SESSION DESCRIPTION

Session ID:

S4

Title of session:

Ecosystem Services and nature conservation: do utilitarian and ethical motives support or hinder each other to protect nature within and outside PA’s?

Hosts:

<table>
<thead>
<tr>
<th>Title</th>
<th>Name</th>
<th>Organisation</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host</td>
<td>Dr. Rob Bugter</td>
<td>Alterra</td>
<td><a href="mailto:rob.bugter@wur.nl">rob.bugter@wur.nl</a></td>
</tr>
<tr>
<td>Co-host</td>
<td>Dr. Dolf de Groot</td>
<td>ESA-Wageningen University</td>
<td><a href="mailto:Dolf.degroot@wur.nl">Dolf.degroot@wur.nl</a></td>
</tr>
<tr>
<td>Others Involved</td>
<td>Claire Ntsane</td>
<td>SA National Parks</td>
<td><a href="mailto:Claire.Ntsane@sanparks.org">Claire.Ntsane@sanparks.org</a></td>
</tr>
</tbody>
</table>

Abstract:

Over the last decades the focus of protection policies shifted away from protecting Nature for its own sake towards the sustainable management of biodiversity, ecosystems and ecosystem services. However, public support for conservation (at least in Europe) still mainly rests on moral values. Reason to re-value old values and rethink communication strategies?

As inherent value arguments proved to be insufficiently effective in stopping biodiversity decline, in particular the Millennium Ecosystem Assessment (MA 2005) started using Ecosystem Services (ES) to show how humans depend on their natural environment. The added value of the ES concept used in this way, is that biodiversity is treated as an asset providing extra and more easily supported grounds for protection. Policy makers embraced the idea and as a result the use of ES in assessments and policy development is fast becoming mainstream. However, with the success also came concern about the increasing need to justify biodiversity protection with especially the economic value of ES, at the neglect of alternative arguments and strategies. The core of the concern is that ES is seen as an anthropocentric concept, in which biodiversity is a means to an end (instrumental value) and not a value in itself. Managing biodiversity for sustainable delivery of ES (and especially for just their economic value) does therefore not necessarily add up to Nature conservation. As a recent call in Nature for ‘inclusive conservation’ shows, even the inclusion of instrumental values as arguments for protection is still controversial amongst conservationists, let alone a protection regime entirely based on them.

As membership of, and support for, nature conservation organizations as well as questionnaires and polls invariably show, inherent value is still the main pillar on which both Nature conservation and biodiversity protection in the Western world rest. Ignoring this support base or simply taking it for granted could cause it to erode and jeopardize not only non-instrumental but also instrumental objectives. The question is maybe not so much ‘Can Nature conservation afford to neglect instrumental values’, but ‘Can sustainable ES
management afford to neglect the Nature conservation fundament? Should this fundament be revalued and revived in communication?

This session is inspired by the results of the BESAFE and BIOMOT projects which both investigated alternative arguments for biodiversity protection. BESAFE results confirming that biodiversity protection is still generally considered to be a moral issue and clearly indicate that a mix of arguments is most effective, will be presented. Other presentations covering ‘inclusive argumentation’ or aspects of the relation between ES and Nature conservation are invited. The session will end with a public discussion.

Additional information:

This Workshop will also reflect upon the results of a similar workshop organized at the previous ESP-conference in Costa Rica entitled: “The use of ES to support nature conservation and financing of protected areas: examples, case studies and guidelines”

Planned output:

Possibly a white paper and a Special Issue on use of Ecosystem Services in Nature Conservation for the Int. Journal of Biodiversity Science, Ecosystem Services and Management

Voluntary contributions accepted:

Yes

SPEAKERS

Invited speakers (if applicable)

<table>
<thead>
<tr>
<th>First name</th>
<th>Name</th>
<th>Organization</th>
<th>Title of presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rob</td>
<td>Bugter</td>
<td>Alterra</td>
<td>What works in arguing for biodiversity?</td>
</tr>
<tr>
<td>Alta</td>
<td>De Vos</td>
<td>Rhodes University</td>
<td>The Cultural Ecosystem Service framework for biodiversity conservation in South Africa’s National parks: uses and limitations.</td>
</tr>
</tbody>
</table>

Oral presentations

<table>
<thead>
<tr>
<th>First name</th>
<th>Name</th>
<th>Organization</th>
<th>Title of presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kim</td>
<td>Chong–Chun</td>
<td>Korea National Park Service</td>
<td>Healthy Parks, Happy People: enhancing nature conservation and eco–welfare</td>
</tr>
<tr>
<td>Alexander</td>
<td>Fremier</td>
<td>Washington State University</td>
<td>A riparian conservation network for ecological resilience – benefiting nature and people</td>
</tr>
<tr>
<td>Nyeema</td>
<td>Harris</td>
<td>Luc Hoffmann Institute</td>
<td>Releasing benefits from protected areas through an integrated evaluation schema and legal reform</td>
</tr>
<tr>
<td>Sarah</td>
<td>Jeanloz</td>
<td>Hasselt University</td>
<td>The importance of stakeholders to select environmental attributes for choice experiments: the use of participatory methods in a national park</td>
</tr>
<tr>
<td>Hannes</td>
<td>König</td>
<td>ZALF</td>
<td>Ecosystem Services and management strategies: the case of grey wolf (Canis lupus) in Eastern Germany</td>
</tr>
<tr>
<td>Hyuksoo</td>
<td>Kwon</td>
<td>National Institute of Ecology</td>
<td>Evaluating Ecosystem Services in the Korean DMZ Using Satellite Imagery</td>
</tr>
</tbody>
</table>
Rita Lopes, CENCE – FCT-UNL, Participatory systems mapping of ecosystem services in marine and coastal protected areas: The case of Arrábida Natural Park.

Joachim Maes, Joint Research Centre, Reconciling biodiversity targets of the EU Biodiversity Strategy.

Le Nghiem, National University of Singapore, Economic valuation of ecosystem services fails to capture biodiversity value of tropical forests.

