I. SESSION DESCRIPTION

ID: G6a

Effective teaching strategies for making the ES concept relevant for society

<table>
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<tr>
<th>Host:</th>
<th>Title</th>
<th>Name</th>
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<tbody>
<tr>
<td>Dr.</td>
<td>Igone Palacios-Agundez</td>
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<tr>
<td>Dr.</td>
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<tr>
<td>Dr.</td>
<td>Luis Inostroza</td>
<td>Ruhr University Bochum, Germany</td>
<td><a href="mailto:Luis.inostroza@rub.de">Luis.inostroza@rub.de</a></td>
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<tr>
<td>Dr.</td>
<td>Gloria Rodriguez-Loinaz</td>
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<tr>
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Abstract:

The ecosystem services (ES) concept at its very basis, as the benefits that nature provides to people, is clear and powerful. However, teaching ES poses challenges for teachers and students who apply their knowledge in practice and interact with societal actors and diverse stakeholders. Teaching at the university level the ES concept needs to be addressed in a clear and effective way so that the concept and its implications may become better mainstreamed
and implemented among different societal groups. To do so, we believe that 1) a better understanding of the ES concept can be achieved using participatory collaborative teaching methods in the classroom that improve students teaching and learning processes; and 2) it is important to design teaching formats that prepare students to apply the ES knowledge in practice and interact with societal actors and diverse stakeholders. Successful uptake of the ES concept, therefore, will enhance understanding by different governance actors, facilitate social change in the approach to ecosystems and thus, foster a better implementation of ES concept in different governance frameworks.

In this session, we focus on the aspect of teaching ES to the younger generations at the university level. University students are e.g. future teachers, policy makers or scientists. The university provides an exceptional context to route the ES concept to young people and thereafter to the whole society.

The ES concept at its very basis is intuitive. The original idea of ES, as the benefits that nature provides to people, is clear and powerful. Therefore, teaching ES in a simple and practical way in order to guarantee its correct dissemination and implementation is fundamental. This allows students coming from different backgrounds to have fruitful dialogues with the rest of the society that may lead to find joint solutions to common socio-ecological problems. We will share experiences on how to teach the theoretical background of the ES concept using active and participatory methods, leading to a dialogue between different actors. Afterwards, we will identify ways to operationalize the ES concept based on practical teaching experiences of selected fields or backgrounds (architects, urbanists, environmental specialists, teachers, geographers), and making students interact with stakeholders and practitioners. Such teaching operationalizations of the ES concept are crucial to prepare students for their future professional challenges.

The interaction between students and people from outside the university can initiate mutual learning and raise awareness of ES concept in society. Based on a well–developed teaching design, students not only gain many practical and soft skills, but also act as multipliers of the ES concept. The ES concept has the advantage that it addresses all parts of society and can be used as a door opener to raise people awareness. Students need to develop communication skills on the relevance of ES, which should be part of the teaching–learning process in the mentioned both steps. Research in this field is currently very limited and should focus on how to share good practice examples on teaching the ES at university level, and more importantly, on assessing the ES teaching effectiveness. We encourage presentations addressing the following questions:

- How to integrate the ES concept in different subjects at the university level and in other formal and informal educational levels?
- How to operationalize the ES concept within university teaching experiences?
- What kind of methods could be implemented to teach the ES concept? What has worked and what has not worked out?
- How can we assess the effectiveness of the teaching and learning process?

Goals and objectives of the session:

The general aim of the session is to share and discuss experiences on teaching the ES concept at the university level. Our aim is to propose ways to facilitate mainstreaming the ES concept: both, innovative experiences that deal with how to teach the concept itself, and implementation experience that make students apply the concept working with stakeholders. We propose to develop – together with the session participants – evaluation methods of the teaching success related to ES concept at the university level. Our specific goals are:
- Support networking of lecturers in the Ecosystem Services community.
- Provide a platform for exchange of innovative teaching approaches to a broader audience.
- Discuss and share assessing methods of the effectiveness of the ES teaching and learning process.

