BOOK OF ABSTRACTS

I. SESSION DESCRIPTION

ID: S1a

Leveraging ecosystem services for agroecological transitions

Hosts:

	Name	Organisation	E-mail
Host:	Helena Freitas	Centre for Functional Ecology, Associate Laboratory, TERRA, University of Combria	hfreitas@uc.pt
	Paula Castro	Centre for Functional Ecology, Associate Laboratory, TERRA, University of Combria	pcastro@ci.uc.pt
Co-host(s):	Alexandros Tataridas	Centre for Functional Ecology, Associate Laboratory, TERRA, University of Combria	a.tataridas@gmail.com
	Joana Costa	Centre for Functional Ecology, Associate Laboratory, TERRA,	jcosta@uc.pt

Abstract:

Agroecological transitions mark an essential step towards sustainable agricultural systems. However, in moving towards a decisive feature of sustainable agriculture, it is crucial to adopt a comprehensive and interdisciplinary approach that recognises the multifaceted benefits agriculture offers beyond mere food provision (provisioning services). This entails acknowledging and integrating various ecosystem services, including regulating and maintenance functions such as pollination, nutrient cycling, pest control, soil fertility, and erosion prevention, alongside cultural ecosystem services like recreation, heritage preservation, and agro-tourism

This session, proposed within the framework of the European Research project GOOD – Agroecology for weeds (https://www.goodhorizon.eu/) (Grant agreement ID: 101083589), aims

to foster the discussion on how ecosystem services may enable and boost agroecological transitions. Understanding the natural processes in which agriculture/agroforestry thrives and how reliance on biodiversity and their relationships can help combat environmental degradation while fostering resilience and implementing sustainable food production patterns is pressing.

By embracing agricultural and agroforestry management practices centred around ecosystem services, we not only contribute to biodiversity conservation but also cultivate economic and social prosperity. However, various challenges persist, ranging from trade-offs between ecosystem services to institutional barriers and knowledge gaps, all of which require attention and resolution within the proposed session

Goals and objectives of the session:

Research question: How can ecosystem services be effectively integrated in agroecological transitions?

Participants will be invited to (session goals):

1. Map challenges around the importance of ES in agroecological transition;
2. Discuss solutions to overcome barriers (e.g., knowledge gaps), biases and other identified challenges:
3. Propose frameworks for the harmonised integration of ES into agroecological transitions

Planned output / Deliverables:

Publication of an opinion/research article with the main findings/results of the sessions.

II. SESSION PROGRAM

Part 1

Date of session: 18th of November 2024

Time of session: 14:00-15:30

Timetable speakers

Time	First name	Surname	Organization	Title of presentation
14.00-14.10	Helena	Freitas	Centre for Functional Ecology - Science for People & the Planet, TERRA Associate	Host presentation and explanation of the session

Time	First name	Surname	Organization	Title of presentation
			Laboratory, Department of Life Sciences, University of Coimbra, Portugal	
14.10-14.15	Alex	Tataridas	Centre for Functional Ecology - Science for People & the Planet, TERRA Associate Laboratory, Department of Life Sciences, University of Coimbra, Portugal	Leveraging ecosystem services for agroecological transitions: the role of the GOOD Project
14:15-14:20	Mario	Balzan	Institute of Applied Science, Malta College of Arts, Science and Technology. Paola, Malta	Assessing trade-offs in managing pollinators and pollination ecosystem services in the Maltese Islands
14:20-14:25	Jan	Brabec	Faculty of Social and Economic Studies, Jan Evangelista Purkyně University in Ústí nad Labem	Overcoming Barriers: Enhancing Nature-Based Flood Mitigation Strategies through Policy and Practice
14:25-14:30	Sheila	Holz	Centre for Social Studies - CES - University of Coimbra	The Green Deal Pathway for Farmers: Regulatory and Policy Barriers to Implementing Agroecology
14:30-14:35	Metaxia	Kokkini	Agricultural University of Athens, Greece	VALERECO: Valorization of LEgumes Related Ecosystem Services
14:35-15:40	Anabela	Paula	Centre for Functional Ecology - Science for People & the Planet, TERRA Associate Laboratory, Department of Life Sciences, University of Coimbra, Portugal	Co-creation of sustainable development strategies for agroecological transition based on ES framework
15:40-14:45	Mónica	Pinto	CITAB, Universidade de Trás-os-Montes e Alto Douro, Inov4Agro, Portugal	Insights from preliminary field observations: pollinators diversity with different crops and plants in agroecosystems

