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Local action for the common good

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Session: D6a-30

Title of session: Value integration in ecosystem service science and policy

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Short description of the session

Value Integration is the challenge of consistently combining a diversity of value systems in resource use decisions. An effective ecosystem service assessment includes the multitude of values of nature, taking into account local and planetary boundaries of natural resource use. The central aim of ecosystem service assessments is to raise awareness and inform decisions on more equitably spread benefits and burdens from the use of nature within and across societies and generations. Valuation methodologies and allegedly neutral technical choices affect the representation of equity, efficiency, ecological sustainability and procedural legitimacy in the final outcomes and hence the entire concepts' effectiveness to produce sustainability and environmental justice. In our session we would therefore focus on the integration of these aspects.

Additional information

Workshop of the TWG 6D Value Integration, in cooperation with the OpenNESS project

Planned Output

During our session at the ESP conference in Costa Rica, our working group aims to gather building blocks for development of a critical evaluation framework for the effectiveness of ecosystem service assessments

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		Australian National University	benefit of sustainable land management
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Presentation abstracts:

ID: 77

Type: Voluntary contribution

30. Value integration in ecosystem services science and policy (OPEN)

Evaluating social sustainability of regional communities affected by major gas projects from an ecological economics perspective

Presenting author: Anna Phelan

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Exploration and development activity in the coal seam gas (CSG) sector in Australia has grown rapidly over the last ten years, and continues to be at the forefront of Queensland's petroleum industry. Regional and rural communities, especially the ones that underpin the resource sector, experience various pressures as the result of rapid economic growth associated with major resource and energy projects. Studies examining the relationship between the resource sector and regional communities have confirmed that better understanding is required about the socio-cultural dynamics at the local level, and how cumulative impacts of major industrial projects are contributing to variations in community well-being over time.

This paper examines how the scale and speed of development of CSG megaprojects in the predominately agricultural region of Southeast Queensland is influencing quality of life and social sustainability of the affected communities. Identifying and responding to internal and external social and institutional variables that determine whether benefits and costs of economic growth are equitably distributed is central to achieving social sustainability. Drawing on a case study of the communities in the Surat Basin, social sustainability was evaluated using a survey method and semi structured interviews. The evaluation framework was guided by the understanding that the capacity to improve quality of life is dependent on all four capitals and their systemic interaction, and that investment in one capital will not compensate or substitute for lack of investment or loss in another. The criteria of the questionnaire were grouped into five categories based on key components of social sustainability. This paper discusses the overall results as well as results obtained in particular categories. The findings suggest that key aspects of social sustainability in the affected communities are under sustained stress, and that the resulting externalities associated with depleted social and natural capital, may potentially lead to long term community vitality and community capacity implications.

Keywords: social sustainability, quality of life, externalities, major projects, community well-being

ID: 109

Type: Voluntary contribution

30. Value integration in ecosystem services science and policy (OPEN)

Human preferences towards biodiversity and ecosystem services: a comparative analysis of monetary and non-monetary valuation techniques

Presenting author: Berta Martín-López

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The non-monetary valuation of ecosystem services is one of the current scientific challenges in ecosystem services science. In fact, different non-monetary methodological approaches have been recently applied to identify human preferences for ecosystem services. However, to our best knowledge, no previous study has compared the outputs of monetary and non-monetary techniques for determining their specific contributions in estimating the social relevance of ecosystem services. In this context, the main objective of this study is to compare the outcomes obtained through stated-preference (monetary) and ranking preference (non-monetary) methods for determining social preferences towards biodiversity and ecosystem services. We performed a social survey using face-to-face questionnaires where preferences towards species, landscapes, and ecosystem services have been elicited in three different social-ecological systems: Doñana protected area (south-west of Andalusia), semi-arid watersheds (south-east of Andalusia), and transhumance landscapes associated with the Conquense Drove Road. The environmental entities studied were the existence value of species in Doñana and of landscapes in semi-arid watersheds, as well as ecosystem services in semiarid watersheds and the Conquense drove road. Data about preferences towards: (1) species in the Doñana case study ($N = 649$) were collected from February to October 2004; (2) landscapes and ecosystem services in the semi-arid watersheds ($N = 381$) were gathered between May 2009 and February 2010; and (3) ecosystem services provided by transhumance-related ecosystems ($N = 381$) were sampled from May 2009 to March 2010. A Spearman correlation test was performed to explore the association between willingness to pay (WTP) metrics and ranked preferences for each of the environmental entities. Finally, we explored the association between WTP and ranked preferences considering different stakeholders: (1) local actors, (2) tourists, and (3) environmental professionals.

The results showed that there is a strong association between WTP and ranked preferences for each of the environmental entities for the overall sample, but also considering specific stakeholders groups. However, we found differences among stakeholders groups regarding social preferences towards species, landscapes or ecosystem services, using either monetary or non-monetary techniques. These results can contribute to the debate on monetary vs. non-monetary valuation of biodiversity and ecosystem services through the identification of their strengths and weakness on the basis of real data from different ecosystems and considering a diverse spectrum of environmental entities and stakeholder groups.