Planned output / Deliverables:

Our planned output and deliverables are based on participants’ interest and involvement. We plan to encourage participants to the following medium and long-term steps:
1. Overview of teaching formats and methodological advances in ES and identifying interesting effective positive experiences.
2. Discussion on how to develop indicators of the teaching effectiveness together with session participants.
3. Discussion about the possibility to establish a new ESP working group related to Ecosystem Services education. This would include all levels of formal education (kindergarten, primary, secondary, and high school and university level) and also informal education of citizens and stakeholders.
4. Possible joint research application.
5. Joint scientific paper.

Related to ESP Working Group/National Network:

Other
II. SESSION PROGRAM

Date of session: Monday, 21 October 2019
Time of session: 15:30 – 18:00

Timetable speakers

<table>
<thead>
<tr>
<th>Time</th>
<th>First name</th>
<th>Surname</th>
<th>Organization</th>
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<tbody>
<tr>
<td>15:30 – 15:35</td>
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<td>INTRODUCTION TO THE SESSION</td>
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<tr>
<td>15:35 – 15:45</td>
<td>Claudia</td>
<td>Romelli</td>
<td>International Institute Zittau / Technische Universität Dresden</td>
<td>Making the ESS concept relevant for society through innovative teaching methods</td>
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<tr>
<td>15:47 – 15:57</td>
<td>Mario</td>
<td>Torralba</td>
<td>University of Kassel</td>
<td>Integrating the concepts of Ecosystem Services and Social–Ecological Interactions in Agricultural Studies programs</td>
</tr>
<tr>
<td>16:00 – 16:10</td>
<td>Igone</td>
<td>Palacios–Agundez</td>
<td>University of the Basque Country (UPV/EHU)</td>
<td>Teaching ecosystem services through flipped classroom and active methodologies</td>
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<tr>
<td>16:12 – 16:22</td>
<td>Hyuksoo</td>
<td>Kwon</td>
<td>National Institute of Ecology, Korea</td>
<td>(Poster brief explanation) Assessing Ecosystem Services through Public Participation</td>
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<tr>
<td>16:23 – 16:45</td>
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<td><strong>Interactive exercise 1</strong>: moderated discussion on how to assess the effectiveness of ES concept</td>
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EXPERIENCES AND LESSONS LEARNT

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<tr>
<th>Time</th>
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<tr>
<td>16:45 – 16:55</td>
<td>Thomas</td>
<td>Beery</td>
<td>Faculty for Teacher Education; Kristianstad University</td>
<td>The Vattenrike flower: An educational tool to support broad-based public understanding of ecosystem services</td>
</tr>
<tr>
<td>16:57 – 17:07</td>
<td>Maria</td>
<td>Hänsel</td>
<td>University of Bayreuth</td>
<td>Policies and ecosystem services: Conveying trade–off decisions with agent–based modelling</td>
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<tr>
<td>17:10 – 17:20</td>
<td>Luis</td>
<td>Inostroza</td>
<td>Ruhr University Bochum</td>
<td>Teaching ES at the Ruhr University Bochum, Germany. An interview with Master students</td>
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<td>Time</td>
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<td>17:20: 17:30</td>
<td>Diana Riano–Guzman</td>
<td>International Institute Zittau / Technische Universität Dresden</td>
<td>Learning and transferring the Ecosystem Services concept through stakeholders’ involvement: Tourism in the Zittau Mountains Nature Park (DE)</td>
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<tr>
<td>17:30–17:35</td>
<td>Natchiyar Balasubramanian</td>
<td>International Institute Zittau / Technische Universität Dresden</td>
<td>Poster brief explanation) Assessing recreational potential and species conservation value provided by zoos in partnership with stakeholders</td>
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<tr>
<td>17:35–18:00</td>
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<td><strong>Interactive exercise 2:</strong> moderated discussion on the possibility of creating a New ESP Working group on Ecosystem Service Education, and the session wrap up, including an outlook on a potential paper based on the session.</td>
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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

G. General sessions: G6a Effective teaching strategies for making the ecosystem services concept relevant to society

The Vattenrike flower: An educational tool to support broad-based public understanding of ecosystem services

