BOOK OF ABSTRACT

I. SESSION DESCRIPTION

ID: T14b

Ecosystem services and adaptation to global change

Hosts:

	Title	Name	Organisation
Host:	Dr.	Matthew Colloff	Fenner School of Environment and Society, Australian National University
Co-host(s):		Sandra Lavorel, Bruno Locatelli, Berta Martin-Lopez	

Abstract:

Uncertain, novel changes to social-ecological systems caused by climate change and other drivers mean that we can no longer assume the ecosystem services we currently depend on for livelihoods and wellbeing will be supplied in future. As ecosystems change, so do their ecosystem services; some current ones will decline and new ones appear as altered water balance, temperature regimes and land uses impact on ecosystems and societies. Governance systems are emerging to address these issues, but it will increasingly fall to those whose livelihoods are most impacted to develop options for adaptation. Both bottom-up and top-down approaches to operationalising adaptation are required, including how ecosystem services can be conceptualised and used.

The ecosystem services that can help people adapt to changes in social-ecological systems have been termed 'adaptation services'. This framing provides a way to bridge the gap between normative concepts of ecosystem services and the need for adaptation to global change. An ecosystem services perspective that is 'global change-ready' reveals ecosystem properties that provide benefits to people under global change and supports inclusive learning, co-production and implementation of adaptation strategies.

In this session the objective is to focus on how ecosystem services can be used in adaptation initiatives, including case studies on design and implementation; re-framing of governance

structures; co-production and learning; overcoming operational barriers to develop opportunities and mainstreaming adaptation services into policy and management. The objective of the session is congruent with the conference theme of 'Ecosystem services in a changing world: moving from theory to practice'.

Goals and objectives of the session:

The objective is to discuss how ecosystem services can be used in adaptation initiative and to invite participants in the audience to propose their own case studies for a discussion on ecosystem services and adaptation. Some participants will be invited to prepare case studies in advance; others may be spontaneous.

Planned output / Deliverables:

A summary of the case studies, main discussion points, and ideas for new research collaborations on ecosystem services and adaptation to global change.
A blog article for the conference website.
Networking, collaboration and co-production on Ecosystem services and adaptation to global change

Related to ESP Working Group/National Network:

Thematic Working Groups: T14 – Application of ES in Planning & Management

II. SESSION PROGRAM

Date of session: Tuesday, 16 October 2018
Time of session: 14:30 – 18:00

Timetable speakers

Time	First name	Surname	Organization	Title of presentation
14:30-14:45	Matt	Colloff	Fenner School of Environment and Society, Australian National University	Nature's contributions to adaptation to climate change

Time	First name	Surname	Organization	Title of presentation
14:45–15:00	Sandra	Lavorel	Laboratoire d'Ecologie Alpine, Grenoble, France	Nature's Contribution to Adaptation in the French Alps
15:00–15:15	Bruno	Locatelli	CIRAD–CIFOR, University of Montpellier	Ecosystem services for adaptation to climate change in mountains: Actors and worldviews
15:15–15:30	Sander	Jacobs	Research institute for nature and Forest INBO	Winter is coming: the fate of nature in Europe and Central Asia
15:30–15:45	Noelia	Zafra-Calvo	Basque Centre for Climate Change bc3	Acknowledging the multidimensional value of protected areas` contribution to people
15:45–16:00				Discussion
16:30–16:45	Giacomo	Fedele	Conservation International	Ecosystem services and transformative adaptation to climate change
16:45–17:00	Paula	Harrison	Centre for Ecology & Hydrology	Evaluating the effectiveness of adaptation, mitigation and transformation pathways to high-end climate change for the balanced delivery of ecosystem services
17:00–17:15	Kevin	Thellmann	Institute of Agricultural Sciences in the Tropics and Subtropics	Assessing the efficiency of land use planning to preserve hydrological ecosystem services under scenarios of climate change in a mountainous watershed

Time	First name	Surname	Organization	Title of presentation
			(Hans-Ruthenberg-Institute), University of Hohenheim, Stuttgart, Germany	in Xishuangbanna, South-West China
17:15-17:30	Zuzana	Harmackova	Global Change Research Institute of the Czech Academy of Sciences	Stakeholder preferences for ecosystem-based adaptation measures in Czech cities
17:30-17:45	Johannes	Förster	Helmholtz Centre for Environmental Research - UFZ	Ecosystem-based adaptation in small island states: how an explicit focus on 'ecosystem service opportunities' can inform adaptation options
17:45-18:00				Discussion

III. ABSTRACTS

The abstracts appear in alphabetic order based on the last name of the first author. The first author is the presenting author unless indicated otherwise.