Agata Pietrzyk-Kaszynska, Institute of Nature Conservation, Polish Academy of Sciences, Ecosystem services in reality – how is an abstract concept perceived at the local level? Insight from mapping workshops.

Lin Roberts, Lincoln University, The ecology of wellbeing: how ecosystem services enhance the wellbeing of New Zealanders.

Claudia Sattler, Leibniz-Centre for Agricultural Landscape Research (ZALF), The role of collaborative governance approaches in mitigating institutional misfit in nature conservation areas to spur ecosystem service provision.

Anik Schneiders, Research Institute for Nature and Forest, Biodiversity as value or life insurance: two sides of the same coin?

Shivali Sugandh, Emergent Ventures India, Evaluation of major Ecosystem Services offered by Keoladeo National Park: An International Wetland by using geospatial tools.

Jane Turpie, Environmental Policy Research Unit, School of Economics, University of Cape Town, The Economic Value of Zambia’s Forest Ecosystems and potential benefits of REDD+ in Green Economy Transformation in Zambia.

**Poster presentations**

<table>
<thead>
<tr>
<th>First name</th>
<th>Name</th>
<th>Organization</th>
<th>Title of talk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mattias</td>
<td>Gaglio</td>
<td>University of Ferrara</td>
<td>Effectiveness in natural capital safeguard in protected areas of the Po river Delta</td>
</tr>
<tr>
<td>Namue</td>
<td>Lee</td>
<td>National Nature Trust</td>
<td>DMZ Global Trust for Peace and Biodiversity</td>
</tr>
<tr>
<td>Samara</td>
<td>Silva</td>
<td>University of Sao Paulo</td>
<td>Analysis on land use change, carbon ecosystem services provision and Brazilian Forest Code</td>
</tr>
<tr>
<td>Florence</td>
<td>Aghomo</td>
<td>Ministry of Forests and Wildlife, Cameroon, College for the Training of Wildlife Specialist</td>
<td>Traditional Ecological Knowledge to promote sustainable exploitation and services of NTFPs in forest management unit 11–001, Southwestern Cameroon</td>
</tr>
<tr>
<td>V.P.</td>
<td>Uniyal</td>
<td>Wildlife Institute of India</td>
<td>Assessing Ecosystem Services in Landscape Level through Bioindicators in Western Himalayan Protected Areas</td>
</tr>
</tbody>
</table>
54 Ecosystem Services and nature conservation: do utilitarian and ethical motives support or hinder each other to protect nature within and outside PA’s?

What works in arguing for biodiversity?

*Presenting author:* Rob Bugter  
*Other authors:* BESAFE partners  
*Affiliation:* Alterra, Netherlands  
*Contact:* rob.bugter@wur.nl

The top-down implementation of a system of protected sites and species has not been enough to stop biodiversity loss – as is recognised in, for instance, the European Union’s new Biodiversity and Green Infrastructure strategies, and in the CBD’s Aichi targets. We need a much more integrated approach to protection, which also targets the biodiversity outside protected areas and seeks to ‘mainstream’ biodiversity concerns across all policy areas. The success of this approach largely depends on convincing actors at all scales of the necessity and benefits of protecting and investing in biodiversity.

In the BESAFE project (within the European Commission 7th Framework Programme we investigated how the effectiveness of different types of observed arguments for biodiversity protection is related to the situation and manner in which those arguments are presented and used. The project gave special attention to the effectiveness of Ecosystem Services as arguments.

Our results show that tailoring of argumentation to the situation is the most important factor for effectiveness. Tailoring is part of a process of trust building and learning about all parties interests, and therefore takes time.

The results of our study also imply that there is a role for several lines of argument supporting the protection of biodiversity: for example, those based on the rights of species to exist; those based on the value to humans, and those based on the “insurance policy” approach. In particular, our results could be used to justify a stronger emphasis on ethical and moral arguments for biodiversity conservation, as it seems that many decision-makers and other stakeholders respond to those arguments.

Perhaps the key to improving biodiversity protection is to ensure a better balance between argument lines, and wider dissemination of these lines to all stakeholder groups, rather than assuming that, for example, decision-makers will only respond to financial arguments.

However, there is clearly also a demand from policy-makers for better data to inform economic analysis about alternative biodiversity conservation strategies. In particular,
evidence to support the role of biodiversity conservation as an insurance policy is currently limited.

Keywords: biodiversity, ecosystem services, arguments, conservation, value
The Cultural Ecosystem Service framework for biodiversity conservation in South Africa’s National parks: uses and limitations.

**Presenting author:** Alta De Vos

**Affiliation:** Rhodes University, South Africa

**Contact:** alta.devos@gmail.com

Protected areas have long been a key global strategy for biodiversity conservation. In recent years, however, protected areas have increasingly had to justify their existence through the services they provide to society. In this realm, the ecosystem service framework has become the de facto conceptual tool used to advocate for protected areas and, by proxy, biodiversity conservation. The ecosystem service framework has, in recent years, become increasingly popular in policy frameworks, an integrating bridge between biocentric conservation and anthropocentric developmental goals. Despite its success in advancing the case for nature, the ecosystem service framework does not always succeed in making the case for nature conservation. Cultural benefits provided by protected areas to society, in particular, can often be difficult to quantify or appreciate economically. Furthermore, biodiversity critical to ecosystem service functioning is often not directly beneficial to human well-being, and may also provide disservices. Thus, advocating for sustainable ecosystem service management does not always equate to biodiversity conservation. Although the discourse on the use and limitations of the ecosystem service framework in biodiversity conservation has received significant recent attention internationally, comparatively little work has been done in the Southern hemisphere. Here, drawing on the unique socio-political contextuality of South Africa’s national parks, we draw on two case study examples to argue for the appropriate use of the cultural ecosystem service framework in the discourse on biodiversity conservation. We show its value in understanding the context within which ecotourism benefits are received and valued, but also its limits in understanding how local well-being relates to cultural benefits from protected areas. We suggest ways in which other frameworks can be integrated into the argument for biodiversity conservation to different stakeholder groups in appropriate contexts.