First author: Thomas Beery
Other author(s): Ola Magntorn, Karin Magntorn, Sam Peterson
Affiliation: Kristianstad University, Sweden
Contact: thomas.beery@hkr.se, thbeery@gmail.com

The Kristianstad Vattenrike naturum (nature center) provides both non-formal and informal educational opportunities for area residents and visitors to this UNESCO designated Biosphere Reserve. For example, to provide education about ecosystem services across a broad range of visitors, from school children to nature center visitors, to community stakeholders, etc. the Kristianstad Vattenrike Biosphere Reserve has developed both exhibitry and programming. Of interest to this study are the recently developed curriculum and educational tools designed to provide program participants with direct experience of the concept of ecosystem services. One of the tools, the “Vattenrike flower,” is a manipulative device that participants use to investigate, consider, and score different ecosystem services on the spot in outdoor nature-based settings. Educators at the biosphere reserve have developed the tool and curriculum based on the underlying idea that people need direct experiences with the concept of ecosystem services to fully understand why they are so important. Combining use of the flower tool with a series of outdoor education activities are designed to provide ecosystem services learning experiences that are active, physically, cognitively, and affectively. Thought-listing qualitative interview methodology is then used to assess the effectiveness of the curriculum and tools in regards to supporting heightened public understanding of ecosystem services. A presentation highlighting the educational approach, the specific educational process, and preliminary data from the evaluation research will be shared.
Keywords: Ecosystem services, outdoor education, thought-listing, Vattenrike flower

2. Type of submission: Abstract

G. General sessions: G6a Effective teaching strategies for making the ecosystem services concept relevant to society

Policies and ecosystem services: Conveying trade–off decisions with agent–based modelling

First author: Vera Maria Hänsel
Other author(s): Thomas Schmitt
Affiliation: University of Bayreuth, Germany
Contact: maria.haensel@uni-bayreuth.de

Good policymaking requires strong multi-criteria decision skills. Agricultural policies in Europe traditionally had a strong focus on food production. Other ecosystem services from agricultural landscapes are increasingly valued by society. Framework conditions like the availability of funds for subsidies and market developments also need consideration. University students, being potential future policy-makers, should be equipped with expertise in making these kind of trade–off decisions. For this purpose, we created a simplified model world that still aims to adequately represent the complex basic conditions of agricultural landscapes in a European context.

We developed an agent–based model in NetLogo for a course for master students with an interdisciplinary background. The model “World of Cows” has the main characteristics of a region in southern Bavaria, except for the fact that all farms are dairy farms. Food production is limited to milk output (from extensive and intensive farms with differing producer prices). Other ecosystem service (simplistically!) implemented are water quality, climate regulation, soil fertility and habitat provisioning. In the model, farms decide on a yearly basis on farm size and management intensity. This choice drives stocking density, the share of arable land (versus grassland) for fodder production and the amount of applied fertilizer.

Students were required to come up with a sensible combination of policy measures trying to achieve the following goals: (i) ensure economic viability of dairy farms, (ii) maintain all ecosystem services at a desired level, and (iii) spend as little money as possible on subsidies.
The effects of the set of policy measures were then tested within the model environment. The experience of our first year of teaching this course proved that the complexity of political trade–off decisions on ecosystem services could be effectively communicated. Students with little to no experience with scripting languages were however struggling understanding the implementation in NetLogo.

**Keywords**: Teaching, Grassland Ecosystem Services, Agricultural Policies, Multi–Criteria Decision Making, Agent–Based Modelling

3. **Type of submission**: Abstract

G. General sessions: G6a Effective teaching strategies for making the ecosystem services concept relevant to society

**Teaching ES at the Ruhr University Bochum, Germany. An interview with Master students**

*First author*: Luis Inostroza  
*Other author(s)*: Harald Zepp  
*Affiliation*: Ruhr University Bochum, Netherlands  
*Contact*: luis.inostroza@rub.de

