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# Ecosystem services for connecting actors – lessons from a symposium

**Abstract:** This paper is a communication from the corresponding symposium at the Global Land Project Open Science Meeting, Berlin, March 2014. We explored the assumption that the ecosystem services-(ES) concept has the potential to support communication and collaboration between actors in land use planning. If true, the concept could facilitate collaborative planning processes. We analyse how to evolve a planning context in which governance networks at the local landscape level gain importance in decision making, while the central government delegates power. From case studies presented during the symposium we learned that the ES-concept has been explored for application in local land use planning around the world. However, whether ES are recognized as a useful planning concept depends on individual actor preferences and cultural and contextual factors, such

as the actual nature-human relationship and gender differences. Also, successful application requires the support of novel assessment, design and visualization tools, which are designed to foster collaboration and social learning. The potential of the concept to contribute to collaborative relationships needs further investigation.

**Keywords:** Local land use planning, community-based learning, governance networks, market mechanism, individual and cultural variation, perception of value

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## 1 Introduction

The concept of ecosystem services (ES) has the potential to develop as a basis for integrative assessment approaches that foster a shared focus on common values provided by ecosystems [1,2]. Beyond its usefulness for assessing values of natural assets in land use systems, the ES-concept (as well as the related landscape service concept as proposed by Termorshuizen & Opdam [3] has the potential to be used as a reference for collective action. Therefore it may support decision-making about balancing landscape values and vision building in social-ecological systems [4,5]. Ruckelshaus et al. [6] have analysed the use of the ES-concept in a series of spatial planning cases in which decisions were primarily made by governments. Although they conclude that the ES-concept definitely has potential to influence investments and development around the globe, our insights into how the use of ES affects decision-making are still in its early days.

In this paper, we draw upon a session held during the Open Science Meeting of the Global Land Project in Berlin, March 2014. In this session, “Ecosystem services for connecting actors”, we explored possible answers to the question: How do ES connect people in land change processes and facilitate collaborative action for common

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values? We recognized that although most land-use planning approaches make use of target systems that show parallels to the ES-concept [7], the concept as such is not yet widely applied in planning practice [5,8]. Possible reasons for this lack of acceptance, such as differences in terminology, the emphasis on existing assessment methods and economic values, and the dominant scale of application, have been suggested [3,9], or explored in interviews with practitioners [10].

Several authors have suggested that the ES-concept has a potential to facilitate land-use planning and landscape governance. Arguments have been based on assumptions that the concept would facilitate knowledge exchange between actors, connect actors at different levels of spatial and governance scale, help to balance between private and common needs or build consensus about planning objectives [11, 12]. Also, the added value of using ES in land-use planning has been associated with revealing multiple benefits and trade-offs of land change decisions at the micro-scale and macro-scale [13,14]. Due to the fact that most ES depend on the spatial configuration of landscape elements and land-use patterns, the concept may help individual actors to understand how actions on their properties may contribute to common landscape level benefits ([3,15]. Because of these benefits, the ES-concept has a potential advantage in collaborative approaches for common goal-setting and finding acceptable and effective solutions that match the local landscape context. These new planning approaches require scientific tools that foster integration of disciplinary knowledge, the development of social networks, collaboration at the landscape level, use of local knowledge and social learning [16,17]. Such steps towards operationalising the ES-concept are addressed as part of recent research undertakings, e.g. OPERAs (<http://operas-project.eu>) and OPENNESS <http://www.openness-project.eu>)

Fifty to sixty people attended the symposium, where 10 short talks were presented addressing new challenges in ecosystem service research. In order to take full benefit of the potential for the ES-concept to connect actors and facilitate collective action, it is essential to learn from cases where this concept was used. We first summarize the symposium planning context. We developed the symposium starting with basic topics regarding use and awareness of ES, then focusing on the required level of knowledge to apply ES in collaborative planning and the availability of adequate frameworks and tools, and finally discussing the role of the ES-concept in fostering collaborative relations. The reason for this sequence is the assumption that the ES-concept needs to be understood and adequately supported by scientific tools in order to facilitate collaboration between different actor groups.