**Keywords:** Cultural ecosystem services, biodiversity conservation, South African National Parks, human well-being
Healthy Parks, Happy People: enhancing nature conservation and eco-welfare

Presenting author: Kim Chong-Chun
Affiliation: Korea National Park Service, Republic of Korea
Contact: cckim220@knps.or.kr, knpsoia@knps.or.kr

National parks have excellent natural ecosystems which provide various ecosystem services and where human can realize corresponding welfare for clean ecological environment and healthy life. Korea National Park Service (KNPS) makes its efforts to have better management of national parks under its mission, "Healthy Park, Happy People" and vision of “Leading Nature Conservation and Eco-welfare”. KNPS strives for Eco-welfare of Korea national parks where biodiversity conservation and ecosystem sustainability are well balanced and pursue the harmony between ‘ecosystem wellbeing of national park’ and ‘human wellbeing of national park’. Ecosystem welfare of national park is to conserve the intrinsic function of ecosystem and biodiversity. Human welfare of national park is to promote improved quality of life by providing ecosystem services which include ecotourism, recreation, healing and others. There are three pillars necessary for ecosystem and human welfare such as scientific knowledge, public understanding, and policy action. In this regard, Co-Welfare Program (CRAVS: conservation restoration, awareness value, sustainable use) is necessary to enhance ecosystem and human welfare in nation and it can promote happiness of human being along with recovery of nature health. Enhancement of Eco-welfare in national parks will play a key role in achieving Sustainable Development Goals (SDGs) as well as Aichi Biodiversity Targets.

Keywords: Ecosystem service, Eco-welfare, Korea national parks, ecosystem welfare, human welfare, wellbeing
A riparian conservation network for ecological resilience – benefiting nature and people

Presenting author: Alexander Fremier

Other authors: Amanda Stahl, Michael Kiparsky, J. Michael Scott

Affiliation: Washington State University, United States of America

Contact: atstahl@wsu.edu

One of the most significant challenges to biological conservation in the Anthropocene is how to foster species long-term survival in increasingly fragmented and dynamic environments. Going forward, land management actions must consider the benefits of ecosystem services based management to promote species resilience – the ability of species survive through stressors such as climate-related change, habitat fragmentation and/or habitat loss. Ecosystem services play an increasing role in the debate about the conservation of natural areas, both for species conservation and resilience of social ecological systems. Habitat connectivity is a key attribute of resilience; yet, re-building connectivity has proven a difficult restoration task. Here, we argue for building habitat connectivity through further coordinated efforts to protect and restore riparian ecosystems. We use policies and emerging patterns of conserved lands in the US as an example of the coupling of both motivations for protecting riparian lands – ecosystem services for human well-being and connectivity for species conservation. We describe the concept of a Riparian Conservation Network and its potential to develop resilience of protected areas via the protection and restoration of riparian corridors. We provide evidence for the geospatial viability of an RCN in the United States, that significant riparian area conservation is already occurring for both motivations and needs to be further coordinated, and that this solution is scalable through policy and administrative coordination rather than the initiation of new legislation.

Keywords: Ecosystem services, habitat connectivity, resilience, riparian areas
The incessant requirements of a growing human population for both space and resources threaten the sustainability of “fortress conservation” schema such as protected areas. So, despite over a century of implementation with over 160 000 individual protected areas, their value remains under scrutiny. The recognition that protected areas simultaneously harbor high levels of biodiversity as well as provide key goods and services to society can cause conflict between development and conservation agendas. Ecosystem services, by definition, have a human-use element. Protected areas often “lock-up” the ecosystem service assets such that utilization is deemed illegal and consequential to livelihoods. However, the modern movement in conservation recognizes protected areas as socio-ecological systems, increasingly progressing from iconic landscapes and species as the justification for establishment to an ecosystem services framework. It does remains unclear whether tools presently in practice to monitor performance fully integrate the suite of ecological and social benefits possibly derived from protected areas. Here, we review over 100 tools used to assess performances of places including those explicated designed for marine and terrestrial protected areas. We categorized the indicators within the tools into three domains: social (e.g., human well-being, access and cooperation); ecological (e.g., biodiversity, habitat quality and ecosystem services); and economical (e.g., fines, tourism, employment). We found that most tools aimed at evaluating management effectiveness, but these were insufficient at assessing outcome variables relevant for conservation goals or economic development. Furthermore, ecological indicators were dominant though those pertaining to ecosystem services were confounded by issues related to access, legal use, and rights. This finding highlights the need for improved evaluation of social benefits derived from protected areas. Ultimately, the goals of protected areas must deliver conservation outcomes that are reflected in the maintenance of biodiversity as well as ecological processes and services as a public good.

Keywords: Sustainability, conservation, socio-economic indicators, expansion
The importance of stakeholders to select environmental attributes for choice experiments: the use of participatory methods in a national park

Presenting author: Sarah Jeanloz
Other authors: Sebastien Lizin, Natalie Beenaerts, Roy Brouwer, Steven Van Passel, Nele Witters
Affiliation: Hasselt University, Belgium
Contact: sarah.jeanloz@uhasselt.be

Protected areas situated in urbanised regions play a substantial role in the provision of ecosystem services. This provision has a management cost that is largely covered by (declining) governmental sources. In order to reduce their dependency on public subsidies, protected areas could build a diverse funding portfolio to achieve financial sustainability. Payment mechanisms that capture the values that beneficiaries assign to a protected area’s goods and services represent a solution to reduce this dependency. Although hypothetical, a choice experiment survey can reveal these values (willingness-to-pay) as well as implicit trade-offs between future park management scenarios. For a choice experiment (CE) survey to produce realistic values, its design needs to be based on the importance that stakeholders assign to the protected area characteristics. The results aid the construction of the future management scenarios included in the CE by indicating where changes should occur.

