

BOOK OF ABSTRACT

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I. SESSION DESCRIPTION

ID: S8a

Ecosystem services for nature conservation and protected areas

	Title	Name	Organisation	E-mail
Host:		Jan Philipp Schägner	EC, JRC, Italy	Philipp.SCHAEGER@ec.europa.eu
		Klara Johanna Winkler	McGill, Canada	klara.winkler@mcgill.ca
		Augustin Berghöfer	UFZ, Germany	augustin.berghoef@ufz.de
		Johannes Förster	UFZ, Germany	johannes.foerster@ufz.de
Co-host(s):		Claire Johnstone	South African National Parks	Claire.Ntsane@sanparks.org
		Tobias Matusch	PH Heidelberg, Germany	matusch@ph-heidelberg.de
		Elena Osipova	IUCN, Switzerland	Elena.OSIPOVA@iucn.org
		Sophie Peter	Senckenberg Biodiversity and Climate Research Centre, Germany	sophie.peter@senckenberg.de
		Dolf de Groot	Wageningen University, The Netherlands	dolf.degroot@wur.nl

Abstract:

This session is calling for contributions on how the ecosystem service (ES) concept can be used in nature conservation and in the management of protected areas (PA). Traditionally, nature conservation is primarily understood to protect biodiversity and nature for its intrinsic values. In recent years, the ES concept has been recommended to complement this approach by emphasizing the multiple benefits of PAs. One approach is to make ES benefits explicit in order to advocate for enhanced political and financial commitments for PAs. However,

population growth and increasing needs for income, food, energy and raw materials stimulate an increasing demand for provisioning ES that are mainly provided by agricultural and semi-natural landscapes. Consequently, the ES concept may not necessarily support a sole focus on conservation in many cases. In addition, the ES concept has been proposed for improving PA management. The ES concept in PA management implies a shift from pure nature conservation towards more integrative conservation approaches which combine the sustainable use of areas while ensuring nature conservation goals. Hence, the ES approach may help to integrate considerations for nature conservation and for other sectors (PA tourism, sustainable agriculture, hydro power production etc.). Depending on the PA category, this shift is also reflected in policy goals and in PA management strategies. For example, while National Parks (IUCN category I or II) allow only for limited human use, Biosphere Reserves (IUCN category V) are supposed to be 'more than just protected areas' and 'sources and stewards of ecosystem services' (Lima Action Plan, 2016). If the ES concept is considered in PA zoning, planning, and management, it provides improved knowledge to balance the interests and needs of different stakeholder groups within and around PAs and it may support PA-related negotiation and decision processes. However, the shift from pure nature conservation towards a more ES provision orientated strategy may be limited by the regulations and policy goals of different PA categories. This raises questions such as: What value can the use of the ES concept add to the management and governance of PAs of different categories (e.g. National Parks, UNESCO Biosphere Reserves)? What empirical evidence of the value added by the ES concept to nature conservation and to the management of PAs is available? What processes and methodological issues need to be taken into account when assessing ES for informing PA management? What lessons can be drawn for the further uptake of the ES concept in PA management?.

Goals and objectives of the session:

Bring together researchers, practitioners and policy makers with a specific interest and experience in the application of the ES concept within PAs and nature conservation. Stimulate collaborations for the assessment and integration of ES in PA management.

Planned output / Deliverables:

A review paper on the use of ES concept in PA and nature conservation policies.

Related to ESP Working Group/National Network:

[Sectoral working group: SWG 8A – ES in conservation](#)

II. SESSION PROGRAM

Date of session: Tuesday, 22 October 2019

Time of session: 10:30 – 18:00

Timetable speakers

Time	First name	Surname	Organization	Title of presentation
Sub-session 1: ES in PA management, conflicts, trade-offs & Synergies (chairs: Philipp Schägner, Elena Osipova, Johannes Förster)				
10:30–10:40	Philipp	Schägner	Joint Research Center, EC, Italy	“Introduction to the session” Ecosystem services for nature conservation and protected areas & a glance into literature.
10:40–10:50	Ben	Delbaere	NEEMO eeig, Belgium	Does Europe’s environment funding support ecosystem services?
10:50–11:00	Rizza Karen	Veridiano	Thuenen Institute, Germany	Bridging the gap from science to policy: a look on community-based forest conservation approach in the Philippines “Last Ecological Frontier
11:00–11:10	Andrea Marco	Motroni Vannini	University of Sassari, Italy	Trade-offs among ecosystem services within protected areas: results from the GIREPAM study of Asinara National Park” / “From Ecosystem Mapping to Potential Carbon storage: a tool for protected areas management
11:10–11:20	Jhon Dario	López-Rojas	Metropolitan Technological Institute, Colombia	Ecosystem services, challenges and compensations for the change of land use in a regional protected area
11:20–11:30	Adriana	Bernal-Escobar	Universität Osnabrück, Germany	Spillover effects from mixing conservation policies in neighboring areas: Evidence from a field experiment in Colombia
11:30–11:40	Jorge	Aubad	ITM, Colombia	Evaluation of cultural ecosystem services to support the updating of the environmental management plan of a regional protected area in the central Andes of Colombia
11:40–11:50	Fernando	Santos-Martín	Universidad Rey Juan Carlos de Madrid, Spain	Protecting nature is necessary but not sufficient for conserving ecosystem services: A comprehensive assessment along a

				gradient of land-use intensity in Spain
11:50–12:00	Stefania	Benetti	Sapienza University of Rome, Italy	Understanding trade-offs between nature conservation and benefits to people: Applying an ecosystem service justice framework to the Circeo National Park, Italy
Sub-session 2: Participatory methods, perceptions and values (chairs: Klara J. Winkler, Jan Philipp Schägner, Augustin Berghöfer)				
13:30–13:40	Manoj	Bhatta	Charles Darwin University, Australia	Services people recognise that they obtain from red panda habitats in western Nepal
13:40–13:50	Anne	Böhnke-Henrichs	NABU, Germany	Does a conservation project affect management preferences and ecosystem service values of local residents? The case of salt marsh conservation in the lagoon of Venice
13:50–14:00	Iliana	Janssens	Vrije Universiteit Brussels, Belgium	Rapid ecosystem services assessment in practice: Applying the TESSA tool in African Biosphere Reserves
14:00–14:10	Jin	Jang	Korea National Park Service, South Korea,	Valuation of Ecosystem Services in the National Parks of Korea / Value Estimation for the Preservation of Species Diversity in Jirisan National Park in Korea
14:10–14:20	Augustin	Berghöfer	UFZ	Arguments for Protection: Preview on the 2020 Report 'Africa's Protected Natural Assets'
14:20–14:30	Matteo	Corsi	Università degli Studi di Genova, Italy	A comparison between the preferences of recreationalists on two Marine Protected Areas in Italy
14:30–14:40	Andrea	Ghermandi	University of Haifa, Israel	Country-wide analysis of nature-based recreation in Israel's protected areas using georeferenced social media data
14:40–14:50	Matthew	Mitchell	University of British Columbia, Canada	Quantifying and mapping nature's benefits to people for national-scale conservation planning
14:50–15:00	Ilaria	Rigo	Department of Earth, Environment and Life Science (DISTAV), University	Assessment of the loss of natural capital in priority marine habitats as a result of environmental changes



of Genoa, Corso
Europa 26, 16132
Genoa, Italy

Sub-session 3: Poster session (15:15–16:15)

