

BOOK OF ABSTRACTS

This Book of Abstracts provides a comprehensive overview of the session content and is structured into three main sections:

- I. **Session Description** – an introduction to each session, including its objectives and expected outputs
- II. **Session Program** – a detailed schedule for each session, including speakers and timing
- III. **List of Abstracts** – a complete compilation of all accepted abstracts

1. SESSION DESCRIPTION

ID: E1

Ecosystem services in the classroom: reflections on learning assessments

Hosts:

	Name	Organisation	E-mail
Host (s):	Alexander van Oudenhoven	Leiden University	a.p.e.van.oudenhoven@cml.leidenuniv.nl
Co-host(s):	Louise Willemen	University of Twente	l.l.willemen@utwente.nl
Other organiser(s):	Marija Bockarjova	University of Twente	m.bockarjova@utwente.nl
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Abstract:

The ecosystem services concept is taught all over the world, in many different higher education programmes. We learnt this during a very successful exchange as part of the 2024 ESP EU conference. But how do we assess the students' knowledge and understanding of the concept and its various aspects?

Collectively, we teach about ecosystem services in the context of biodiversity conservation, environmental economics, governance, spatial planning, ethics and many other fields. But what does this mean for the assessments we use? Which aspects of ES are highlighted in our assessments? Do we assess students' ability to formulate viewpoints, or is certain basic knowledge considered crucial to be understood by them? What is the role of AI in this? As a student, what do you want to be assessed for?

In this session, we will learn more about examples of assignments and assessments in higher education. These could be, but are not limited to, examples from dedicated assignments that put ES central, or applied case studies, practicals and essays. In addition, we are interested in if and how multiple assessments are combined within a course, to explore the strength of having various forms of assessments.

To clarify, with assessment we refer to the more systematic process of determining what students know and understand. Hence, this goes beyond 'just' testing, but also involves formulating adequate learning goals and assessing the students' progress towards achieving them, in a summative and formative way.

Goals and objectives of the session:

We hope that participants and presenters will be inspired by a wide range of examples of assessing students' learning, and reflections thereof. By combining presentations with open conversations, we facilitate contributions from all.

Planned output / Deliverables:

During the session (and conference), we will also make an inventory of 'essential readings' - our community's favourite literature, and the reasons why.

Session format:

Open session with short presentations (speed talks), demonstrations of assessments, followed by a round table discussion / world cafe.

Related to ESP Working Group:

Other

2. SESSION PROGRAM

Room: A2

Date of session: Wednesday 20, May 2026

Time of session: 09:00 – 10:30

Timetable speakers:

Time	First name	Surname	Organization	Title of presentation
09:00-10:00	Speed talks of 5 minutes each, followed by a short Q&A per talk.			
	Monika	Leuenhagen	Bielefeld University, Faculty of Biology	Project-based assessments in ecosystem services teaching
	Claudia	Caro	Universidad Nacional Agraria La Molina	ESTEM: An Inquiry-Based STEM Learning Activity Using Butterflies for Ecosystem Services understanding
	Adriana	Bernal-Escobar	University of Göttingen	Assessing Knowledge in Economic Valuation of Ecosystem Services
	Louise	Willemen	University of Twente	GenAI and assignments: A Red Queen's race with personalized learning assessments
	Arron	Tippett	Norwegian University of Science and Technology (NTNU)	Building sustainability competences in international business students through place-based pedagogy.
	André	Mascarenhas	ILPÖ – Institute of Landscape Planning and Ecology, University of Stuttgart	Ecosystem services-based teaching for international urban planning and design students at the University of Stuttgart
	Hristina	Prodanova	National Institute of Geophysics, Geodesy and Geography - Bulgarian Academy of Sciences	Teaching ecosystem services: Methodology for non-formal education of secondary school students towards sustainability
10:00-10:30	Plenary discussion, round table			

3. LIST OF ABSTRACTS

The first author is the presenting author unless indicated otherwise

1. Project-based assessments in ecosystem services teaching

First author: Monika Leuenhagen

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The ecosystem services approach supports the management of landscapes and ecosystems in order to maintain or improve their services to society. In GIS-based courses at Bielefeld University, ecosystem services are addressed in the context of landscape planning. One of the goals is to enable students to conduct and use ecosystem services assessments as a basis for sustainable planning decisions. To this end, the courses are structured into different projects, e.g., the optimization of vegetation services in settlement areas for temperature regulation. In these projects, students work step by step and with formative interim tests to acquire the knowledge and skills needed to solve the respective project task. In accordance with the constructive alignment approach, it makes sense to design the exams in a project-based format as well. This not only allows students to demonstrate the skills they have acquired, but also encourages them to focus their learning processes on mastering the skills required in the exam. However, teachers are generally not free to choose and implement the types of exams at the course level. Conditions are set at the meso level by degree programs, curricula, or modules, and at the macro level by political or legal regulations, for example. The rapid spread of AI is bringing dynamism to this situation: while some traditional forms of examination are now coming under pressure, complex project-based exams are seen as having advantages. AI can only perform partial tasks for project assignments and tends to take on the role of a tool for solving complex problems, e.g., when agents in GIS increasingly support spatial analyses. A prerequisite, though, is that regulations for the use of AI are established. Examples of project-based exam formats from teaching about ecosystem services will be presented as possible inputs for an exchange of experiences in the session.

