NAEM 2026

Presentation Abstracts

Table of Contents

Plenary Session 1

Date and Location: Tuesday, 10 February, Earth

Being an ecologist in a world of biodiversity decline

Ecologists and others work hard to understand the natural world. In addition, there are several national to global policies to protect and restore biodiversity and to move towards a nature-positive society. Still nature is declining and progress is slow. What can we do as ecologists to help and speed up? And how can we still research what we like and at the same time contribute to policy and biodiversity-positive? In this session, we like to show how this can be done and also have a dialogue with the audience about how to improve our impact.

10:30 | Enthusiasm for basic and applied entomological research as a way into biodiversity and nature policy

Josef Settele, *Helmholtz Center for Environmental Research*

In this presentation, we start with love for butterflies and the urge to study and understand them. Through a series of (EU) projects the knowledge on butterflies has been increased dramatically as has the linkage between science and policy. Currently butterfly indicators are the best available ones for insects in general for example. This in turn has led to involvement in global policy such as IPBES and the CBD with exciting scientific collaborations and outputs as a result as well.

11:15 | From ecology to natural capital, impact assessment and policy contributions

Koos Biesmeijer, *Naturalis Biodiversity Center*

From a sound basis in social bee ecology and pollination developed a carrier combining science and its applications. Pollinator expertise led to insights in crop pollination and IPBES assessment. The drive to understand ecological interactions led to development of innovative monitoring, while accumulating data led to ecological insights as well as impact assessments.

Plenary Session 2

Date and Location: Wednesday, 11 February, Earth

Macroecology and Physiology in a Warming World

Climate warming is reshaping life on Earth, from global biodiversity patterns to the physiological limits of individual organisms. This session brings together macroecological and physiological perspectives to reveal how temperature governs species distributions, performance, and ecological interactions across scales. By linking broad-scale patterns with underlying biological mechanisms, the plenaries offer insights into the constraints, vulnerabilities, and adaptive responses shaping ecosystems in a rapidly warming world.

16:10 | Macroecology in a warming world

Laura Antão, University of Turku

Biodiversity change in the Anthropocene unfolds through complex, scale-dependent dynamics that are only detectable through long-term, comparative analyses across taxa and realms. Drawing on time-series data from the BioTIME database and complementary datasets, I examine how species and communities respond to large-scale environmental drivers such as climate and land-use change from local to global scales. My research synthesizes patterns of species richness, turnover, and abundance across spatial and temporal gradients, with a focus oncross-taxa and cross-realm comparisons including marine and terrestrial systems. While marine assemblages often exhibit stronger, more immediate responses to warming, terrestrial communities demonstrate varied temporal dynamics that reflect diverse thermal tolerances and buffering capacities. By integrating macro-ecological synthesis with rigorous time-series analysis, this work highlights both generalities and divergences in biodiversity responses across ecosystems and underscores the value of cross-taxonomic, cross-realm perspectives for understanding ecological change in a warming world.

16:55 | Physiological ecology in a warming world

Wilco Verberk, Radboud University

Understanding how organisms respond to climate warming requires more than documenting ecological patterns; it requires identifying the physiological mechanisms that generate them. In this talk, I synthesize experimental and comparative work on aquatic animals—including insects (e.g. stoneflies), amphipods, fish, and molluscs—to show how processes at the cellular and organismal levels shape ecological responses to temperature. While much ecological research focuses on large-scale patterns across species, causality ultimately lies in how individual species function and are constrained. By linking cellular and organismal physiology to performance, tolerance, and distributional limits, I illustrate how mechanistic insight can clarify why species differ in their sensitivity to warming and how these differences scale up to broader ecological patterns. This synthesis argues for a more explicitly mechanistic physiological ecology as a necessary foundation for predicting biological responses to ongoing climate change.

Parallel Session 1

1a: Exploring Biodiversity and Ecosystem Functioning: From Traits to Functions

Date and Location: Tuesday, 10 February, Earth

Conveners: Shengnan Wang (Utrecht University)
Xiaobin Pan (Utrecht University)

Biodiversity underpins ecosystem functioning, yet global change continues to reshape this vital relationship. Functional traits provide a powerful lens to understand how biodiversity influences ecosystem processes. Uncovering how traits drive multiple ecosystem functions is key to predicting ecosystem resilience. We welcome studies exploring biodiversity–ecosystem functioning relationships, with a focus on traits link to functions. In particular, we encourage contributions that link trait mean and variation to ecosystem processes and their responses to global change.

14:00 | Cell size matters: a unifying theory across the tree of life

Marcin Czarnoleski, and Wilco Verberk
Jagiellonian University / Radboud University

Cell size shapes how organisms interact with their environment, yet our understanding of these effects remains fragmented. We synthesise these effects into a Theory of Optimal Cell Size (TOCS), predicting that the size of single-cell organisms, as well as the number and size of cells in multicellular organisms, is subject to strong selection. At the heart of TOCS lies a trade-off between power and energy conservation: cell size acts as a 'double-edged sword', influencing both resource acquisition and maintenance costs. Major evolutionary transitions across the tree of life are connected with innovations in cellular organisation. A unified framework for cell size adaptation is essential for revealing the fundamental principles governing the ecology and evolution of life.

14:20 | Understanding plant diversity effects on community multitrophic interactions: the role of leaf and root defence traits

Leonardo Bassi
Terrestrial Ecology Department, NIOO-KNAW

Increases in plant diversity may cause the dilution of antagonists and the amplification of mutualists at the community level. However, the extent to which plant functional traits – in particular those related to defence - mediate these community-level effects is not well understood. Furthermore, it remains unclear whether these effects consistently increase over time.

In this study, we used structural equation modelling (SEM) to disentangle the overall effect of plant species richness on a comprehensive set of above- and below-ground organisms, including herbivorous arthropods and nematodes, pathogenic fungi, and arbuscular mycorrhizal fungi. Specifically, we examined to what extent this effect is mediated by plant community defence traits. To investigate how these relationships change over time, we manipulated plant and soil history in a long-term grassland diversity experiment.

We found that the direct effects of plant species richness on biotic interactions were consistently stronger than the indirect effects mediated by plant community defence traits. Evidence for mediation by leaf and root defence traits was limited, with only weak negative effects of leaf mass per area on herbivory rate and root nitrogen on soil fungal pathogen load. Additionally, we found limited evidence that plant or soil history influenced the relationships between diversity, defence traits, and above-ground multitrophic interactions. Nonetheless, the effect of species richness on the load of below-ground antagonists were stronger in old communities, whereas the effects of root defence traits tended to be more pronounced in younger plant and soil communities.

Overall, our community-level results contrast with species-level studies, which show stronger effects of plant defence traits on multitrophic interactions along diversity gradients. This highlights that complementary mechanisms, such as host dilution and top-down control by antagonists, may be more relevant at the community level while bottom-up trait-mediated effects are less dominant or may depend on different plant traits. Our study further highlights the need for future research comparing the relative importance of different mechanisms driving antagonist dilution and mutualist amplification along diversity gradients at both the species and community levels.

14:40 | Seagrass meadows as thermal shields: buffering sediment temperatures during heatwaves

B. Walles, Qi Liu, Alicia Hamer, Wouter Suykerbuyk
Royal Netherlands Institute for Sea Research / Utrecht University / Delta Climate Center / Wageningen Marine Research

Seagrass meadows are important ecosystem engineers whose physical structure affects both the environment and ecosystem processes. This study examines how seagrass canopy influence sediment temperature in intertidal areas, which strongly affects benthic organisms and nutrient cycling, particularly under climate change. We measured temperature profiles under and outside seagrass canopies and found that the canopy can reduce exposure to extreme temperatures by up to 2 °C at 5 cm sediment depth during a heatwave. Temperature differences persisted even at 40 cm depth. We will show how variation in canopy density influences the strength of thermal buffering. These findings demonstrate that structural traits of seagrass can buffer thermal stress, creating more stable sediment conditions. Stable sediment conditions protect benthic organisms and maintain biogeochemical processes, supporting overall ecosystem functioning. Overall, our results illustrate a clear link between seagrass traits and ecosystem processes, highlighting how seagrass meadows contribute to ecosystem resilience under global warming.

15:00 | One species, diverse dunes: Intraspecific trait variation in a coastal engineer

Carlijn Lammers, Martijn van Zanten, Valérie Reijers
Department of Physical Geography, Utrecht University

Biogeomorphic landscapes are shaped by feedbacks between biota and physical processes. In coastal dunes, dune-building vegetation reduces wind flow, enhancing sediment deposition that in turn stimulates plant growth. The magnitude of these feedbacks depends on physical conditions and plant traits. While interspecific variation in these 'engineering traits' has been widely studied, intraspecific variation remains largely overlooked. Along the European Atlantic coast, marram grass (*Calamagrostis arenaria*, 'helmgras' in Dutch) is the dominant foredune building species, and shoreline resilience critically depends on its functional traits — traits that drive dune formation and determine tolerance to environmental stress. My research investigates intraspecific trait variation of marram grass by combining field surveys and (controlled) experiments across environmental gradients and populations. By characterising trait diversity, this work aims to improve understanding of how within-species variation influences dune building capacity and how climate change may aLect the functioning and resilience of these vital coastal systems.

15:20 | Shifts in Biodiversity in Response to Mussel Bottom Culture in the Wadden Sea

Lotte Bouwman
Wageningen University

Wild mussels are key ecosystem engineers, forming complex biogenic habitats that support diverse marine communities. Although mussel culture plots share many structural similarities with natural mussel beds, the extent to which mussel aquaculture influences biodiversity remains largely unknown. Dutch mussel culture, occurring in the Western Wadden Sea and Oosterschelde Estuary, covers 11,500 ha of designated plots alongside wild bivalve beds of similar scale. During the 2021 optimisation of mussel plots, we conducted a unique before-and-after study across six newly designated blocks. A longitudinal sampling campaign monitored changes in infauna and epifauna, providing insights in the facilitative role of mussel plots for (associated) macrozoobenthos. Here, we present findings on benthic community development on the newly established plots. Using biodiversity indices and functional trait approaches, we examine community structure, ecological functioning, and temporal dynamics. This large-scale monitoring illuminates ecological succession and species establishment, offering guidance for sustainable management of aquaculture impacts in Dutch waters.

1b: The Community (and) Ecology of Tropical Forests

Date and Location: Tuesday, 10 February, Water

Conveners: Tomonari Matsuo (Wageningen University & Research)
Catherine Nistha (Wageningen University & Research)
Nina Witteveen (Science Panel for the Amazon)

Species interactions are central to the biodiverse tropical forests. Competition, predation, and symbiosis are key mechanisms driving ecological processes. Humans also affect these processes, for example by influencing forest recovery through legacies of previous land use and modifying the

landscape matrix. This session explores how communities of animals, plants, and humans influence forest structure, composition, and resilience. We welcome ecological and social perspectives highlighting the community ecology in tropical forest dynamics in a changing world.

14:00 | Slow but steady: young tropical forests with higher drought tolerance show lower productivity

Jazz Johanna Maria Kok, Masha van der Sande, Lucy Amissah, Jonathan Dabo, Salim Mohammed Abdul, Tomonari Matsuo, Lourens Poorter
Wageningen University & Research

Global climate change may drive young tropical forests toward being more adapted to drought, yet the impact of such adaptation on their growth remains poorly understood. Therefore, we examined how macroclimate and community drought traits together shape forest productivity during the first decade of succession. Fifty permanent plots across Ghana's dry and wet forest zones were monitored for basal area growth (proxy for productivity). Community-weighted means were calculated for eight leaf and stem traits relevant to both drought adaptation and productivity. Macroclimate strongly shaped successional productivity trajectories: wet forests showed high initial absolute productivity that declined rapidly, whereas dry forests showed lower but stable absolute productivity, suggesting differences in inherent growth rates. Relative productivity was initially high and slowed down across both zones as standing biomass accumulated. Community traits changed little over time but showed strong local spatial variation, possibly due to priority effects, where first arrivers pre-empt resources, gain dominance, and influence subsequent community development. Importantly, communities dominated by drought-tolerant species (high absolute leaf turgor loss point, high wood density) consistently showed lower productivity across forest zones. These results reveal a trade-off between drought tolerance and productivity, indicating that climate-driven shifts toward drought-adapted communities may slow down basal area growth in young tropical forests.

14:20 | Effect of dominant and rare tree species on productivity in secondary tropical forests

Iris Hordijk, Lourens Poorter, Tomonari Matsuo, Jazz Johanna Maria Kok, Lucy Amissah, Frans Bongers, Jorge Meave, Miguel Martínez-Ramos
Wageningen University & Research

To enhance natural forest recovery, fast tree growth and high productivity are vital in young secondary tropical forests. The effect of biodiversity, and specifically of dominant and rare tree species, on forest productivity has long been debated but is less studied in young secondary forests. According to the mass-ratio hypothesis, dominant species contribute most to productivity, while according to the niche complementarity theory, rare species contribute most when occupying additional niches. To understand the importance of dominant and rare tree species for forest productivity in young secondary tropical forests, we analysed results of a dominant and rare tree species removal experiment. This experiment consists of 32 plots, monitored for 3–5 years, in a wet and dry forest in Mexico and Ghana. This study shows that rare species contribute most to biodiversity, species richness recovers faster than community evenness, and dominant and common species are more important for basal area change compared to rare species.

14:40 | Predicting Species-Area Relationships in Fragmented Forests

Monique de Jager, Finn van Wordragen, Fleur Slegers, Edwin Pos
Utrecht University

Habitat destruction leads to severe biodiversity decline, and its spatial configuration affects its impact. Predicting the effects of different habitat loss scenarios on biodiversity will facilitate making better, well-informed management decisions, but such predictions are not yet available. We predict species-area relationships in tropical forest landscapes undergoing habitat loss and fragmentation. To do so, we use the information theoretical framework of Maximum Entropy Theory in Ecology (METE). Using an individual-based model, we explored how METE's state variables should be adjusted to provide a good species-area relationship prediction in disturbed environments. We determine the accuracy of our predictions using empirical data. Our adjusted METE predictions can demonstrate the severity of fragmentation's impact on biodiversity, relative to what could be expected in a pristine, continuous environment. With this new method, we can estimate the immediate effects of habitat loss on biodiversity loss, as well as its long-term effects.