15:15–15:27	Marios	Andreou	Frederick University Cyprus	“Troodos National Forest Park: Promoting natural values and Ecosystem Services”
15:27–15:39	Haojie	Chen	Australian National University, Australia	Valuing ecosystem services: an essential tool to assess land use trade-offs in China’s protected areas
15:39–15:51	Nicolas- George	Eliades	Cyprus Frederick University	Mapping and assessing ecosystem services to ensure the long-term preservation of a mountainous protected area: the case of Koilada Kedron-Kampos in Cyprus
15:51–16:03	Jonna	Heuschele	German Center for Integrative Biodiversity Research (iDiv), Germany	Investigating supply and demand differences of cultural ecosystem services in the Bavarian Forest National Park: An application of the international ECO-POTENTIAL participatory mapping and survey framework to Germany
16:03–16:15	Francesco	Licari	University of Udine, University of Trieste, Italy	“Evaluation of Green Infrastructure elements in rural-urban landscapes: a case study in North-East of Italy”

Sub-session 4: Planning, management and policy aspects (chairs: Jan Philipp Schägner, Klara J Winkler, Augustin Berghöfer, Elena Osipova, Johannes Förster)

16:30–16:40	Nikoleta	Jones	University of Cambridge, UK	Proposing a new framework explaining support for multi- functional protected landscapes: evidence from Cairngorms National Park, Scotland
16:40–16:50	Jan	Daněk	CzechGlobe, Czech Republic	Can ecosystem services framework support nature conservation in Protected Landscape Areas?
16:50–17:00	Wrap-up / Introduction group discussion			
17:00–17:50	Group discussion			
17:50–18:00	Closing/wrap-up			

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**

S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas

Evaluation of cultural ecosystem services to support the updating of the environmental management plan of a regional protected area in the central Andes of Colombia

First author: Jorge Aubad

Other author(s): Paula Salazar, Adriana Guerrero, Noelia Guaita

Affiliation: Faculty of Applied and Exact Sciences, Metropolitan Technological Institute, Medellín, Colombia

Contact: jorgeaubad@gmail.com

The integrated management district of paramos and high Andean forest system, in the mid-northwest Antioquia, is a protected regional area of 42,587 hectares, located in the central Andes of Colombia. The area, ranging from 2,400 to 3,400 MAMSL was created in 2010 and belongs to the national system of protected areas. In 2017, the environmental management plan was reviewed and a first draft was released with the opposition of the local population and other interested parties. Given its general disapproval, mainly due to the restrictions established on land use, it was proposed to include in the new plan, a characterization of the cultural ecosystem services. To achieve this characterization, the urban and rural population living in the area, as well as, visitors were taken into account, analyzing the differences between gender, age, educational level and occupation in the use of both, the type of service and the cultural activity carried out. In addition, a non-economic valuation was performed to understand the interest that people gave to their cultural activities. For this purpose, the annual frequency of use was estimated and their willingness to invest time in their activities, under new conditions. Finally, using expert criteria, the main cultural ecosystem services offered in the region were mapped, thus improving knowledge of the spatial relationship between people and the protected area. With all this, it is intended that the new environmental management plan, consider not only the biodiversity conservation and the regulation and protection of water resources but also the maintenance and improvement of the quality of life of the people that live or visit the area.



Keywords: Non economic valuation, mapping cultural ecosystem services

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

S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas

Understanding trade-offs between nature conservation and benefits to people: Applying an ecosystem service justice framework to the Circeo National Park, Italy

First author: Stefania Benetti

Other author(s): Johannes Langemeyer

Affiliation: Department of Methods and Models for Economy, Territory and Finance (MEMOTEF), Sapienza University of Rome, Via Del Castro Laurenziano 9, 00161 Rome, Italy

Contact: stefania.benetti@uniroma1.it

Protected areas are key instruments for conserving biodiversity and landscapes. Additionally, protected areas are essential to people's well-being, not least by maintaining communities' livelihoods. Yet, conservation initiatives are still often struggling to accommodate people's needs, provoking conflict and opposition. In this study, we apply a combined approach of environmental justice and ecosystem services to provide critical understanding of ecosystem services traded off with conservation policies. Moreover, we tried to identify different stakeholders' objectives and highlight pathways of conflict resolution. Our study focused on the Circeo National Park in Italy. By means of a survey (n=375) and a policy analysis we examined the procedures related to the governance of ecosystem services; we explored the distribution of ecosystem services benefits across different social groups; and we assessed the consideration of ES values held by different social groups. Although the ecosystem services concept was mentioned in some objectives of the park, the conservation strategies did not deeply consider of the actual people needs and benefits. Our results highlighted a top down approach in the protected area, with a general tendency to exclude local communities in the decision-making process. The exception was the park plan, supported by a participatory planning that involved administrators and citizens. However, only 12,33% of respondents participated in the meetings for the park plan design and 64% was not aware of these initiatives. Perceptions regarding the value of ecosystem services differed among survey respondents, depending on their age, area of residence, and business activities. This allowed us to recognise which social groups were more disadvantaged by the protection regime. We



conclude that a justice lens added to the ecosystem services approach can provide useful insights to consider trade-offs, which may increase social support for conservation.

Keywords: Ecosystem Services, Environmental Justice, Conservation, Socio-cultural values, Stakeholder Perception

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

S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas

Arguments for Protection: Preview on the 2020 Report, Africa's Protected Natural Assets'

First author: Augustin Berghöfer

Other author(s): Ulrike Tröger, Isabel Renner, Karla Locher, Heidi Wittmer, Nina Bisom, Hugo van Zyl, Michael Thiel, Martin Wegmann, Volker Koch, Fabien Quetier, and 20+ contributing authors

Affiliation: UFZ, GIZ, Würzburg University, Independent Economic Researchers, Biotope, and partners

Contact: augustin.berghoefer@ufz.de

As the Aichi targets aimed at the period 2011–2020, CBD COP15 will adopt a new international biodiversity policy framework. While some conservation protagonists campaign for a new target of putting 30% of land- and seascapes under protected areas status by 2030, the reality in many countries indicates a growing competition for land, sea, and natural resources. Economic and demographic growth will likely enhance pressure on protected areas in many African countries.

Enhanced public understanding and recognition of the multiple benefits which protected areas provide beyond their boundaries appears prerequisite for decisions and policies which balance immediate needs with longer term societal interests.

We present rationale, approach and outline of the upcoming report 'Africa's Protected Natural Assets'. The report synthesizes many pieces of evidence and seeks to interpret at continental scale the plethora of case study material and disperse (environmental) data, so as to show various facets of societal dependence on African protected area systems.