Time	First name	Surname	Organization	Title of presentation
14:45-14:50	Laura	Riggi	Department of Ecology, Swedish University of Agricultural Sciences, Sweden	From blurry maps to clear solutions: mapping pest control services for agroecological transition
14:50-14:55	Philippa	von Nathusius	1Agroscope, Research group Extension Arable Crops, Reckenholzstrasse 2ETH Zurich, Sustainable Agroecosystems, Switzerland	Quantification of ecosystem services of narrow-leaved lupins and lentils in mixed cropping systems
14:55-15:00	Vasileios	Gkisakis	Hellenic Agriculultural organisation (ELGO) - DIMITRA, Institute of Olive Tree, Subtropical Crops and Viticulture	One Health approaches to support Agroecological transformation and the provision of Ecosystem Services in peri-urban farming: the experience from west Africa.
15:00-15:30	All participants	Group discussion on topics 1 & 2: Map challenges around the integration of ecosystem services (ES) in agroecological transitions and how to overcome barriers and biases		

Part 2

Date of session: 18th of November 2024

Time of session: 16:00-17:30

Timetable speakers

Time	First name	Surname	Organization	Title of presentation
16.00-16.10	Paula	Castro	Centre for Functional Ecology - Science for People & the Planet, TERRA Associate Laboratory, Department of Life Sciences, University of Coimbra, Portugal	Welcome and explanation of the session
16:10-15:20	ALL	Group discussions to propose frameworks for harmonising ES into agroecological transitions to facilitate a transformative change in agri-food systems		

Time	First name	Surname	Organization	Title of presentation
17:20-17:30	ALL	Final conclusions and validation of the proposals		

III.ABSTRACTS

The first author is the presenting author unless indicated otherwise.

1. Assessing trade-offs in managing pollinators and pollination ecosystem services in the Maltese Islands

First authors(s): Mario V Balzan
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The abundance of pollinators is important for the delivery of pollination ecosystem services but functional divergence between species traits is also considered important and maintaining non-overlapping trait distributions could benefit crop pollination and yield. This research evaluates the influence of local and landscape habitat variables on honeybee abundance and wild bee functional group abundance and richness, and potential trade-offs between beekeeping and functional group abundance and richness. This study is carried out in Malta, a Central Mediterranean small island state, characterised by high agricultural (51%) and urban (30%) land use and a high honeybee hive density (12.86 hives/Km2 in 2019). Timed surveys of plant-bee interactions were carried out in belt transects (2 x 25m) between April and June for 4 years. For each specimen, functional traits associated with morphological characteristics, pollen transport, sociality and nesting type were identified. Preliminary results indicate a positive association between plant richness and wild bee species and functional diversity. There was no significant impact of honeybee abundance on wild bee abundance and richness, but a negative association with functional diversity parameters was recorded indicating that honeybee abundance may impact the functional diversity of pollinators at the local scale. These results are presented in more detail, and the implications for more holistic management of local and landscape habitat characteristics, as well as interspecific interactions, when planning measures for the conservation of bee diversity and pollination ecosystem services, are explored.

Keywords: bees, wild bees, Apis mellifera, socio-ecological systems

2. Overcoming Barriers: Enhancing Nature-Based Flood Mitigation Strategies through Policy and Practice

First authors(s): Jan Brabec

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Sustainable strategies are required to mitigate the impacts of climate change, particularly the increased occurrence of natural hazards. Traditional approaches may not be sufficient to address the recurring threats to agricultural land posed by events such as floods. Existing solutions rely on governmental investments in large grey infrastructure, but these efforts should be complemented by effectively integrating small-scale nature-based solutions on private land that provide a range of ecosystem services. Such solutions can be implemented by local farmers. However, farmers often lack significant motivation to do so. While they are generally aware of the substantial benefits associated with ecosystem services, they recognize that implementing a nature-based solution typically means a loss of income. Farmers need to dedicate a portion of their land to these solutions, which reduces their yield. In a world where payments for ecosystem services (compensations) are nearly nonexistent, this creates a significant barrier to the development of mitigation strategies based on nature-based solutions.