15:00 | Forest boundary shape modifies resilience through interactions with dispersal and savanna fires

Max van der Ree, Gerard Barkema, Max Rietkerk, Els Weinans, Arie Staal
Utrecht University

The effects of global changes on tropical forests and savannas are manifested primarily at their boundaries. The dynamics at these forest-savanna boundaries depend on their shapes, which influence the spread of fires through the savanna landscape. How these boundaries are shaped depends on tree recruitment patterns, which differ between trees dispersed by wind and those dispersed by birds. Therefore, tree dispersal modes may have effects on fire spread and subsequently on forest-savanna resilience. To study these effects, we developed a novel individual-based model of seed dispersal in savanna-forest ecosystems, and investigated the interactions among tree seed dispersal modes, spatial patterns of tree cover, and fire spread. We find that forest recruitment rate and resilience are more sensitive to forest pattern morphology when trees are dispersed by birds than by wind. In addition, these effects are more pronounced for larger forest patches that are spaced further apart. Moreover, recruitment and resilience in bird-dispersed forests display high sensitivity to bird behavioural parameters, suggesting that the community composition of frugivorous birds may be an important indirect driver of forest resilience. Importantly, the shape of the forest boundary asymmetrically affects the average dispersal rate and fire-induced tree mortality, with implications for resilience. Our findings demonstrate for the first time that interactions between spatial patterns of tree cover and tree dispersal modes may affect the resilience of tropical forests and savannas against tipping. Thus, efforts to understand the impact of global change on tipping points between forest and savanna should account for the effects of seed dispersal modes.

15:20 | How land-use history and farm management determine multi-taxa biodiversity and ecosystem service multifunctionality in vanilla agroforestry

Dominic Martin
Wageningen University & Research

Agroforestry systems are vital for reconciling agricultural production with biodiversity conservation and ecosystem service provisioning. In Madagascar, vanilla agroforestry exemplifies this complexity, shaped by contrasting land-use histories and farm management practices. Approximately 30% of vanilla agroforests originate from forest conversion, while most are established on fallow land previously used for shifting cultivation. These origins strongly influence biodiversity and ecosystem service multifunctionality: forest-derived systems retain higher structural complexity and support greater multi-taxa diversity, including endemic species, but essentially represent forest degradation. Conversely, fallow-derived agroforestry systems rehabilitate degraded landscapes by enhancing ecosystem services such as carbon storage. Across land-use histories, vanilla yields do not trade-off with biodiversity, creating win-win opportunities for people and nature. In conclusion, policies must integrate land-use history to avoid incentivizing forest degradation. Promoting agroforestry on suitable open land while conserving remaining forests offers a pathway toward sustainable agricultural production in resilient tropical landscapes.

1c: Bridging Modelling and Field Ecology

Date and Location: Tuesday, 10 February, Fire 1

Conveners: Laura Mansier (University of Amsterdam)
Luuk Croijmans (Wageningen University and Research)

Field ecology uncovers novel, real-world patterns and quantifies them via manipulation, whereas modelling helps explain underlying mechanisms and quantify process at scales that are hard to measure in-field. Both are vital for understanding ecology and to develop practical applications. This interdisciplinary session bridges these approaches, featuring field ecologists that quantify relevant patterns for integration within mathematical models, and modelers that creatively use field observations to validate and calibrate their models.

14:00 | Modelling the carrying capacity of Low-Trophic Aquaculture in the North Sea

Merel Lanjouw
Aquaculture and fisheries group, Wageningen University

Understanding the production potential of low-trophic aquaculture (LTA) in the North Sea requires detailed knowledge of ecosystem interactions. LTA refers to extractive systems using species such as seaweeds and bivalves which fully rely on nutrients from the ambient ecosystem. Empirical studies on plankton, bacteria, and aquaculture species such as seaweed (*Saccharina latissima*) and mussel (*Mytilus edulis*) provide information on physiological rates and nutrient dynamics yet

assessing ecological carrying capacity demands scaling beyond individual experiments or field observations.
We apply the Dynamic Energy Budget framework to couple key functional groups, i.e. phytoplankton, zooplankton, and decomposers, with aquaculture species. Experimental and observational data guide parameter estimation and model calibration, providing insight into species interaction and the influence of environmental drivers such as temperature and nutrient availability. This approach bridges empirical evidence with mechanistic understanding, offering a scalable tool to interpret observed patterns and predict sustainable production potential in the North Sea.

14:20 | The impressive evasive performance of an aquatic prey
Lars Koopmans
Theoretical and computational ecology, University of Amsterdam

Pursuit and evasion dynamics are a universal phenomenon observed across terrestrial, aquatic, and aerial environments. While these interactions have profound implications for ecological and evolutionary dynamics, our understanding of the mechanics of these behaviours is surprisingly limited. This is primarily due to a lack of high-resolution behavioural data on predator-prey interactions. To bridge this gap, we conducted a field study on coral reef fish in Curaçao, where we developed a novel stereo-camera method to reconstruct precise three-dimensional trajectories of predator-prey interactions. To our knowledge, this approach generated the first high-resolution trajectory data on aquatic pursuit and evasion in the wild. Our findings reveal that despite being substantially slower, prey successfully evaded predators in 97% of the attacks. By comparing observed behaviours to a computational model of pursuit-evasion dynamics incorporating biomechanical constraints and sensory-motor delays, we demonstrate that prey achieve this remarkable success by timing their manoeuvres with high precision, exploiting the sensory-motor delay of their predators.

14:40 | Guano fertilization strengthens dune-engineering traits across dune grass species and origins, with consequences for dune dynamics
Floris van Rees
Royal Netherlands Institute for Sea Research

Coastal dunes depend on vegetation that traps sand and enhances resistance to erosion, yet the influence of marine-derived nutrients on these bioengineering traits is poorly understood. Because seabird guano is a major nitrogen source in many dune systems, we tested how nutrient enrichment affects dune-building grasses and dune development. In a greenhouse experiment, we studied three European dune grasses, *Elytrigia juncea*, *Ammophila arenaria*, and *Leymus arenarius*, which may have evolved different nutrient-use strategies, by exposing plants from guano-rich and guano-poor origins to a gradient of guano inputs (0–1000 g m^{-2} yr^{-1}). Trait responses were consistent across species and origins: moderate enrichment (50–250 g m^{-2} yr^{-1}) increased biomass and root surface area, whereas excessive inputs reduced growth and survival, likely due to nitrogen toxicity. Using these traits in the AeoLiS model, we show that guano-driven increases in vertical growth may raise embryonic dune height by ~30%. Incorporating trait-based processes into dune models will improve predictions of vegetation–sediment feedbacks under nutrient enrichment.

15:00 | Combining modelling and field studies for a better understanding of the effect of goose grazing on agricultural grassland yields
Nelleke Buitendijk
Faunabeheereenheid Noord-Holland

In the last decades, many goose populations have grown and are increasingly using agricultural land as foraging habitat, resulting in increasing farmer-goose conflict. While compensation payments for yield losses increased to millions, ecologists continued to question whether, and if so how, goose grazing affects grassland yields. Various modelling and field studies into the relationship between grazing pressure and yield loss gave seemingly contradictory results. However, by analysing the scale, study system, and underlying assumptions of these studies, the seeming contradictions can be explained, revealing important factors that influence the relationship between grazing pressure and yield loss. Integrating the results of both the modelling and field studies has led to a better overall understanding of how goose grazing affects grassland yield losses.

15:20 | Embracing ecological complexity in trait-based simulation models
Jorad de Vries
Forest Ecology and Forest Management Group, Wageningen University

We build trait-based simulation models with the goal of understanding or predicting the patterns we find in ecological systems, which are rife with complexity. Individuals are a complex network of functions and fitness components that interact with an environment that is incredibly variable in

both space and time. This makes for complex and variable fitness landscapes where a multitude of different strategies may find success. This makes elucidating optimal trait combinations in any given environment a challenging task, where modelling can prove to be an indispensable tool, if it is built to embrace the complexity that drives the ecological system. In this talk, I will showcase a study on local adaptation in *Dianthus carthusianorum* along an elevational gradient, where we investigated how the abiotic environment and competition for light, nutrients, and pollinators may have shaped the selection for distinct elevational ecotypes. In this study, we build an Evolutionary Functional-Structural Plant model that takes a process-based, individual-based, and spatially explicit approach to simulating the trait-environment interactions that determine plant fitness. The model was parameterized and validated on empirical data, showcasing how modelling can supplement empirical research in the quest to unravelling ecological complexity.

1d: Agroecological Transitions through Co-Creation: Multifunctionality in Rural Landscapes

Date and Location: Tuesday, 10 February, Rooms 2 & 3

Conveners: Luis Barba Escoto, University of Groningen
Barbara Prack Mc Cormic, University of Groningen

Field ecology uncovers novel, real-world patterns and quantifies them via manipulation, whereas modelling helps explain underlying mechanisms and quantify process at scales that are hard to measure in-field. Both are vital for understanding ecology and to develop practical applications. This interdisciplinary session bridges these approaches, featuring field ecologists that quantify relevant patterns for integration within mathematical models, and modelers that creatively use field observations to validate and calibrate their models.

14:00 | Above- and belowground legacies: Land-use legacies in soils and vegetation shape early tropical forest succession

Tomonari Matsuo, Iris Hordijk, Masha van der Sande, Lourens Poorter, Jazz Johanna Maria Kok, Lucy Amissah, Frans Bongers, Jorge Meave, Miguel Martínez-Ramos, Susan Laurance.,
Wageningen University & Research

Secondary tropical forests have expanded rapidly over the last century as human-driven land-use changes and disturbances clear vegetation and initiate natural regeneration. Because these forests typically regenerate on former agricultural fields or pastures, their recovery pathways are strongly shaped by the type and intensity of previous land use and by the lasting legacies these practices leave in soils and vegetation. Although previous studies have examined how previous land-use practices influence secondary succession, few have evaluated the underlying mechanisms through which land-use history creates above- and belowground legacies and how these jointly shape successional dynamics. Here, we ask how previous land use creates legacies in soils and vegetation, and how these legacies influence the start (initial values), speed (rates of change), and direction (successional trajectories) of early secondary tropical forest succession. We established 122 permanent plots in recently abandoned agricultural fields across dry and wet tropical forests in Australia, Ghana, and Mexico, and monitored them annually over the first five years, measuring 12 attributes related to structure, diversity, function, and biotic interactions. Structural and diversity recovery were strongly shaped by vegetation and soil legacies: higher densities of remnant trees and resprouts and greater soil organic carbon increased both initial states and rates of change, whereas greater grass and vine cover suppressed recovery. In contrast, functional composition and biotic interactions were more strongly driven by annual precipitation, indicating strong environmental filtering. In sum, above- and belowground legacies jointly regulate early successional pathways, highlighting the important role of socio-ecological context in shaping secondary tropical forest succession.

14:20 | Exploring rice cultivation as a sustainable future for Dutch peatlands

Martijne Kennekens
Leiden University

Dutch peatland agriculture, based on continued drainage of the peat soil, causes land subsidence, large CO2 emissions and increased vulnerability to saltwater intrusion. To prevent further degradation of our peatlands, ground water levels need to rise. This would render our current agricultural system impossible, as livestock farming and many agricultural crops are not well-suited to wet conditions. How can we still maintain our productive agricultural use of peatlands?

Rice cultivation is proposed as an alternative form of Dutch peatland agriculture. In the coming years, our research explores the sustainability of rice on Dutch peatlands by looking at biodiversity impacts, greenhouse gas emissions, socio-economic transition pathways and combined rice-aquaculture cultivation.
Experiments have been conducted on cold-tolerant varieties of rice in an experimental peatland research field in Oud Ade. The preliminary results of this research are promising. Net CO2 and CH4 emission measurements indicate relatively low methane emissions from the rice field compared to warmer climates. Collected data also suggests that rice might be able to lower CO2 emissions compared to grassland, but more research is necessary to confirm these results. Also, Dutch rice fields significantly raised the ground water level of surrounding grassland in five farms, reducing peat oxidation. Furthermore, experiments on combining rice and African sharptooth catfish (*Clarias gariepinus*) cultivation have demonstrated successful yields.
More research is necessary, but if successful, rice cultivation on peatland could become a form of climate mitigation as well as an early adaptation to climate change.

14:40 | Agroecology Partnership: Living labs and the monitoring of agroecology transitions as part of a nested socio-ecological system

Anne van Doorn, Mark E. Caulfield, Sinead O'Keeffe, Jan Feist, José Manuel Avila, Iria Soto
Wageningen University and Research

Monitoring agroecology, the degree of change in systems, the effects and impacts on agroecological systems, and the transition process, is critically important. Effective monitoring provides evidence for which practices have the most impact; contributes to learning and knowledge exchange; and identifies the socio-ecological trade-offs. Living labs (LLs) play a key role in agroecology transitions in Europe, often operating at a local or landscape scale, nested in the larger socio-ecological system. However, while a number of agroecology monitoring frameworks exist at the farm scale, none deal with this nestedness. The Agroecology Partnership will co-develop an innovative multiscale monitoring framework for agroecology, accounting for the nestedness of farms and LLs within the larger socio-ecological system.
Launched in 2024, the Partnership has developed a draft conceptual framework to monitor the transition to agroecology. To operationalize this framework across scales and contexts we will identify the main settings in which monitoring agroecology transitions should take place. The main tools, frameworks, indicators and data sources will then be mapped out for each of the monitoring settings, creating a toolbox for monitoring of agroecology. Any significant gaps in the toolbox will be assessed and monitoring tools and indicators adapted or developed accordingly. The toolbox will be tested and finetuned through a series of selected case studies.
The monitoring approach adopted by the Partnership builds upon the Lamanna et al. (2024) framework. It does so by working with the concept of monitoring settings: broad categories of monitoring applications that act as lenses to focus on specific parts of the socio-ecological system at different spatial levels (from farm-continental), integrating LLs. A monitoring setting is defined by 4 aspects: the purpose of the monitoring, the spatial scale and the entity to monitor (together constituting the system boundary) and end-user of the monitoring. Primarily this work will provide tools for decision makers on different levels to provide evidence which agroecological practices can create positive impacts within the socio-ecological systems, as well as the potential trade-offs at different nested scales. It will also contribute to enhanced learning and knowledge exchange among diverse stakeholders from farmers, to LLs, and LL networks, enabling more systematic, inter-operable, and scientifically robust data across space and time. In this way the work can act as a catalyst to facilitate the scaling of agroecological transition pathways within the EU.