4. *Type of submission: Abstract*

S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas

**Spillover effects from mixing conservation policies in neighboring areas:
Evidence from a field experiment in Colombia**

First author: Adriana Bernal–Escobar

Other author(s): Stefanie Engel, Estelle Midler

Affiliation: Osnabrück University, Alexander von Humboldt Professorship for Environmental Economics, Germany

Contact: adrianaberna@uos.de

Equity is increasingly being recognized as a crucial issue for environmental conservation both from an ethical and efficiency perspective. Ignoring the sociopolitical context while implementing policies could undermine their environmental effectiveness as perceived unfairness may erode cooperation and compliance by policy addressees. For example, the sanctions commonly implemented in Protected Areas (PAs) raise equity concerns as local people depend on these areas to pursue livelihoods (Mbaiwa, 2005). At the same time, exclusion from Payments for Ecosystem Services programs (PES) has been reported to result in rule breaking, protest and sabotage (To et al., 2012). Nevertheless, when neighboring households of a PA generate relevant levels of pressure on its border, practitioners might use PES as a complementary tool for buffer areas. Where state enforcement capacity is low, PES have also been discussed as complements to legal restrictions inside PAs (Engel, 2016). However, the implications of implementing such different policies in neighboring areas have not been formally studied yet.

We use lab–in–the–field experiments with farmers from rural Colombia to examine spillover effects from implementing different policies or policy mixes in neighboring areas relevant for the provision of water. In a first treatment we mimicked PES targeting, while in a second treatment, we resembled the case where a PA is surrounded by a buffer area targeted by a PES. Finally, in a third treatment we studied the impact of using a PES as a compensation mechanism within a PA. Control treatments with equal policies were implemented to allow testing for spillover effects. We assessed the impact of the different policy combinations on fairness perceptions and pro–environmental behavior. As expected, preliminary results suggest that exclusion from PES in absence of further policy reduces pro–environmental behavior.

Surprisingly, penalizing some while compensating others increases pro-environmental behavior of those penalized.

Keywords: Watershed, PES, protected areas, policy mixes, spillover effect, fairness

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

S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas

Services people recognise that they obtain from red panda habitats in western Nepal

First author: Manoj Bhatta

Other author(s): Stephen Garnett, Kerstin Zander, Beau Austin

Affiliation: Research Institute for Environment and Livelihoods (RIEL), Charles Darwin University, Darwin, Australia

Contact: manojenvbhatta@gmail.com

Biologically and culturally diverse mountain habitats of the red panda produce numerous ecosystem goods and services of global significance, as well as satisfying the daily sustenance requirements and well-being of poor and vulnerable local communities. Most studies of ecosystem services conducted in Nepal have investigated community forest management and protected areas, largely in the lower hills and plains of Nepal. However, to conserve the endangered red panda, knowledge is needed of the services instrumental to the livelihoods and wellbeing of people living in and around their Himalayan mountain habitats. Using case of six remote villages nearest to known red panda habitats inside and outside the protected areas of western Nepal, this study has aimed to identify and categorize the goods and benefits provided by these habitats. Focus group discussions, key informant interviews, informal interactions, and participant observation identified varieties of direct use, indirect use, and non-use provisioning and cultural ecosystem services. Among the goods and benefits obtained from red panda habitats, local people prioritized summer grazing in high altitude pastures, plant materials for medicines and food, wild plants for energy, transhumant culture, and religious interaction with nature. Their dependency on these services varied with season and location, with greater reliance on the services outside the protected areas, however, the availability of these goods and benefits has declined greatly in recent years. Some services used for valuing ecosystems, such as carbon storage, improved air and water quality and



biodiversity, were never mentioned and appear to be acknowledged as services only by people from outside the region. This study suggests that understanding the value of the services provided to local communities could allow development of policy that would also help conserve red pandas, particularly if income can be obtained for providing services to outsiders that have no perceived local benefit.

Keywords: Red panda, ecosystem services, livelihoods, cultural services, mountain habitats

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

S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas

Does a conservation project affect management preferences and ecosystem service values of local residents? The case of salt marsh conservation in the lagoon of Venice

First author: Anne Böhnke-Henrichs

Other author(s): Laura Grechi, Alberto Barausse, Rudolf de Groot

Affiliation: Wageningen University, Germany

Contact: anne.boehnke@nabu.de, anne.boehnke-henrichs@wur.nl

Salt marshes are among the most threatened marine ecosystems globally. These global losses are mirrored by salt marshes in the lagoon of Venice. Almost two thirds of the salt marshes in the lagoon were lost during the past century due to erosion. This issue was addressed by a salt marsh conservation project (LIFE VIMINE <http://www.lifevimine.eu/>) which implemented low impact participatory restoration and conservation measures.

In our study we surveyed local residents at two different time steps during the LIFE VIMINE project to explore (1) what stakeholders know about and how they perceive environmental changes in the lagoon and how their knowledge and perception changed between the two surveys; (2) what preferences they have regarding future salt marsh management and related future ecosystem service provision and (3) how they value the salt marshes and how this notion of importance changed between the two surveys. Results show that only a small increase in knowledge level was measured but the appreciation of the importance (value) of salt marshes and the support for their restoration significantly increased between both surveys. Survey



results are useful for inferring suggestions for future salt marsh management in Venice lagoon.

Keywords: marine ecosystem services, lagoon, participatory management, salt marsh conservation

7. *Type of submission: Abstract*

5. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas

Can ecosystem services framework support nature conservation in Protected Landscape Areas?

First author: Jan Daněk

Other author(s): Linda Blättler, Dava Vačkářů

Affiliation: Global Change Research Institute of the Czech Academy of Sciences, Czech Republic

Contact: danek.j@czechglobe.cz

Interviews are considered an important tool for gaining insight into specific conservation issues. These issues are inherently connected with ecosystem services (ES) and their perception by stakeholders. In the Czech Republic, there has not been any research yet based on qualitative research techniques addressing conservation decision-making on the national level. Also, the concept of ES remains out of consideration when it comes to addressing challenges of nature and landscape conservation. Our research aim was to identify the contributions of Protected Landscape Areas (PLAs) for society and nature as perceived by key stakeholders in the nature protection decision-making administration, the heads of PLAs responsible for their management. Furthermore, we wanted to identify current problems or conflicts related to water, forestry, agriculture, biodiversity, recreation and tourism in PLAs. We conducted semi-structured interviews with 20 regional chief representatives of PLA administration (out of 24). We also addressed the concept of ES and its viability to support the goals of nature protection. Data were processed using qualitative content analysis with the MAXQDA software. The results show a relative coherence in information amongst all PLAs. The contributions of PLAs to society are perceived mostly in the form of cultural ES, especially recreation and tourism, education value and aesthetics. The contributions of PLAs to nature conservation itself are perceived mostly in the protection of biodiversity. Regulating ES are not so obvious to most of our respondents and there is an evident openness and willingness to



employ the ES concept for justifying the values of nature and its protection when dealing with important stakeholders. Presented research is part of a multi-level process and will be followed by other upcoming activities including participatory workshops to elicit values of nature in PLAs or national ES assessment.