1. *Type of submission:* ***Abstract***

T. Thematic Working Group sessions: T14b Ecosystem services and adaptation to global change

Nature's contributions to adaptation to climate change

First author: Matt Colloff

Other author(s): Sandra Lavorel, Russell Wise, Tim Capon, Michael Dunlop

Affiliation, Country: Fenner School of Environment and Society, Australian National University, Australia

Uncertain, novel changes in ecosystems caused by climate change require new and transformational adaptation responses. We propose 'adaptation services' or 'nature's contributions to adaptation' as a complementary perspective on the ecosystem services concept to help reveal the properties of ecosystems that provide livelihood options to help people adapt to climate change. Initial applications of adaptation services have facilitated new ways of thinking and adaptive learning about the transformational capacity of social ecological systems and human-nature relations under climate change. The adaptation services concept can enable the co-production of adaptation approaches that overcome constraints imposed by prevailing decision contexts for adaptation, shaped by societal values, rules and knowledge that are considered credible, legitimate and salient. By creating novel outlooks and options adaptation services can help re-frame current decision contexts for implementing transformative adaptation.

Keywords: transformation, values-rule-knowledge, adaptation services, decision context

2. *Type of submission:* ***Abstract***

T. Thematic Working Group sessions: T14b Ecosystem services and adaptation to global change

ESP EUROPE
2018 REGIONAL CONFERENCE
Ecosystem services in a changing world: moving from theory to practice
SAN SEBASTIÁN, SPAIN
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Ecosystem services and transformative adaptation to climate change

First author: Giacomo Fedele
Other author(s): Camila Donatti, Celia Harvey, David Hole, Lee Hannah
Affiliation, Country: Conservation International, United States of America

In the face of major shifts in temperatures and precipitations, some conventional strategies that help people to cope or incrementally adapt to climate change may be insufficient or even maladaptive in the long-term. Transformative adaptation, i.e. fundamental changes in systems that address root causes of vulnerability, may be needed. However, we have a limited understanding of what transformative adaptation looks like in social-ecological systems and when it may be needed. In this study, we define and characterize transformative changes and adaptation in socio-ecological systems to help decision makers consider this type of responses in programs, plans, and processes that address climate change impacts (e.g. NAPs, NDCs, EbA projects). We reviewed 80 recent conceptual publications about major changes driven by climate change in social, ecological, and socio-ecological systems and responses to adapt to them. We then used this information to assess when transformative changes occur and when actions are needed to catalyze transformative adaptation. Our review suggests that transformative adaptation is characterized by being restructuring, path-shifting, innovative, multiscale, systemwide, and persistent. Policy makers and practitioners should consider transformative adaptation as option to anticipate, guide, or recover from the radical impacts from climate change. Most of current responses seek to cope or incrementally adapt to changes rather than addressing the root causes of vulnerability. A lack of transformative adaptation in both infrastructure and ecosystem-based responses to climate change may lead to increasing costs, delaying issues, and missing opportunities for long-term adaptation. Using transformative adaptation to navigate shifts driven by climate change can increase the effectivity and sustainability of climate solutions.

Keywords: adaptation, climate change, ecosystem services, landscape, land-use changes, social-ecological systems, transformation

3. *Type of submission:* ***Abstract***

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Ecosystem-based adaptation in small island states: how an explicit focus on 'ecosystem service opportunities' can inform adaptation options

First author: Johannes Förster
Affiliation, Country: Helmholtz Centre for Environmental Research - UFZ, Germany

This presentation provides an introduction to the guide "Acting on Ecosystem Service Opportunities - Guidelines for identifying, selecting and planning economic instruments to conserve ecosystems and enhance local livelihoods" (Rode and Wittmer 2015; Rode et al. 2016). The talk outlines how the guide is used in the Republic of Palau for assessing options for ecosystem-based adaptation that can help to build the resilience of island communities. As Palau has been experiencing major droughts and water shortage, the focus is in particular on watershed management using a ridge-to-reef approach. Understanding how stakeholders currently use ecosystems and their services helps identifying motivations and incentive structures that promote more sustainable ecosystem management with benefits for adaptation. These "ecosystem service opportunities" can be entry points for management options and policy instruments that support ecosystem-based adaptation. Challenges and opportunities related to the use of economic instruments for promoting adaptation on small islands are highlighted. The Helmholtz-Centre for Environmental Research (UFZ) partners with The Nature Conservancy (TNC) in the project "Building the Resilience of Communities and their Ecosystems to the Impacts of Climate Change in Micronesia and Melanesia", which is financed by the International Climate Initiative of the German Federal Ministry for Environment, Nature Conservation and Nuclear Safety (BMU).