Our study responds to the lack of rigorously reported qualitative processes prior to CE design. We used qualitative methods (focus groups and in-depth interviews) to identify which characteristics were important to different stakeholder groups (park managers, tourism businesses, governmental agencies, residents, visitors, NGOs and land owners) of the National Park Hoge Kempen (Belgium). Our methodology includes a ranking exercise and an interactive discussion aiming to select park characteristics to be included as final attributes in a CE. The results revealed that most stakeholders attach great importance to cultural services such as nature conservation and landscape variety, whereas we would have expected tourism-related characteristics to obtain higher scores (e.g. cultural heritage). As a general conclusion we found that attribute selection approaches in an environmental context should be preferably mixed (i.e. focus group discussions, in-depth interviews, expert consultation), meticulously reported and include a wide range of stakeholders in order to help practitioners to guide environmental management and protected area financing.
Keywords: Focus groups, in-depth interviews, attribute selection, qualitative methods, protected area
Natural recolonization and growing population of grey wolf in various parts of Germany has fostered controversial debates among lobby groups, civil society and policy makers. Policy makers are requested to establish effective management strategies that cope with current development trends of the growing wolf populations in Germany. This, however, implies considering state of the art research and preferences of the multiple stakeholders involved. In a pre-study, we revealed that most research in Germany and Europe has been conducted on ecological type of questions related to the wolf while little is known about the holistic picture that integrates ecological aspects with socio-cultural norms. For example, many conservationists promote protecting wolf populations (per se), and hunting associations recently claim management rights, while the civil society gets dis-informed. We propose to use the concept of Ecosystem Services to bridge the gap between science and stakeholder to support decision making in a structured and evidence-based way. In a first step, the identification of ecosystem services related to wolf need to be specified; for example, in terms of biodiversity enhancement, limiting the numbers of their herbivore prey (i.e. red deer) and indirect re-establishment of native plant diversity, riparian restoration, and regulating diseases; as well as considering socio-cultural ecosystem services. In a second step, an integrated assessment approach is proposed that enables exploring possible implications of regional management strategies on key ecosystem services and their possible trade-offs. We discuss the potential of an integrated ecosystem services framework to assess wolf management strategies in Eastern Germany. Thereby, strengthen the communication between science and stakeholders to support decision making.

**Keywords:** Conservation strategies, ecosystem service values, science–stakeholder dialogue, decision support
Type of submission: Voluntary contribution

S4 Ecosystem Services and nature conservation: do utilitarian and ethical motives support or hinder each other to protect nature within and outside PA’s?

Evaluating Ecosystem Services in the Korean DMZ Using Satellite Imagery

Presenting author: Hyuksoo Kwon
Other authors: Jisun Shin, Jungin Kim, Byeori Kim
Affiliation: National Institute of Ecology, Republic Of Korea
Contact: ulmus@nie.re.kr

The Demilitarized Zone (DMZ) established in 1953 has been free of human occupation for more than 60 years and presents remarkable opportunities to conserve the flagship biodiversity of the Korean Peninsula. The DMZ and its corresponding Civilian Control Zone (CCZ) buffer zones cover an impressive linear territorial area of an estimated 367,000 ha. However, the region is restricted researchers access due to military tensions, the ecosystem survey had long been limited. There has been much discussed about the potential for conservation within the DMZ as a means to achieving the multiple aims of protecting nature, memorializing social history and ensuring stability and lasting peace on the troubled Korean Peninsula. Through the evaluation value of the region ecosystem, it will be able to be efficient and reasonable spatial planning. We have classified the type of ecosystem in the DMZ area using high resolution imagery (Rapideye) and evaluated the ecological value accordingly. The area is provisioning and cultural services is limited, then, this study was conducted by regulating and supporting services. Image classification results, DMZ had occupied a high proportion of forest. Which was used as cropland area in the past was changed into wetlands. Including existing natural wetlands DMZ is relatively wetlands were widely distributed. This study showed that the utilization of the satellite imagery for the evaluation of inaccessible areas. This data will be used as a important data in the conservation planning of the DMZ.

Keywords: Inaccessible areas, landcover map, imagery classification
Participatory systems mapping of ecosystem services in marine and coastal protected areas: The case of Arrábida Natural Park.

Presenting author: Rita Lopes
Other author: Nuno Videira
Affiliation: CENCE – FCT–UNL, Portugal
Contact: rjl@fct.unl.pt

Participatory modelling approaches have been widely applied to understand the structure and causal relationships of complex systems characterizing many sustainability issues. Through participation one is able to capture stakeholders’ mental models, integrating different types of knowledge, and identifying critical feedback loops.

With the growing dissemination of the ecosystem services (ES) concept in science and policy agendas, it becomes crucial to find new approaches capable of integrating ES values in decision–making, taking into account multiple value dimensions. In this work we implemented an approach, were participatory systems mapping (PSM) was applied to foster the understanding of ES among a group of stakeholders in a Portuguese coastal and marine protected area.

Firstly, collaborative scoping of ES involved an institutional and stakeholder analysis and a participatory workshop that allowed to identify key stakeholders, their interdependencies and institutional rules governing the area. Participants engaged at this stage collaborated in a process of ES identification, recognition of threats and links to human wellbeing, as well as the social, economic and ecological relative importance of the identified ES.