ID: 158

Type: Invited speaker

30. Value integration in ecosystem services science and policy (OPEN)

Value integration in ecosystem service science and policy – Introduction

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Value Integration is the challenge of consistently combining a diversity of value systems in resource use decisions. An effective ecosystem service assessment includes the multitude of values of nature, taking into account local and planetary boundaries of natural resource use. The central aim of ecosystem service assessments is to raise awareness and inform decisions on more equitably spread benefits and burdens from the use of nature within and across societies and generations. Valuation methodologies and allegedly neutral technical choices affect the representation of equity, efficiency, ecological sustainability and procedural legitimacy in the final outcomes and hence the entire concepts' effectiveness to produce sustainability and environmental justice. In our session we would therefore focus on the integration of these aspects.

The session presentations shed light on social, ecological, and economic implications of valuation choices, or demonstrate integration of different value systems in local case studies, specific methodological assessment steps or implementation. With this session, the working group aims to gather building blocks for development of a critical evaluation framework for the effectiveness of ecosystem service assessments. The session builds on contributions from many WG members (<http://www.es-partnership.org/esp/81931/5/0/50>)

ID: 170

Type: Voluntary contribution

30. Value integration in ecosystem services science and policy (OPEN)

Integrating Ecosystem Services: Accounting for Natural Capital and Return on Investment Analysis

Presenting author: Nora Wahlund

Other authors: Lola Flores, Dave Carlton

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Investing in natural capital for the conservation of ecosystems can diminish the risk posed by future erosion and climate instability, avoiding expensive mitigation expenses for cities, counties and ultimately tax payers. Economic valuation can inform policy development and implementation, which are applicable to decision-making at every jurisdictional level.

Accounting for Natural Capital–Thurston County

Earth Economics valued Thurston County's natural capital, an essential asset to both economic development and quality of life. The natural capital of an ecosystem consists of its structural components including forests, riparian buffers, wetlands and prairies among others; all providing economically valuable and quantifiable services. By reducing the frequency and severity of floods, supplying water, and providing waste treatment, Thurston County ecosystems provide between \$608 million and \$6.1 billion in economic benefits to the regional economy every year. With the passage of Thurston County's Critical Areas Ordinance (CAO) update in 2012, and the resulting increase in natural areas that will be conserved, the contribution of these natural assets annually will range between \$7.7 million and \$198 million.

Return on Investment–Pierce County

Earth Economics worked with Pierce County Surface Water Management to quantify the value of several land use regulations and capital projects designed to mitigate long-term flood damage. Those regulations are Channel Migration Zones, Compensatory Storage Requirements, and Deep and/or Fast Flowing Floodways. Earth Economics also worked to put a dollar value to the derived ecological benefits that would have accrued at each case study location had current regulations been in place at the time development began. Greater investments in natural capital throughout the Puyallup Watershed could result in substantial returns on investment both locally and downstream in the lower reaches of the watershed where both urbanization and flood risk is greatest. The returns will be measured in ecosystem services, dollars, health, and social benefits. However, there is no single solution to flood risk reduction. A combination of built structures, natural systems and social actions (such as warning systems and land use planning) are the most efficient and effective ways to provide flood protection and build a healthy and prosperous economy. It is important to determine the right level of investment and balance between built structures and green infrastructure. The results of our case studies will be presented along with suggestions on how to use the results to better inform public decision-making.

ID: 211

Type: Voluntary contribution

30. Value integration in ecosystem services science and policy (OPEN)

Reconciling views and values of Ecosystem Services for sustainability? – Thoughts and tools from the Belgium Ecosystem Services community of practice.

Presenting author: Nicolas Dendoncker

Other authors: Jacobs Sander, Keune Hans, Boeraeve Fanny, Boerema Annelies, De Vreese Rik, Devillet Gwenaël, Dufrêne Marc, Fontaine Corentin, Goethals Peter, Janssens Lieve, Landuyt Dries, Liekens Inge, Lord-Tarte Evelyne, Peeters Alain, Popa Florin, Turkelboom

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This paper builds on the outputs of the book “Ecosystem Services – Global Issues, Local Practices” (Jacobs et al. 2013) with contributions from more than 80 authors from the BEES (Belgium Ecosystem Services) community of practice. In this context, we recently performed a (non-exhaustive) review of how the ecosystem service (ES) concept could be useful to Belgian and international policy actors. As the ultimate goal of ES valuation is to improve the well-being of every individual now and in the future (MEA, 2005), this paper intends to elaborate on the concept of ES valuation and how it could (not?) reach the intended goal.

A clear tension appears between policy actors’ desire to acquire tools for monetary valuation and the risks posed by monetary valuation (e.g. commodification of nature, neglect of other values...). On the one hand, there is the need for ‘proof of concept’, and the availability of economic tools and mainstream character of ‘money talk’ is a pragmatic choice. On the other hand, we note a strong reluctance and critical attitude towards the culture of ‘math and money’ at all levels: it is perceived as one of the main causes of social and ecological unsustainability. Several actors therefore urge for more collaborative approaches of ES valuation, e.g. to build trust between providers and beneficiaries, as monetary valuation alone is not relevant in their working context.