Moreover, this is not the only barrier that slows down the transition to nature-based flood mitigation. Local farmers expressed their concerns in semi-structured interviews conducted within the Czech project Taxonomy (2022-2025). The results indicated that while financial barriers are significant, they are not the most pressing issue. What troubled farmers the most were various administrative burdens. The amount of paperwork, combined with the lack of time available for administration, was viewed as the main barrier. Additionally, existing legislation does not facilitate the implementation of nature-based solutions. The third type of barrier repeatedly mentioned by farmers was complicated property rights. In Czechia, agricultural land is particularly fragmented, and implementing a series of meaningful nature-based solutions that work well together requires extensive negotiation, significantly increasing transaction costs.

Keywords: nature-based solutions, farmers, ecosystem services, barriers, interviews

3. The Green Deal Pathway for Farmers: Regulatory and Policy Barriers to Implementing Agroecology

First authors(s): Sheila Holz
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This communication will explore the regulatory and public policy obstacles that EU farmers encounter when implementing agroecological and agroforestry practices in response to the panel's research question, "How can ecosystem services be seamlessly integrated into agroecological transitions?". This proposal will be incorporated into one of the objectives of the H2020-PHOENIX project, aiming to gain a comprehensive understanding of human and non-human relationships in achieving the European Green Deal (EGD). The core idea behind PHOENIX is that this transition necessitates a collective effort and a different approach to human-nature interactions.

Agriculture, a fundamental human activity, heavily relies on nature while significantly impacting it. Moreover, agriculture is affected by climate change. Agroecological farmers play a pivotal role in safeguarding ecosystems by adopting ecologically sustainable practices, representing a relationship of care with nature.

The EU recognises agroecology as a potent tool for addressing the world's climate, biodiversity, environmental, economic, and social challenges. It is endorsed in the Farm to Fork and Biodiversity Strategy for 2030 and is financially supported by the Common Agricultural Policy (CAP) through direct payments to agroecological farmers. The EU has recently introduced eco-schemes into the CAP to provide financial incentives for adopting agroecology to biodiversity and ecosystem services.

However, despite the favourable regulatory framework, farmers still encounter obstacles in implementing agroecological practices. These barriers are associated with various factors, such as the necessity for expertise in diverse areas (crop and livestock management, technical skills, regulatory compliance), insufficient research, education, and advisory services, increased labour requirements for farm operations, and the availability of suitable seeds and breeds.

This proposal aims to identify the institutional barriers farmers face when embracing agroecology and explore potential measures to surmount these challenges.

Keywords: European Green Deal; Farm to Fork; Agroecology; Farmers; Challenges

4. VALERECO: Valorization of LEgumes Related Ecosystem Services

First authors(s): Metaxia Kokkini

Other author(s): Ilias Travlos, Spyros Fountas, Jan Kiers, Agnoli Lara, Daniele Antichi, Daniel de Jong, Ann-Kathrin Koessler

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VALERECO is a Horizon project including 14 partners and coordinated by the Agricultural University of Athens and Professor Ilias Travlos, started on June 1, 2024. The project aims to promote the adoption and understanding of the value of legume crops, facilitating a shift towards sustainable, productive, climate-neutral, environment-friendly, and resilient farming systems. The project seeks to quantify and enhance the environmental and economic value of ecosystem services provided by 12 legume crops. Identification will be achieved through a comprehensive analysis of the legacy of ecosystem services and investigating pathways for integrating legumes and their associated ecosystem services into the new Common Agricultural Policies (CAP). Valorization will occur through nine Living Labs established in six countries across Europe for three growing seasons. These Living Labs are multi-actor open-innovation spaces that will employ behavioral design strategies towards the adoption of legumes in healthier and more sustainable diets, conduct on-station participatory trials to assess the performance of legume crops, quantify multiple ecosystem services, and incorporate farmers' perspectives by evaluating indicators for the economic and environmental benefits in diversified farming systems. Furthermore, the Living Labs will demonstrate and co-create technically, economically, and environmentally assessed solutions for integrating legumes into cropping systems. All outcomes will be available via a Digital Legume Information Hub (DLIH), designed to maximize the uptake of project's results. This hub will serve as a 'One-Stop-Shop' for legume ecosystem services, containing training and capacity-building materials, technical solutions for legume adoption, a knowledge database on ecosystem services, and policy recommendations along with a Decision Support System (DSS) as an independent web tab.