Keywords: ecosystem services, semi-structured interviews, Protected Landscape Areas, governance, decision-making

8. *Type of submission: Abstract*

S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas

Assessment of the loss of natural capital in priority marine habitats as a result of environmental changes

First author: Ilaria Rigo

Other author(s): Chiara Paoli, Giulia Dapuzo, Alice Oprandi, Sara Venturini, Lorenzo Merotto, Valentina Capanera, Giorgio Fanciulli, Lucia Capuano, Federico Betti Monica Montefalcone, Giorgio Bavestrello, Paolo Povero, Paolo Vassallo

Affiliation: Department of Earth, Environment and Life Science (DISTAV), University of Genoa, Corso Europa 26, 16132 Genoa, Italy

Contact: giulia.dapuzo@edu.unige.it

Marine and coastal ecosystems are among the most productive environments in the world and contribute to the economic value generated by the biosphere offering a wide variety of services.

Posidonia oceanica and some organisms of coralligenous biocenosis are key species listed among the priority habitats in the European Habitat Directive 92/43/ECC and they are considered as important bioindicators to define quality of coastal marine ecosystem in order to reach the good environmental status (Marine Strategy Framework Directive, 2008/56/EC).

In this study *P.oceanica* meadows and coralligenous are used as indicator for their sensitivity to environmental changes in Portofino Marine Protected Area (Ligurian coast).



Aims of this study are 1) to quantify and characterize Natural Capital (NC) value of both *P. oceanica* and coralligenous habitats (considering *Paramuricea clavata* and *Eunicella Cavolini*) and 2) to evaluate changes in NC value due to increasing effects of anthropogenic disturbances and exceptional meteorological phenomena (e.g. heavy sea-storms that hit the Ligurian coast on October 2018).

The NC has been assessed through emergy analysis (Odum, 1988; 1996), a biophysical approach able to study the ability of the system to stock natural capital. This methodology quantifies resources directly or indirectly used up to generate or maintain a system and its functioning.

Environmental accounting can be used as a tool to assess both the biophysical and economic value of NC and ecosystem services.

The ecological value of natural resources is linked to the role that they play in the functioning of the biosphere at different scales and in support of different species, as such must be maintained and guaranteed.

Keywords: *Posidonia oceanica*, Coralligenous, Emergy analysis, Marine Protected Area, Liguria (Italy)

9. *Type of submission: Abstract*

S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas

Does Europe's environment funding support ecosystem services?

First author: Ben Delbaere

Affiliation: NEEMO eeig, Belgium

Contact: ben.delbaere@neemo.eu

The LIFE programme is the European Union's funding instrument for the environment and climate action. Created in 1992, much of the funding supports the development and management of Natura 2000, the EU network of protected areas that was established in the same year. This network, and the species and habitats to be protected in association with it, is underpinned by some of the world's strongest conservation policies: the EU Birds and Habitats Directives.



Actions supported through LIFE include development, restoration and management of habitats and ecosystems. Besides nature projects, projects dealing with biodiversity in a broader sense, with the wider environment and climate change are co-funded. Although LIFE Nature projects traditionally focus on the conservation of species and habitat of most interest to the European Community, the concept of ecosystem services and green infrastructure may add value to their impact.

Here we will present a brief analysis of how LIFE projects relate to ecosystem services and green infrastructure, and in extension to nature-based solutions. Which ecosystem services are most closely linked to the projects? How are they used? What tools are applied in assessing the ecosystem services? How can the application of the concept help integrate nature into other policy sectors? And what does the future bring with respect to linking ecosystem services to enhanced impact of LIFE funding?

Keywords: nature conservation, protected areas, EU legislation, mainstreaming biodiversity, LIFE funding

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

[S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas](#)

Country-wide analysis of nature-based recreation in Israel's protected areas using georeferenced social media data

First author: Andrea Ghermandi

Other author(s): Edna Fichtman, Michael Sinclair, Lyan Wolovelsky

Affiliation: Department of Natural Resources and Environmental Management, University of Haifa, Israel

Contact: aghermand@univ.haifa.ac.il

Despite being important co-benefits of nature and heritage conservation, recreational activities are seldom monitored in protected areas, which poses limitations for their sustainable management. We analyze georeferenced data from four social networking websites (Twitter, Flickr, VK, Panoramio) for the entire network of national parks and nature reserves managed by the Israel Nature and Parks Authority, with a focus on predicting visitation rates in unmonitored sites. We test several calibration models against visits observed



in 59 sites for which data is monitored. We show that controlling for site-specific differences and sites' photogenicity improves fit and predictive power of the models. Combining data from multiple sources improves the performance of the calibration model (adj. $R^2=0.69$; Geometric Mean Absolute Percentage Error=33%; Mean Absolute Percentage Error=64%), even if correlation with data from individual sites may be low. Errors are substantially higher for sites with a small number of social media user days (GMAPE=49%; MAPE=95%) compared to sites with larger samples (GMAPE=26%; MAPE=52%). We perform a repeated k-fold cross-validation with ten partitions ($k=10$) and 100 repetitions, concluding that the model has good predictive skills (reduction of error=0.544; coefficient of efficiency=0.577). We predict annual visitation rates and 80% prediction intervals for 314 protected areas in Israel where recreational visits are not routinely monitored. Even restricting the analysis to the 118 protected areas where we can predict visitation with high confidence, our results indicate that actual visitation rates are substantially (20%) higher than the currently available best estimates. Finally, we map cultural ecosystem services hotspots within Israel's largest national park on Mount Carmel and the adjacent nature reserve, relying on the insight that manual content analysis and automated classification with a purposely trained online machine learning algorithm are fairly consistent in identifying the services represented in 2,864 geotagged photographs taken within the site (overall agreement=75.3%; Cohen's kappa=0.71).

Keywords: cultural ecosystem services, social media, ecosystem service mapping, protected areas, Israel



11. Type of submission: **Abstract**

S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas

Economic Value Estimation for the Preservation of Species Diversity in Jirisan National Park in Korea

First author: Jin Jang

Other author(s): Jun Hyung Park, Hag Young Heo, Kyu Won Sim, Bo Hyun Kim

Affiliation: Korea National Park Research Institute, Korea, Republic Of

Contact: jinimi0903@knps.or.kr

Jirisan national park was designated as the first national park in Korea on December 29th, 1967. It is the widest mountain-style national park out of a total of 22 national parks in Korea. And it is an area with higher ecosystem service benefits, with superior natural scenery and biodiversity. This study estimated the economic value of "Preservation of Species Diversity" in Jirisan National Park. We conducted an online survey, by sampling 554 persons in 2018. The survey was designed to evaluate the economic value of the preservation of species diversity. The evaluation method used Choice Experiments (CE) to investigate the willingness to pay for the conservation of one species in Jirisan National Park. In order to explain the species diversity, the questionnaire configuration divided the species into endangered species, indigenous species (except for endangered species), and alien species. Also, the explanation of species diversity was provided prior to answering the survey for the respondents' better understanding. In Jirisan national park, the economic value of an endangered species was approximately 146 times than an indigenous species (except for an endangered species). Based on the hypothetical market, we analyzed the limit value of species-specific conservation in Jirisan National Park. Further research is needed to improve methodology in the future.