Among the suggested solutions are the development of alternative new valuation methods and practices – amongst others using social debate and including relations between humankind and nature – as well as methods to integrate different types of values (e.g. economic, heritage, and biodiversity value) in decision making. In particular, several actors point out the necessity to account for environmental thresholds and ecological values, to be more explicit about the socio-ethical assumptions underlying the expressed values, and to deal with uncertainty, ambiguity, and complexity in decisions and actions. In the first part of this paper, we expand on the main outcomes and challenges, while in the second part we assess how these challenges are dealt with in current cases. Finally, we propose a valuation framework that accounts for pluralistic values to better and more transparently inform decision-making.

ID: 249

Type: Voluntary contribution

30. Value integration in ecosystem services science and policy (OPEN)

Bottom-down with values – a conceptual framework for mapping values and ecosystem services of an urban pond in Helsinki, Finland

Presenting author: Kati Vierikko

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Sustainable storm water management is one of key urban policies in the European Union and at national level in Finland. Increasing population in cities and global climate change put major challenges on the management of urban storm waters. Small urban aquatic ecosystems (ponds, brooks) are important, because they support human health and well-being by regulating storm waters and providing restoration experience. Contributions of ecosystems, which arise from interaction of biotic and abiotic processes benefit society, and are called ecosystem services. Ecosystem service approach represents mutual interactions between social and natural systems. Commonly interlinks between nature and human has been illustrated by the cascade model, in where ecosystem deliver services to society who benefits and finally values these contributions. Despite the anthropocentric character, ecosystem service approach often fails to give appropriate weight to socio-cultural values. Many authors agree that ecosystem service assessment underestimates intangible, non-use or non-economic values. In this presentation we will discuss about socio-cultural values of urban ecosystems and how they are interlinked with ecosystem services. We studied a local environmental conflict related to storm-water management plan in Helsinki, Finland. The research was performed by using qualitative research methods. Stakeholder groups (local residents, managers and political decision-makers) expressed totally 47 perceived values related to the brook Kumpulanpuro and the park Vallilanlaakso. We divided values into four types: 1) use and experience, 2) existence, 3) symbolic, and 4) bequest and moral. We found great differences between value systems of locals, managers and politicians. Managers held abstract negative values towards the park, while locals held symbolic values more commonly. Exhaustive value mapping could help to identify mutual values and understand disagreements between stakeholders. Based on our results and earlier conceptual papers, we call for transdisciplinary adaptive urban planning by using the ecosystem service valuation framework. Often local protests towards developing projects or management of green area are seen in negative light by considering them as NIMBY. Instead of dismissing plurality of meanings and values that emerge from strong place identity, we call for Sustainable management of Place Attached Meanings (SPAM) as a part of techno-economic planning of urban ecosystems. We argue that strong place identity of citizens supports the goal of resilience of urban socio-ecological systems.

ID: 329

Type: Voluntary contribution

30. Value integration in ecosystem services science and policy (OPEN)

Integrating the concept of ecosystem services in the Province of Antwerp: the inland dunes project.

Presenting author: Hans Keune¹

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The province of Antwerp until recently did not explicitly apply the concept of ecosystem services in its practice. With an ecosystem services based process on landscape planning in the area of the inland dunes this will be tried for a first time. The inland dunes project is situated on the territory of the municipalities of Balen, Mol, Meerhout, Geel. The identity of the area is closely linked with the inland dunes and the watercourses of Molse Nete and Grote Nete (special protected areas of European importance) embedded in a dense landscape with lots of small-scale landscape elements as tree rows, hedges, and cultural heritage elements as windmills, watermills, chapels and homesteads. Currently the inland dunes are mostly covered with 50–70 year old pine trees. Choices are to be made for the future land use and management of the inland dunes. 80% of the woods are in private ownership. The forest owner's organization, Bosgroep Zuiderkempen, requested for a policy framework on forest management. This bottom-up demand anticipated to the Province of Antwerp's policy on landscape and green infrastructure, inspired by the European Landscape Convention. The Province of Antwerp's targets are the enhancement of the environmental quality and the community-based development of integrated visions on a multifunctional use of green infrastructure on a regional scale.

The challenge for the inland dunes area is the development and implementation of a future scenario for the inland dunes and surroundings. A scenario for the preservation and quality enhancement of the inland dunes and sustainable multifunctional use of the inland dunes. A scenario optimizing the ecosystem services needed and creating value out of the ecosystems delivered by the inland dunes.

The scenario building will be based on an analytical deliberative process: a combination of top-down expert assessment and bottom-up stakeholder deliberation. All relevant stakeholders will be involved. In this process the Province of Antwerp will be supported by the Research Institute for Nature and Forest (INBO) and the University of Antwerp.

Spatial alternatives will be designed, based on an analysis of the landscape (ecology, connectivity for species, archeology, ...), and on the input coming from the stakeholder deliberation. The design of spatial alternatives will be underpinned by analysis and mapping on the optimization of provided ecosystem services. New opportunities will be searched for in new alliances between green infrastructure and local economy, cultural heritage, tourism

and recreation and win-win situations between green infrastructure and businesses. The valuation of ecosystem services will underpin these assessments.