15:00 | ALLFacts: Scaling Agroecological Transition Across Europe l The case of the ALLFacts Dutch Living Labs

Marjolein Elings, Janneke Bruil, Eduardo Cáceres Salgado, Jessica Duncan y Jan Hassink
Wageningen University and Research

The EU ALLFacts project aims to close the gap of upscaling agroecology to the landscape level and establishing agroecological territories mobilizing adapted policy design and governance approaches that match the particular needs of diverse Living Labs in Agroecology. One of the aims of the project is to bring together various stakeholders involved in agroecological transitions. In doing so, we seek to identify different transition pathways at the landscape and territorial levels, with the ultimate goal of determining which strategies are most effective for further scaling up agroecological practices. When it comes to scaling up, we look at scaling up, changing institutions at the level of policy, rules and laws; scaling out, replication and dissemination, increasing the number of people or communities impacted; and scaling deep, changing relationships, cultural values and beliefs. In this presentation, we will use the three ALLFacts Living Labs in the Netherlands to show how these initiatives are attempting to scale up through the use of narrative and deep rooting.

15:20 | Soil and Peace: Bridging soil ecological knowledge and frameworks for conflict-resolution

Giles M. Ross, Naomi Rintoul-Hynes
Netherlands Institute of Ecology

Soils underpin ecosystem resilience to disease, resistance to environmental stress and redundancy in the form of biodiversity loss. These all impact food security, and public health, yet remain under-protected in policy and post-conflict planning. Building on the momentum of the recently approved EU Soil Monitoring Directive, which establishes a framework for comprehensive soil health assessment and harmonised data collection across Member States (European Commission, 2024), this work highlights the urgent need to integrate soil biodiversity assessment according to SHARE protocols (SOB4ES, 2025) for considerations into peacebuilding processes. Despite evidence of environmental degradation with heavy-metal burdens suppressing crop productivity for generations (Rintoul-Hynes, 2025), and detrimental effects on soil ecology and biodiversity (Certini et al., 2013), only a tenth of peace treaties include substantial provisions for environmental restoration (PeaceRep, 2025). With growing knowledge as to the central role of soil biodiversity to overall ecosystem sustainability, transdisciplinary fields of ecology, land-management and conflict resolution have to come together to ensure equitable reconstruction for mitigating long-term impacts to sustainability and ecosystem and human wellbeing (van der Putten et al., 2023).
In response, we propose an initiative for the systematic co-creation and collection of soil samples from conflict-affected areas to create a searchable record of impacts to soil biodiversity. This record would support the ongoing development of consistent international standards and benchmarks for contamination and degradation. Building such an evidence-based framework with harmonised processing and analyses pipelines to generate robust, comparable biodiversity data that aligns with EU monitoring practices with the goals of environmental peacebuilding.

1e: Plant Community responses to spatial and temporal scales

Date and Location: Tuesday, 10 February, Rooms 10 & 11

Convener: Lourens Poorter (Wageningen University & Research)

14:00 | A connectivity threshold between grass patches amplifies coastal dune formation

Paul Berghuis
Utrecht University

Biogeomorphic systems, key providers of ecosystem services, emerge from self-reinforcing feedbacks between landscape-building biota and geomorphic processes. Typically, these feedbacks are considered to operate at an individual patch scale, yet it remains unclear how interactions between patches shape landscapes at larger scales. Here we show how dune-building grasses form functional clusters of interacting patches that strongly amplify engineering capacity. By analysing a decade of morphological development in an establishing coastal dune system, we discover that dune height is primarily driven by the initial density of neighbouring patches, rather than individual patch size. We identify an S-shaped relationship consistent with a spatial percolation threshold: increasing local patch density triggers an abrupt shift from isolated sand-trapping patches to functionally connected clusters that enhance dune growth. This work reveals an important yet overlooked spatial dimension of ecosystem engineering, one that can be harnessed to inform future restoration designs and enhance ecosystem resilience.

14:20 | Plant-soil feedback matters more than competition for short-term temporal dynamics of grassland community

Miradili Kuerban
Institute of Biology, Leiden University

Plant-soil feedback (PSF) and competition are central to ecological theory and have been studied extensively across systems. Previous research has often linked PSF and competitive interactions to patterns of species abundance, coexistence, or trait-mediated performance. However, these mechanisms are rarely examined in direct relation to the temporal dynamics of plant communities in the field such as shifts in dominance, or temporal dynamics. To bridge that gap, we combined field experiments with controlled setups to test how PSF and competition influence species' temporal dynamics. Our findings suggest that both mechanisms play distinct roles in driving fluctuations and trends, but PSF more matters than competition. Importantly, parameterized mechanistic models with PSF and competition reproduced observed fluctuations and directional changes in community. These findings demonstrate that PSF and competition can jointly structure plant community dynamics over time, offering a pathway to bridge mechanistic theory with field-based temporal patterns.

14:40 | Effect of herbivore exclosure and winter inundation on vegetation heterogeneity and plant community composition in a grassland-wetland system

Emma Polman, Kenneth Rijsdijk, Perry Cornelissen, Harry Seijmonsbergen & Franciska de Vries
University of Amsterdam, Institute for Biodiversity and Ecosystem Dynamics, Dutch State Forestry Service

Grazing with large herbivores and periodic inundation are two commonly used strategies for promoting wildlife through increasing vegetation structural heterogeneity in managed grassland-wetland systems. However, little is known about the combined effect of herbivory and inundation on vegetation structure and plant community composition. We hypothesized that herbivore exclosure increases vegetation heterogeneity through increasing plant diversity, and that these effects are most pronounced in year-round dry grassland. We used a combination of vegetation surveys and light detection and ranging (LiDAR) to quantify vegetation heterogeneity in ungrazed exclosures and grazed control plots on winter inundated and year-round dry grasslands in a Dutch wetland-grassland area. Horizontal vegetation variability was higher in non-grazed exclosures, but plant diversity was lower, and both metrics were unaffected by water table management. These results show that grazing exclosure can increase the heterogeneity of vegetation structure, but that this, initially, comes at the cost of decreased plant diversity.

15:00 | Community-driven science on the edge: a Belgian case study from the MIREN Rocks network about rock climbing impacts on cliff vegetation

Sarane Coen
Utrecht University

Cliffs host diverse and often endemic species but remain largely understudied. The global MIREN Rocks network of climbing ecologists addresses this gap using standardized vegetation surveys along vertical transects. A first case study on Belgian limestone cliffs shows that abiotic filters strongly shape vegetation diversity. Under suitable conditions, moderate climbing disturbance increases species richness compared to unclimbed or heavily climbed cliffs, consistent with the intermediate disturbance hypothesis. Community composition patterns indicate unclimbed cliffs favour competitive species, while climbed ones harbour more ruderals. These findings enhance understanding of cliff ecosystems as extreme ecological communities and highlight their vulnerability. They also demonstrate how community science driven by passion for the focal ecosystem, uniting scientists and climbers worldwide, can be an inspiring example for conservation-oriented ecological research.

15:20 | Tracing plant diversity changes on the Swiss Plateau during agricultural intensification: evidence from pollen records

Catrien Hoffman
Utrecht University

To extend the record of biodiversity changes beyond the observational record, information from natural sediment archives is an important but currently under-utilized information source. The principal tool available to reconstruct past floristic diversity is based on the richness of subfossil pollen-types in sediments. The relation between pollen type richness in sediments and plant diversity of the landscape surrounding the deposition site has been established but is distorted by several known biases. Understanding how these biases manifest in a pollen-type richness curve and how their impact can be diminished is needed to increase the quality of pollen-based reconstructions of plant diversity. Available high-quality pollen count data from two large lakes on the Swiss Plateau provide a unique opportunity to address this issue. The excellent chronological and taxonomical resolution of these records enables comparison with alternative methods for estimating palynological richness that minimize aforementioned biases. Covering the last 100-500 years at high temporal resolution, the new data allow for evaluation of how plant diversity loss caused by agricultural intensification is reflected in the pollen record and how land-use changes reduced the abundance of specific plant types in the study area.

Parallel Session 2

2a: Collectively Collecting Data: Using Citizen Science in Ecological Research

Date and Location: Tuesday, 10 February, Earth

Convener: Monique de Jager (Utrecht University)

In this session, we focus on the role of citizen science in ecological research and conservation. Citizen science can be a cost-effective method to increase data collection. In addition, by engaging the public, participants may improve their connection to nature and their understanding of scientific processes. We will explore methodologies for managing and interpreting citizen-generated data, as well as the importance of effectively engaging the public in data collection and monitoring.

16:10 | From citizen science to a new bird atlas: enhanced data collection, modern analyses, and improved population insights

Michiel Boom & Juan Gallego-Zamorano
Sovon

Bird atlas projects have a fundamental place in the natural sciences, providing essential information on species distributions, habitat associations, and population status. While continuous monitoring schemes provide high-quality long-term trend data, atlases remain indispensable because they deliver the comprehensive spatial coverage needed to interpret those trends and validate them against national population estimates. In the Netherlands, national bird atlases are made possible through the efforts of trained volunteer fieldworkers, forming one of the country's largest citizen-science initiatives. A new national bird atlas project will begin in winter 2026/2027 and, for the first time since 1987, will include year-round data collection to better capture seasonal patterns in the occurrence of resident and migratory species.
Recent technological developments, particularly digital data collection through mobile applications, now allow volunteers to gather more detailed and structured observations than ever before. At the same time, increases in computational power have enabled the application of advanced statistical modelling techniques. Together, these developments open new possibilities for deriving high-resolution species distribution models, exploring seasonal shifts in occurrence patterns, and producing robust, model-based national population estimates.
This presentation will highlight how modern bird atlas data collection, combined with advanced modelling approaches, can generate detailed spatial and temporal insights into avian populations. We will show practical examples and discuss the broader value of (semi-)structured citizen-science data for ecological research and long-term biodiversity monitoring.

16:30 | Ringing birds for science and conservation: a 'high-end' citizen science project

Henk van der Jeugd
Netherlands Institute of Ecology

The 'Vogeltrekstation', or 'Dutch Centre for Avian Migration and Demography' of the Netherlands Institute for Ecology coordinates all bird ringing activities for science and conservation in the Netherlands. Birds are ringed annually by c. 570 ringers, of which the larger part, c. 460, are citizen scientists. These go through a two-year training, after which an exam is done and an individual ringing permit is issued. Permits are restricted and tailored towards specific ringing projects and species groups. Permits have to be renewed each year, and ringers adhere to a code of conduct, and follow a certification system with regular meetings during which skills and knowledge are being tested.
There is strong emphasis on 'community-building', knowledge sharing and self-regulation. Based on experience and performance, participating citizen scientists can become tutors, instructors and examiners. This promotes commitment and reduces the workload for the coordinating institute. The citizen scientist network is frequently involved in research projects by scientific institutions and interactions between the network and the scientific community is highly valued and promoted. Volunteer bird ringers can be seen as 'high-end' citizen scientists, and their special skills and high level of commitment render them a valued asset that professional ornithologist increasingly make use of in collaborative projects.

16:50 | Citizen Engagement in Environmental research: lessons learned on data quality

Lies Jacobs, Noelia Valderrama, Mercy Ashepet, Julius Tumusiime, Caroline Michellier, Kin Ho Chan, Emiel van Loon, Grace Kagoro, Casim Umba Tolo & Tine Huyse
University of Amsterdam

Citizen Science (CS) has taken particular flight in the domain of environmental sciences, with citizen-generated data volumes often greatly exceeding those collected by professional scientists. Despite the ever growing volume of CS generated data, only a small portion is integrated into research and policy. This lost opportunity also risks disillusionment among contributors, weakening long-term public engagement. In this contribution we share experiences from a CS project in Uganda where data on freshwater snails transmitting the parasitic disease schistosomiasis is collected since 2019. We provide an overview of mechanisms in the design, verification and processing stages that can be leveraged to facilitate highly qualitative citizen-generated data. We will provide insights into how CS - generated data is valued by policy actors within the region and how these values are shaped by perceived data quality. Finally, we will frame this in light of research results outlining participant motivations within the same project.

17:10 | Identifiability of non-native species

Lars Willighagen
Radboud University

Biological invasions of non-native species form an increasing problem globally, with severe negative impacts in a wide range of areas including human health, food security, biodiversity, climate, and the economy. Large-scale management is necessary to prevent introductions and the establishment of viable populations, to counteract their spread, and to reduce the effects of their impacts. To guide management strategies, monitoring of nonnative species, including by citizen science projects, is needed. Additionally, taxonomic expertise is needed to implement and execute the planned management. This requires resources for the identification of non-native organisms. In this research, we evaluated the availability of identification resources of plants, true bugs, and ants through time. We also investigated the effect of this availability on observation trends in citizen science platforms.

2b: Ecology without borders: Resource Subsidies and Connections Across Habitats and Ecosystems

Date and Location: Tuesday, 10 February, Water

Conveners: Nacho Villar (Netherlands Institute of Ecology)
Casper van Leeuwen (Radboud University Nijmegen)

Resource subsidies, processes and species connecting habitats and ecosystems can have strong effects in ecosystem dynamics. Understanding those effects is crucial for biodiversity conservation and restoration in a packed and densely populated delta like the Netherlands, where limited space inevitably coerces different terrestrial and aquatic habitats and ecosystems to coexist and interact in many ways. This session welcomes illustrative empirical, conceptual and modelling examples that contribute to understanding connections across classical ecological borders.

