SESSION DESCRIPTION

ID: X8

Artificial Intelligence for Ecosystem Services: opportunities, challenges, and governance

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Abstract:
Artificial Intelligence (AI), including Generative AI (GenAI) and Large Language Models (LLMs), is rapidly transforming ecosystem services (ES) science and practice. By integrating and processing large, heterogeneous datasets - from citizen science and ecological monitoring to policy-relevant actions- AI offers unprecedented opportunities for mapping, modeling, monitoring, valuing, and communicating ecosystem services. These tools can support climate adaptation, nature-based solutions, restoration, and resilience, while helping to capture synergies and trade-offs between human well-being and ecological integrity.

This session brings together researchers, practitioners, and policymakers to explore how AI can be responsibly embedded into ES science, governance, and decision-making. Contributions will highlight technical innovations, such as GeoAI for large-scale geospatial assessments, LLMs for knowledge synthesis, and GenAI for scenario narratives and linking local data to European and global frameworks, including the EU Nature Restoration Law and the Corporate Sustainability Reporting Directive. Applications across ecosystem accounting (SEEA-EA) for coastal, marine, and terrestrial systems, including ecosystem extent, condition, and services (physical and monetary), will be emphasized.

Equally important are the governance, ethical, and societal dimensions of AI in ES. The session will address transparency, inclusivity, equity, and justice, ensuring AI tools do not exacerbate biases or marginalize local and Indigenous knowledge. Contributions will also explore emerging regulatory frameworks such as the EU AI Act, and how standards and policies shape the uptake of AI in ES science and practice.

Building on discussions from the ESP Conferences in Wageningen (2024) and Darwin (2025) and the AI4ESS framework, this session will introduce the new ESP Thematic Working Group "Artificial Intelligence and Machine Learning for Ecosystem Services." This platform will provide continuity for the growing AI–ES community, enabling interdisciplinary collaboration and guiding the responsible integration of AI into ES research, governance, and policy.

By connecting methodological innovation, applied case studies, and critical reflections, this session aims to clarify where AI can responsibly add value to ES science and policy, where safeguards are needed, and how AI can advance a people-and nature-positive future.

Goals and objectives of the session:

This session aims to initiate a structured, critical dialogue on the integration of AI, including Generative AI (GenAI) and Machine Learning (ML), into ecosystem service (ES) research and practice. Its primary goals are to:

- Showcase innovative applications: Present recent AI/ML advances supporting ecosystem service mapping, monitoring, valuation, and decision-support.
- Promote interdisciplinary collaboration: Foster dialogue between researchers, policymakers, and practitioners at the intersection of AI and ES.
- Reflect on governance perspectives: Discuss how frameworks such as the EU AI Act may influence future applications, while maintaining focus on scientific and practical advances.
- Address ethics and inclusivity: Explore fairness, transparency, and integration of diverse knowledge systems, ensuring AI tools do not marginalize local or Indigenous knowledge.
- Introduce the ESP Thematic Working Group: Present the structure and aims of the new ESP platform on "AI and Machine Learning for Ecosystem Services," fostering long-term interdisciplinary collaboration.
- Assess opportunities and challenges: Identify where GenAI can enhance ES knowledge generation, integration, and communication, while critically examining methodological, ethical, and policy implications, including risks of bias, reproducibility issues, and legitimacy concerns.

Planned output / Deliverables:

- Showcasing and broadening the Thematic Working Group
- Identifying the direction and future paths of AI/ML related ES approaches

Session format:

- Oral presentations (15 minutes each) highlighting case studies, methods, and governance perspectives.
- Moderated panel discussion with speakers, focusing on opportunities and challenges for integrating AI into ecosystem services research and practice.
- Open Q&A and audience interaction to identify future directions and priorities.

Voluntary contributions accepted:

Yes, I allow any abstract to be submitted to my session for review

Related to ESP Working Group:

Other – new ESP Thematic Working Group "Artificial Intelligence and Machine Learning for Ecosystem Services.