ID: 370

Type: Voluntary contribution

30. Value integration in ecosystem services science and policy (OPEN)

Framework for integration of valuation methods to assess conservation policies: methodological approach to using 'hybrid' valuation methods in the assessment, design and implementation of incentive-based conservation policies.

Presenting author: David N. Barton

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Introduction

The EU Biodiversity Strategy 2011–2020 marks a broadening in the objectives and structure of biodiversity conservation in Europe, following the broadening of the objectives of the Convention for Biological Diversity (CBD) at the 2010 Nagoya Conference of Parties. Next to the strict conservation of biodiversity, ecosystems or natural capital, the sustainable use of that capital, and the services that are produced by and with that capital, have become a central pillar of policy development. In Europe that implied that Natura 2000 ambitions, incorporating the Habitat and Bird Directives, but also relying on other environmental quality directives, will be extended. The extension refers to multiple sustainable use of the protected areas and to the development of so called green infrastructure in agricultural and forest lands, as well as fresh water and marine (coastal) ecosystems.

Such major shifts in European policy has already shown to affect land use planning at national, regional and local scale, and together with an increasing awareness of the social and economic importance of healthy natural systems, this has led to a demand in the EU policy circles, and in some Member States, for more up to date decision support tools. The knowledge produced in the science community about the causal relationships between the ecosystem condition (the health of the natural capital) and about the methods to involve different disciplinary fields must be mainstreamed into land use planning and economic decision making. With an increasingly more aware and better educated population, mechanisms must be developed to create democratic support for such economic and social changes. An essential step in decision processes is to put values on the relative importance of natural capital and the services it produces for all parties involved.

The EU FP7 OpenNESS project examines these changes, focusing on operationalising the concept of ecosystem services in the context of EU legislative frameworks. As part of this

project, this paper presents the design and potential effectiveness in national and regional land use planning of a hybrid valuation framework that combines monetary and non-monetary valuation methods to address multiple value dimensions in environmental, land use and biodiversity, and therefore economic policy.

The ambition

TEEB (2010) indicates a need to evaluate the capacity of conventional economic accounts to “capture” the value of ecosystem service in view of alternative valuation methods and the requirements of different EU policy contexts. In the EU Biodiversity Strategy, this ambition is the last of three steps in of Action 5 under Target 2 (*By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems*). The title of Action 5 is: Improve knowledge of ecosystems and their services in the EU. It is defined as: *Member States, with the assistance of the Commission, will (1) map and assess the state of ecosystems and their services in their national territory by 2014, (2) assess the economic value of such services, and (3) promote the integration of these values into accounting and reporting systems at EU and national level by 2020.* (EC 2011).

The paper illustrates how Step (1) is currently in progress, with a steep learning curve for many of the member states, among others with respect to the complexities of land (and sea) use. Instead of traditional land use maps, showing one ecosystem and implying one ecosystem service, this mapping activity requires identification of the bundles of ecosystem services provided by a single ecosystem, and quantification of the condition of that ecosystem (i.e. its health or level of degradation), to be able to assess the total quantity of services provided in landscapes, regions or the nation. Adequate mapping is a necessary precursor for a sound estimate of the social and economic (including but not only financial) values, which is the ambition of Step 2 in Action 5. In this paper we focus on this valuation step, assuming that the maps will become available and will at some point be adequate.

We address this challenge by first developing a *framework for the hybrid valuation of ecosystem services* rendering information in formats that are *relevant for present (and future) European policies, such as the EU Biodiversity Strategy*. The framework is based on an anthropocentric value perspective, acknowledging the presence of “intrinsic value and rights of nature” notions among many citizens and organised stakeholders. As indicated above, the biophysical quantification of ecosystem condition and goods and services provided is considered necessary to assess the range of policy decisions that fall within sustainable use margins. And in this we employ the hard sustainability definition at the relevant geographical and administrative decision making level, even if in the analysis of spatial scenarios substitution between technological and natural ecosystem solutions and financial compensation for services lost is included, at lower geographical scales.

The state of the art in valuation

Valuation in a decision making context has traditionally been approached via monetary methods, but non-monetary methods have always been included, e.g. EIA scores on species richness, and have gained recognition and impact in the last two–three decades. Monetary valuation methods include valuation based market pricing and production (cost) functions, revealed preferences methods such as hedonic pricing and travel cost techniques, and valuation methods based on stated preferences, such as contingent valuation and choice

modelling approaches, as well as deliberative variants of monetary valuation. Non-monetary valuation refers to the set of qualitative and quantitative methods used to elicit social values of ecosystems that cannot (or may not) be commensurable in money terms. This set of methods include deliberative, discourse-based, and preference-ranking approaches to elicit societal values that cannot be properly measured through monetary estimations. This includes social values shaped by principles or beliefs that may be largely detached from social preferences as expressed in markets. In addition, quantitative, non-monetary, analysis of the energy (and /or material) cost of producing value in an ecological –economic production chain, is being used in some places.