Keywords: Project-based learning, ecosystem services, assessment, exam, AI

2. ESTEM: An Inquiry-Based STEM Learning Activity Using Butterflies for Ecosystem Services understanding


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Despite the growing importance of Ecosystem Services (ES) in ecological research and environmental management, they remain notably underrepresented in education and classroom practice. This presentation introduces an innovative learning activity designed to bridge this gap by integrating inquiry-based learning, STEM education, and Pestalozzi's pedagogical triad of "head, hands, and heart" (knowing, doing, and feeling). Using butterflies as a compelling entry point, the activity employs storytelling to engage students emotionally before guiding them through systematic exploration of ecosystem services in their local environments. The pedagogical approach unfolds in three interconnected phases aligned with Pestalozzi's framework. The knowing phase introduces ES concepts through butterfly narratives that illustrate pollination services, aesthetic values, and ecosystem connectivity. The phase engages students in hands-on STEM investigations, including butterfly observation, habitat assessment, and ecosystem service identification through field-based inquiry. The feeling phase cultivates personal connections and values through reflection on how ecosystem services directly impact students' lives and communities. This activity addresses a critical need in environmental education, helping university students recognize, understand, and value ecosystem services in their immediate surroundings. By starting with the accessible and charismatic example of butterflies, students gradually expand their understanding to encompass the full spectrum of provisioning, regulating and cultural services provided by local ecosystems. By fostering recognition and appreciation of ES during formative educational years, this



activity builds foundational knowledge that can translate into future application in both personal environmental stewardship and professional contexts.

Keywords: STEM education, University students, butterflies, inquiry-based learning

3. Assessing Knowledge in Economic Valuation of Ecosystem Services

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The key to successful economic valuation is clarity regarding the W-questions: What type of value is measured; Whose values are considered; Why is valuation undertaken; What is being valued, When and Where; Which methods can be applied. To achieve this, I propose to combine two teaching methodologies. On the one hand, a historical and theoretical overview of different theories of value and a review of applied cases from the literature, gives students a conceptual foundation. This knowledge is assessed through a traditional exam. On the other hand, students are faced with the challenge of using economic valuation to formulate recommendations for policy-making—such as whether to invest in the modernization of a hydroelectric complex or in river restoration. They do this for a fictional country, for which fictional information is available: a geographic map, demographic statistics and ecological indicators. Rather than applying the methods mechanically, emphasis is placed on framing: identifying the relevant ecosystem services and how they are affected, defining stakeholder groups, choosing an appropriate temporal and spatial scale, and applying the most appropriate method. Before receiving the specific information about the fictional country, students are asked about their particular position, i.e., which decision they would support. Later on, knowledge is assessed in a presentation, in which students must share and explain the cost-benefit analyses they have prepared, and use them to defend their initial position. This way, students learn in an applied way the limitations of each method and the ethical implications that these limitations may have. Additionally, they learn the importance of combining different decision criteria when making decisions.

Keywords: Economic valuation, scenario-based learning

4. GenAI and assignments: A Red Queen's race with personalized learning assessments

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Written assignments are a common way of assessing learning in higher education. This assessment format has become challenging due to the widespread use of generative AI. Large Language Models (LLMs) provide answers in a heartbeat. LLM output cannot be used to assess students' learning, except when LLM prompting is a learning outcome. Banning students from using LLMs in take-home written assignments is futile as bans cannot be enforced and would ignore the potential of LLMs.

How can we allow students to use LLMs in their written assignments on ecosystem services and still test their own learning? Here we will share our new assessment learnings for a 5 ECTS elective MSc course in autumn 2025. Students were graded on two assignments: group work and an individual written assignment. The group work included data collection on one ecosystem service on campus, method reflection, and ES assessment for the planned location of new student housing.