Keywords: Jirisan National Park, values of ecosystem services, economic value, Choice Experiments (CE)



12. Type of submission: **Abstract**

S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas

Valuation of Ecosystem Services in the National Parks of Korea

First author: Jin Jang

Other author(s): Hag Young Heo, Kyu Won Sim, Bo Hyun Kim

Affiliation: Korea National Park Research Institute, Korea, Republic Of

Contact: jinimi0903@knps.or.kr

The national park has rich biodiversity and provides high ecosystem service benefits. The Korea National Park Research Institute has got the plan to conduct ecosystem services assessment for all national parks in Korea, around 3 or 4 parks per year. In 2017, the assessment indicators for the ecosystem services of national parks were selected through the process of the precedent research reviews, and expert workshops, etc., in order to assess the value of the ecosystem services of national parks. In 2018, drafting the assessment system of selected indicators was modified and supplemented more effectively, in order to enable application at the local level. Total 23 of assessment indicators have been composed of provisioning services(5 indicators), regulating services(6 indicators), cultural services(6 indicators) and supporting services(6 indicators). Using these 23 indicators, ecosystem services assessed in Jirisan National Park, Gyeongju National Park, and Dadohaehaesang National Park. In 2019, we try to derive what are the major ecosystem service of its national park. We used the InVEST model and we improved the model to match the characteristics of the national park and have obtained a modified model.

Keywords: protected area, values of ecosystem services, assessment indicators, park management plan



13. Type of submission: **Abstract**

S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas

Rapid ecosystem services assessment in practice: Applying the TESSA tool in African Biosphere Reserves

First author: Iliana Janssens

Other author(s): Anne-Julie Rochette, Jean Hugé, Richard Niyomugabo, Tatiana Gonzalez, Devonne Goad, Luc Janssens de Bisthoven

Affiliation: Vrije Universiteit Brussels, Belgium

Contact: iliana.janssens@vub.be

African Biosphere Reserves aim to foster the interconnection between humans and nature. This requires the sustainable management of natural resources. In order to achieve this, it is key to understand the state and trends of, along with the threats to ecosystem services provided by these protected areas. One of the tools to rapidly assess and quantify ecosystem services is the Toolkit for Ecosystem Service Site-based Assessment or TESSA. TESSA is a field estimation tool which does not require any advanced technical knowledge or financial resources. It works at a local scale, is highly adaptable and focuses on stakeholder identification and engagement. After a quick contextualization of the TESSA tool and a short overview of TESSA applications worldwide, we will present the experiences of our team in applying TESSA-inspired approaches in four African Biosphere Reserves: the Pendjari National Park in Benin; Lake Tana in Ethiopia; the Sine-Saloum Delta in Senegal and coastal Kenya. We will reflect on the practical pros and cons of the method, its relevance for the management of Biosphere Reserves, and present the adaptations we used to link the TESSA-approach with the Nominal Group Technique (NGT). This emphasizes one of the major strengths of TESSA: its flexibility to fit the different expectations of its diverse users, and how it can be easily combined with other techniques.

Keywords: TESSA tool, ecosystem service assessment, stakeholder perception, Africa, Biosphere Reserve



14. Type of submission: **Abstract**

S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas

A New Approach in Explaining Public Support for Protected Areas: linking the literature of ecosystem services with theories of environmental psychology

First author: Nikoleta Jones

Other author(s): James McGinlay

Affiliation: Anglia Ruskin University & Department of Land Economy, University of Cambridge, United Kingdom

Contact: nj322@cam.ac.uk

It is now widely accepted that in order for Protected Areas (PAs) to be effective they require the support and cooperation of all users, with a significant role being played by local communities. It is important that factors influencing support for PAs are fully understood in order to be able to design new PAs and improve existing ones. Considering the increasing evidence regarding the parameters that influence support for PAs and also the developments in the last decade of the role of ecosystem services in human wellbeing there is a need to broaden existing theoretical frameworks in order to be able to understand individuals' perceptions of such conservation policies. In this presentation we propose a new framework explaining support for PAs influenced by four main theoretical streams: the value-belief-norm theory, the theory of planned behaviour, Ostrom's behavioural theory of collective action and finally the theoretical links between ecosystem services and human wellbeing. Our framework proposes a chained link process between personal characteristics and values, perceived ecosystem services, expected policy outcomes, internalisation of personal norms and responsibility for action with the level of support for Protected Areas. This framework is an important contribution currently missing in the literature conceptualising the psychological journey of individuals when they are introduced to the idea of a PA that will allow practitioners and scientists to understand the reasons for the differentiated levels of support for these Areas.

Keywords: social impacts, protected areas, social norms, values, trust



15. Type of submission: **Abstract**

S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas

A comparison between the preferences of recreationalists on two Marine Protected Areas in Italy

First author: Matteo Corsi

Other author(s): Elena Lagomarsino, Barbara Cavalletti

Affiliation: Università degli Studi di Genova, Italy

Contact: elena.lagomarsino@unige.it

This paper presents an application of a discrete choice experiment on the recreational benefits deriving from beach-bathing in two distinct marine protected areas (AMPs) in Italy (Liguria), Portofino and Montemarcello-Magra. These AMPs present very different baselines as the former is well known for its high environmental quality and a very efficient management while the latter is less monitored and shows potential margins of improvement. The attributes used to describe the bathing activity are separated into two categories: natural attributes, directly linked to the natural capital and ecosystem services, and anthropic attributes, connected with the level of anthropic impact in the area. Our sample is composed of bathers interviewed on-site during the summer of 2018. The comparison between results for the two AMPs is interesting as they are closely located and belong to the same administrative region. It appears that the naturalistic features of the site drive recreationalists' choices: in Portofino there is a clear-cut preference for the status-quo while in Montemarcello-Magra emerges a significant willingness to pay for improvements in the quality of the water and the richness of the seabed (5–6 euros per person per year).

Keywords: Marine Protected Areas, Choice Experiment, Willingness to pay



16. *Type of submission: Abstract*

S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas

Ecosystem services, challenges and compensations for the change of land use in a regional protected area

First author: Jhon López-Rojas

Other author(s): Jorge Aubad, Adriana Guerrero, Juan Bolívar, Andrés Londoño, Noelia Guaita

Affiliation: Metropolitan Technological Institute, Medellín, Colombia

Contact: jhondariolopez@gmail.com

A new regulation has been introduced to promote land cover changes in the jurisdiction of the Integrated Management District of the system of páramos and high Andean forest of the Midwest of Antioquia, Colombia, an area responsible for the water supply of more than 60 % of the 3.5 million inhabitants of the Aburrá valley. The interest of this regulation on the part of the regional authorities is to promote the replacement of pastures to forests, in order to protect and improve ecosystem services, a necessary but highly complex measure to implement among the property owners. In order to facilitate decision-making, we propose a support tool related to compensation systems, adding changes in production and in the value of heritage, where changes in production will be made by calculating the cost of recovery of dairy farms. These dairy farms belong to areas of recovery and sustainable use of the Municipality of Belmira and in them, we have started with the approach the assessment of livestock activity from a milk production perspective approach, which represents more than 90% of the value generation of the business. It is intended to extrapolate the results obtained over time, incorporating the production planning for a maximum of 5 years, counted from the year 2020, given that the new fiscal regulations could generate uncertainties that would affect the validity of the model. For the new calculation, a review based on the ecosystem services offered and on the profits of the dairy sector is recommended. This will change the equity value of the sector, adjusting the incentives so that they respond both to the degree of conservation and to the decrease in the properties value, due to land use restrictions.