16:10 | Connecting the landscapes and waterscapes of the Netherlands

Nacho Villar & Casper H.A. van Leeuwen
Netherlands Institute of Ecology / Radboud University

The Dutch delta is home to a mosaic of waterscapes and landscapes that are often managed and restored in isolation. Yet, reinstalling connections between habitats and ecosystems can have a strong leverage on the restoration of their biodiversity, processes and functions. We illustrate this with a case study on the restoration of a rewilded floodplain, the Gelderse Poort. Here, the return of vertebrate herbivory and seed dispersal, and their interactions, reinstalled connections between grasslands and forest habitats. Such rewilded connections engineered mosaic landscapes and initiated walking forest dynamics.

16:30 | The carbon connection: impacts of succession and season on the food webs in the newly restored wetland islands of Marker Wadden

Gijs Hendrik van Beilen, Joep de Leeuw, Joey Volwater, Wilco Verberk, Casper van Leeuwen
Radboud University

In newly restored wetlands littoral food webs on land are recoupled to benthic and pelagic food webs in the water. Yet, it remains unclear how quickly such food webs develop and how they vary seasonally. Here we tested effects of seasonality and succession of littoral vegetation on food webs in Marker Wadden, a restored wetland. We hypothesize that littoral food webs include increasingly more terrestrial inputs as succession progresses. In addition, we hypothesize that terrestrial food

sources dominate in winter, while benthic production is a dominant component of food webs in summer. Four shoreline habitats representing successive stages (sandy beach, pioneer, reed, and willow) were sampled across all seasons for macroinvertebrates, fish, and bird communities. Together with the representative basal food sources for each habitat type, we use the stable isotope signatures of macroinvertebrates to elucidate carbon flows between terrestrial, pelagic and benthic habitats in a newly restored ecosystem.

16:50 | Aquatic insects from ditches as prey for farmland birds: supplementary or critical?
Hugo Langezaal, Cassandra van Altena, Kevin Groen, Liesbeth Bakker
Netherlands Institute of Ecology

Farmland birds remain in decline across Europe. In intensively managed agricultural landscapes, it remains unclear how insectivorous species still obtain enough prey to breed successfully, especially as terrestrial insects continue to decline. In the Netherlands, ditches are prevalent and may provide an overlooked source of insect biomass. We hypothesize that aquatic emergent insects from these waterways act as important subsidies supporting terrestrial consumers such as the Western Yellow Wagtail (*Motacilla flava flava*). We investigated this in intensively managed flower bulb fields by combining DNA metabarcoding, stable isotope analysis and camera observations to identify nestling diet and trace prey origin across land–water boundaries. In parallel, we quantified aquatic insect emergence from adjacent ditches and give a brief outlook on the magnitude of these subsidies. By integrating diet composition with aquatic emergence, this study highlights the importance of ditch ecosystems and aquatic–terrestrial linkages in sustaining biodiversity in modern agricultural landscapes.

17:10 | Upstream passage of large migratory fish at the Haringvliet sluices in the Rhine-Meuse estuary
Melanie P. Meijer zu Schlochtern, Leopold A. J. Nagelkerke, Anthonie D. Buijse, F.T. Vriese, André W. Breukelaar, Jochem Hop, Hendrik V. Winter
Wageningen University & Research

Estuaries are critical migratory corridors for diadromous fish species. However, in many estuaries connectivity is severely hampered by human impact, e.g. large dams, tidal barriers, and sluices. Discharge sluices are difficult to pass for fish, even large migratory species encounter challenges, particularly in the upstream direction due to high flow velocities and limited passage windows. In the Rhine–Meuse estuary, the management of the Haringvliet sluices was recently adjusted to allow limited saltwater inflow and improve fish passage, known as "Kier management". This PhD research investigates the passage behaviour of large anadromous fish species prior and since adjusted sluice management. We show that these fish species (including Atlantic salmon and sea trout) already used the limited passage windows prior to adjusted management to move upstream. Our findings further underline species-specific differences in passage conditions. Using acoustic telemetry, we now assess whether passage conditions have indeed improved.

17:30 | Modified hydrology controls terrestrial carbon fluxes towards freshwater lakes
Arie Vonk, Harm van der Geest
University of Amsterdam

Freshwater ecosystems support a high biodiversity and provide essential ecosystem services for humans, but the functioning of these systems are threatened by many anthropogenic disturbances including changes in the hydrology. Natural dynamics in hydrology drives both the connectivity between terrestrial and aquatic ecosystems, e.g. through run-off and floodings, as well as between different aquatic ecosystems, resulting in the exchange of carbon sources. In modified freshwater lakes, these exchanges are strongly altered through the constructions of dikes, dams and pumping stations, with impacts on their food webs and biodiversity. In this presentation, we provide an overview of altered carbon fluxes on lake functioning and provide in depth insights into the carbon fluxes towards lake Markermeer, a delta lake with a heavily modified hydrology. Finally, we discuss possibilities to restore these carbon fluxes in order to support the food web and enhance the functioning of modified freshwater lakes.

2c: Urban ecology

Date and Location: Tuesday, 10 February, Fire 1

Conveners: Joeri Morpurgo (University of Leiden / Naturalis)
Genesis Daquinan (University of Leiden / Naturalis)

Urban animals are adjusted to a cocktail of anthropogenic stressors but the research on their behavioural responses often is not. Most urban studies only look at the additive effects, overlooking potential synergistic, antagonistic or emergent effects. By researching how the calls of the Eurasian coot change under noise and light pollution in the city, we found that coots respond to urban stressors in synergistic and non-linear ways. Together, sound and light fundamentally change how coots communicate.

16:10 | How do soil-plant-insect interactions shape green roof communities?

Eva Drukker
Wageningen University & Research

Green roofs, exposed to wind, heat and drought, might seem like unlikely habitats for ecological development. Yet in just three years, they can transform from bare substrates into thriving, shifting communities. This study explored that transformation on eight blue-green roofs in Amsterdam, investigating how these elevated ecosystems might help cities respond to the challenges of biodiversity loss and fragmentation.
We monitored each roof from the moment it was built, measuring how design choices and environmental factors shaped soil, plant and insect diversity, abundance and community structure. We used several methods, like network analysis and non-metric multidimensional scaling to reveal patterns in species composition. We further grouped species by functional traits to understand what it means to be a green roof community.
Our findings suggested a promising design approach, as specific roof design supported a higher number of species, with many native to Dutch grassland habitats. This suggests that these green roof types do not remain isolated islands, but actually connect with the surrounding (urban) landscape.

16:30 | Urban airborne allergenic pollen shows highly local patterns driven by public green spaces

Nemi Dorst, Maarten Hogeweij, Aukje Clercx, Dominique de Boer, Ilse Thijssen, Leon van Leeuwen, Martijn van de Velde, Arjen Speksnijder, Laurens Sparrius, Letty de Weger, Kevin Raaphorst, Marcel Polling, Barbara Gravendeel
Hortus botanicus Leiden

Urban heat islands intensify global warming effects in cities, increasing the need for cooling from plants. However, when flowering, some urban plant species release allergenic pollen, which can deter people with hay fever from using green spaces and reduce the benefits of urban green. Smart designs of hypoallergenic urban green requires better knowledge of local airborne pollen dispersal, which is currently lacking. We investigated how local plants influence pollen concentrations and composition at street level in a green and grey neighbourhood in Leiden, the Netherlands. Airborne pollen was collected over 12 months and analysed using both DNA metabarcoding and microscopy. Our results show that local public green spaces are the main source of allergenic pollen in urban heat islands. Grasses contributed most to allergenic pollen in summer, whereas street and park trees dominated pollen loads in winter, spring, and autumn. The latter might be caused by global warming induced second blooms, but this needs further investigation. Our findings emphasize the need to carefully select urban tree species and to prioritize non-allergenic forbs over grasses when designing healthy urban green infrastructure.

16:50 | Basic Quality Nature: an approach to safeguard everyday resilient biodiversity

Hidde Hofhuis
Deltaplan Biodiversiteitsherstel, SoortenNL, IUCN, Vogelbescherming, and Wageningen University

Basic Quality of Nature (BKN) offers a practical framework to address biodiversity poverty outside designated nature areas by steering on the environmental conditions required by common species. This presentation introduces the BKN approach and the recent report 'Basiskwaliteit Natuur in de bebouwde omgeving' (Edixhoven & Hofhuis 2025), which presents a consensus on the key ecological conditions for biodiversity in urban areas, including measurable targets. The report is based on expert and stakeholder input from the national BKN knowledge programme (2024–2028). By

synthesising diverse insights, the program establishes a shared language and provides concrete tools for policymakers and practitioners working on ecological restoration in both urban and rural landscapes. The identified conditions serve as a benchmark that supports stakeholders in creating healthy, biodiverse environments, following the principle of "doing–learning–improving". This synthesis enables governments and professionals to effectively prioritise the conditions needed to ensure that common species truly remain common.

17:10 | Combined effects on coots: how sound and light change communication in the city

Sebastiaan Grosscurt
Naturalis Biodiversity Center

Urban animals are adjusted to a cocktail of anthropogenic stressors but the research on their behavioural responses often is not. Most urban studies only look at the additive effects, overlooking potential synergistic, antagonistic or emergent effects. By researching how the calls of the Eurasian coot change under noise and light pollution in the city, we found that coots respond to urban stressors in synergistic and non-linear ways. Together, sound and light fundamentally change how coots communicate.

17:30 | City-to-City Shifts: Species' Urban Affinity Varies Widely

Joscha Beninde
Vrije Universiteit

The ability of species to persist in urbanized landscapes is predominantly considered a constant, species-inherent property, implying that all populations of a species respond uniformly. However, environmental conditions vary fundamentally among urbanized landscapes, and we hypothesize that this leads to a wide breadth of intra-specific urban responses. Yet, limited data availability and a lack of appropriate methodology previously prevented quantitative comparisons. This study assesses the breadth of urban responses using a novel metric that summarizes, in a standardized way, the disparity in suitable habitat distribution across urbanization levels. Across the same 166 species in eight metropolitan areas, we demonstrate that most species exhibit considerable breadth in their responses. Thus, persistence in urbanized landscapes needs to be conceptualized as a population-specific property, driven by interactions with the locally prevalent, unique environmental conditions. These findings present a wealth of opportunities to further investigate the spatial and temporal dynamics of species responses to urbanized landscapes

2d: Integrative Ecology: How Energy, Behaviour, and Environment Shape Species and Ecosystems

Date and Location: Tuesday, 10 February, Rooms 2 & 3

Conveners: Evy de Nijs (Amsterdam University)

16:10 | Effects of canopy openness and forest management intensity on decomposition rate and decomposer communities of different types of necromass

Marit Hertlein
Forest Zoology, TU Dresden, Germany

Decomposition of necromass, i.e. dead organic matter, is a key ecosystem process for ecosystem functioning and nutrient cycling. Different necromass types vary in their physicochemical characteristics, decomposer communities, and consequently in their decomposition rates. As forest canopies open up rapidly due to climate-change related mortality, it is important to understand how this affects decomposition rates and related decomposer communities.

We exposed carrion, leaf litter and deadwood in paired closed-canopy and gap plots and sampled arthropods, fungi and bacteria. Canopy openness did not affect carrion decomposition which was mainly driven by arthropods, but leaf litter decomposition rate was increased and deadwood decomposition decreased. Species richness of carrion and deadwood decomposer communities did not differ between canopy openness whereas their community composition clearly differed.

Our findings show that patterns of decomposition rates in response to environmental drivers cannot be generalized across necromass types, while decomposer community composition follows a more consistent pattern.

16:30 | Energetic cost of infection is key to food-web resilience to parasitic invasion

Swarnendu Banerjee, Andre de Roos

Dutch Institute for Emergent Phenomenon / Institute for Biodiversity and Ecosystem Dynamics / Korteweg-de Vries Institute for Mathematics, University of Amsterdam

Ongoing climate change has facilitated invasion of parasites into new ecosystems by expanding habitats and affecting vector spread. These parasites can impact host density which in turn can influence food web stability. Understanding resilience of food webs to such parasitic invasions is therefore crucial. Previous studies have mainly focused on host mortality as the key consequence of infection, but parasites also impose energetic or maintenance costs that are often overlooked. In this talk, I show that while both higher mortality and increased maintenance costs can cause extinctions, the latter makes more hosts functionally keystone, meaning their infection can trigger cascading losses. This occurs because increased mortality due to infection reduce the lifespan of the infected individuals limiting their potential to spread infection, whereas increased maintenance cost do not have this effect. These findings emphasize the importance of incorporating energetic costs of infection when assessing food web resilience to parasitic invasions.

16:50 | Integrating Field Data and Dynamic Energy Budget (DEB) Models to Explain Marine Species' Energy Dynamics and Their Responses to Environmental Change

Alejandra Ortiz

Wageningen University and Research

Using Dynamic Energy Budget (DEB) theory, we link field observations of marine species' growth, reproduction, and survival with mechanistic models of energy allocation. This approach helps explain how environmental change affects individual organisms and their life processes, connecting field observations to the underlying biological processes that explain them. We also illustrate how models can be informed, constrained, refined, and validated by field data, increasing their ecological relevance and predictive power.

17:10 | Responses of carabid beetles to river restoration: a case study in the Demer River

Malaurie Hons

University of Antwerp

Rivers and riparian habitats are biodiversity hotspots but are widely degraded by channelization and poor management. While river restoration increasingly targets wetlands, riparian zones are often overlooked in monitoring frameworks. We used carabid beetles as bioindicators to assess how hydrological connectivity and local habitat features influence riparian biodiversity across different restoration designs. Carabid communities were sampled along five sections of the Demer River (Belgium), including restored, near-natural, and degraded sites. Restored sites with lateral connectivity supported higher species richness and a greater proportion of riparian specialists than degraded or disconnected sites, although surrounding land use also influenced community composition. Soil moisture, bare ground, grain size, slope, and flood frequency were key drivers of assemblage structure. Our findings show that restoring lateral connectivity and habitat heterogeneity is crucial for improving riparian biodiversity outcomes in river restoration.