Keywords: ecosystem-based adaptation, small island states, ecosystem service opportunities, watershed management

4. *Type of submission:* ***Abstract***

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Evaluating the effectiveness of adaptation, mitigation and transformation pathways to high-end climate change for the balanced delivery of ecosystem services

First author: Paula Harrison
Other author(s): Ian Holman, Niki Frantzeskaki, Katharina Hölscher, Simona Pedde, Jill Jäger, Mark Rounsevell
Affiliation, Country: Centre for Ecology & Hydrology, United Kingdom

The IMPRESSIONS project aims to improve scientific understanding of the consequences of high-end climate and socio-economic change, and support the use of this knowledge by decision-makers working on adaptation and mitigation. In-depth interviews have been undertaken to ascertain the needs of stakeholders, their capacities to use information in decision-making processes, and drivers and barriers they face. In response to this information the project has co-created an integrated set of multi-scale, climate and socio-economic scenarios with stakeholders in participatory workshops. These scenarios have been applied to models for analysing impacts and vulnerability, including the complex interactions, synergies and trade-offs between ecosystem services in different sectors (agriculture, forestry, water, biodiversity, urban, health). Finally, adaptation, mitigation and transformation pathways have been generated with stakeholders to identify strategies that are robust for a range of possible futures. The approach was successfully applied at municipal (Hungary), river basin (Iberia), national (Scotland) and European scales.The pathways focus on enhancing the system conditions and the governance capacities in the scenarios, according to the challenges and opportunities provided by the respective scenario contexts. Three common cross-scale pathways for climate action are identified: shifting to sustainable lifestyles; new governance for sustainability and climate resilience; and new forms of resource management for ecosystem services, water and energy. The ability of the pathways to achieve a co-created stakeholder Vision by 2100 depends on the systemic constraints and opportunities within the scenarios with no case studies entirely reaching their Vision. The analysis of the pathways shows that conventional solutions to climate change adaptation and mitigation may prove not to be enough. Transformative solutions aimed at implementing radically different institutional arrangements, searching for synergies between adaptation and mitigation and linking them to sustainable development become increasingly important.

Keywords: climate change, socio-economic change, scenarios, pathways, adaptation

5. *Type of submission:* ***Abstract***

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Winter is coming: the fate of nature in Europe and Central Asia

First author: Sander Jacobs, Fernando Santos-Martin

Other author(s): Primmer Eeva, Boeraeve Fanny, Proença Vânia, Schlaepfer Martin, Morán Alejandra, Dunford Robert, Brotons Lluis, Harrison Paula, Solidoro Cosimo, Czucz Balint, Subramanian Suneetha

Affiliation, Country: Research institute for nature and Forest INBO, Belgium, Universidad autonoma de Madrid, Spain, UAMNetherlands, Netherlands

The international sustainability agenda identifies ambitious economic, ecological and social goals. Specifically, the United Nations Sustainable Development Goals (SDG) and Biodiversity Convention Aichi-Targets (AT) lay out normative goals that all signatory countries plea to pursue. As a large-scale knowledge production endeavor, the Intergovernmental Panel for Biodiversity and Ecosystem Services (IPBES) conducts global assessments aiming to aggregate knowledge on how to reach SGD and AT. This study elaborates a systematic analysis for the IPBES regional assessment for Europe and Central Asia (ECA). We compare to what extent plausible futures will impact global sustainability and biodiversity goals. Our analysis answers three key questions: “what is the value of nature?”; “how will these values change?” and “how can sustainability goals be attained under different plausible futures?”. Therefore, we assess prioritization of nature’s diverse values by the global sustainability goals (1); we map the impact of plausible future scenarios on diverse values, building upon the systematic literature review of scenario archetypes in IPBES ECA (2); and we present the impact on individual SDG and AT to discuss pathways to a desirable future (3).In short, we show that three out of five plausible futures will decrease intrinsic value of nature, ecosystem services as well as good quality of life in the ECA region. Intrinsic values will decrease anyway, even under the sustainable scenario’s. Secondly, we establish that scientific insights are lacking to reliably estimate impacts on the most important values. Ongoing sustainability research and assessments have to increase reliability of the impact estimates. Allocation of time, resources and communication of key findings should be rebalanced over disciplines following the societal importance reflected by SDG and AT, rather than the ad hoc composition of the prevailing scientific and assessment community. A better disciplinary balance will increase the chances for a desirable sustainable future.