As compared to monetary valuation, non-monetary valuation methods are far less developed and formalized in the ecosystem services literature. Yet, the need to integrate non-monetary values of ecosystem services assessments as explicit inputs for environmental policy is expressed widely in decision practice and a growing number of studies have started to use non-monetary valuation in practical contexts. Different decision-support tools have been developed to aggregate and combine results from valuation methods for priority setting in environmental policy, including cost-effectiveness analysis (CEA), benefit-cost analysis (BCA), and multi-criteria analysis (MCA). However, an operational hybrid framework for integrated valuation of bundles of ecosystem services to inform decision making over a range of environmental policy contexts has not been yet developed.

Potential and options

Although ideas about bundles of ecosystem services and spatially explicit integrated valuation have been around for some years, such a hybrid framework is nowadays more feasible because of the current GIS tools, modelling approaches and state of computing power. This allows more explicit consideration of uncertainty and risk in CEA, BCA and MCA. However, there is also an increasing gap between what tools can evaluate computationally and the data available for such exercises. The more data intensive an approach is, the fewer decision contexts the approach can be applied to. An option to resolve this is “a priori” expert opinion on probabilities, which can be updated by real-world observations, e.g. by integrating scenario analysis and MCA and spatially distributed Bayesian Networks in a GIS platform.

Valuation of ecosystem services may also play an increasingly important role in informing policy analysis and policy instrument design. The link between evaluation and policy instrument design is especially important for the design of economic instruments in conservation policies such as Payments for Ecosystem Services (PES), ecological fiscal transfers, biodiversity offsets and habitat banking as well as damage compensations. This also holds true for processes of environmental liability and damage compensation when environmental conflict ends in litigation.

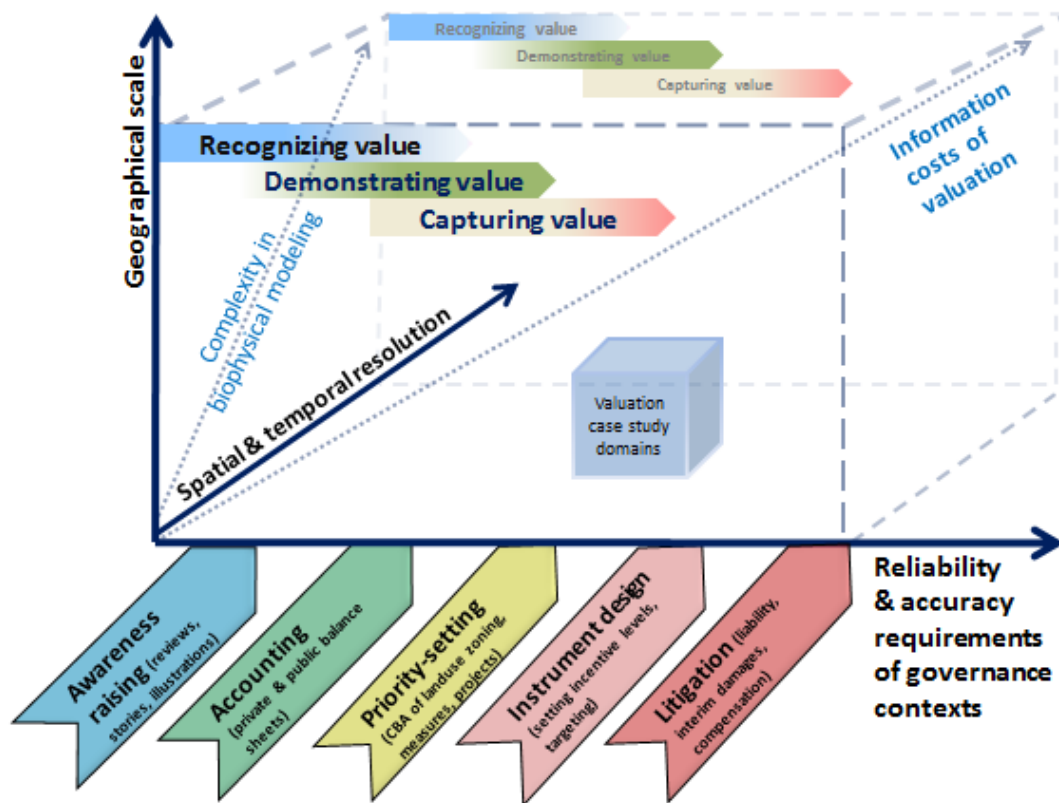


Figure 1. Different policy contexts for the use of valuation results (adapted from (Barton, Lindhjem et al. 2011)). Trade-offs between policy requirements of scale, resolution, reliability and accuracy drive information costs of valuation. Valuation case studies will cover different parts of this state space, e.g. valuation for priority-setting using cost-benefit analysis at a low geographical scale with intermediate resolution (box in figure)

A conceptual framework for the policy contexts of valuation is illustrated in Figure 1. This framework extends the TEEB approach by focusing on ways to ‘capture ESS values’ in specific policy contexts. Individual valuation methods have been used to raising public awareness about the societal value of biodiversity as well as to inform public decision-making on a diversity of social, economic and environmental issues. They may also be used for ‘capturing’ value by integration of ESS in economic accounts. Decision-support tools can be used to ‘capture’ values from valuation methods to support priority-setting using. Policy instrument design can also ‘capture’ values determined by individual valuation methods, e.g. in setting incentive levels. Finally, we will explore how valuation methods can be useful in mediation of conflicts of interest, in evaluating environmental liabilities and in resolving litigation.