Subsequently, a PSM workshop was organized where the stakeholder group was involved in the construction of CLDs depicting four ES perceived as highly important for the natural park (e.g. ecotourism, food provision, climate regulation, and genetic diversity). These conceptual maps systematized knowledge on the key variables and feedback loops influencing a sustainable flow of each ecosystem service and their interrelations. This resulted in an improved and shared understanding of ES in the area. Participants have been since engaged in the follow–up activities (e.g. on–line surveys), and have evaluated positively this experience. The outcomes of the PSM process will contribute to the ongoing testing of the conceptual participatory framework proposed by Lopes and Videira (2013), which aims at improving articulation of ES values in decision–making processes.
Keywords: Ecosystem services, multi value-domains, participatory modelling, stakeholders’ perceptions
Reconciling biodiversity targets of the EU Biodiversity Strategy

*Presenting author:* Joachim Maes  
*Other authors:* Sara Vallecillo, Chiara Polce, Grazia Zulian, Ana Barbosa  
*Affiliation:* Joint Research Centre, Italy  
*Contact:* joachim.maes@jrc.ec.europa.eu

The first and foremost target of the EU biodiversity strategy to 2020 is conserving rare and endangered habitats and species which are protected under the Habitats and Birds directives. The second target aims at maintaining or enhancing ecosystems and their services. Actions under the first target thus focus on conservation while actions under the second target require the development of green infrastructure and restoration of degraded ecosystems. The targets were set under the assumption that biodiversity underpins the delivery of ecosystem services and that management actions which increase ecosystem condition automatically deliver more ecosystem services. A recent report (Nature Communications 6, Article number 7414) casts doubt on this assumption and rejects the idea that we can simultaneously make progress on both policy targets. This paper presents an analysis of the progress made on both targets and presents a synthesis of the knowledge that is available at the European scale to help biodiversity policy and decision making. Our analysis is based on two assessment studies: (1) a survey on the arguments used by different stakeholders who make use of protected areas; (2) a European wide assessments of biodiversity, green infrastructure, and ecosystem services aimed at maximising win–win situations with respect to the biodiversity targets. Scientific evidence can help define win–win areas guiding investments in nature protection and green infrastructure development. But scientific evidence alone is not enough. Building consensus among different users and stakeholders, including agriculture and forestry, is equally important, even if it leads to sub-optimal outcomes.

*Keywords:* EU Biodiversity Strategy, green infrastructure, restoration, conservation status
Economic valuation of ecosystem services fails to capture biodiversity value of tropical forests

Presenting author: Le Nghiem
Other authors: L.R. Carrasco, T. Sunderland, L.P. Koh
Affiliation: National University of Singapore, Singapore
Contact: nghphuongle@nus.edu.sg

The reconciliation of biodiversity conservation, ecosystem service provision and agricultural production in tropical landscapes requires recognition of the trade-offs between competing land-uses. It is especially relevant for conservation planning to assess whether the economic value of ecosystem services is spatially congruent with biodiversity. Previous analyses have largely focused on ecosystem service provision or assumed homogeneous economic values across land uses within biomes. We relax this assumption by carrying out a spatially explicit meta-analysis based on 30 studies of ecosystem service values in tropical forests from The Economics of Ecosystems and Biodiversity (TEEB) database, while controlling for economic, environmental and methodological variables. Our results demonstrate a lack of spatial congruence between the economic value of ecosystem services and biodiversity in tropical forests. Instead, we find that economic value presents a nonlinear inverted-U relationship with site accessibility and type of economic activity, highlighting the importance of matching supply and demand between each ecosystem service and its beneficiaries for economic values to be realized. The implications are that conservation policies focusing solely on the economic value of ecosystem services will fail to protect biodiversity in remote and less disturbed regions.

Keywords: Cultural services, forest economics, landscape conservation planning, non-timber forest products, regulating services
The ecosystem services concept is one of the most important in current conservation policy at the global level, it is also becoming implemented in national legislative documents. From one side it serves as a main framework to set international goals for biodiversity conservation, from the other – it is complex and tangled thus potentially hard to be implemented straightforward into decision making process at lower, executive levels.

Taking into account multi-level governance settings, the actual acknowledgement and understanding of the concept by people influencing conservation at the local level is an important aspect of its implementation. In this presentation we offer an insight from focus groups interviews, the main aims of which were to (1) identify ecosystem services that were perceived as the most important for local societies well-being and (2) identify areas providing those ecosystem services within a given case study area. We investigated five case study areas in Poland that were varied in size, ecological character, conservation regime and socio-economic context. At each site, we conducted group interviews with conservation professionals and local leaders separately. Although most of the respondents understood and acknowledge the general idea of the concept, it remained abstract and in some cases became a barrier for mapping. We identified several difficulties for the respondents, such as referring to very general scale due to too general idea of ecosystem services or inability to differentiate areas providing and benefiting from ecosystem services (e.g. scenic points vs. landscape values provision).

This presentation provides analyses of respondents’ capability to receive the ecosystem services concept and to apply it during the workshops. Based on participatory observation of mapping process and on respondents’ reflections on comprehensibility, we discuss the concept’s potential in application into decision making and governance processes with particular attention given to the local level.

**Keywords:** Participatory mapping, local level, concept comprehensibility, stakeholders
Type of submission: Voluntary contribution

S4 Ecosystem Services and nature conservation: do utilitarian and ethical motives support or hinder each other to protect nature within and outside PA’s?

The ecology of wellbeing: how ecosystem services enhance the wellbeing of New Zealanders

Presenting author: Lin Roberts
Other authors: A. Brower, G. Kerr, S. Lambert, W. McWilliam, K. Moore, J. Quinn, D. Simmons, S. Thrush, M. Townsend, P. Blaschke, R. Costanza, R. Cullen, K. Hughey, S. Wratten
Affiliation: Lincoln University, New Zealand
Contact: lin.roberts@lincoln.ac.nz

Most research on ecosystem services has focused on the supply side of the supply–demand equation – what are ecosystem services, and how to classify, value and manage them to protect supply. These approaches are generally based on the assumption that if people only understood how much they depend on ecosystem services and how valuable they are to them, they would do more to protect them. This assumption does not take into account human behaviour – we may know something but often do not act consistently with that knowledge, especially if we believe that acting otherwise will enhance our wellbeing, particularly in the short term. Yet if we do nothing about continuing growth in demands on the systems that provide these services, our efforts to protect the supply will be as futile as trying to turn back the tide.

A greater focus on what is driving our demand for ecosystem services—a desire for enhanced wellbeing—and the linkages between wellbeing and the quality and use of ecosystem services is therefore timely. This paper reports on a recent study funded by the New Zealand Department of Conservation that explores the relationship between wellbeing and ecosystem services. For each of the nine fundamental human needs recognized by Max-Neef (1991) – subsistence, protection, affection, participation, understanding, leisure, creation, identity and freedom – we examined the diverse ways in which ecosystem services contribute to the satisfaction of these needs, leading to enhanced wellbeing.