## 2 The planning context for using the ES-concept is changing

The audience acknowledged that most ES research to date is focussed on conservation issues and application at the international and national policy level. One popular current topic concerns mapping the actual provisioning of services, while others consider impact or policy assessment methods and economic valuation. Such work is reported to have an impact on policy agendas and policy planning [18,19]. This impact cannot be regarded as independent of how scientists are engaged in the policy processes. Based on a comparative analysis of cases, Ruckelshaus *et al.* [6] concluded that the way how scientists interact with policy makers is often of greater importance than the quality of information and tools brought to the interactions.

However, the planning context for applying ES information is changing. Policy is shifting from hierarchical implementation with the government as a powerful actor towards multi-actor governance modes [20]. As governments identify the need to decentralize their power and responsibilities to lower governance levels (e.g. EU Water Framework Directive; [21]), the mandate to more intensively involve local actors in planning to increase acceptance and support grows. For example, in the participatory democracy of Switzerland, an ES-based tool has recently been developed to support a collaborative planning processes for implementing a revision of their spatial regulation law ([www.palm.ethz.ch](http://www.palm.ethz.ch)). Governance concepts such as adaptive management, adaptive co-management and community-based environmental planning [22,23,16] advocate active roles for local land owners and users in decision-making about preferred future landscapes and measures to develop these roles.

For the application of scientific information about ES, this shift in planning means a change of end users from governmental administrators towards land owners, managers and a wide range of potential users. Also, it means a change of the character of the planning process the information has to contribute to, and of the level of spatial scale of planning [17]. Cooperation between a variety of actors involved in land management, including citizens, farmers' collectives, municipalities and enterprises, becomes a key issue. This governance change brings up questions about the added value of using the ES-concept as a conceptual model in land use planning [24].

A German case study (presented by Albert) showed that a differentiated analysis of provided cultural ES,

recreational infrastructure and the actual use of cultural ES delivers information complementary to what the standard methods of land use planning tend to provide. Innovative aspects are, for example, an eased identification of places in need for planning interventions, the introduction of benchmarks in the planning process, and an approach for trade-offs between planning alternatives. These aspects are a potential advantage from the point of view of developing a shared vision of priorities to adapt the landscape to future needs. La Rosa's presentation focused on experiences of the use of ES in Italian urban planning processes, highlighting the limited integration of ES. According to a web-based review of land-use plans in Italy, ES have been integrated in a few Strategic Environmental Assessments for local land-use planning and in a couple of regional planning laws, but without relevant and tangible examples. He suggested that particular issues for these urban landscapes, such as the high pressure from private land owners, the limited financial resources by local municipalities and the need of fine scale decisions about land-use assets, might make the use of ES-concept more challenging. He called for a more wide inclusion of the ES-concept in regional planning laws and the integration of different land-use planning tools (e.g. Transfer of Development Rights, Incentive-based approaches for managing urban growth and/or protect open spaces as ES providers) to achieve more efficient results in urban planning contexts [25].

### 3 Awareness and understanding of ES

The use of the ES-concept in collaborative land use planning is still in its early days. A case study in Waterloo Region, Ontario, Canada, reported by Parker, highlights the potential for the ES-concept to enhance communication and increase support for measures that protect green infrastructure and the provision of ES. The Region has designed policies to address several management challenges: storm water management fees and incentives programs, tree removal to control tree canopy damage from the Emerald Ash Borer, protection of agricultural land and endangered species, and land-use planning and growth controls to protect ground-water recharge. Although these programs protect ES, the concept is not invoked. Lively public debates around these programs centres on how to evaluate trade-offs between these competing goals to allocate increasingly scarce budget resources. Although scientifically grounded information enters these debates, a clear voice for the public good aspects of ES values is absent. Use of the ES concept might

well enhance the perception of stakeholders value of the protected resources and provide a conceptual framework for evaluating trade-offs between them. The concept is increasingly used at the provincial level at the Ministry of Natural Resources, with staff reporting that its use enhances their ability to argue for resource protection.