Keywords: Scenario archetypes, integrated valuation, plural values, Eurasian region, disciplinary bias

6. *Type of submission:* ***Abstract***

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Stakeholder preferences for ecosystem-based adaptation measures in Czech cities

First author: Eliška Krkoška Lorencová
Other author(s): Adam Emmer, Petr Bašta, David Vačkář
Affiliation, Country: Global Change Research Institute of the Czech Academy of Sciences, Czech Republic
Presenting author: Zuzana Harmackova

Future and ongoing climate change-related risks and need for adaptation represent major issue in science as well as in decision-making processes at all spatial administrative levels. Ecosystem-based approaches to adaptation (EbA) represent alternative to traditionally used technical solutions (i.e. grey infrastructure). EbA are considered to be the highly efficient in enhancing sustainable resilience of the cities. Incorporation of such measures into the decision making processes on the level of individual cities is, however, somewhat not fully achieved in the Czech Republic nowadays. Our study aims to analyse stakeholder's perception of climate change-related risks (present and 2030 horizon), prioritization of specific EbA measures, while illustrating benefits of EbA in terms of ecosystem services, with the aim to support adaptation planning in Czech cities. This approach is illustrated on the case of three Czech cities - Prague, Ústí nad Labem and Litoměřice.The results show that the prioritization and suitability of individual EbA measures substantially differ among the pilot cities, reflecting local setting as well as relevant risks particular city is facing. While green infrastructure in general (urban greenery, green roofs, permeable surfaces and vegetation belts) gained the highest priority in Prague, measures related to water retention and reuse were preferred by stakeholders in Ústí nad Labem and Litoměřice. Moreover, we illustrate the heterogeneity of problems and actors, difficult coordination that is associated with rather fragmented decision-making in climate change adaptation in Czech cities.

Keywords: climate change adaptation; Czech Republic; ecosystem-based adaptation; participation; urban

7. *Type of submission:* ***Invited speaker abstract***

T. Thematic Working Group sessions: T14b Ecosystem services and adaptation to global change

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Nature's Contribution to Adaptation in the French Alps

First author: Sandra Lavorel

Other author(s): Matthew Colloff, Bruno Locatelli, Suzanne Prober, Enora Bruley, Baptiste Nettier

Affiliation, Country: Laboratoire d'Ecologie Alpine, Grenoble, France

Mountain socio-ecosystems offer a paradox of expected sensitivity to climate and socio-economic change, yet show exemplary long-term ecological and social resilience. Their future is thus highly uncertain. It is expected that traditional knowledge and innovation capacity should support future adaptation, and especially ecosystem-based adaptation. Here, we present results from a participatory study of adaptation pathways to global change based on long-term research in the French Alps. Using ecological data, ecosystem service and resilience modelling, and information from stakeholders on their ongoing adaptation and future livelihoods collected during workshops and interviews, we identified adaptation services, which provide the potential for people to adapt based on biodiversity, ecosystem functioning and properties of ecological resilience and transformability. Bundles of adaptation services include (i) ecosystem properties that are actively managed for climate adaptation, (ii) properties that emerge as co-benefits from this management, and (iii) adaptive properties that derive from responses to other drivers like markets and subsidies. Within each land use type, adaptation is thus also about managing synergies and trade-offs among these three categories of adaptation services. These trade-offs scale up to the entire landscape to determine the net adaptation benefits from ecosystems. Alternative adaptation pathways are negotiated from these benefits, while balancing other social and economic dimensions of adaptation. For this, barriers resulting from interactions among values, rules and knowledge need to be overcome through private, collective and institutional innovation. These include reducing resistance to technical innovation (e.g. for agronomic management) through strong and well-supported agriculture extension services, or by moving away from an economy highly dependent on subsidies to consumer-producer networks with demand for local, high environmental quality products. Overall, as adaptation unfolds, alternative pathways mobilise an increasing diversity of adaptation services that support the diversification of agriculture and tourism activities.

Keywords: global change adaptation , ecosystem service model , participatory research , adaptation pathway , mountain socio-ecosystem

8. *Type of submission:* ***Abstract***

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Ecosystem services for adaptation to climate change in mountains: Actors and worldviews