The choices we make about how to satisfy our needs have an impact on both how much wellbeing we achieve and how much impact we have on ecosystem services. Encouraging discussion about the sources of wellbeing and recognition that there are a variety of ways (with varying effectiveness and impacts on nature) of satisfying those needs, allows us to explore how we might achieve the ‘double dividend’ of enhanced wellbeing and flourishing ecosystem services.
Keywords: Wellbeing, ecosystem services, fundamental needs
The role of collaborative governance approaches in mitigating institutional misfit in nature conservation areas to spur ecosystem service provision

Presenting author: Claudia Sattler  
Other author: Barbara Schröter  
Affiliation: Leibniz–Centre for Agricultural Landscape Research (ZALF), Germany  
Contact: csattler@zalf.de

The analysis of institutional misfit addresses the question if established approaches for environmental governance are optimally aligned to the natural resources with they are meant to govern. Thereby different types of misfit can exist: for instance, when the spatial extent of the governance system is incongruent to the extent of the resource system, or, when the governance system is in timely mismatch to the resource management requirements. A consequence of institutional misfit is suboptimal provision of ecosystem services for specific groups of stakeholders or society as a whole. A general framework for the analysis of institutional misfit is introduced which looks at the landscape from three different perspectives. The first perspective is the physical landscape in terms of existing ecosystems and related ecosystem services. The second perspective is the human landscape, i.e. the part of the landscape that is under human management. The third perspective is the institutional landscape related to different governance approaches. The framework is applied for a case study in eastern Germany in Brandenburg State which contains different categories of nature protection areas. Presented results show the analysis of misfit for the case study with regard to ecosystem service governance, differentiating between hierarchical (command and control), market-based and collaborative governance approaches and showing the related restrictions that result particularly for agricultural management which in turn have impacts on the ecosystem service provision. In the presented study the role of collaborative governance approaches, involving actors from the public, private and civil society sector, in mitigating institutional misfit is in the focus.

Keywords: Environmental governance, institutional mismatch, collaborative governance, nature protection areas
Biodiversity as value or life insurance: two sides of the same coin?

Presenting author: Anik Schneiders
Other authors: Dirk Maes, Toon Spanhove, Heidi Demolder, Sander Jacobs, Helen Michels, Maarten Stevens, Peter Van Gossum, Wouter Van Reeth, Johan Peymen, Geert De Knijf, Wouter Van Landuyt, Glenn Vermeersch
Affiliation: Research Institute for Nature and Forest, Belgium
Contact: anik.schneiders@inbo.be

Linking biodiversity and Ecosystem Services (ES), the following research questions should be taken into consideration:

1. Biodiversity as a value: What is the state of biodiversity? What part of biodiversity is monitored and mapped? Are these maps correlated with ES-supply-maps.
2. Biodiversity as a life insurance: What is the role of biodiversity within each step of the ES framework: biodiversity as (1) a stock or asset, (2) a ES regulator, (3) a direct benefit, (4) a cultural or intrinsic value, (5) and a (policy) goal.

As in many other European countries and regions, an Ecosystem Assessment for the region of Flanders (north Belgium) is worked out (www.inbo.be/en/flanders-regional-ecosystem-assessment-state-and-trends-synthesis-report). To disentangle all components of biodiversity and ES and clarify the links, an analytical biodiversity framework was developed. Biodiversity is divided in four components (composition, structure, function, stock) nested in a range of organization levels (genes, species, ecosystems and landscapes). For 16 services the link between the essential biodiversity components and the service providing unit (SPU) is described.

Conclusions
– For most services a group of organisms (functional groups: pollinators, predators, purificators,… ) and a vast amount of individuals (stock) is needed to ensure the ES supply.
– Biodiversity indicators are often based on presence/absence of rare species and habitats. There is a "biodiversity-data-gap" to link biodiversity and ES.
– Although the data-gap, a significant correlation is found between hot spots of biodiversity and most of the regulating services.
- Valuing “biodiversity” is always subjective. It depends on our knowledge, our cultural background and our personal meaning.

- The role of biodiversity is often (partly) replaced by external inputs or technological design. It is important to describe the whole range from natural delivery towards technological design, to understand the interdependence of biodiversity and ES-supply.

- The most important scale of the SPU is not always an "ecosystem". ES are delivered at very different scales, ranging from population level to ecosystem level and landscape level.

*Keywords:* Biodiversity indicator, nature value, ecosystem service providing unit, functional biodiversity
Evaluation of major Ecosystem Services offered by Keoladeo National Park: An International Wetland by using geospatial tools

Presenting author: Shivali Sugandh
Other author: P.K Joshi
Affiliation: Emergent Ventures India, India
Contact: shivali_sugand@yahoo.com

Wetlands are most productive ecosystems on Earth. They provide an array of Ecological services which are essential for humans as well as the biodiversity to survive. Keoladeo National Park is a manmade wetland of International Importance in India which is known for its rich avian biodiversity and ecosystem. Considerable changes have taken place in the land use/land cover of wetland in the past 12 years on the account of irregular water supply and subsequent invasion of many exotic species. This has further affected the ecosystem services offered by the park spatially and temporally. The study uses GIS and InVEST Model, a spatially explicit modeling tool to map the supply and value of 3 major Ecosystem services offered by the park: Carbon Sequestration, habitat Services for Wetland Avifauna and Recreational services. ESS value maps are created using spatial Economic Valuation technique and monetary value is assigned using Adjusted Value transfer Method from reviewed literature (using Meta analysis approach). This study thus predicts the aggregate monetary value of Ecosystem services offered by KNP and attempts to bring the attention of policy makers and public to this wetland. This study reveals additional information about conservation priorities, tradeoffs between various ecosystem services and possible alternatives for maintaining ESS supply of the Park. By integrating these recommendations and values into decision making, the Park can be protected from deterioration in the future.