Various factors may inhibit the introduction of ES in land use planning. One reason for not actively demanding ES was suggested by Termorshuizen and Opdam [3], who argued that the term ES was associated with conservation and protected nature. They suggested the term landscape services for use in collaborative planning. The terminology used in local applications needs to be adapted to the context, and the language must be chosen carefully to pick-up the stakeholders starting from their socio-cultural context. During the symposium, Schmidt and Walz reported that values differed notably whether visitors to the Pentland Hills Regional Park in Scotland were asked about their personal values of ES or shared values for society. Local actors were well aware that the landscape provides specific regulating, provisioning and cultural ES and valued all these services highly when asked for the shared/societal value. Local actors gave lower values to regulating and provisioning services, when they were asked about personal values and the benefits they obtained from the Pentland Hills. Benefits received through cultural ES for the near-by citizens of Edinburgh distinctly dominated the overall valuation, with a clear emphasis on services that supported both well-being through physical exercise and nature experience.

Whether potential services are recognized as important may also depend on the cultural background and economic development of a community. Explorative research in West Africa, reported by Kleemann and Fürst at the symposium, about the recognition of the concept among planners, agricultural consultants, scientists and policy makers raised a lively discussion about the use of the ES-concept as such and how it is operationalized in land use planning. It was questioned whether the absence of the recognition of cultural services was due to the way the concept was introduced or due to limitations to recognize the concept as legitimate by a society that suffers from sincere daily survival pressures. By contrast, in the Pentland Hills Scottish community reported on by Schmidt and Walz, the personal value attributed to cultural ES was high, not only among regional experts but also among the local population. This reflects very well the actual use of the Regional Park and the benefits it provides for the city of Edinburgh and its surroundings.

Another aspect to consider when organizing collaborative stakeholder processes is that the

recognition of and preferences for ecosystem services are dependent on personal characteristics. A study presented by Villamor in South-East Asia and West-Africa revealed in particular the impact of gender differences. Such gender specificity in response to land-use options, agents and desirable goods or services has so far received little attention [26].

These examples show that the recognition of and preferences for ES in collaborative planning processes depend on how the information is framed in relation to the variable mind sets of actors. The formulation and terminology used is conditional on the role which the ES-concept plays in connecting actors. While this seems to be pivotal to the application of the ES-concept, little is known about how ES-based information is understood by actors with different background and interests.

## 4 Frameworks and tools

Evidently, the current focus in ES-research is on its application in policy and conservation planning [27]. Recent publications have advocated the development of ES-knowledge and tools towards application in multi-stakeholder communities at the local landscape level [17]. For example, von Haaren *et al.* [28] discussed the suitability of current ES approaches in environmental planning and decision contexts at the local and regional scale and proposed an adapted ES cascade for improved application. It was also recognized that, while socio-cultural services are rated as highly important in enquiries among landscape users, this category of services only recently became better represented in scientific analysis [29,30,31].

With respect to tools that support such market based planning processes, the diagnosis and valuation tools which are produced in the mainstream of ES research [6] need to be scaled down and specified to individual stakeholder perceptions of value. Liu and Opdam [32] argue that the perception of values is created through a social process, which means that valuation tools have to be flexible enough to foster the evolution of value perception in the course of the planning process and thereby facilitate collective learning. The need for novel methods that foster social interaction in multi-actor groups is not limited to assessments, but should also consider different phases in the planning process in which common vision building and problem-solving approaches are important. An example of such an approach was given at the symposium by Grêt-Regamey in the frame of a collaborative planning process for rehabilitating the Ciliwung River in Jakarta,

Indonesia [33]. In a first step, preferences of location and water-related ES values were assessed in a discrete choice experiment. The expressed ES-preferences were linked to computational parametric design methods with hydrodynamic models providing design outputs that were readily accessible to stakeholders and members of the public.