First author: Bruno Locatelli
Affiliation, Country: CIRAD-CIFOR, Peru

Nature-based solutions are receiving increasing attention in the water management sector. There is a growing interest and awareness of the value of managing, conserving and restoring ecosystems for their role in regulating water and protecting watersheds. In the Peruvian mountains, some adaptation projects and programs emphasize nature-based solutions but face multiple challenges, for example the lack of knowledge on the effectiveness of such solutions and the diverging opinions on their relevance among decision-makers. In those projects, stakeholders have diverse interests in the implementation of nature-based solutions, in part because of their different interactions with ecosystem services. Using mixed methods, this study analyses options for adaptation and water management in the Andes in Peru. We propose a critical analysis of decision contexts on adaptation and water management and the implications of adaptation options on ecosystem services and equity. We identify different doctrines and preferences for technological or ecosystem-based options and relate them to stakeholder worldviews. The contrasting discourses on whether adaptation should be based on ecosystems or infrastructure can be associated with different conceptions of equity and different opinions on the role of government, communities and the private sector in water management. We also explore whether some options are favoured by decision rules and power relations. Analysing the interactions between stakeholders and ecosystem services and understanding the trade-offs between ecosystem services can help explain the different positions in favour or against nature-based solutions. This research highlights the importance of power relationships in adaptation decision-making, as such relationships favour the values and knowledge of some stakeholders and give priority of their preferred adaptation options.

Keywords: adaptation to climate change, water management, stakeholders, power, equity

9. *Type of submission:* ***Abstract***

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Assessing the efficiency of land use planning to preserve hydrological ecosystem services under scenarios of climate change in a mountainous watershed in Xishuangbanna, South-West China

First author: Kevin Thellmann, Marc Cotter

Other author(s): Reza Golbon, Georg Cadisch, Folkard Asch

Affiliation, Country: Institute of Agricultural Sciences in the Tropics and Subtropics (Hans-Ruthenberg-Institute), University of Hohenheim, Stuttgart, Germany

The extension of cash crops in South-East Asia brought new livelihood options to farmers. These land use changes transformed entire landscapes, which had previously been characterized by the century-long tradition of shifting cultivation. This altered biophysical structures and processes, which serve as the basis for the supply of ecosystem services (ESS). It is yet to be understood how resilient these altered landscapes are with regard to the supply of hydrological ESS in the face of climate change. Our study area, the Nabanhe Reserve in Xishuangbanna prefecture (Yunnan province, PR China), saw a rapid decline of semi-natural forest areas as well as extensive rubber expansions. We aimed to assess the effect of potential pathways of rubber-related land use changes under multiple scenarios of climate change. Three spatially explicit land use scenarios were developed with local stakeholders for the year 2040: (1) The Business-As-Usual scenario, featuring a continuation of past rubber expansion rates; (2) the 5-Year-Plan scenario, incorporating land use restrictions based on regional policy plans; and (3) the Balanced-Trade-Offs scenario, which is based on conservation measures such as riparian buffers and water protection zoning. We combined the scenario maps with data on expected changes in precipitation patterns, derived from two Representative Concentration Pathways (RCP 4.5 & RCP 8.5) of IPCC5 (Fifth Assessment Report of the Intergovernmental Panel on Climate Change). These serve as main inputs to model water yield and sediment export on watershed scale with InVEST (Integrated Valuation of Ecosystem Services and Trade-offs). The method we applied can easily be transferred to regions facing comparable land use situations, as InVEST and the IPCC5 data are open-source or freely available. The results contribute to the development of adaptation and mitigation strategies to buffer against the adverse effects of long-term changes in precipitation patterns on the supply of hydrological ESS.

Keywords: InVEST, climate change, land use change, rubber cultivation, South-East Asia

10. Type of submission: ***Abstract***

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ESP EUROPE
2018 REGIONAL CONFERENCE
Ecosystem services in a changing world: moving from theory to practice
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Acknowledging the multidimensional value of protected areas` contribution to people

First author: Noelia Zafra-Calvo
Affiliation, Country: Basque Centre for Climate Change bc3, Spain

Most studies assessing the benefits or services of protected areas to people have focused either on biophysical assessments of the capacity of the protected ecosystems to deliver biodiversity or ecological functions, or on highlighting the economic value of the services provided by protected areas. Fewer studies, however, have addressed the multidimensional benefits (intrinsic, instrumental and relational) of protected areas to people. We survey a diversity of people involved in the management of 167 protected areas all over the world about their perception on multidimensional services protected areas provide to local people. Benefits and services associated to intrinsic values has been identified in up to a 20% of the protected areas surveyed, instrumental in up to a 90% of and relational in up to 60% of protected areas. We find that most relational values in protected areas are described as people interactions with nature in recreational activities; aesthetic values contributing to place attachment and feelings of harmony with nature; emotional and physical health; places where awareness, education and research can take place; related to people's cultural identity; traditional knowledge; cultural heritage; social cohesion and branding; quality of life; spiritual peace and stability. It differs by categories of protected areas and across regions worldwide. These results highlight the need to integrate different values in policy and management decisions about protected areas in an adaptive governance framework.

Keywords: Governance, multidimensional benefits, protected areas, values