Keywords: Legumes, Ecosystem services, Valorization

5. Co-creation of sustainable development strategies for agroecological transition based on ES framework

First authors(s): Anabela Paula

Other author(s): Natália Roque, Paula Castro, Diogo Martinho, Paulo Fernandez, Albano Figueiredo, Silvia Castro, Luciana Frazão, Helena Freitas

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Rural agricultural landscapes provide a comprehensive range of ecosystem services (ES) vital to local populations' support, development and well-being. However, those areas face multiple challenges (e.g. agricultural abandonment or intensification) that require the co-creation of sustainable solutions toward agroecology that might be supported by the ES framework. Additionally, these issues should be discussed with local stakeholders and be included in decision-making processes. To meet this gap, the 'CULTIVAR' research and innovation project for the sustainable development of the agri-food sectors in the Portuguese Beira Interior region included a co-creation strategy to address the vision and interests of local actors. Using participatory methodologies, including workshops, face-to-face and online surveys, primary ES perceived by stakeholders in the territory were identified. Twelve key services were selected for mapping based on secondary data. These maps were then presented and discussed with stakeholders in participatory workshops to validate the results and promote a discussion on sustainable development strategies, including a participatory SWOT analysis and a "reverse engineering" approach (TWOS) to help defining suitable strategies to enhance the territory's ES and support the transition to agroecology, aiming to restore the traditional agroforestry mosaic that used to characterises the region few decades ago.

Keywords: ecosystem services, participatory methodologies, agroecology, agroforestry mosaic,

6. Insights from preliminary field observations: pollinators diversity with different crops and plants in agroecosystems

First authors(s): Mónica Q. Pinto

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Agroecology and ecosystem services (ES) are closely linked, promoting sustainable management of agroecosystems. There is growing interest in agroecology as a sustainable innovation, crucial for transitioning towards sustainable agriculture. This study investigates the diversity and abundance of pollinators across different plant species, highlighting the importance of pollination as a key ES.

Field observations were conducted during the flowering periods of different plant species (juniper, lavender, fennel, rockrose, strawberry tree, and cistus) and crops (vines, orange tree, almond tree and, olive tree), with each observation lasting ten minutes and repeated five times. Data were collected on honeybees, wild bees, hoverflies, and butterflies. Preliminary results revealed significant variations in pollinator diversity and abundance among plant species. Honeybees were most common, notably abundant in orange trees [16;30] and least abundant in juniper [4;10]. Wild bees exhibited high diversity in almond trees [12;26] and lavender [8;20] but were absent in vines and orange trees. Hoverflies were frequent in vines, lavender, and fennel [2;14]. Different butterflies' species were present across all plant species, with notable diversity in lavender and rockrose.

The results highlight the importance of plant diversity in supporting a wide range of pollinators. In this study, plants such as lavender and almond trees were essential for promoting ecosystem resilience. However, the presence of invasive species can attract pollinators away from native plants, posing a threat to local biodiversity

The study underscores the need for agroecological practices that enhance pollinator diversity and abundance. By ensuring a variety of flowering plants within agroecosystems, sustainable agricultural practices can be supported, increasing ecological balance and resilience. Future policies should focus on protecting pollinator habitats and mitigating the impacts of invasive species to preserve vital ecosystem services.

Keywords: Agroecology, ecosystem services, pollinators, crops, plant-pollinator interactions

7. From blurry maps to clear solutions: mapping pest control services for agroecological transition

First authors(s): Laura Riggi
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Agricultural intensification has led to significant biodiversity loss and a decline in essential ecosystem services, such as natural pest control. Despite its importance, natural pest control is poorly mapped, with only 1% of studies addressing it spatially*. To support agroecological transitions and reduce pesticide use, our study developed an expert-based moving window model to predict natural pest control potential at the landscape scale. This model integrates insights from 52 European experts and considers the impact of landscape and agricultural practices on the abundance of generalist and specialist predators and parasitoids.

Our model was validated against field data, explaining 11% of the variation in generalist carabid predator abundances, though it performed less satisfactorily for other groups. This highlights significant challenges in mapping natural pest control services and understanding their interactions at multiple scales.