Ecosystem services (ES) science is gaining momentum, increasingly considered to be applied in planning and policy making. One identified gap to be filled up to allow a smoother landing of the ES framework in the policy arena is the teaching of ES at the university level. To advance in putting ES into practice, it is necessary to train our young professionals and politicians in understanding and mostly using the concept. The body of knowledge on ES is abundant and consolidated through a massive amount of scientific literature, broadly and daily used by scientists while performing research. However, such robustness does not necessarily facilitate the teaching of ES in Universities. What is the impact on students exposed to the ES concept? What are the strengths and weaknesses perceived by students while studying ES? What lessons can we learn from current experiences of teaching ES in master programs? In this presentation, we present a set of recorded interviews (video) with former Master students of Geography from the Ruhr University Bochum. We present the interviews as an ethnographic exercise to capture the direct impressions of students. We asked them to share their experiences while learning on ES around a set of 6 simple questions. Their answers point into two directions, first the relevance of the conceptual foundations of ES for university students and second the need to
develop adequate teaching approaches which are not necessarily contained or reflected in the available scientific literature.

**Keywords**: video, teaching methods, teaching philosophy, master program

4. **Type of submission**: Abstract

**G. General sessions**: G6a Effective teaching strategies for making the ecosystem services concept relevant to society

**Teaching ecosystem services through flipped classroom and active methodologies**

*First author*: Igone Palacios–Agundez  
*Other author(s)*: Miren Onaindia, Gloria Rodríguez–Loinaz  
**Affiliation**: Mathematics and Experimental Sciences Didactics Department. Faculty of Education of Bilbao. University of the Basque Country (UPV/EHU), Spain  
**Contact**: gloria.rodriguez@ehu.eus

In the last decade, the concept of ecosystem services has gained global relevance at both scientific and political levels, as it has shown its ability to facilitate dialogue between groups with different attitudes towards biodiversity conservation. In spite of this, this concept has not permeated society deeply. For this to happen, it would be necessary to teach this concept and its conceptual framework in the educational period.

Despite its high didactic potential, the inclusion of the concept of ecosystem services in primary schools is anecdotal. The problem lies in the fact that neither the people responsible for updating the contents nor those in charge of imparting them, the teachers, know this concept and its theoretical framework.

In order to make this concept and its theoretical framework more relevant in basic education, it should be taught on initial teacher training. To this end, a didactic intervention is presented in which the flipped classroom is combined with active methodologies. This intervention was carried out in the academic year 2018/2019, in the Faculty of Education of Bilbao and the Faculty of Education and Sport of Vitoria–Gasteiz, with 67 students distributed in three classes,
within the subject "Nature Sciences in the Primary Education Classroom I" which is taught in the first year of the Primary Education Grade.

*Keywords*: Ecosystem services, pre-service teachers, didactic intervention, Basque Country

5. Type of submission: *Abstract*

G. General sessions: G6a Effective teaching strategies for making the ecosystem services concept relevant to society

**Making the ESS concept relevant for society through innovative teaching methods**

*First author*: Claudia Romelli

*Other author(s)*: Melissa Lee, Diana Riano Guzman, Natchiyar Balasubramanian, Nur Liyana Binti Mat Nayan, Donam Tushabe, Marta SyllaNina Hagemann

*Affiliation*: Chair of Ecosystem Services, International Institute Zittau, Technische Universität Dresden, Germany

*Contact*: claudia.romelli@tu-dresden.de

The use of formats that support the interaction between students and actors from outside the university are challenging because lecturers and students need to step out of their comfort zone and teaching / learning routines.

In this presentation, the conceptual approach of a seminar on "Ecosystem Services – Case studies" is illustrated through the design and results of two student projects (3–4 students per group) that were conducted during the winter semester 2018/19. After being introduced to basic components of project management, students developed their projects in a professional manner with the following requirements:

- application to a real-world context from the region (Upper Lusatia, Germany) and work with a stakeholder to shape project objectives and design.

- define a deliverable as result of the project that is beneficial to the stakeholders.

- students hold responsibility for the design and implementation of the project.
One project focused on understanding people’s perceptions regarding the recreational potential and species conservation value provided by two zoos in the region. The other project focused on assessing the perception of relevant stakeholders about ESS provided by the Zittau Mountains Nature Park to tourism in the region.