17:30 | Aquatic ecosystem restoration in Dutch peatland ditches: Introducing *Stratiotis aloides*

Fleur van Duin

Leiden University

While much research has focused on the terrestrial aspects of peatlands, their aquatic counterparts – drainage ditches – are also under increasing pressure of degradation by high nutrient loads, intensive management and invasive crayfish. Where biodiversity restoration on land often fails to materialize due to incompatibility with agricultural practices, aquatic ecosystem restoration could already result in functional ecological corridors.

This study investigates an ecosystem restoration approach through re-establishment of *Stratiotes aloides*, a keystone native macrophyte and peatland ecosystem engineer that was once highly common in the Dutch peatlands. We hypothesized that the reintroduction of *S. aloides* in high densities would promote the development of robust aquatic communities that are resilient to the multitude of current stressors.

In Polderlab Vrouw Venne, a Peatland Living Lab near Leiden, we set up a field experiment, introducing *S. aloides* to twelve 50m ditch tracks, adjoined by twelve reference tracks. We monitored chemical water quality, macroinvertebrate community composition and crayfish densities. *S. aloides* successfully established in part of the introduced tracks, allowing us to identify the key limiting environmental conditions for re-establishment. We recorded measurable changes in the

macroinvertebrate community, that could be linked to improved habitat structure. These successes seemed to be independent of crayfish density.
Our findings demonstrate the potential for ecosystem restoration, even in artificial watercourses that are under pressure from invasive species and local agricultural practices. We hypothesize that, over time, the robust aquatic ecosystems can be established, forming extensive ecological corridors throughout the Dutch peatlands.

Parallel Session 3

3a: Bright Spots in Nature Conservation and Restoration

Date and Location: Wednesday, 11 February, Earth

Conveners: Ralph Temmink, Utrecht University
Renske Vroom, University of Greifswald
Liesbeth Bakker, Netherlands Institute of Ecology
Michelle van Mulken, Utrecht University

Humans have heavily degraded the world's lands and oceans, thereby creating a major challenge: halting ecosystem destruction and restoring damaged or lost ecosystems. While this task may seem daunting and can provoke frustration, despair, or inaction, this session seeks to inspire and encourage. We will highlight "bright spots"; positive and exemplary examples of conservation and restoration. We welcome speakers who can illuminate pathways forward and share guidance through successful projects, innovative approaches or transformative ideas.

9:00 | Positive impacts of community involvement in the conservation of mountainous landscapes

Arash Ghoddousi
Wildlife Ecology and Conservation Group, Wageningen University

As human impacts reach the most remote landscapes, mountainous areas are the last strongholds for many species. However, these landscapes are often inherently fragile, making the quest for the most impactful conservation approaches particularly relevant. In recent decades, conservation paradigms have moved towards more inclusive and participatory approaches to solve wicked social-ecological challenges. But these approaches are still not widely applied or their effectiveness evaluated. In two case studies from mountainous landscapes of Central and Southwest Asia, we show the impacts of community-based conservation efforts on conservation performance, including the abundance of flagship mountain ungulates (markhor, argali, urial and bezoar goat). Our results indicate substantial improvements in the abundance of target species in response to benefit-sharing, involvement in governance structure, and participatory monitoring initiatives. These results show that participatory conservation approaches are imperative in the Anthropocene, involving both instrumental and intrinsic values for nature.

9:20 | Bright spots in peatland conservation, rewetting and restoration

Renske Vroom, Michelle W.E. van Mulken, Gerald Jurasinski, Franziska Tanneberger1, Hans Joosten, John Couwenberg, Ralph J.M. Temmink
Institute of Botany and Landscape Ecology, University of Greifswald /Copernicus Institute of Sustainable Development, Utrecht University

Humans have relied on peatlands for millennia, but their exploitation through drainage-based agriculture, forestry and peat extraction has led to their widespread degradation. However, peatlands are important in addressing climate change, pollution, and biodiversity decline. To tackle these crises, humanity must, among other actions, conserve the remaining c. 431 million hectares of (near)natural peatlands and rewet all c. 57 million hectares of degraded peatlands before 2050. This may seem unattainable and may provoke frustration, despair and inaction. We explore peatland 'bright spots': positive examples of peatland conservation, rewetting and restoration worldwide to encourage and inspire peatland action. We found that common success factors are inter- and transdisciplinary collaboration, creating positive narratives, and solution-oriented approaches. We conclude that action towards sustainable peatland management has a high potential, for which the bright spots provide clear guidance.

9:40 | When is an ecosystem "restored"? New restoration approaches and brightspot Marker Wadden

Casper H.A. van Leeuwen
Department of Ecology, Radboud University

Rapid loss of pristine ecosystems across the world is leading to an increased interest in ecological restoration. However, whether we can change an ecosystem that is declared "degraded" into an ecosystem that will be considered "restored", depends on the targets of nature managers and the definition of "success" by policymakers. Restoration approaches are diverse, and can for instance involve changing abiotic conditions, reinstalling trophic interactions, or may simply be the reintroduction of one specific local target species. In this talk I will define the 10 most common

ecosystem restoration approaches, and order them along axes of human interference, ecosystem structure and ecosystem functioning. After mapping the currently existing approaches, I will introduce the special case of the large-scale restoration project "Marker Wadden" in the Netherlands. What type of restoration approach has been applied here, did this create a "brightspot", and can such an approach also be applied to other degraded ecosystems?

10:00 | Design engineering for restoration solutions: a case study in mussel reef restoration

Daniel Varley, Ralph Temmink, Oscar Franken, Anne Hendriks, Lisanne van der Vijgh, Rick Lammers, Tom van Leusden, Tom Dijkstra, Tjisse van der Heide
Royal Netherlands Institute for Sea / University of Groningen / Utrecht University / The Fieldwork Company

Ecosystem engineers play essential roles in habitat structuring. Despite this, their populations have greatly declined worldwide. Due to limited restoration success using traditional techniques, novel approaches are needed. Interest has been growing in restoration techniques that mimic self-facilitation to bypass population establishment bottlenecks in targeted ecosystem-engineering species. However, an approach for developing tailor-made species-specific techniques is lacking. In the presented study, we test a novel theoretical restoration framework based on design engineering using mussel reef restoration as a case study. We ran a series of successive field experiments in which we designed, tested and optimised structures for mussel bed restoration, yielding a solution that successfully kickstarts reef formation. The success of our design is a bright spot on how to use design engineering to restore nature. This approach can be expanded to other ecosystem engineer-dominated systems, thereby highlighting the broad applicability of the design framework for creating targeted restoration solutions.

10:20 | Towards climate-resilient forests

Sam A.F. Bielen
Netherlands Institute of Ecology / Wageningen University & Research

Global change, including drought and nitrogen deposition, is driving large-scale forest diebacks throughout Northwest Europe. In addition, nitrogen deposition leads to acidification, nutrient leaching, and the disappearance of beneficial microbial species. There is an urgent need to enhance forest resilience by planting climate-resilient trees and restoring microbial communities that can deliver ecosystem functions. We established a large-scale field experiment in 'De Hoge Veluwe National Park', by planting 43.200 saplings from six broad-leaved, climate-resilient tree species across 432 plots. We tested effects of soil transplantation and alkaline rock dust addition in a full-factorial combination for each tree species. Our results identify effective strategies to promote tree survival and growth under challenging environmental conditions. The results demonstrate that even in nutrient-poor and acidified soils, resilient, climate-adapted forests can be established. These findings provide a framework for scaling up restoration efforts across similar landscapes in Northwest Europe.

3b: The Future of Dutch Peatlands

Date and Location: Wednesday, 11 February, Water

Conveners: Simone Weidner (Louis Bolk Institute)
Sanne Bethe (Vrije Universiteit)
Janna Barel (Utrecht University)

Peatland management seeks to restore the climate mitigation function of a habitat that harbours unique biodiversity. Hydrology, soil microbial activity and vegetation dynamics are all key to functional peatlands. In this session we discuss the latest insights into the scientific underpinning of peatland conservation and restoration strategies, ranging from paludiculture, carbon management to restoration measures. Abstracts that examine the position of Dutch peatlands in an international context are also very welcome.

9:00 | Peatland conservation and restoration in a crowded country

Bjorn Robroek
Radboud University, Radboud Institute for Biological and Environmental Sciences, Department of Ecology

One of the most cost-effective manners to contribute to halt the increase in atmospheric carbon, and thus fight global warming, is to conserve and restore waterlogged and carbon-dense peatland soils. In a crowded country like the Netherlands, such conservation and restoration efforts are diverse and sometimes stacked, making it difficult to evaluate their effectiveness. While many restoration efforts focus on species reintroduction, important studies reveal that restored peatlands

often fail to return to their original ecological state. This presentation highlights key research findings on peatland restoration from an international perspective. I will conclude with a strategic roadmap for successful ecosystem recovery, emphasizing functional restoration rather than solely focusing on species return, and propose a landscape-scale approach to wetland rehabilitation.

9:20 | Environmental legacy shapes peat moss carbon uptake resilience to drought

Yvet Telgenkamp, Sasiporn Kiamontri, Stefan Weideveld, Felicia Slettenhaar, Janna Barel, Gustaf Granath, Peter Cruijssen, Enrico Dammers, Giulia Devilee, Annelies Veraart, Bjorn Robroek
Radboud University

What is the future of peatlands? Will these ecosystems remain allies in reducing atmospheric CO_2, or are they at risk of shifting into net carbon sources under climate change? The conservation and restoration of peatlands are widely promoted as effective climate-mitigation strategies, yet their capacity to withstand increasing climate extremes, such as drought, remains uncertain. The carbon sequestration function of peatlands may be challenged during drought events, but an apparent resilience would imply that this function can bend, but not break. Importantly, the effects of drought can accumulate over time, progressively altering ecosystem functioning beyond the impacts of individual events. Such a history, or drought legacy, may therefore play a key role in shaping drought resilience. Here, we tested the response to repeated drought in four pristine Scandinavian peat bogs. Our first results indicate that not successive drought, but environmental legacy shapes the carbon sequestration resilience.

9:40 | Restoration for future self-regulation: drivers of successful Sphagnum reintroduction in raised bogs

José van Paassen, Juul Limpens, Hilde Tomassen, Jelmer Nijp
Wageningen University & Research / B-WARE Research Centre / KWR Water Research Institute

To restore the self-regulating capacity of raised bogs it is essential to restore growth of hummock-forming *Sphagnum* mosses. After hydrological restoration in strongly degraded systems hummock-forming *Sphagnum* mosses scarcely establish spontaneously. We tested drivers of reintroduction success of *Sphagnum papillosum* at medium and high levels of environmental stress in four Dutch sites over seven years, focusing on drivers affecting water- and competitive stress. In medium degraded locations with stable hydrology (floating mats), reintroduction in 20x20cm sods was most effective to overcome competitive stress. Sites with high pore water CO_2 concentrations additionally showed largest growth. In high-stress locations consisting of strongly humified peat, treatments with water supply and shelter by straw mulch showed highest *Sphagnum* fragment growth. Well established hummocks showed signs of subsequently suppressing vascular plants. Large scale *Sphagnum* reintroduction efforts therefore need to be targeted based on the degree of environmental stress to limit loss of time and resources.

10:00 | Brackish water pulse drives biogeochemical responses and vitality of paludiculture plant

Sannimari Käärmelahti, Tom Heuts, Christian Fritz, Ralph J.M. Temmink, Gijs van Dijk, Eric Visser, Alfons Smolders
Radboud University Nijmegen, Department Ecology

Salinization, a growing threat driven by sea-level rise, coastal intrusion and drought, may force us to rewet with brackish water. However, its effects on biogeochemical processes and plant performance in paludiculture are unclear. This study investigates how brackish water pulse alters nutrient, pH, and iron dynamics in degraded peat, and how paludiculture plants respond. In a 10-week mesocosm experiment, we inundated degraded peat, with and without *Phragmites australis*, *Typha angustifolia* or *Typha latifolia*, with different salinities: 0, 3, 6 and 12 ppt. Porewater phosphorus and pH decreased with increasing salinity, while iron concentrations increased. *P. australis* maintained high biomass even at 12 ppt, while *T. latifolia* and *T. angustifolia* lost 69% and 83% of shoot biomass, respectively. Typha species showed reduced P and K in shoots at high salinity. These results highlight contrasting species resilience and demonstrate how salinity shapes peat biogeochemistry, informing paludiculture feasibility in an increasingly salinity-prone future.

10:20 | Mineral soil coverage and soil flipping as potential climate change mitigation measures on Dutch peatlands

Luuk Spierings, Maaike van Agtmaal, Simone Weidner, Saskia Hilgers, Joost Keuskamp
Louis Bolk Institute / University of Utrecht / Biont research

Mineral soil coverage and soil flipping are potential climate change mitigation measures for peat soils in the Netherlands, aside or in addition to raising groundwater levels. Mineral soil coverage involves the application of a sand or clay layer aimed at reducing the intrusion of oxygen and compacting the upper layer of peat soil. Soil flipping involves the inversion of relatively shallow peat soils (<1.2m),

where the mineral subsoil is swapped with the overlying peat layer to cover the peat. The goal is to place more of the peat layer under the groundwater table, whereby rewetting it. As part of the VIPNL program, these measures have been investigated through field trials and demonstration plots. A range of parameters are (currently) being measured over a 4-year period including peat oxidation processes, soil quality, soil hydrology, agricultural usage and productivity. Here, we will look into the results of the first three years of this research.