Keywords: Areas of recovery and sustainable use, Valuation, Dairy farms, Integrated Management District, land use restrictions



17. Type of submission: **Abstract**

S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas

Quantifying and mapping nature's benefits to people for national-scale conservation planning

First author: Matthew Mitchell

Other author(s): Richard Schuster, Aerin Jacob, Dalal Hanna, Camille Ouellet Dallaire, Ciara Raudsepp-Hearne, Elena Bennett, Bernhard Lehner

Affiliation: Institute for Resources, Environment and Sustainability, University of British Columbia, Canada

Contact: matthew.mitchell@ubc.ca

A key goal of the Aichi Biodiversity Targets is to conserve “areas of particular importance for biodiversity and ecosystem services.” However, there is limited understanding of where key ecosystem service locations overlap with human access and demand. We developed new methods and used freely-available data to combine the capacity of ecosystems to provide services with human demand and ability to access these services in order to identify areas important for three ecosystem services — carbon storage, freshwater, and nature-based recreation. We then evaluated how these hotspots align with Canada’s protected areas network and current natural resource tenures. We show that, first, areas of high service capacity in Canada are often distinct from those that actually provide benefits to people. Other than for carbon storage, only one-quarter to one-third of provision hotspots overlap with capacity hotspots (recreation: 27%, freshwater: 29%, total services: 36%). Second, Canada’s protected areas could more efficiently target areas important for ecosystem service provision. Canada’s current parks network captures between 11–14% of capacity hotspots, but only ~10% for provision hotspots. Third, there is limited overlap between ecosystem service hotspots; only 24% of the total hotspot area nationally consists of overlapping hotspots of two or more services. Finally, a significant proportion of ecosystem service hotspots overlap with natural resource tenures (freshwater: 66%, recreation 63%, total services: 54%). Our results show that incorporating ecosystem capacity and human demand in the assessment of ecosystem services is crucial to identify locations and opportunities for safeguarding ecosystem service provision. However, this may be challenging if our results are prevalent and few overlapping hotspots for multiple services exist, and those that do exist significantly overlap with natural resource extraction activities. We argue that successfully incorporating ecosystem service capacity,



access, and demand into conservation planning will ensure that conservation actions can effectively safeguard ecosystem services.

Keywords: ecosystem services, conservation, protected areas, Aichi Biodiversity Targets, Canada

18. Type of submission: Abstract

[S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas](#)

Protecting nature is necessary but not sufficient for conserving ecosystem services: A comprehensive assessment along a gradient of land–use intensity in Spain

First author: Fernando Santos–Martín

Other author(s): Zorrilla–Miras, Pedro, Palomo–Ruiz, Ignacio, Montes, Carlos, Benayas, Javier, Maes, Joaquim

Affiliation: Social–Ecological Systems Laboratory, Department of Ecology, Universidad Autónoma de Madrid, Madrid, Spain

Contact: fernando.santos.martin@uam.es

Land–use intensification is occurring worldwide and is impacting the delivery of multiple ecosystem services. We developed an approach to understand land–use change in relation to ecosystem services synergies and trade–offs at a national level. We test the proposed approach for Spain by mapping the spatial distribution of 14 high resolution indicators with the aim to (a) facilitate a greater understanding of the spatial interactions among ecosystem services; (b) identify the hotspots of ecosystem service synergies and trade–offs; and (c) explain the ecosystem service synergies and trade–offs in relation to a land–use intensity gradient. Our results show how current land–use management in Spain is creating a landscape–level dichotomy between land–use intensification and protection (through the declaration of protected areas), which is having a clear negative effect on the conservation of essential ecosystem services. For example, we spatially identify where agricultural intensification is presenting a major trade–off with other ecosystem services. Finally, we discuss the urgent need for a new comprehensive model of landscape planning at a national scale that takes into account the complex interactions among ecosystem services and the establishment of a new



governance body at national level regarding the management and conservation of ecosystem services.

Keywords: Ecosystem services, Synergies and trade-offs, Land-use intensity, Protected areas Landscape planning, Spain

*19. Type of submission: **Abstract***

S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas

From Ecosystem Mapping to Potential Carbon storage: a tool for protected areas management.

First author: Andrea Motroni

Other author(s): Matilde Schirru, Laura Santona, Sabrina Lai, Simona Canu, Marco Vannini, Gianfranco Atzeni, Marta Meleddu, Vittorio Gazale, Chiara Orrù

Presenting author(s): Andrea Motroni and Chiara Orrù

Affiliation: ARPAS – Regional Environmental Protection Agency of Sardinia, Italy

Contact: matildeschirru@gmail.com, amotroni@arpa.sardegna.it

The GIREPAM project (Programme INTERREG Italy–France Maritime, 2014–2020) aims at improving the management of ecological networks, building up synergies and complementarities among parks and marine protected areas across the north Tyrrhenian area in the Mediterranean basin. The evaluation of ES for the Asinara National Park (Sardinia, Italy) represents one of the outcomes of the project, to set a baseline for a natural capital accounting of the protected area and the implementation of ES monitoring over time. Ecological Land classification was applied to the Park, selected as a case study, in order to obtain a map of Land Units that combines bioclimate, lithology, morphology and land use thematic layers. Carbon sequestration and the associated reduction of greenhouse gas concentration is one of the ES considered: belowground and aboveground biomass, litter and soil organic carbon stocks were estimated for all the ecological Land Units in the Park area. The potential carbon inventory map of the Asinara island represents the preliminary result of the Project. Such map is useful for land management and for defining conservation and management policies in the protected area; moreover, it provides a necessary tool for economic accountability of carbon offsets and management of possible ecosystem service trade-offs.



Keywords: Ecological Land classification, Mapping Ecosystem Services, Potential Carbon Inventory

20. *Type of submission:* **Abstract**

S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas

Trade-offs among ecosystem services within protected areas: results from the GIREPAM study of Asinara National Park

First author: Marco Vannini

Other author(s): Marta Meleddu, Gianfranco Atzeni, Giovanni Battista Concu

Affiliation: University of Sassari and CRENoS, Italy

Contact: vannini@uniss.it

The GIREPAM project (Programme INTERREG Italy–France Maritime, 2014–2020) aims at improving the management of ecological networks building on synergies and complementarities among parks and marine protected areas across Europe. Within the spectrum of viable actions (e.g. integrated management plans, environmental accounting, partnerships and transboundary coordination), particular attention is being paid to enhancing the flow of Ecosystem Services (ES). One such service is carbon sequestration and the associated reduction of greenhouse effects. The provision of carbon offsets for a protected area raises a number of problems due to the existence of trade-offs against other ES (e.g. wild flora and fauna, cultural experience). We explore this issue by means of a pilot study concerning the Asinara National Park and Marine Protected Area (Italy, Sardinia). We investigate in particular stakeholders preferences concerning alternative carbon offsets policies and associated change in the provision of related amenities.