Case studies

Case studies are conducted in the OpenNESS project to specify the study designs of monetary and non-monetary valuation methods. We aim to evaluate how valuation design can be made more policy relevant by being more adjusted to purpose, addressing reliability and accuracy requirements of specific uses of the valuation results. Maps of realised and potential ecosystem service supply and demand along with the likelihood of surpluses and deficiencies will inform the information base for trade-off and other decision analyses.

ID: 411

Type: Voluntary contribution

30. Value integration in ecosystem services science and policy (OPEN)

Beyond Anthropocentrism – Biophysical Valuation of Ecological Processes and its Relationship to the Ecosystem Services Paradigm

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‘Ecosystem services’ is fundamentally an anthropocentric concept. Therefore not surprisingly methods for valuing ecosystem services have been based on utilitarian and human-centred ideas of value, to the complete exclusion of biophysical measures of value. Case closed – or is it? Is there any point in pursuing non-anthropocentric methods of valuation? If so, what are the non-anthropocentric methods of valuation that could be used, and how might they be operationalised? Indeed, is it even possible to have non-anthropocentric methods of valuation? These are the questions that will be addressed in this paper, in the spirit of methodological pluralism.

The paper will first of all review the philosophical and theoretical literature that supports the idea of non-anthropocentric (biocentric value), drawing on the debates between ‘deep ecologists’ and other viewpoints, as well as ecological concepts of value which make no reference to human wants or needs. From a more human-centred perspective, the practical rationale for biophysical valuation approaches is also argued. That is, it is argued that economic valuation methods (such as willingness to pay) tend to only capture those values of ecological processes and species that are known and visible. For example, it is well-known that high values are usually ascribed to the ‘charismatic mega-fauna’ (whales, dolphins, penguins) in marine ecosystems, whereas the equally and possibly more important processes, species, and functional groups (phytoplankton, zooplankton) are overlooked and hence are ascribed zero value. From an ecological standpoint these overlooked species are critically important in terms of the functioning of the ecosystem.

The paper will then focus on how ecological processes and species can be valued, from a non-anthropocentric point of view using the ‘contributory value’ concept. That is, how the different species/ecological processes in the ecosystem ‘contribute’ to each other in-so-far as that they ‘receive’ value and ‘donate’ value to each species/ecological process. This contributory value is measured by solving a system of simultaneous equations, which describe the energy and mass flows in ecosystems and food webs. The solution of these equations enables an intensive property akin to ‘prices’ to be determined, with those processes/species with the highest prices having the highest contributory value. The mathematical basis to this methodology has recently been summarised in two articles in the journal *Ecological Modelling* (Patterson, 2012; Patterson, 2014).

Finally the role that this contributory value method can play to understand ecosystem

services values that are not captured by conventional economic methods is evaluated. In this context, it is argued that measuring biophysical value of ecological processes, which support both the well-being of humans and the well-being of other species (aka contributory value), simply: (a) highlights how ecological processes contribute to both human and nonhuman well-being, even though we may not capture these values in conventional economic valuation methods; (b) identifies the 'upper limit' of the value of ecosystem services, by quantifying and comparing the contributory value appropriated by humans and non-human species.

ID: 435

Type: Voluntary contribution

30. Value integration in ecosystem services science and policy (OPEN)

Exploring potential factors affecting the long-term change in the monetary value of coastal ecosystem services: A case in Japanese coastal areas

Presenting author: Takahiro Ota

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Japanese coastal areas have been highly developed after 1950s. For example, tidal flat areas have been reduced by 40% as a sacrifice to economic growth. The sacrifice is mainly due to the lack of holistic and sustainable view by government bodies in charge that were not in coordination and the absence a long-term coastal management plan. This led to a huge loss of valuable coastal areas that used to provide multiple ecosystem services. Hence, it is integral to formulate a long-term coastal management plan for a realization of a sustainable coastal area.

The ecosystem service valuation is a powerful tool for sustainability planning of coastal areas as it supports planner's decision making and priority setting (de Groot et al., 2010). While there are extensive knowledge developed about the valuation methods and discount future value (Bateman et al., 2011), there is little knowledge about the factors affecting the long-term change in values especially for monetary value of ecosystem services. This lack of knowledge is mainly because monetary valuation is implemented to obtain quantified value for informed decision making (Laurans et al., 2013) and it is rarely assessed to check its reliability and validity in the long-term perspective.