3c: Migration Ecology

Date and Location: Wednesday, 11 February, Fire 1

Conveners: Thomas K. Lameris (University of Groningen)
Andrea Kölzsch (Radboud University)

Migratory animals undertake longer or shorter seasonal travels in search of better conditions for reproduction and survival. We will focus on studies that explore the ecological factors shaping migratory movement (incl. physiology and environmental impacts), as well as how migratory species influence ecological processes and biodiversity across different regions. The aim is to show general as well as species specific patterns and processes and set them into relation.

9:00 | The paradoxical heavy reliance on irregularly used sites in the life-cycle networks of long-distance migratory shorebirds

Roeland A. Bom
NIOZ Royal Netherlands Institute for Sea Research /Centre for Global Ecological Change at the Faculties of Science & Engineering and Campus Fryslân, University of Groningen

Migratory birds rely on a network of sites to complete their annual cycle. Key sites have always been designated based on numbers. By considering the functional role of sites chosen by tagged birds, we evaluate whether the classic approach provides full life-cycle protection. Using multi-year tracks of bar-tailed godwits and whimbrel we classified sites as wintering, fuelling, stopping, or breeding. We further identified irregularly used sites and sites where timing matters most. In both species, across networks of over 100 sites, individuals used approximately ten sites per year. Networks were dominated by irregularly used sites, which were mostly found in temperate and (sub)Arctic regions. Godwits stopped at these sites after experiencing adverse wind conditions, suggesting they act as emergency stopping sites. Both species stopped at irregularly used (sub)Arctic sites when approaching snow cover, likely to wait for better conditions. Many irregularly used sites are not designated as Important Bird Areas.

9:20 | Earlier departure is linked to milder winders and higher early spring body mass in a long-distance migratory goose facing Arctic warming

Jan Geisler, Eldar Rakhimberdiev, Michiel Boom, Barwolt Ebbinge, Gerhard Müskens, Preben Clausen, Bart Nolet
Netherlands Institute of Ecology / Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam, Amsterdam / Sovon Dutch Centre for Field Ornithology / Wageningen Environmental Research, Wageningen University & Research / Aarhus University

Migratory birds should adjust the timing of spring migration to keep pace with an advancing Arctic spring and its shifting nutrient peak. Many species now reach their Arctic breeding grounds earlier by departing earlier from non–breeding sites or by migrating faster, both strategies with a bearing on the accumulation of energy stores (fuelling). For dark–bellied brent geese, however, the scope to travel faster is limited: their 5,000 km spring migration is among the fastest of Arctic migrants. Earlier departure to their Siberian breeding grounds would therefore require fuelling adjustments, either through faster fuelling at spring staging sites or through adjustments elsewhere in the annual cycle. Here, we show that in order to depart earlier to their breeding grounds, brent geese already arrive heavier at their key spring staging site from their wintering grounds, and that this shift is associated with milder winters as well as other factors changing over time. We combined over five decades of body measurements from individuals caught in the Dutch Wadden Sea to reconstruct changes in long–term fuelling trajectories with migration counts from the Netherlands and Denmark to estimate the population's spring staging phenology over the past 21 – 49 years. We found that brent geese have not shifted their arrivals in the Wadden Sea, but have advanced the timing of departure from this key staging site. Furthermore, we found that after milder winters, brent geese arrived heavier in the Wadden Sea, and that their mean body mass additionally increased over time, while fuelling rates in the Wadden Sea did not change. Higher body mass in early spring, facilitated by warmer winters at temperate non–breeding grounds, potentially broadens the scope for Arctic migrants to align arrival and breeding with advancing Arctic springs.

9:40 | Young birds drive range shift despite cultural inheritance of parental sites

Hans Linssen, E. Emiel van Loon, Judy Shamoun-Baranes, Götz Eichhorn, Sabine Urban & Bart Nolet
University of Amsterdam

Cultural inheritance of movement patterns, through social learning from older generations, occurs across the animal kingdom. At the same time, many populations are shifting their range in response to environmental change. How cultural inheritance drives or constrains these shifts remains unclear. We investigate this by quantifying wintering site fidelity across age groups in the Bewick's swan, a family-living migratory waterbird whose wintering range is rapidly shifting under a warming climate. By linking age-specific site fidelity to interannual displacement, we assess how cultural inheritance of wintering sites and age-related spatial variability interact. Young birds showed fidelity to their parental wintering sites during their second and third winters, indicating some degree of cultural inheritance of space use. At the same time, those birds up to their third winter displayed considerably more year-to-year variability than adults and, as a result, were primarily responsible for driving the ongoing range shift observed across the population. Our study demonstrates how innovation by young individuals can interact with cultural inheritance in wintering site choice, advancing our understanding of population responses to climate change.

10:00 | Directional patterns of nocturnal bird migration over the Netherlands: Insights from combining bird radars

Bart Kranstauber, Hans van Gasteren, Bart Hoekstra, Maja Bradarić, Johannes De Groeve, Jens van Erp, and Judy Shamoun-Baranes
Institute for Biodiversity and Ecosystem Dynamics (IBED), University of Amsterdam, Amsterdam

Research of population-wide bird migration has mostly focused on abundance and altitude patterns. However, insights into velocities and directional patterns, and how they vary spatiotemporally, can further improve conservation efforts and reduce aerial human-wildlife conflicts. This study examines migration directions on a landscape scale using a dense network of onshore and offshore bird tracking radars and a weather radar in the Netherlands. We compare directional changes between radars located inland and at sea to uncover differences in migration behaviours.

Using three years of nocturnal data across both migration seasons derived from twelve radars, we find that inland radars exhibit the highest similarity, including a strong correspondence with the regional patterns observed by a weather radar, despite the fact they record migration at different altitudes. Radars offshore are more variable, their migration directions change more during the night, and seasonal migration directions are not directly opposite. During the night, there is general shift of migration directions towards the east in both spring and fall.
These results suggest that coastal regions, which can act as ecological barriers, experience more variable migration patterns with greater local variation, while inland migration is more uniform. Understanding these differences is important for optimizing local conservation measures, highlighting where and when tailored conservation efforts are most desirable.

10:20 | Linking Winter Habitat Use and Environmental Cue Connectivity to Spring Departure in European and East Asian Migratory Geese

Eun-Jeong Kim, Andrea Kölzsch, Yali Si, Thomas Lameris
University of Groningen / Seoul National University / Radboud University / Leiden University

Departure timing is a pivotal decision that shapes the migration schedule and ultimately the breeding success of long-distance migratory geese. Although many studies have examined environmental cues influencing arrival at staging or breeding sites, far less is known about the factors governing departure timing at wintering sites, the initiation of spring migration. European and East Asian populations of Arctic-breeding geese differ markedly in habitat use, migration structure, and landscape connectivity, suggesting that the relative importance of phenological and resource-based cues may vary across regions. Using GPS tracking data collected between 2014 and 2023 from Greater White-fronted (*Anser albifrons albifrons*) and Tundra Bean Geese (*Anser fabalis*), we quantified habitat use at wintering sites and at the first major stopover, and evaluated how environmental cue connectivity between these sites shapes departure decisions. We found clear flyway-specific differences: East Asian geese predominantly foraged in croplands (rice paddies) at both wintering and stopover sites, whereas European geese relied mainly on grasslands. We further analyse how these contrasting habitat-use patterns correspond to different environmental cues triggering spring migration. By comparing the two flyways, our study clarifies how variation in habitat dependence and migratory constraints structures departure cues, offering insights for habitat management and the mitigation of agricultural conflicts.

3d: AI for ecology: challenges and opportunities

Date and Location: Wednesday, 11 February, Rooms 2 & 3

Conveners: Thijs van der Plas (Wageningen University & Research)
Haidi Abdullah (University of Twente)
Parinaz Rashidi (University of Amsterdam)
Maaike van der Zanden (Netherlands Institute of Ecology)
Jorn Knuit (Utrecht University)
Julia Mayr (Utrecht University)

Recent advances in Artificial Intelligence (AI) have contributed to much progress in the collection and analysis of complex ecological data (e.g., bio-acoustics, camera traps, eDNA, remote sensing). Yet these advances surface fresh challenges: data privacy, handling data bias, model interpretability and the environmental impact of large models. Here, we welcome contributions on all applications and critical reflections of AI in ecology, including big data, computer vision, ethics, generative AI, machine learning and multimodal AI.

9:00 | Scientific Machine Learning: Bridging data-driven and mechanistic approaches in ecology

Jens van der Zee
Wageningen University & Research

Scientific machine learning (SciML) combines traditional ecological models with modern machine learning tools to improve predictions while maintaining biological realism. Unlike purely data-driven methods, SciML employs ecological theory to ensure predictions follow known biological and physical principles. This approach addresses common challenges surrounding the use of machine learning in ecology such as sparse, noisy observations of complex dynamics, as well as a lack of interpretability. We demonstrate a use case of that combines a mechanistic model of dryland vegetation with satellite observations from the West Sahel. Using optimization tools originally developed to train neural networks, we estimate key ecological parameters of the vegetation model from a time-series of vegetation satellite images. Our physics-based approach outperforms purely data-driven neural networks when predicting vegetation dynamics under new rainfall conditions, successfully capturing the characteristic Turing patterns that emerge in water-limited ecosystems.

9:20 | AI for FAIR data: automating maturity assessment in ecosystem research

Parinaz Rashidi, Daniel Kissling
Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam

The FAIR principles guide research data management, yet existing assessment models are slow, expert-dependent, and difficult to scale. LTER-LIFE, a developing research infrastructure for building ecosystem digital twins, requires findable, accessible, interoperable and reusable (FAIR) data, models and tools. To support this need, we designed and evaluated a lightweight, community-driven, automated FAIR maturity assessment workflow tailored to ecological and environmental data. The community first selected and prioritized a focused subset of FAIR indicators most relevant to LTER-LIFE, ensuring that assessments align with project priorities rather than generic checklists. We then developed a Large Language Model (LLM)-based workflow to automatically evaluate these indicators using available metadata, documentation, and repository information. Guided by structured prompts and simple post-processing rules, the LLM produces transparent, explainable maturity assessments. Applied to LTER-LIFE datasets, the workflow reduced manual effort, increased consistency, and enhanced feasibility and scalability of FAIR maturity assessments for ecosystem digital twins.

9:40 | AI-driven workflow of image-based assessment of insect temporal activity under different light conditions

Gabriel Charvalakis, Hannah Broeckx, Sander Buddendorf, Jona van Delft, Emily Burdfield Steel, Roelof Hut & Kamiel Spoelstra
Netherlands Institute of Ecology / University of Groningen / University of Amsterdam

Insect populations are in global decline, underscoring a growing need for cost-efficient, accessible and repeatable methods to continuously assess insect densities for extended periods of time. Computer vision and neural network models allow for automated monitoring, but current approaches often emphasize taxon identification while overlooking temporal activity precision or precision under variable light conditions. We present a validated workflow for quantifying nocturnal insect activity using low-cost infrared camera traps and an open-source deep learning framework. An object detection model was trained on images taken from traps placed at seven rural sites in the Netherlands. The model was then applied on images from traps placed in six urban sites in the

Netherland in order to extract individual insect arrival time scores. The urban insect arrival times were also manually scored to validate model performance. This validation included arrivals under darkness using an infrared light source, as well as low- and high-intensity visible light, enabling the assessment of illumination effects on model performance. We show that performance varies with low and high light intensities producing more reliable results than darkness where accuracy declined. In addition, the alignment of automated and manual arrival time scores was low at 5-minute intervals but improved substantially when arrivals were aggregated at an hourly or higher temporal resolution. These results show that a reliable and cost-efficient workflow for automating insect activity monitoring can be achieved under different conditions of visible light and at different temporal scales, though with limited taxonomic detail.

10:00 | Image-based deep learning detection of feeding buzzes and social calls in bats

Sander Buddendorf & Kamiel Spoelstra
Netherlands Institute of Ecology / University of Groningen

Acoustic recording is widely used in bat research and monitoring, making automated identification essential. Species classifiers often analyse single echolocation pulses and therefore perform poorly on behaviourally relevant pulse sequences. Here, we present an open-source tool for detecting feeding buzzes and social calls using a spectrogram-based object detection approach, allowing for simultaneous assessment all the whole pulse sequence. Training and testing data was sampled from three large datasets of bat recordings, recorded on different detectors and in urban and rural environments. The tool converts audio to spectrograms at a fixed time and frequency resolution, after which an object detection model detects and localises feeding buzzes or social calls. During training of the model, we expanded the training dataset in three iterations until performance gains levelled off. The final model version is trained on 2381 feeding buzzes, 2857 social calls, and 2442 other (mostly insect (Orthoptera) calls). Model performance was tested using 1500 manually annotated five-second recordings. Our tool achieved a mAP (mean average precision) of 0.908 and a maximum F1-score of 0.865 and 0.905 for detecting and assessing the timing of feeding buzzes and social calls, respectively. Comparison with two open-source feeding buzz detectors was done at the recording level, as they do not provide accurate call timing. No comparable tools exist for social call detection. Our tool outperformed both while keeping runtime comparable, achieving an F1-score of 0.862 (vs. 0.286 and 0.583), correctly identifying 122 files with a feeding buzz (vs. 43 and 74) and producing only 22 false positives (vs. 110 and 32). Improved assessment of foraging and social behaviours in bats is of great importance for ecological research and conservation efforts. The tool offers out-of-the-box classification, while allowing for expansion of the training dataset, for example, to classify species-specific social behaviour.

10:20 | Explainable AI for species distribution modelling

Thijs van der Plas
Wageningen University & Research

Species distribution models (SDMs) are key tools in ecology that predict species distributions from geospatial variables. SDMs are used both to create species distribution maps, but also to understand the ecological drivers that influence occupancy. SDMs can use both simple statistical methods (like regression) and complex machine learning methods (deep neural networks). Traditionally, this choice of method presented a trade-off between predictive performance and model interpretability, and given the importance of interpretability for understanding ecological drivers, this has limited the uptake of 'black-box' machine learning methods. Here, we will explore the use of explainable AI methods, which aim to pinpoint the drivers behind neural network predictions, for SDMs. We will review existing work on attribution-based explainable AI for SDMs, and present our current research on concept-based explainable AI for SDMs using vision-language models. We will highlight the opportunities that explainable AI methods can provide for SDMs, as well as remaining challenges and barriers to implementation.