Keywords: trade-offs, preferences, protected areas, carbon offsets, ecosystem services

21. Type of submission: **Abstract**

S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas

Bridging the gap from science to policy: a look on community-based forest conservation approach in the Philippines “Last Ecological Frontier”

First author: Rizza Karen Veridiano

Other author(s): Jose Don de Alban, Joanne Rae Pales, Roven Tumaneng, Angelica Kristina Monzon

Affiliation: Center for Development Research, University of Bonn and Fauna and Flora International-Philippines Programme, Germany

Contact: rizzakaren.veridiano@gmail.com

In a country where participatory involvement of different stakeholders is the norm, we have come to learn how to translate numbers and data into a language that communities and policy makers alike would understand. Part of the larger REDD+ implementation in the country is the case of the community-based forest conservation project at the Victoria-Anepahan Mountain Range, Palawan, Philippines. The entire island of Palawan was designated as one of UNESCO's Biosphere Reserves in 1990. This study highlights the importance of ensuring that communities of indigenous peoples (IP) play an integral part in every component of REDD+ implementation alongside forest conservation projects. Through a series of training workshops, forest inventory and biodiversity assessments, we were able to train and develop capacities of 97 participants (76% of which are IPs), of whom eventually gained a step-wise understanding of various REDD+ and ecosystem services concepts. Together with the partner IP communities, we're able to estimate that the sub-national REDD+ site currently harbours 11.20 ± 1.37 Mt CO₂eq/yr. Additionally, we're able to estimate the extent of distribution of 20 key forest tree species (as proxy for high-value conservation areas) in the mountain range. Yet, the story does not end with them having understood these concepts. Equipped with the new knowledge about these regulating (carbon storage) and supporting (biodiversity/habitat) ecosystem services, local IPs together with policy makers from the provincial government initiated the establishment of a community-managed watershed reserve, ratified through a local ordinance and demarcated on the ground. Such actions further demonstrate the indigenous peoples communities' capacity to act upon science-based assessments and translate them into conservation policies that promote better management and conservation of the remaining forests of Palawan. Lastly, this approach also provides a concrete example



on how participatory conservation approach has the capacity to influence policies and can be a good example for upscaling at the national or even at the regional level.

Keywords: ecosystem services, forest conservation, local policies, indigenous peoples, biodiversity

22. *Type of submission: Poster abstract*

S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas

Troodos National Forest Park: Promoting natural values and Ecosystem Services

First author: Marios Andreou

Other author(s): Constantinos Kounnamas, Nicolas – George Eliades, Minas Papadopoulos

Affiliation: Frederick University, Cyprus

Contact: andreoum@gmail.com

Troodos National Forest Park (TNFP) is located in the centre of Troodos mountain range and it is one of the most important natural environments of Cyprus. TNFP has been included to the Natura 2000 network of the island due to its important natural ecosystems and its great biodiversity. The project iLIFE–TROODOS (co-funded by the European Commission and the LIFE programme) aims to increase public awareness on the natural values of TNFP, for which it was included in the Natura 2000 network, and the Ecosystem Services (ES) it provides. The current work presents selected ES of TNFP, based on the Common International Classification of Ecosystem Services (CICES – three ES categories: Provisioning services, Regulating and Maintenance services, Cultural services), which have been identified through this project. Specifically, this work graphically presents the ES mapped through CICES, as well as a more detailed presentation of the water related services of the area. The services have been mapped and their distribution in the area is presented in respective maps (using ArcGIS software), while their economic importance has also been evaluated. Most of the data used was acquired from the databases of the Cyprus Department of Forests, while information relating to the use of the area was obtained through surveys carried out by the project’s personnel. Further information was collected from publicly available sources and the Water Development Department, whereas the TESSA toolkit (2017 v. 2.0) was utilized for the evaluation of water–



related services and global climate regulation (including carbon storage). The data derived on these ES is being used for the awareness purposes of the project iLIFE-TROODOS.

Keywords: ecosystem services, Troodos National Forest Park, Cyprus, iLIFE-TROODOS

23. *Type of submission:* **Abstract**

S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas

Valuing ecosystem services: an essential tool to assess land use trade-offs in China's protected areas

First author: Haojie Chen

Affiliation: Australian National University, Australia

Contact: haojie.chen@anu.edu.au

Protected areas (PAs) are a key source of ecosystem services (ESs), and so are crucial to human wellbeing and sustainable development. The Chinese government is now improving management on PAs, but is faced with several land use trade-offs, including whether or not it should expand PAs, and how to balance conservation with tourism and local livelihoods development. Addressing these trade-offs can benefit from a better understanding of the production and value of ESs provided by PAs. Currently, it is unclear whether or not conservation generates greater benefits than costs, since the environmental, economic and social benefits and costs of conservation have not been comprehensively weighed up. Moreover, payment for ecosystem services schemes have been developed to address the trade-off between conservation and local livelihoods, but current schemes offer no financial compensation for local people's loss of non-marketable cultural ESs. Research is needed to estimate what the value of PAs' non-marketable cultural ESs to local people is, and comprehensively assess whether it is cost-effective to enhance tourism development in PAs and improve the coverage of China's nationwide PAs. Valuing ESs is an essential component toward answering these questions.

Keywords: protected area, ecosystem service, trade-off, conservation, development



24. *Type of submission: Poster abstract*

S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas

Ecosystem services and community-based management in protected areas: understanding the perceptions of boundaries communities for management and conservation

First author: Marcondes Geraldo Coelho Junior

Other author(s): Eduardo Carvalho da Silva Neto, Athila Leandro de Oliveira, Thayanne Caroline Castor Neto, Ana Alice de Oliveira Tavares, Vanessa Maria Basso, Acacio Geraldo de Carvalho

Affiliation: Federal Rural University of Rio de Janeiro, Brazil

Contact: marcondescoelho22@gmail.com

Protected areas (PAs) are complex socio-ecological systems that require adaptive management. In order to go towards this direction, knowing the local people's perception of PA landscapes is a key factor for management effectiveness. Thus, the objective of this study was to associate the perception of community residents around the Cunhambebe State Park (CSP), Southeast Brazil, regarding ecosystem services and the function of PAs in providing benefits that sustain human well-being. The CSP represents a significant fragment of the Atlantic Forest, in addition to its water resources providing water to a large region of Rio de Janeiro. Semi-structured interviews with 75 random residents were used. The responses were associated with ecosystem services according to the Millennium Ecosystem Assessment (MEA). More than 80% of cultural ecosystem services were identified by the interviewees, three of which were not included in the MEA: "Body, mind and spirit"; "Ecological values"; and "Values of economic incentive". Subsequently, the services of regulation (12.0%) and provision (8.0%) were observed. The use of the ecosystem services approach for CSP's management enables the valuation of priority areas for conservation and dialogue with the communities. The CSP represents an excellent opportunity for people to connect with the Atlantic Forest, experiencing experiences that can bring psychological, spiritual and social benefits, attested by the perception of "ES Body, mind and spirit". The "ES Values of economic incentive" shows the positive perception about the presence of the park by generating income and adding value to the property and agricultural production. Therefore, due to the proximity to a protected ecosystem, we consider the immaterial benefits brought as a strategy for the management of land use and occupation. Positive perceptions in relation to the CSP favor attitudes pro-conservation of biodiversity and benefits for human well-being.