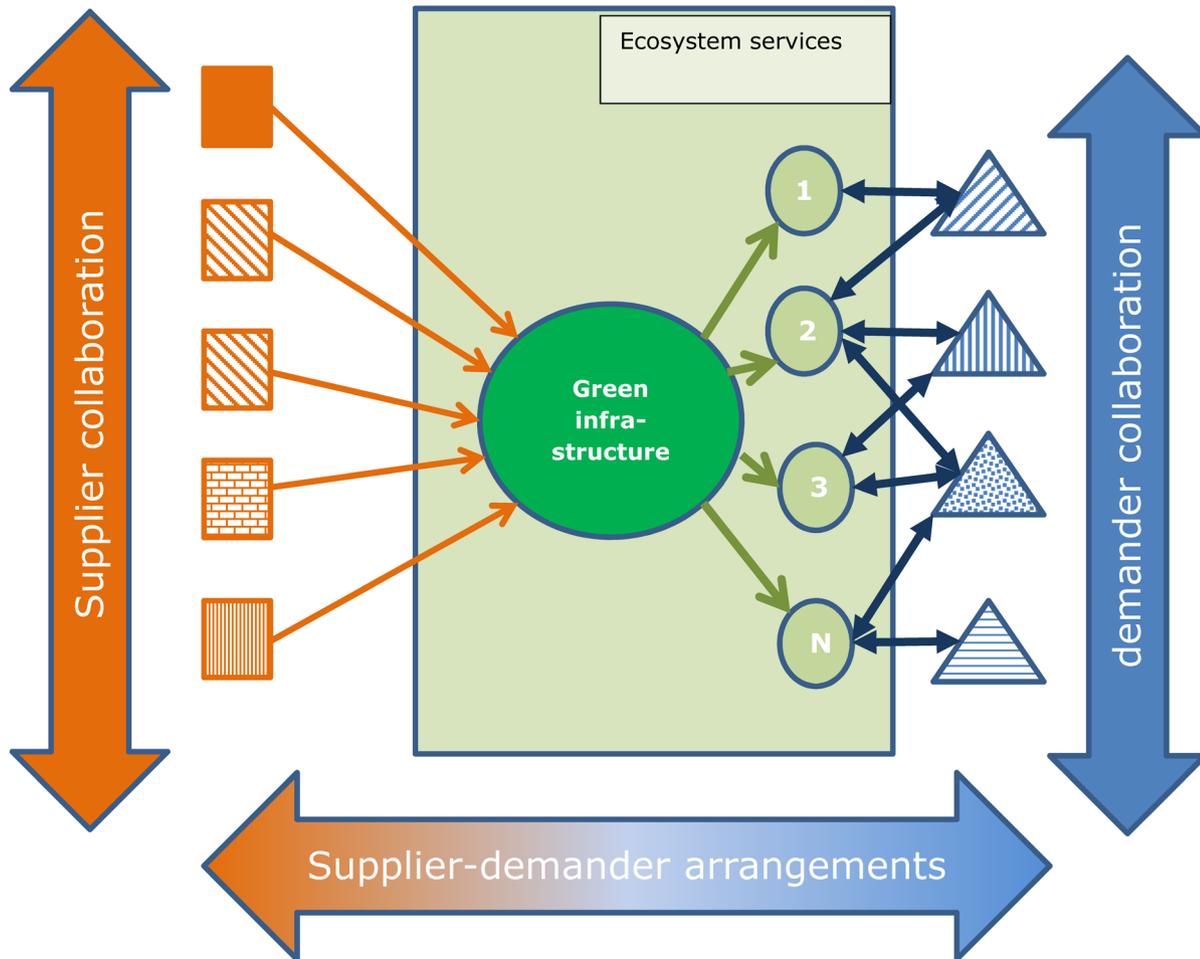
## 5 Enhancing collaboration

Does the ES-concept enhance collaboration if information about ES is understood as relevant and legitimate by local actors, and application is supported by participatory methods? Does it serve as an umbrella for people with widely different interests to discover shared interests of the functioning of the landscape to foster communication and collaboration? This potential power of the concept in social interactions has not yet been investigated systematically.