Parallel Session 4

4a: Animal Resource Use

Date and Location: Wednesday, 11 February, Earth

Conveners: Emma Penning (Netherlands Institute for Sea Research)
Evy Gobbens (Wageningen University & Research)

Understanding animal resource use is central to ecology and conservation, yet measuring diet and foraging across time and space remains difficult. We invite speakers to discuss tools for studying animal diets and to highlight how integration of these techniques reveals not only what is eaten by animals but also how diets shift across landscapes and seasons. Case studies across taxa and ecosystems are presented to show how understanding of ecological interactions is informed by animal resource use.

14:00 | Shared traits of herbivores and carnivores tracking resources

Thomas Lameris, Lydia Cornu, Francisca Araujo Virtuoso, Solange Nunes, Janneke Troost, Frank van Langevelde
University of Groningen / Wageningen University

Animal migration is considered to have evolved as an adaptation to make use of seasonal variation in resources along spatial gradients. Many herbivores travel in accordance to the seasonal peak in forage plant nutritional value, following a so-called 'green wave' of plant growth in early spring. Also carnivores can couple their movements to track or intercept migratory prey. However, it has been suggested that not all migratory animals follow such resource tracking strategies during migration, raising the question whether there are certain species traits linked to resource tracking strategies. We conducted systematic reviews to study which traits can explain (1) a green-wave tracking strategy in terrestrial migratory herbivores and (2) a migratory coupling strategy (i.e. where predators move out of their home ranges to feed on migrant prey) in carnivorous terrestrial mammals. We found that a broad range of herbivores track a green wave during migration, including both grazing and browsing ungulates, and those species generally had a higher body mass compared to non-migratory ungulates (which did not track green waves). While not all migratory waterfowl tracked green waves, species that did not track green waves would track other resources during migration. In the case of carnivores, neither migratory coupling nor diet switching in migratory environments has been studied for a third of the large carnivore species. For those that have been studied, the majority switch diet as a response to migratory prey fluctuation. A small proportion of large carnivores that have been reported to couple migration with their prey are usually specialist obligate carnivores that are larger-bodied. However, given the bias in the number of studies towards more iconic species, the negative results for smaller large carnivores could either present evidence of absence of these behaviours, or absence of evidence.

14:20 | Behavioural responses of a mud-dwelling clam to sediment coarsening and heatwaves

Tjitse Kooistra, Tjeerd Bouma, Stuart Pearson, Karline Soetaert, Rob Witbaard
Royal Netherlands Institute for Sea Research / Delft University of Technology / Utrecht University

With global warming, heatwaves are increasing in frequency and intensity. Additionally, coastal sediments are in many places foreseen to coarsen under sea level rise. These changes combined pose cumulative stress on organisms inhabiting the seafloor. We tested the heatwave tolerance of a mud-dwelling bivalve (*Scrobicularia plana*) in different sediment-feeding treatments. A sandy sediment resulted in a high mortality, regardless of feeding level or heatwave exposure. A sandy substrate lowered the clams' reburial rate and affected valve gaping. Heatwave exposure resulted in less valve closure. The results indicate that sediment coarsening can affect the habitat suitability of this species, even when food supply remains the same. The species was relatively resilient to the tested level of heat exposure. Nevertheless, the lowered mobility in a sandy sediment can lower its behavioural adaptation capacity to heat, and additionally affect its ecological performance, as this trait determines its role as bioturbator.

14:40 | Small prey, big impact: insects and godwit chicks in Frisian dairy grasslands

Michella Ligtelijn, Matty Berg, D.D. Georgette Lagendijk, Theunis Piersma, Ruth Howison
University of Groningen / Vrije Universiteit / Royal Netherlands Institute for Sea Research / University of Groningen

Both insects and godwits have shown long-term declines, raising concerns about the relationship between insects and godwits, which depend on them as prey. To better understand this link, we

monitored above-ground insect populations in Dutch dairy grasslands over three years (2021-2023). During the godwit breeding season (May and June), sticky traps were deployed to capture insects and record their presence. Digital AI techniques were used to count specimens, estimate their size, and classify them to the lowest possible taxonomic level, providing detailed information on potential prey availability. Preliminary results show variation in both the timing and height of insect abundance peaks, differing across years. Interestingly, different patterns are seen when focusing on size classes and the biomass of the insects. These findings suggest that potential food availability for godwit chicks is not constant, but fluctuates over time, which may lead to mismatches between prey presence and chick presence. By examining insect phenology through both abundance and biomass, this study provides new insight into current prey dynamics in dairy grassland landscapes and their potential implications for godwit conservation.

15:00 | The diet of free-roaming domestic cats in open habitats using eDNA metabarcoding

Esther Swankhuisen, Gerrit Potkamp, Yvonne Verkuil, Christiaan Both, Christian Smit
University of Groningen / Cal Poly Humboldt

Free-roaming domestic cats (Felis catus) are among the world's most invasive predators, yet their impact on European biodiversity remains understudied. Using environmental DNA (eDNA) metabarcoding, we assessed the diet of free-roaming cats in Dutch open habitats, where birds and mammals have declined over decades. Cats primarily preyed on small mammals, with bird predation increasing in spring and summer, likely due to breeding. Endangered species such as Meadow Pipit (*Anthus pratensis*) and Northern Shoveler (*Spatula clypeata*) were detected, suggesting potential population impacts. On the mainland, about 25% of the diet consisted of cat food, compared to 5% on islands, where cats relied more on wild prey and showed a broader bird diet. These findings provide new insights into the impact of free-roaming cats in open habitats and highlight the need for management measures, such as restricting outdoor access during breeding periods, to reduce their impact on vulnerable bird and mammal populations.

4b: The Transformative - Transdisciplinary Ecologist

Date and Location: Wednesday, 11 February, Water

Conveners: Guusje Johanna Koorneef (Netherlands Institute of Ecology)
Wietse Wiersma (Wageningen University & Research)
Giulia Bongiorno (Wageningen University & Research)

Transformative or transdisciplinary science has the potential to develop affective and effective solutions to society's wicked problems. We welcome all ecologists practicing or interested in this novel and rapidly growing research field to share their experiences, insights and challenges. Examples of contributions include practical and theoretical projects exploring original ways to engage with diverse stakeholders, or innovative methods to co-create and communicate ecological knowledge. The session provides a platform to collectively discuss best practices.

14:00 | Lessons learned from a transdisciplinary Living Lab

Rosa W.C. Boone, R.J.G. van den Born, C. Smit, H. de Kroon, B.J.M. Robroek, W. H. van der Putten, Huub Ploegmakers, M.P. Berg
Vrije Universiteit Amsterdam | Radboud University

Biodiversity decline in agricultural landscapes represents a wicked problem: complex, dynamic, and deeply interwoven across ecological, economic and social disciplines). Addressing such challenges requires bridging disciplinary boundaries and engaging diverse actors to co-develop solutions. While interdisciplinary research integrates multiple scientific perspectives to tackle issues beyond the scope of a single field, transdisciplinary research extends this approach by actively involving stakeholders throughout the research process. Despite widespread recognition of the need for socio-ecological and economic integration, empirical examples of effective inter- and transdisciplinary collaboration remain limited. Persistent obstacles (including differing methodologies, and communication barriers), continue to hinder collaborative progress.
Over the past four years, the Living Lab Ooijpolder in Nijmegen (The Netherlands) brought together researchers, policy actors, and farmers to jointly explore pathways for biodiversity recovery from ecological, socio-economic, and socio-historical perspectives. Within the ecological work, we examined how landscape elements shape insect communities and how agricultural management influences belowground biodiversity. Alongside these scientific activities, we co-developed practical field experiments with farmers to foster mutual learning and exchange. This experience demonstrated how transdisciplinary research can enrich PhD projects, while also revealing persistent

challenges such as mismatched expectations, methodological differences, and communication hurdles. Insights from this project are now being applied in the Curvebend-project, which extends a similar collaborative framework across multiple regions. In this talk, we will reflect on the process of doing inter- and transdisciplinary research from the perspective of an early-career researcher, discuss strategies used to address barriers encountered in earlier work, and present practical tools that can help strengthen collaboration between scientific and societal partners.

14:20 | Bending the Curve: Engaging Communities in a Biodiversity Challenge

Mieke de Wit, Liesje Mommer, Casper Quist
Wageningen University & Research

Biodiversity is declining globally due to human activities. To bend the curve of biodiversity loss we urgently need to transition to sustainable food production and consumption, next to enhancing efforts for nature conservation and restoration. While this transition requires significant societal changes, a large part of society is becoming increasingly disconnected from nature, especially in urbanized areas. With the Biodiversity Challenge we have developed an event that includes Wageningen University & Research, the municipality, local nature organizations and primary schools. The Biodiversity Challenge connects university staff and students, school children, and citizens with nature and each other. Participants record their nature observations in a BioBlitz, and experts share their knowledge through demonstrations and nature excursions, combining citizen science and outreach in one event. In a few years, the Biodiversity Challenge has grown from a small campus event with fifty students and staff to a joint event with European life science universities and their communities from Iceland to Portugal, mobilizing thousands of participants. In this presentation we will share lessons learned and transferable success factors of the Biodiversity Challenge, and invite you to join us in the 2026 edition to generate positive energy and engagement around one of the most urgent societal problems.

14:40 | Beavers in Your Backyard: Social-Ecological Dynamics of Beavers in Anthropogenic Landscapes

Britt van Zelst, Koen Arts, Sven Teurlincx
Wageningen University & Research; Netherlands Institute of Ecology

Beavers were reintroduced to the Netherlands in 1988, and their population has been expanding ever since. As natural habitats reach carrying capacity, beavers increasingly settle in agricultural and even urban areas. In these anthropogenic environments, conditions are highly regulated and closely tied to human interests, leading to human-wildlife conflicts. At the same time, proximity between humans and beavers can foster direct encounters that enrich the experiences of people's living environment. We study how residents of an urbanized neighbourhood perceive the presence, benefits, and challenges of a recently established beaver family. Combining social-scientific methods with ecological insights, our findings show that the blessings and burdens of beavers are perceived differently across resident groups. These differing views require a combination of management strategies to foster sustainable coexistence. Our transdisciplinary approach links public perceptions to concrete management actions, identifying transformation pathways toward future coexistence as human and beaver lives increasingly overlap.

15:00 | NWA-ORC Living Lab VeenVitaal: Towards sustainable and dynamic (agro-ecological) peat meadows for biodiversity, farmers, nature manager, policy administrator, bank and citizen

Matty P. Berg, Mark Koetse, Bep Schrameijer, Lianne Woudstra, Sanne Bethe1 Jorn van Elden, James Weedon, Mariet Hefting, Francesca Morcelli, VeenVitaal partners
Institute for Life and Environment, section Ecology and Evolution and section Ecosystems Ecology, Vrije Universiteit Amsterdam

In peat meadows societal problems culminate. Intensive agricultural results in biodiversity loss, soil subsidence, greenhouse gas emissions, and low water quality. Sustainable grassland-use is only possible through a shift from peat degradation (input-driven) to conservation (ecosystem-driven) management. This transition is a daunting task as it requires understanding of the complex system of soil structure and chemistry, water, soil life, socio-economic drivers for land owners and the impact of governmental rules and regulations.
The VeenVitaal Living-lab, a transdisciplinary collaboration between scientists, species protection organizations, nature managers, farmers, administrators, waterboards, banks and other stakeholders in the Amsterdam region, investigates (via co-creation and co-design of system knowledge) which landscape interventions are required to refine measures for function maintenance or to implement measures for function change. We examine how restoration contributes to strengthening ecosystem services, which are translated into profitable socio-economic business

models for farmers, tailored to their operations and offering them long-term action perspectives for making land use more sustainable and inspiring for citizens.

15:20 | Design for ecology
Mariet Sauerwein, Ralph Temmink, Tjisse van der Heide
Royal Netherlands Institute for Sea Research

Healthy ecosystems provide vital ecological functions and ecosystem services, such as biodiversity and heat reduction. However, the rise of the industrial revolution dramatically amplified human impact and caused massive ecosystem losses. To alter this, interest in ecological restoration has recently increased. However, restoration attempts are often failure-prone and very costly.
We therefore propose a new interdisciplinary research field – Design for Ecology – which aims to find solutions that are functional and desirable for rebuilding ecosystems. Design for Ecology is a field that unifies design and ecology by integrating ecological principles into design approaches. Design can provide a structured, iterative and creative approach to complex nature restoration problems. Based on the design approach, we developed a framework that aims to empower the actual implementation and to support practical execution. With this, we aim to design product solutions that include the need of communities of species that also benefit human societies.

4c: Animal Movement Ecology

Date and Location: Wednesday, 11 February, Rooms Fire 1

Conveners: Bart Nolet (Netherlands Institute of Ecology)
Emiel van Loon (University of Amsterdam)
Bart Kranstauber (University of Amsterdam)

Movement is a characteristic trait of animals that is acting at very different scales, from short local foraging trips to long-distance migration and dispersal. Rapid developments in tracking and remote sensing technology allow researchers to monitor animals and their movement at the individual and population level in unprecedented detail. In this session, we welcome submissions at all scales and across taxa, with a special emphasis on diverse and new techniques for observation and analysis.