The presentation provides insights on the experiences from the perspective of the students and illustrates their lessons learnt. Moreover, the examples shall inspire interested teachers to apply novel teaching approaches in order to ensure students gain practical experiences in working on societally relevant topics and to translate the ESS concept for societal use.

Keywords: teaching, co-production of knowledge, project management

6. Type of submission: Abstract

G. General sessions: G6a Effective teaching strategies for making the ecosystem services concept relevant to society

Integrating the concepts of Ecosystem Services and Social–Ecological Interactions in Agricultural Studies programs

First author: Mario Torralba
Other author(s): Cristina, Quintas–Soriano, María, García–Martín, Franziska, Wolpert, Miguel Ángel, Cebrián, Tobias, Plieninger
Affiliation: University of Kassel, Germany
Contact: mario.torralba@uni-kassel.de

Globally, environmental and social change in agroecosystems poses sustainability challenges to society. The concept of social–ecological system arises as a bridge–framework for the study of human–natural system relationships. In this sense, the concept of ecosystem services has become a mainstream concept for increasing the awareness of people about the importance of the natural environment for sustaining human life. Agricultural systems are social–ecological systems which have co-evolved and shaped each other over a long time. It is, therefore, necessary to progressively include objectives and targets into our study programs that promote integrative and transdisciplinary thinking. In the chair of Social–Ecological interactions in Agricultural Systems, shared between the University of Kassel and the University of Göttingen, we have in the last years designed and implemented a teaching programme to progress in that direction. Over different bachelor and master programs with a shared focus
on agricultural sciences, we currently offer a diverse array of modules in terms of knowledge-type (methodological, theoretical, practical), module format (students-driven projects, supervised experiments, fieldtrips), and teaching techniques (debates, practical sessions, games, seminars, etc.). They all share as common denominator the emphasis on transdisciplinary processes that integrate multiple approaches (biophysical, socio-cultural and economic), scales, knowledge types and social actors. Although the work is still in progress and we have developed just one first full-year course, our experience showed that students engage easier and more successfully with these concepts when their participation is stimulated. To mirror a transdisciplinary-participatory process in the design and execution of the teaching program seems a promising strategy for the future.

*Keywords*: Agro-ecosystems, transdisciplinarity, social-ecological systems

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

**G. General sessions: G6a Effective teaching strategies for making the ecosystem services concept relevant to society**

**Assessing recreational potential and species conservation value provided by zoos in partnership with stakeholders**

*First author:* Natchiyar Balasubramanian  
*Other author(s):* Melissa Lee, Donam Tushabe  
*Affiliation:* Technische Universität Dresden, Germany  
*Contact:* natchiyar.balasubramanian@mailbox.tu-dresden.de

Zoos play an important role in society by providing ecosystem services to the region. With the unprecedented loss of biodiversity, they function as green spaces within urban surroundings. Zoos also serve as important centers of education through raising awareness about the need for conservation activities and providing a pool for scientific research. For the module “Ecosystem Services: Case Studies”, within the Master’s program Ecosystem Services, students conducted a project aimed at understanding people’s perceptions regarding the recreational potential and awareness of species conservation value provided by two zoos in Saxony, Germany. In order to highlight the different ecosystem services that zoos can provide, study sites were selected in the cities of Zittau and Görlitz. The Zittau zoo resembles more of a park with animals, while the one in Görlitz is more comparable to a conventional zoo. A survey was
conducted in the form of a questionnaire distributed to visitors and non-visiters of the case study areas. Questions about recreational potential covered four categories: aesthetic enjoyment, environmental amenities, maintenance, and education. Likewise, species conservation value focused on three categories: emotional value, maintenance, and education. Qualitative analysis of the results confirms the hypothesis that respondents visit Zittau zoo mainly for recreational value due to the presence of landscape diversity, while Görlitz zoo attracts families seeking to entertain children and serves as a medium for biodiversity education. To conclude the project, the perceptions of the respondents were presented and discussed with the stakeholders, zoo management, to enhance visitor experience at the zoos. By carrying out a project for this module, we gained experience working with stakeholders, and were able to apply our knowledge of ecosystem services in the real world.