A possible issue to explore is the role the concept could play as a boundary object [34,35], because it can be given different meanings by actors with different backgrounds and mind-sets, but still serve as a common ground in discussions and negotiations. Such a role was found in an analysis of three Dutch case studies by Opdam *et al.* [36], a role supposedly accentuated by linking the ES-concept to a second concept “Green infrastructure”. Green infrastructure is the network of (semi-)natural landscape elements, which serve as a common object of physical landscape adaptation. Collaboration was observed in the various phases of the planning process: problem analysis, goal setting, developing solutions and implementation. The study also concluded that the application of the ES-concept was linked to the participatory approach and tools that researchers have applied. At the symposium, this dependency on the way the information is presented and integrated in collaborative planning activities was highlighted by Grêt-Regamey. 3D visualizations were integrated into interactive collaborative platforms and assisted in making urban ecosystem services trade-offs explicit for sustainable urban planning [37].

During the symposium, Opdam presented a conceptual model for analysing collaborative relationships in local communities involved in landscape adaptation, suggesting that such a model can be used as the basis of a role-playing game to support the planning process.

This model is based on the assumption that actors consider the landscape as a social-ecological system that can be managed to supply ES in response to a demand



**Figure 1:** Representation of a virtual social-ecological governance network. Ecosystem services (represented by circles with numbers) link the physical network (green infrastructure) to the values preferred by different demanders (sometimes called beneficiaries), which are the users of the landscape (represented by triangles on the right hand side). Demanders may make arrangements with suppliers of services (land owners, represented by rectangles on the left hand side) to adapt the green infrastructure of the landscape in order to enhance the provision of demanded services. Demander and supplier are roles that actors play. Sometimes one actor plays two roles simultaneously, for example if a farmer demands an increase in pollination service.

for ES-benefits, thus creating a market mechanism of demand and supply. This means that in the social network two roles are to be distinguished: to benefit from using services (demander) and to manage and adapt the provision of services to the demand (supplier) (figure 1). Based on this view, three types of ES-driven collaborative interactions may be established within the social network: firstly, interactions between demanders and suppliers, including negotiations about payments for delivering ES. Secondly, a collective demand for ES. If demanders discover they all benefit from adapting the green infrastructure, their collaboration creates a stronger and economically more promising pull factor for land owners to respond to the demand and adapt the

landscape. For example, developing green infrastructure to produce biomass for energy production in a local industry might become economically more profitable if the green infrastructure also ensures a more reliable pollination service (e.g. for growing better strawberries) and improves the attractiveness of the landscape for visitors. A third type of interaction follows from the need to manage ES from a landscape perspective. Raising the level of service provision in response to a demand often requires that land owners coordinate the management of their properties at the landscape scale. For example, the level of species diversity required for a reliable pollination service can only be established in landscape wide areas.

## 6 Conclusions

The reports presented at the symposium suggest that the added value of applying ES in collaborative planning processes can only be understood in relation to the context of the planning case and the methods applied in the planning process. We summarize the insights from the symposium by the following four conclusions.

- Ecosystem services as such have reached the perception of planners and policy makers in most world regions. However, an unexplored potential of the concept is its role in collaborative land use planning where decisions about landscape development are primarily made in multiple-stakeholder governance networks.
- The role of the ES-concept in multiple-actor planning processes depends on the framing of the information in connection to actors' cultural backgrounds and personal characteristics.
- Using the ES-concept in planning reveals the connection between personal values and public goods (see also [24]) and highlights roles that actors play in the planning process.
- Developing the role of ES in land use planning requires new insights in how actors understand the concept and respond to perceived benefits, and how the concept bridges different mind-frames of actors to facilitate collaboration and social-network building. New interactive methods, for example for valuation and design, may help in developing such insights.

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