Our findings show that our indicator integrating the magnitude of adoption of different ecological intensification practices correlates positively with carabid abundance, despite considerable variation in predictions. This indicator could identify areas with low levels of ecological intensification practices where natural pest control services are expected to be low.

To improve predictions, models must include more specific associations between field and landscape-scale habitat interactions. Experimental research and meta-analyses investigating multiple ecological intensification practices along land-use gradients are needed to quantify these interactions. Additionally, to support farmers' decisions and shift towards low-pesticide agriculture, models need to be trained and tested with accessible, spatially explicit field data made available in online databases.

Ultimately, developing similar spatially explicit models that integrate landscape and field management interactions for multiple ecosystem services, and considering the interplay between pest control and other services like pollination, is crucial. This approach will leverage

multiple ecosystem services for agroecological transitions, supporting sustainable agriculture, biodiversity conservation, and reduced pesticide reliance.

* Englund et al. 2017. 0.1016/j.ecolind.2016.10.009

Keywords: Expert based models, spatial explicit model, multiple scales, ecosystem service mapping

8. Quantification of ecosystem services of narrow-leaved lupins and lentils in mixed cropping systems

First authors(s): Philippa von Nathusius
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Introducing legumes into crop rotations can play a key role for sustainable agricultural systems. Their potential of biological nitrogen fixation can be used to reduce the application of synthetic fertilis ers and due to diversification of crop rotations, the overall disease and pest pressure can be decreased, resulting in reduced application of pesticides. Furthermore, grain legumes, rich in proteins, are highly valuable for human nutrition especially within plant-based diets. Nevertheless, cultivation of grain legumes can be associated with a high risk for farmers. The low competitivity of the pure stands and high tendencies of lodging in lentils are limiting factors for widespread cultivation. Intercropping legumes has shown potential in buffering those risks and increasing the land use due to niche differentiation, increased diversification and reduced synthetic inputs. Still, the benefits of introducing legumes in intercropped systems into crop rotations are rarely quantified and ready-to-use tools for farmers are missing. The European project LEGENDARY (www.legendaryproject.eu) addresses these issues. To quantify the ecosystem services of legumes in different management systems, we are conducting field experiments cultivating lupins (Lupinus angustifolius) and lentils (Lens culinaris) in intercrops with oats as well as in pure stands. While focusing on regulating and provisioning ecosystem services, pre-harvest assessments for quantifying the weed, disease and pest pressure are performed. Furthermore, the abundance of pollinators during flowering of the legume and the abundance of beneficial insects as well as the impact on the soil fertility and structure including the erosion potential is investigated. To assess the land use, yield and yield quality parameters

are determined. Focusing on nutrient availability and uptake, the legacy effect of the legumes and the cropping systems will be assessed by sowing barley as a subsequent crop and analysing soil and plant samples. Preliminary results from the first season will be presented.

Keywords: Sustainable agroecosystem · ecosystem service · legume · intercropping

9. One Health approaches to support Agroecological transformation and the provision of Ecosystem Services in peri-urban farming: the experience from west Africa.

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One Health is an integrated approach that recognizes the health relationship among ecosystems, plants, animals and people while it ensures that multiple sectors work together to tackle respective health threats. This interconnection becomes important due to the increasing world-wide adoption of urban and peri-urban farming. Indeed, a migration of rural people to cities is prominent, particularly in areas like Western Africa, which besides the advantages of peri-urban farming, it also raises concerns about sanitary issues and environmental degradation. The URBANE is a Horizon Europe project applying a One Health approach to study issues related to the application and intensification of peri-urban agriculture built around the principles of agroecology. It aims to explore links between farming practices and health, for tackling issues related to the application & intensification of peri-urban farming and the health of animals, humans and ecosystem as a whole. URBANE designs real-world case studies that cover different farming zones in six Western African countries; Specific pilot sites are selected following a series of assessments, registering capabilities and potential impact of the project approach in these farms considering both agro-environmental factors but also socio-economic ones. The project supports that applied agroecology allows the achievement of better health of humans, animals and the ecosystem & respective services by promoting improvements in their physical and psycho-emotional states. It has already developed an integrated strategy for the promotion of agroecological farming practices, in combination with the development of novel technologies and Decision Support Systems, as well as the formulation of policy

recommendations to allow expanding the reach of the approach and positively influence and support of its broader adoption.

Keywords: One-health, agroecology, peri-urban, Africa