Keywords: Wetland, land use land cover, GIS, InVEST, economic valuation
The Economic Value of Zambia’s Forest Ecosystems and potential benefits of REDD+ in Green Economy Transformation in Zambia

Presenting author: Jane Turpie
Other authors: Benjamin Warr, Jane Carter Ingram, Pushpam Kumar, Ivo Mulder
Affiliation: University of Cape Town, South Africa
Contact: jane.turpie@uct.ac.za

An assessment was undertaken of the value of forests in the Zambian economy based on a review and analysis of available spatial and non-spatial information. The study assessed the values of forests in the form of wood production (for timber, fuel wood, charcoal) and other non-wood forest products (NWFPs) such as wild foods and medicines, their tourism value and their supply of ecosystem services such as the regulation of climate through carbon storage and carbon sequestration, the retention of sediment for erosion control, the regulation of water flow and water quality, and support for agricultural production through pest control and pollination. This involved extrapolation of data based on spatial parameters at the resolution allowed by the data (e.g. by vegetation type, biomass, population density or district), and the use of an existing spatial modelling platform, “InVEST”. Forests were estimated to make a direct contribution equivalent to at least 4.7% of Gross Domestic Product (GDP) or US$957.5 million (using 2010 figures). However, when the multiplier effects of forestry and tourism-related activities on other sectors are taken into account, the overall, or economy-wide contribution of forests on GDP was estimated to be at least 6.3% or US$1 277 million. Forests support a total of 1 067 000 jobs supporting over 60% of rural Zambian households who are heavily dependent upon the use of natural resources to supplement or sustain their livelihoods. Forest resources contribute approximately 20% of household incomes including the market value of subsistence production. The true value of forests, including flows of goods and services for which no reliable data were available, is likely to be considerably higher. Given the importance of forests to the economy, employment, and livelihoods, it is important that cost-effective ways for conserving and sustainably managing forests are implemented to support Green Economic growth. Areas where avoided deforestation could yield incomes high enough to cover opportunity costs plus transaction costs (which may vary from $23 – $94 per ha) are geographically limited to the northwestern areas where this could be achieved through avoided deforestation. However, conservation or REDD+ interventions could be more viable generally, if the public good values of forests are recognised and used to secure public benefits of forest conservation.
Effectiveness in natural capital safeguard in protected areas of the Po river Delta

Presenting author: Mattias Gaglio
Other authors: Aschonitis V., Castaldelli G., Gissi E., Fano E.A.
Affiliation: University of Ferrara, Italy
Contact: gglmts@unife.it

Assessment of the effectiveness of protection policies is of key importance in environmental governance. Monitoring natural capital provides a suitable indicator in order to evaluate environmental protection performance for maintaining the well-being of local and nearby populations. The present study aims to assess the pattern changes in natural capital and ecosystem services during a 54 years timespan as a consequence of land use/land cover (LULC) changes. The study region is a protected area within the Regional Park of river Po Delta: the “Volano–Mesola–Goro station” (VMG). Comparison with total Province of Ferrara is also discussed. Three land cover maps for 1954, 1976 and 2008 are used in order to characterize two periods: the last land reclamations period (1954–1976) and the environmental protection period (1976–2008). For VMG, the results show that the total natural capital value (NCV) showed a decrease of −39.68% during 1954–1976 and a smaller decrease of −6.31% during 1976–2008, as a result of environmental governance mitigation. For the total Province of Ferrara the NCV strongly decreased −51.13% during 1954–1976 and increased +6.13% during 1976–2008. Although the VMG region provides the 11.46% of the total provincial NCV of Ferrara in 2008, it covers only ~4% of the Province. VMG suffered of change trends occurring at wider scale, as urbanization and natural land cover loss but the environmental policies performed by Regional Park mitigated the negative consequence on NCV. The study highlights the need to coordinate local environmental measures with governance at wider scale, considering both local contexts and landscape trends.

Keywords: Ecosystem services, LULC changes, conservation policies, environmental management, management effectiveness
Type of submission: Poster

S4 Ecosystem Services and nature conservation: do utilitarian and ethical motives support or hinder each other to protect nature within and outside PA's?

DMZ Global Trust for Peace and Biodiversity

Presenting author: Namue Lee

Affiliation: National Nature Trust, Republic of Korea

Contact: namue99@yahoo.co.kr

The Demilitarized Zone (DMZ) is a 4–km-wide, 248–km-long ecological corridor covering rivers, wetlands, and arable lands in the west and rugged mountains in the east between North and South Korea. After the Korean War, since 1953, this corridor has blocked human access with landmines, barbed wire fences and military threats, and it became a wildlife sanctuary providing habitats to over 68 endangered species in Korea. DMZ areas including civilian control zones provide important habitats of East Asian Australian Flyway and Ramsar sites are connected to. There have been several attempts to designate this total area as a transboundary UNESCO Biosphere Reserve, but in vain due to military tensions and political pressure. In addition, development drive in adjacent areas becomes a noticeable threat to wildlife.

“DMZ Global Trust” is a collaborative initiative to conserve DMZ areas with governments, scientists, NGOs and citizens together. This also becomes an open platform to engage international community to protect critically important ecological areas in Northeast Asia. Ecosystem approach and payment for ecosystem services have been used as tools to support local conservation movements, capacity-building trainings and fund-raising schemes. This will be a truly symbolic process in Northeast Asia to demonstrate how cooperative nature conservation can foster peace and biodiversity which consequently contributes to human–wellbeing locally and worldwide.
Analysis on land use change, carbon ecosystem services provision and Brazilian Forest Code

Presenting author: Samara Martins Silva
Other authors: Fernando Scardua, Rosana Carvalho Cristo Martins, Hilton Thadeu Zarate do Couto.
Affiliation: University of Sao Paulo, Brazil
Contact: sa16_martins@hotmail.com