Keywords: protected area management, environmental perception, stakeholders' perception, social participation, conversation planning

25. *Type of submission: Poster abstract*

S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas

Mapping and assessing ecosystem services to ensure the long-term preservation of a mountainous protected area: the case of Koilada Kedron-Kamos in Cyprus

First author: Nicolas-George Eliades

Other author(s): Roxanne Suzette Lorilla, George Kefalas, Andreas K. Christou, Konstantinos Papasavvas, Marios Andreou, Constantinos Kounnamas, Konstantinos Poirazidis

Affiliation: Frederick University, Cyprus

Contact: niceliades@gmail.com

The current study is implemented within the frame of LIFE-KEDROS project (LIFE15 NAT/CY/000850) and aims to ensure the medium and long-term preservation of the priority habitat type 9590* in good conservation status, at the only Natura 2000 site where this habitat exists, in Cyprus and Europe. The habitat 9590* *Cedrus brevifolia* forest is an endemic priority habitat type of Annex I of the Directive 92/43/EEC, found in Cyprus. This study focuses on understanding the spatial and temporal dynamics of Ecosystem Services' (ES) supply across the Natura 2000 site "Koilada Kedron-Kamos", and on optimizing future ES provision, along with mitigating current trade-offs within the habitat 9590*.

Five ES were quantified covering all ES sections of the CICES. These ES are "biomass-based energy resources", "climate regulation", "soil erosion prevention", "maintenance of nursery populations and habitats" and "recreation". The results revealed similar spatial patterns among the ecosystem services, where the northern part of the site has a lower ES provision than the southern part. Forested regions presented higher ES supply except for some ecosystem services, which showed lower supply in less diverse areas. The pattern of correlations remained the same between the two studied years (in 1997 & in 2017) for most pairs of ecosystem services. However, while in 1997, "biomass-based energy resources" and "maintenance of nursery populations and habitats" showed no correlation, in 2017 this specific ES pair presented a significantly strong trade-off relationship. This study showed that in 2017



regions with multiple ES provisions decreased compared to those in 1997, followed by an increase of areas with low ES provision. The spatial dynamics and interactions among ES could provide information for stakeholders and decision-making processes to develop an appropriate sustainable management of the ecosystems on the targeted protected site to secure ecological, social, and economic resilience.

Keywords: *Cedrus brevifolia*, habitat type 9590*, spatial dynamics and interactions among ES

26. *Type of submission: Poster abstract*

S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas

Investigating supply and demand differences of cultural ecosystem services in the Bavarian Forest National Park: An application of the international ECOPOTENTIAL participatory mapping and survey framework to Germany

First author: Jonna Heuschele

Other author(s): Aletta, Bonn, Maria, Felipe-Lucia, Marco, Heurich, Maria, Hußlein, Florian, Porst

Affiliation: German Center for Integrative Biodiversity Research (iDiv), Germany

Contact: jonnaheuschele@posteo.de

Conflicts in the management of protected areas arise when its objectives are contradicting such as nature protection versus tourism. The integration of the concept of cultural ecosystem services to the context of nature conservation in protected areas offers a broad spectrum of applied areas. The Bavarian Forest National Park (BFNP) identifies under the IUCN protected area category II and therefore is also to implement plans for education and recreation. Promotion of tourism and the significance of protected areas in their function as regional attractions can play a crucial role for their acceptance by the local population. However, the ongoing increase of visitors entering the park arise questions on what the adverse effects of that increase of people, using the park in diverse ways, will be. Therefore, it is important to investigate whether the supply and realized demand of ecosystem services overlaps to adapt management strategies, and whether there are differences in the demand of cultural services from local versus tourists. It is expected that locals who visit BFNP use a more diverse range of ecosystem services whereas tourists are expected to use a smaller number of services, generally related to the main attractions suggested by the park. We conducted more than 200 questionnaires (ongoing survey) with both local and tourist visitors in the BFNP. We asked



visitors to grade several cultural ecosystem services and to map their location including a 10 km buffer around the BFNP. Our results will provide key information regarding the determinants and constraints for the use of cultural ecosystem services and will contribute to the sustainable management of tourist flows in protected areas.

Keywords: participatory mapping, cultural ecosystem services, national park, realized provision

27. *Type of submission: **Poster abstract***

S. Sectoral Working Group sessions: S8a Ecosystem services for nature conservation and protected areas

Evaluation of Green Infrastructure elements in rural–urban landscapes: a case study in North–East of Italy

First author: Francesco Liccari

Other author(s): Giovanni Bacaro, Maurizia Sigura

Affiliation: University of Udine, University of Trieste, Italy

Contact: francesco.liccari@phd.units.it

Green Infrastructures (GIs) are defined as strategically planned networks of natural and semi–natural areas designed and managed to deliver a wide range of ecosystem services. GIs are identified as one of the priorities in EU policies (e.g., the EU Biodiversity Strategy to 2020 or the new Common Agricultural Policy strategy). This implies the development of effective approaches for planning and mapping GIs.

In this framework we present the preliminary results of a study aimed to identify and to prioritize GI elements in rural landscapes of North–East of Italy. Two are the main project achievements: i) to identify the most important areas for natural stock and for ecological connectivity and ii) to evaluate multi–functionality by mapping a set of ecosystem services. In the first phase of this project, habitat suitability, least cost path analysis, spatial graphs and connectivity indices were combined to model a composite multi–species network (flora and fauna species) as expression of ecological connectivity for biodiversity at the landscape scale. As a result, almost 2000 ha of core areas and more than 4000 ha of ecological corridors, connecting 8 Special Area of Conservation (Habitats Directive 92/43/EEC) and several regional protected areas, were mapped allowing to identify the most relevant green areas to support biodiversity both in the protected and non–protected areas. In order to evaluate biodiversity



within the core areas, sampling field activities were carried out: 150 plots were collected using a stratified random sampling (based on habitats within core areas) and diversity elements evaluated. Furthermore, we observed that the probability of connectivity (PC) was affected by both the extension of the target habitats considered and the species behavior. Results provide a good approximation to identify important areas for biodiversity conservation.

Keywords: Ecological networks, Biodiversity conservation, Green Infrastructure, Mapping ecosystem services, Connectivity indices