This study addresses potential factors affecting the long-term change of the monetary value of coastal ecosystem services through a thorough literature review. The obtained factors will be checked and relevant data will be collected along with two valuation surveys at intervals of 5 years (i.e. 2014 and 2019). The surveys will be implemented in Japanese three coastal areas and it covers four major types of ecosystem services. We explore existing studies related to the long-term value or preference change. The literature review is conducted based on the two categories of the factors: psychological and socio-economic aspects. These can be labeled as two categories: the inner and outer world of the evaluators. We identify possible factors in Japanese context. We also reveal the possible direction of change in monetary value (i.e. increase or decrease). These findings are applied to suggest how to integrate the knowledge into the existing valuation and planning process.

ID: 446

Type: Invited speaker

30. Value integration in ecosystem services science and policy (OPEN)

Farmers' value assessments – a case study from Scania, Sweden

Presenting author: Joachim H. Spangenberg

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Farmers' management decisions are based not only on monetary values, but also on non-monetary ones, on knowledge, habits, traditions and pragmatism. In our qualitative study, we investigated farmers' perception and valuation of (natural) biological control and its pest suppression potential, using aphid infestation on cereals in Scania, the southernmost province of Sweden, as model system. Almost a dozen semi-structured interviews were conducted to investigate motivations corresponding to distinct farm management methods like insecticide use and the implementation of measures to benefit biological control. The interview partners represented three different farm management types (organic farmers, conventional farmers, and otherwise conventional farmers implementing measures benefiting biodiversity). Since the complexity of the surrounding landscape largely influences biological control potential, farms in each group were chosen so that half of them were located in intensively managed open plains, the other half in heterogeneous landscapes with small-scale mixed farming.

All conventional farmers were risk-averse, practicing preventive spraying explicitly for reasons of risk avoidance. None of them based his decisions regarding spraying on an ex-ante cost-benefit analysis CBA comparing potential harvest losses top spraying cost. Besides risk aversion, lack of knowledge (data estimates varied enormously) and unfamiliarity with accounting methods and discounting (never mentioned) may have been additional reasons.

Organic farmers did not undertake a CBA either, but for different reasons: in their business model, insecticide use was no option, and a cost calculation for this non-option recognized as useless. They relied on biocontrol for minimizing pest damage, knowing it would not be avoided completely.

Values mentioned in the interviews include existence, aesthetic and heritage value of natural compounds, hedonic values (self-esteem, life satisfaction, etc.); however, the link to land management practices, and to biocontrol in particular, was not always obvious. In conclusion, valuation must take multiple kinds of values into account, beyond monetary values.

ID: 463

Type: Voluntary contribution

30. Value integration in ecosystem services science and policy (OPEN)

The Economics of Land Degradation – Methods and models to establish the benefit of sustainable land management

Presenting author: Katrine Grace Turner

Other authors: Robert Costanza, Sharolyn Anderson, Mauricio Gonzalez Chang, Sasha Courville, Estelle Dominati, Ida Kubiszewski, Sue Ogilvy, Nazmun Ratna, Harpinder Sandhu, Paul C. Sutton, Graham Mark Turner, Alexey Voinov, Stephen Wratten, Yann–David Varennes

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Land degradation is a landscape's reduced ability to produce ecosystem services over time. Recent studies have established that land degradation decreased the productivity of the world's terrestrial surface by approximately 25% between 1981 and 2003. This is despite the need to meet projected future demands of productivity by a growing human population. Already, between 1–1.5 billion people live with the negative effects of land degradation on a daily basis. The Economics of Land Degradation (ELD) is a global initiative for sustainable land management that aims to increase political and public awareness of the economic costs and benefits of healthy and productive land. This paper looks at the methods and models for quantifying the economics of land degradation on national level. It condenses existing knowledge on land degradation and sustainable development to create compelling economic incentives for policies, business models, and schemes that adopt sustainable land management practises.

The last decades have enhanced our understanding of ecosystem goods and services, and how market and institution failures cause unintentional depletion of natural and ecological assets. If we are to improve the performance of these complex systems we need a different approach, a systems approach. It is not achieved by modifying individual parts of the system, particularly where they exhibit high degrees of complexity and are sensitive to efforts aimed at regulation or taxation. The paper identifies measurements for drivers and indicators, as well as the stocks and flows for the four capitals: human, built, social, and natural. Furthermore, it reviews a range of different models for agricultural ecosystems ranging from field scale to global scale. This will help to identify the balancing and reinforcing loops needed to create a systems dynamics model to help decision makers on all levels test and visualize their strategies. Improved understanding of these mechanisms is an important step in reversing the declining trend of land degradation and may help to identify solutions to the problem. This will enable policy-makers and practitioners alike to determine costs of land degradation, land restoration, and identify sustainable management practices and their economic benefits.

Keywords: Land degradation, sustainable land management, systems dynamics model, food security, ecosystem services

ID: 500

Type: Voluntary contribution

30. Value integration in ecosystem services science and policy (OPEN)

Can deliberative methods of biodiversity valuation improve knowledge integration?