In the last years Brazil has suffered changes in patterns of greenhouse gas emissions (GHG) and also in the provision of carbon ecosystem services, leaving to be the deforestation the most important factor for GHG’s emissions. The objective was make a literature review on changes in patterns of greenhouse gas emissions and climate regulation for key sectors of changes in land use and forests, agriculture and pasture, emphasizing in the brazilian environmental law on the most important advances and challenges arising from the modification of current forestry law. The methodology used was analysis of mains command and control that affect this issue, literature review and document analysis. The data for change in brazilian emission patterns showed low values in taxes for deforestation to period between the data 2003 and 2012, and slight increase in 2013. This increase of deforestation values in 2013, can probably have occurred for being the first year of the implementation year of the new forestry law and the intense debates occurred in its occurred in drafting that would allow amnesty for previous deforestation occurred 2008 that could. For more excellence in the reduction’s levels deforestation, provision of carbon ecosystem services and reduction in the gas emissions, is recommended more attention about the process’s costs for insert in the rural environmental. Can be consider that obligation in insert and the respective deadline, maybe can’t arrive in the expected result of total insertion of brazilian farmers, by the cost or by the time, or can be by difficulties of this process. Soon the Brazil, figure as a world leader in greenhouse gas emissions reduction and carbon ecosystems services by the reduced deforestation, being the implementation of environmental valuation as a payment for environmental services so importante to development and protection of forests inside the brazilian farms.

Keywords: Carbon ecosystem services, land use and forests, agriculture, brazilian forest code, environmental payment services.
Traditional Ecological Knowledge to promote sustainable exploitation and services of NTFPs in forest management unit 11–001, Southwestern Cameroon

Presenting author: Florence F.M Aghomo
Affiliation: Ministry of Forests and Wildlife, Cameroon, College for the Training of Wildlife Specialist
Contact: aghomoflorence@yahoo.com

The majority of Sub-Saharan Africa’s population relies on forest products for subsistence uses, cash income and traditional practices. Today, continuous declines in resources have been promoting the creation of protected areas (PA) for biodiversity conservation. But, most have been created without the consent of local people who are either displaced or deprived from using resources. In such a conflicting environment, sustainable exploitation efforts cannot be effective if humans and their interactions with resources are not considered. The present study aimed at documenting on the use of Non Timber Forest Products (NTFPs) of plant and animal origin, analyzing harvesting methods used by the people around the Forest Management Unit (FMU) 11–001 and proposes a theoretical NTFPs management model based on PA–managers and local knowledge. A questionnaire was addressed to 371 randomly chosen Household Respondents (HRs) from the 15 selected villages out of 22 found around FMU 11001 and to 17 PA–managers. Mapping of harvesting sites was performed with members of the local forest management committee. With regards to NTFPs of animal origin, 96.8% of HRs and 93.7% of PA–managers recognized the services delivered by wildlife for traditional purposes. From the 58 wildlife species used by local people, four use category values were identified: Food, medicine and sales (43.8%), Ethnomusical and object making (28.8%), Decoration and jewelry making (17.9%) and Magico–religious (9.36%) values. Despite these uses, 92.7% of HRs reveal that services derived from wildlife is disappearing progressively mainly because of its scarcity (68.9%). As for NTFPs of plant origin, 54 wild plants belonging to 32 families were identified. Annonaceae, Mimosaceae and Zingiberaceae families were the most represented. The palm tree Elaeis guineensis was the only multipurpose plants used by these communities. For most of the plants, only the vegetative organs were useful and were represented by 21.1% of grains, 19.7% of fruits, 18.3% of barks, and 9.9% of sap. Some plants such as Baillonella toxisperma, Irvingia gabonensis and Poga oleosa are transformed locally before use. Regarding harvesting methods, fruit picking (38%),
trimming/gathering (13%), barking (13%) and felling (13%) were the most used for plants meanwhile snare trapping (65.7%) and local gun hunting (20.9%) were most used for wildlife. Fruit picking and local gun hunting had less harmful impact on resources. The harvest of NTFPs is done in a linear manner within tracks in the FMU because of easy accessibility. To ensure continues services of NTFPs we define the roles of a local community NTFPs management institution and that of other stakeholders in a theoretical framework model in which practices as the respect of defined NTFPs harvesting plots and low impact harvesting practices will be promoted. Timber exploitation and priority conservation initiatives should be oriented towards maintaining the long-term values of NTFPs for local people.

*Keywords*: Forest Management Unit; Local people; Non-Timber Forest Products; NTFPs services; South–west Cameroon; Sustainable use; Traditional Ecological Knowledge.
Ecological indicators mainly invertebrates have been used for assessing the changes in biodiversity and ecosystem health as they are less mobile specialist and are intolerant to ecosystem changes unlike other vertebrate. Within invertebrates, spiders and lepidoptera comprising butterfly and moth are well established group of invertebrates used as ecological indicators for monitoring ecosystem health. Both the groups are extremely sensitive to changes in habitat structure, complexity and micro climatic condition. They are easy to monitor because of high abundance, ubiquitous distribution, ease of collection; hence, they are used as an indicator groups. The landscape level study has been conducted to assess biodiversity changes in five prominent protected areas of western Himalayan landscape situated in Garhwal region viz. Gangotri Landscape (Gangotri and Govind National Park and Wildlife Sanctuary) and Nanda Devi Biosphere Reserve, the World Heritage Site (Valley of Flowers and Nanda Devi National Park), the fragile alpine areas of Western Himalayan landscape. The study result shows that, out of 215 species of spiders belonging to 29 families and 435 species of moths belonging to 23 families, only 9 species of spiders belonging to a single family Lyniphidae and 44 species of moths belonging to 3 families viz. Pyralidae (13), Geometridae (17) and Noctuidae (14) were dominant only in alpine areas. Study proposes that, these groups of spiders and moths can be monitored in a long-term basis for changes in their species composition, relative abundance and seasonal activity pattern to trace the effects of climate-change in this frazil landscape.

Keywords: Indicators, ecosystem services, biodiversity, Gangotri Landscape, protected areas