Keywords: ecosystem services, stakeholders, project management, questionnaire, zoo

8. Type of submission: Poster abstract

G. General sessions: G6a Effective teaching strategies for making the ecosystem services concept relevant to society

Assessing Ecosystem Services through Public Participation

First author: Hyuksoo Kwon
Other author(s): Changwan, Seo, Ilkwon, Kim
Affiliation: National Institute of Ecology, Korea, Korea, Republic Of
Contact: ulmus@nie.re.kr

People have a high access to and use of ecological assets. It is meaningful to identify ecological assets and analyze the ecosystem services through public participation. These activities lead to citizens' ecological knowledge, which enables them to gain ecological information. In addition, public participation in ecological asset assessment brings educational and awareness-enhancing effects of ecosystem services to local residents. It also reflect citizen's opinions on the local environmental plan. We have recruited local conservationists and conducted a rapid assessment on ecosystem services followed by the basic statistics analysis, correlation analysis, and factor analysis of ecosystem services. We also had the opportunity to hold workshops for local conservationists and civil servants to share these results and discuss ways to utilize them. Through this, we were able to identify ecosystem services that are closely related to citizens' lives by establishing a list of ecological assets by region. It also showed
that a series of processes for ecological asset selection and evaluation can be linked to ecosystem services awareness promotion, environmental education programs and ecotourism. Public participation, together with local conservationists, has the advantage of monitoring ecosystems at a lower cost and in a shorter period of time. Furthermore, in sharing and discussing the results, they said it was an opportunity to learn about local ecological assets. We also hope that more people will be able to engage with the local ecosystem in the future, and there is a request to use this result in local government. Also, in the questionnaire, it was confirmed that public participation in ecosystem service increased their interest and understanding level, and the preference, reflection opinions, and satisfaction of ecosystem service evaluation were also high.

**Keywords**: Eco–education, public participation, ecological asset, rapid assessment, regional assessment

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

**G. General sessions**: **G6a Effective teaching strategies for making the ecosystem services concept relevant to society**

**Learning and transferring the Ecosystem Services concept through stakeholders' involvement: Tourism in the Zittau Mountains Nature Park (DE)**

**First author**: Diana Riano–Guzman  
**Other author(s)**: Claudia Romelli, Nur Liyana Binti Mat Nayan  
**Affiliation**: International Institute Zittau (IHI), Technische Universität Dresden, Germany  
**Contact**: diana.riano89@gmail.com

The Ecosystem Services concept is recognized as facilitating tool to help stakeholders recognize the importance of well–preserved ecosystems for their activities. Given the dependence of tourism on the provision of ecosystems services, understanding their role can be a good way to influence the stakeholders’ perception and support more sustainable management decisions. In the context of effective teaching strategies, students of the Master’ s Ecosystem Services, designed, implemented and assessed a research project. This project aimed at assessing the perception of relevant stakeholders about the ecosystem services provided by the Zittau Mountains Nature Park to tourism in the Upper Lusatia region. In addition, it tried to raise awareness among them on the important role of the ecosystem services provided by the area. For the active involvement of stakeholders a focus group was
chosen as method. Different activities like questionnaires and participatory mapping guided the stakeholders through the understanding and assessment of the relation between ecosystem services and tourism in the Zittau Mountain Nature Park. The ecosystem services concept was overall regarded as an important and useful tool to highlight the role of the natural environment for the development of tourism in areas like the Zittau mountains. Cultural and regulating services were identified as the most important ecosystem service categories offered by the park with respect to touristic activities. Stakeholders involved in the project showed a change in their perception and deeper understanding of the concept of ecosystem services. The different phases of project implementation provided relevant results to achieve the project aims, but also a learning process for young researchers to understand how to apply the methods to engage stakeholders with the ecosystem services concept.

*Keywords*: stakeholders’ involvement, participatory mapping, learning ecosystem services, project management