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Economic methods of valuing biodiversity (be it in the form of species, habitats, or ecosystem services) are usually preference-based, i.e. they take stakeholders' preferences as given and seek to illuminate these (given) preferences and incorporate them into decision-making (e.g. via benefit-cost-analysis or economic instruments). However, these methods have been facing a lot of criticism with respect to ethical considerations, feasibility, and policy implications. Deliberative economic valuation methods (e.g. Market Stall Method, Citizen's Jury) can be seen as an improvement in this field, focusing at the interface between economic valuation and social valuation. In contrast to economic approaches they do not take individual (stated or revealed) preferences as given (because in the field of biodiversity protection individuals often do not have knowledge about causes of biodiversity loss, and impacts and consequences of policy measures due to uncertainty and knowledge gaps), but seek to form these preferences by inviting stakeholders (affected by or involved in a certain biodiversity policy or project) with their diverse local or regional, indigenous, socio-political, administrative and/or technical expert knowledge, understandings and perspectives on the biodiversity issue (project or policy) at hand and finally come to an evaluation of biodiversity policy (or instrument or project) in a guided process.

On the one hand, these deliberative methods have several advantages: They overcome (at least to some degree) the problem that preferences and values in the field of biodiversity are not "given" due to uncertainties or "cognitive" restrictions; diverse values are brought together; and the development and implementation of biodiversity policies (projects or instruments) can be improved. In addition, the science-policy interface could be intensified by applying these methods. On the other hand, these methods also face problems: Is there a manipulation of preferences (because additional information is provided in the discourse)? Are group decisions biased due to individual group participant's power and influence? How are different values taken into account? Can the results be generalized? And can these methods be seen as a tool to improve acceptability and legitimacy of economic valuation – and thus improve science policy interfaces? In our presentation we seek to illustrate these opportunities and challenges by focusing on deliberative evaluation methods.

Keywords: Economic valuation, deliberative methods, biodiversity policy, stakeholder participation, knowledge integration, science-policy interface

ID: 539

Type: Voluntary contribution

30. Value integration in ecosystem services science and policy (OPEN)

Framework for integration of valuation methods to assess conservation policies: methodological approach to using 'hybrid' valuation methods in the assessment, design and implementation of incentive-based conservation policies.

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The Araçá bay, (located at São Sebastião, São Paulo estate, Brazil), consists of a small bay, sieged by rocks, formed by four beaches, two tiny islands, three mangroves and a great plain covered with soft sediment, which became completely exposed in low tides (sizigia). This area contains the last mangrove population considering a large extension of the north region of estate coast. Due to the proximity with the urban area, this ecological system have been exposed to many kinds of human action, like irregular occupation, sewage, and mostly, with constant oil liking and other disturbances related to the São Sebastião Port aside.. By now, the environmental license process of Port expansion is in course. The plans include an expansion of 1 million square meters placed right above to the bay, covering at least 75% of the area, creating permanent and irreversible environment impacts in different scales, like fishing interference, quality alterations in underground and coastal water, deforestation, increasing the risk of invasion by foreign biota and others.

The ecosystem services valuation roll to conservation and environment management importance is increasing, showed by their relevance to human wellbeing. However, the economic valuation, alone, cannot incorporate all ecosystem values. The requirement for some integration view of the economic and ecological systems, which could relate the particularities of these two systems by means of biological and physical parameters, using energy and matter flows.

The System Analysis methodology, or emergy analysis, use to estimate the values of natural energy incorporated in products, processes and services. By means of indicators (emergetic indexes) this approach create a dynamic image of the annual natural resources flow and of the environmental services they provide, affecting the increase of wealth and the human impact on the ecosystem.

Emergy analysis is usually divided in three steps: 1) the creation of the system diagram, to verify and arrange all the components and relations of the system; 2) create the emergy analysis table, which use numbers associated with the nature flows; 3) calculate emergy indexes, which allow the evaluation of the economic and environment situation.

The diagram of Araça Bay includes the mangrove population as a subsystem inside the bay. Rain, solar energy, sewage and tides are the main inputs to the system as a whole, and to the mangrove subsystem. Ecological components also include Fito/Zooplankton, Necton and Benthos communities, with their food interactions. Anthropic relations are represented mainly by fishing activities and boat parking area. This is also the mainly economic activities studied. The system has inorganic salts, energy, organic material and money as major outputs.

The valuation of Ecosystem Services related to Araça bay will include the participation of other groups of researchers. At least 8 groups of scientist will provide information to this analysis. Their specialties are Trophic Relations, Fishing Diagnosis, Benthos, Necton and Plankton Communities, Mangrove population, hydrodynamics and sediment dynamics.

This work will create information that will enhance the comprehension of the environment and economic relevance of the Araça bay, in addition to collaborate with the wider thematic project named Biodiversity and Functioning of a Coast Subtropical Ecosystem: Subsidies to Integrated Management.

ID: 470

Type: Poster

30. Value integration in ecosystem services science and policy (OPEN)

Hydroclimatological analysis for effects evaluation of the federal Payment program for Hydrological Environmental Services in Mexico

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ID: 499

Type: Poster

30. Value integration in ecosystem services science and policy (OPEN)

A critic view on valuing ecosystem services provided by protected areas: the case of water resources in Brazil

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