We focus here on the redesign of the individual take-home assignment to assess the intended learning outcomes related to the understanding of ecosystem concepts, selection of mapping methods, and reflection on management decisions. To avoid generic answers generated by a LLM, we asked students to work on a case study of choice (ranging from an urban park to a larger landscape). Students described their unique case study based on a template, submitted a map, and answered all subsequent questions in relation to their specific case. Use of LLMs was allowed but had to be stated. Initial experiences show mixed outcomes. Compared to last years' take-home assignment, the tailored design resulted in greater



variability across answers, hinting at a better reflection of student learning and not LLM use. However, some submissions remained highly polished, raising doubts about students' authentic reasoning and depth of engagement. In addition, the personalized assessments needed obviously more time for grading.

Keywords: genAI, spatial methods, graded assignment, higher education

5. 2Building sustainability competences in international business students through place-based pedagogy

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The United Nations Development Programme (UNDP) have underlined the role of businesses in realising the Sustainable Development Goals by 2030. Business studies have the potential to shape businesses and put sustainable development on the agenda. In this study, we reflect on the experience of teaching Business students about the Sustainable Development Goals, with a specific focus on SDG15 'Life on Land'. In a bachelor's degree offered at a University in Norway, one course addresses Sustainability Management. We develop a theoretical model based on literature pedagogies, boundary objects and sustainability competence. We test the effect of teaching ecosystem services using place-based pedagogy on the nature relatedness of students taking the course. Our findings from a qualitative pilot study indicate that the students are positive towards the outdoor learning method we employed to teach ecosystem services. We will present the full results during ESP 2026.

Keywords: Place based pedagogy, Greencomp, sustainability competences, teaching, ecosystem services

6. Ecosystem services-based teaching for international urban planning and design students at the University of Stuttgart

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We present our experience of teaching the course "Urban Ecology and Ecosystem Design", centred around the ecosystem services (ES) concept, to an international group of students of the M.Sc. Program "Integrated Urbanism & Sustainable Design", jointly offered by the University of Stuttgart and Ain Shams University Cairo. The program's philosophy is based on transnational learning exchange between students with different regional backgrounds applied to a specific urban reality. Most students are unfamiliar with the ES concept and more generally with urban ecology topics when they join the course, which potentially facilitates assessing the course's impact on ES-related learning. The main goal therefore is to discover urban nature as useful contribution to planning liveable cities, by disentangling nature's functions and benefits, and linking them to urban planning and design. The students come from all parts of the world, the majority being urban planners or architects; related backgrounds, such as engineering, or political science are also represented. Several of them worked as practitioners before. Hence, the course benefits from a diversity of perspectives and backgrounds. It is structured along main ES categories (provisioning, regulating, and cultural ES) and biodiversity (as the basis for ES), while introducing other ES-related concepts, such as nature's contributions to people, urban green infrastructure, or nature-based solutions. It combines lectures and practical activities, including small exercises drawing on students' experiences, a regular paper club where we jointly reflect on scientific articles, and a final project review, where groups of students select and critically analyse urban greening projects from an ES perspective, hence stimulating peer-learning. In our presentation, we critically reflect on our personal teaching experiences and on student evaluations and feedback collected over the years. We aim to contribute to (and learn from) an enriching discussion on how teaching about ES might develop in the future.

Keywords: Urban planning and design, Urban social-ecological-technological systems, Higher education, International audience

7. Teaching ecosystem services: Methodology for non-formal education of secondary school students towards sustainability

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Education is highlighted as a key tool to fight global challenges through transformative change in many strategic documents of the United Nations, European Union, and UNESCO, along with IPCC and IPBES-related publications and reports, calling it "a leverage point to sustainability". Despite those initiatives for greening education, there is still a lack of training activities, especially in school education. In Bulgaria, in particular, the educational school programs in Geography from 5th to 10th grade were updated many times over the past 30 years, and yet lacking to align with the relevant "hot topics" on global challenges. Terms like sustainability, human well-being, ecosystem services (ES), and nature-based solutions are completely missing from the national education plans on related subjects.

To address this gap, we developed and tested the Teaching Ecosystem Services (TES) methodology—a flexible, robust, and easy-to-use methodology for non-formal education activities with secondary school students about ES concept that applies field studies, geospatial and communication technologies.

The TES methodology was developed in 2023 as a stand-alone training module and represents an extension of the 20 years of ES research experience of Bulgarian geographers (Nedkov et al. 2024). It also addresses the identified barriers and needs by SELINA project stakeholders to enhance the uptake of ES knowledge into practice and education in Bulgaria (Prodanova and Stoycheva 2024). The methodology combines traditional approaches from Geography (such as lectures, additional learning materials and field studies) with modern online digital tools and techniques for geospatial mapping, assessment, communication, and evaluation of results, entirely based on freely accessible Google Apps. The training included 17 students from different classes and schools and enabled us to draw valuable conclusions on the quality of the results and the feedback from the students. We set priorities for further development and implementation within the formal and non-formal school programs.

Keywords: Classroom, field training, Geography, school programs, transformative change