sense, including the three traditional pillars of sustainability, i.e. environment, society and economy, and the two additional pillars often cited, i.e. technology and institutions, but may also encompass resilience, inclusive development, green growth, climate smartness, or adaptive governance. This to emphasise the need to step away from semantic discussions and focus on the matter itself: how to move towards a better life for present and future generations in a world where complex and wicked problems render the future unknown and unpredictable and where we can only define alternative pathways towards sustainability on which we 'learn' our way forward (a phrase I borrowed from resilience theory; Slootweg & Jones 2011).
2. **Distrust.** Within the nature conservation community the concept of ecosystem services is increasingly distrusted as it is considered part of the neo-liberal economic agenda. Biodiversity is commodified by attaching a monetary value to everything. Even though many conservationists recognise the value of the concept, they see that in reality often only marketable ecosystem services are valued. Rare species hardly represent important ecosystem services (only those with high touristic value), as services are provided by dominant and abundant species. The insurance value of having many species (enhancing resilience!) cannot be discounted for as long as the application of discount rates give these long-term and overwhelmingly important values a net present value of virtually zero.
3. This issue has partially been recognised by the German ValuES project. They created a database of ES assessment and valuation tools, accessible through a number of practical, sector-wise entry points and purposes (see the online database: http://www.aboutvalues.net).
4. In an inventory of knowledge brokerage institutes for climate change Reinecke et al. (2013) found that legitimacy, i.e. the perceived fairness of knowledge brokerage processes, is the least articulated attribute and is clearly subordinated to concerns of saliency and credibility in most analysed knowledge institutes.
5. Berghöfer et al. (forthcoming) propose the more accessible term 'relevance'; in this paper I will stick to the original 'salience'.

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