14:00 | Disentangling offshore wind farm avoidance from fishery attraction using Step Selection Analysis in GPS-tracked Lesser Black-backed Gulls
Rosemarie Kentie, Rob van Bemmelen, Judy Shamoun-Baranes, Eric Stienen, Ruben Fijn
Royal Netherlands Institute for Sea Research

Offshore wind farms are expanding rapidly, yet their impacts on seabirds remain poorly understood. Some species avoid wind farms while others are attracted to them, with both responses potentially causing habitat displacement or collision mortality. For discard-feeding species, apparent avoidance may actually reflect attraction to fishing vessels excluded from wind farm areas rather than true avoidance. We GPS-tracked 58 Lesser Black-backed Gulls (*Larus fuscus*) from a breeding colony to quantify responses to both offshore wind farms and fishing activity. Using a Step Selection Analysis with individuals as random effects, we tested whether wind farm selection varied with fishing pressure by comparing weekdays (high fishing activity) versus weekends (75% lower activity) across pre-breeding, breeding, and post-breeding periods. At the population level, gulls were 1.8 times more likely to avoid wind farms and 1.5 times more likely to select areas with fishing activity. However, individual variation was substantial: some males were attracted to wind farms during breeding and post-breeding periods, with the greatest individual heterogeneity occurring during breeding. Critically, despite four-fold lower weekend fishing intensity, we found no difference in wind farm avoidance between weekdays and weekends, indicating that avoidance is not driven by fishing exclusion within wind farms. This study showcases how integrating individual-level movement models with natural temporal experiments can distinguish between correlated habitat features. The method is broadly applicable to movement ecology questions where multiple environmental drivers covary in space, and highlights the importance of accounting for individual behavioural variation in population-level inference.

14:20 | First long-distance tracking of adult allis shad (Alosa alosa) with acoustic telemetry
Rob Kroes, Pieterjan Verhelst, Jacco van Rijssel, Melanie Meijer Zu Schlochtern, Thomas Weisbeek, Sven Bouwman, Stefan Oskam, Tim Vriese, Emiel van Loon, Piet Verdonschot, Harm van der Geest
University of Amsterdam

Allis shad (*Alosa alosa*) is an anadromous, semelparous fish species that disappeared from many European rivers in the first half of the 20th century due to overfishing and anthropogenically induced changes. A recent reintroduction program in the River Rhine has led to increasing observations of upstream-migrating adults in Germany and the Netherlands. As allis shad has never been tracked between the sea and rivers, their timing of river entry, migration routes, and migration speeds remain unknown.
To gain insight into these factors underlying reproductive success, we tagged 16 adult allis shad with acoustic transmitters at the seaside of the Haringvliet sluices. We developed new capture and surgical procedures to minimize handling effects on the fish. Tagged individuals were tracked using a dense existing network of acoustic receivers in the sea and the estuary of the river Rhine and river Meuse. In addition, a new receiver network was established in the Rhine at the German border. Detection data showed that at least 12 allis shad entered the river system, and at least three individuals reached the German border via the Rhine at high swimming speeds. Individuals that entered the river Meuse stopped and returned at the first barrier.
The novel insights from this study further demonstrate the critical importance of maintaining open connections between rivers and the sea and advocate for stronger international collaboration in the monitoring of migratory fish.

14:40 | Fine-Scale Movement of an Elusive Carnivore Revealed by Automated Radio Tracking

Pieter Otte, Jasja Dekker, Tim Hofmeester, Iris Kromhout Van Der Meer, Bob Jonge Poerink, Christian Smit
University of Groningen

In recent decades, advances in tracking technology have provided ecologists with detailed insights into carnivore movement using GPS devices. However, such devices are often too heavy for small carnivores like weasels *Mustela nivalis* and stoats *Mustela erminea*, leaving this group understudied. Traditional studies on small mustelids have relied on manual radio tracking, which is labour-intensive and yields low-resolution data. As a solution, newly developed automated radio tracking systems (ARTS) offer a promising alternative, enabling continuous, fine-scale monitoring of small mammals. Here, we present the first results on stoat movement derived from ARTS deployed in an extensive agricultural landscape in autumn 2025. During this talk, we will highlight three tracked individuals and the first results of their home range size and movement patterns. This study demonstrates the potential of ARTS for revealing the spatial ecology of elusive small carnivores and highlights its value as an efficient tool for future ecological and conservation research.

15:00 | Functional trait similarity predicts fine-scale space-use overlap in a diverse shorebird community

Johannes Krietsch, Evy Gobbens, Allert Bijleveld
Royal Netherlands Institute for Sea Research

Species can coexist by partitioning resources across space and time, reducing direct competition. On intertidal mudflats, where multiple shorebird species forage side by side on benthic invertebrates, functional traits shape how individuals can access and exploit prey species. Morphological traits - such as bill length, leg length, and body mass - influence probing depth, wading depth, and energetic needs, respectively. However, it remains unclear whether morphological similarity among these species leads to greater spatial overlap or promotes habitat segregation to reduce competition. We used high-resolution movement data from 234 individuals of eight shorebird species tracked simultaneously with the WATLAS system in the Dutch Wadden Sea, to analyse overlap in space use and linked this to their morphological similarity. We show that morphologically similar species, that are able to exploit the same or similar prey species, also show greater overlap in space-use on the mudflats. This finding suggests that morphological similarity partially reflect shared habitat preferences that draw species to the same areas, rather than promoting spatial segregation to reduce competition. In highly productive ecosystems like the Wadden Sea, abundant prey may buffer competitive pressures, allowing communities to be shaped largely by bottom-up processes. Nevertheless, fine-scale habitat partitioning or prey specialization may still facilitate coexistence within these shared foraging spaces.

15:20 | The impact of vehicle-based wildlife tourism on carnivore space use and movement

Merel Hilderink, Femke Broekhuis, Henjo de Knegt
Wageningen University & Research

Wildlife tourism is one of the fastest-growing industries worldwide, and a continuously increasing demand is augmenting pressure on the wildlife and ecosystems involved. Wildlife tourism can affect stress levels, foraging behaviour, and reproduction in many species, but impacts on animal space-

use and movement remain understudied. To understand the effect of vehicle-based tourism on carnivore movement, we used GPS data from six collared cheetahs (*Acinonyx jubatus*) in Kenya's Maasai Mara, a premier wildlife destination. We applied step selection functions and hidden Markov models to investigate the impact of predicted tourist densities on cheetah habitat selection and switching probabilities between movement states. Preliminary results indicate that cheetahs avoided high tourist-density areas in certain habitats and were more likely to switch to, and stay in, fast movement states under such conditions, suggesting disturbance from vehicle-based tourism. We recommend stricter enforcement of vehicle regulations and maintenance of habitat heterogeneity to reduce negative impacts on carnivore behaviour and conservation outcomes.

4d: Advances in belowground ecology under global change

Date and Location: Wednesday, 11 February, Rooms 2 & 3

Conveners: Justus Hennecke (Wageningen University & Research)
Leonardo Bassi (Netherlands Institute for Sea Research)
Alya Kingsland-Mengi (Utrecht University)
Yuheng Chen (Utrecht University)

Global change is threatening both above- and belowground communities. This session shines light on the "hidden world" belowground, where roots and soil processes shape plant performance, community dynamics, and interactions across trophic levels. We welcome contributions on root trait variation and syndromes, plant-soil interactions, belowground biodiversity-ecosystem function (BEF) relationship, and other belowground processes under global change, that aim to deepen our understanding of the world beneath our feet.

14:00 | Diversity–productivity relationships in ericaceous plants are influenced by interactions with ericoid mycorrhizal fungi

Camille S. Delavaux
Netherlands Institute for Sea Research

The positive effect of plant diversity on ecosystem productivity is among the most widespread trends in ecology. Although most plant species require mutualistic mycorrhizal fungi, previous studies have not examined the effects of mycorrhizal diversity on these effects. Here, we use a mesocosm experimental system to manipulate ericoid mycorrhizal and plant diversity to assess their influence plant productivity. We find support for the positive effect of plant diversity on productivity, particularly at higher levels of fungal diversity. Within plant monocultures, we found higher fungal diversity reduced plant productivity, consistent with symbiont antagonism limiting production. Moreover, we found that plant species vary in their response to changing plant and fungal diversity, though results generally follow community patterns. These results suggest that plant productivity relationships within the ericoid mycorrhizal system are impacted by both plant and fungal diversity, with implications for the use of ericoid mycorrhizal fungi in both agriculture and restoration

14:20 | The Rhizosphere connection – how changes in root traits and exudation in response to insect-based fertilizer could explain crop species differences in N uptake and rhizosphere activity

Lee Harris Frank
Wageningen University & Research

Root exudates are a primary pathway through which plants can recruit and interact with microbial communities surrounding their roots. Yet little is known about how the rate at which differing quantities and compositions of root exudates connect to the microbially driven nutrient cycling in the rhizosphere. This is particularly relevant in crop species in interaction with novel organic fertilizers when aiming for increased nitrogen use efficiency. To fill this gap, we conducted a greenhouse experiment with 20 crops grown in field soil without and with "flytilizer" (insect-based fertilizer). After 7 weeks, we measured a variety of root traits, root exudation, as well as 5 enzymes and microbial biomass in the rhizosphere. We expect that root exudation will be correlated to rhizosphere activity and strategies where plants grow quickly. Preliminary analysis indicate species differ in their response to flytilizer, either increasing or decreasing root exudation with possible implications for rhizosphere activity

14:40 | Restoring organic carbon in agricultural soils: long-term management and sporadic organic inputs

Giulia Vultaggio
Wageningen University & Research

oil organic carbon (SOC) is critical for maintaining primary production and mitigating climate change, yet SOC dynamics depend on its composition. Particulate organic matter (POM) is relatively fast-cycling, whereas mineral-associated organic matter (MAOM) is a more stable pool supporting longer-term carbon storage. SOC distribution between these pools is mediated by soil microbes, which both decompose organic inputs and contribute to SOC storage through their necromass. With agricultural intensification causing substantial carbon losses, it is urgent to find agricultural practices that maintain and promote POM and MAOM. Strategies promoting SOC storage include long term farming management such as organic farming and targeted practices like the sporadic application of organic inputs, in the form of amendments or cover crops. Through the addition of organic inputs, both organic farming and such targeted practices can stimulate microbial activity and enhance necromass production, likely promoting SOC storage. However, the long-term effect of farming management and the legacy effects of sporadic organic inputs on SOC dynamics and microbial processes are still unclear.
To investigate SOC dynamics, soil samples were collected from a long-term field experiment testing the sporadic application of different organic inputs (compost, chitin, and two cover crops) within organic and conventional management. We analysed SOC stocks and pools alongside microbial pools (PLFA and necromass) and processes (enzyme activity and substrate induced respiration) to understand how microbial characteristics relate to carbon cycling in response to management. We show how long-term agricultural management plays a key role in determining SOC storage whereas the legacy effects of sporadic organic inputs have already disappeared after seven years.

15:00 | Cattle grazing override engineering effect of *Lasius flavus* on the salt marsh ecosystem of Schiermonnikoog

Eline van der Meer
University of Groningen

We investigated (1) how *Lasius flavus* (yellow meadow ant) affects macrodetritivore abundance, plant composition, and soil properties of a salt marsh, and (2) how grazing cattle affect the engineering effects of *L. flavus*. Soils of ant mounds had lower water content, organic matter content and salinity, likely due to bioturbation by *L. flavus*. Plant biomass was driven by grazing, with lower biomass in grazed plots. Macrodetritivore abundance was 56% lower in grazed plots compared with ungrazed plots. On-mound macrodetritivore abundance was 70% lower compared to off-mound areas. Our results indicate that *L. flavus* effects are restricted to its mounds, and that grazing cattle override these local effects of *L. flavus* on soil properties, vegetation composition and macrodetritivore abundance. Using grazers as a management tool results in higher plant diversity, but reduces macrodetritivore abundance and overshadows effects of small-scale engineers.

15:20 | Harmonizing Environmental DNA and Remote Sensing for Scalable Belowground Biodiversity Assessment

Andjin Siegenthaler
University of Twente

Understanding impacts of global change on belowground communities necessitates assessments of biodiversity dynamics at large spatial scales. While the integration of integration of in situ and Earth Observation (EO) data is common practice for monitoring of aboveground ecosystems, this is rarely practiced for belowground ecosystems. Here we present innovative methodologies that combine environmental DNA (eDNA) metabarcoding with remote sensing to assess belowground forest biodiversity in the Netherlands and Germany. Our approach demonstrates that hyperspectral remote sensing can serve as a proxy for habitat characteristics influencing soil microbial diversity. This strategy enables scalable biodiversity assessments, supporting the monitoring of belowground diversity and ecosystem functioning across large and heterogeneous landscapes. By harnessing the strengths of both state-of-the-art research fields, we can gain deeper insights into the spatial dynamics of belowground forest communities and their drivers of change, thereby supporting more informed conservation and land management strategies under global change.

Workshop Sessions

1: Walking in Darwins Footsteps

Date and Location: Tuesday, 10 February, Main Entrance, 14:00
Conveners: Annemieke Drost (Netherlands Institute of Ecology)
Judith Epping (Wageningen University & Research)

Many great minds have had their best ideas while out and about on daily walks to mull over a scientific question or on the look for inspiration. Charles Darwin, Jane Goodall and many more were known to walk daily for field observations and to develop their ideas. In this workshop we invite participants to walk in their footsteps on an hour-long stroll (approximately 5km). Rediscover what it means to you to be an ecologist, what inspires your work, connect and share with the group at the end.

2: The Ecosystem of Ecological and Biodiversity Research Infrastructures in the Netherlands

Date and Location: Tuesday, 10 February, Rooms 10 & 11, 16:10
Conveners: Marcel Visser (Netherlands Institute of Ecology)
Astrid Souren (Naturalis)
Peter van Tienderen (LifeWatch / University of Amsterdam)

Within the Netherlands there are a number of scientific infrastructures that support ecological and biodiversity research. In this workshop we briefly present these infrastructures, how they complement each other and the opportunities and challenges we face. Our workshop is also an invitation for researchers to express their needs for tools and facilities and bring to the fore their contribution to further develop a coherent ecosystem of research infrastructures in the Netherlands.

3: Reproducible and Extensible R Package for Species Distribution Modelling (sdm)

Date and Location: Wednesday, 11 February, Rooms 10 & 11, 9:00
Conveners: Babak Naimi (Utrecht University)

This workshop offers a short course to get you quickly started using the sdm R package for species distribution modelling. The sdm package has been developed by the workshop organiser and was introduced in a paper published in the Journal of Ecography (Naimi & Araujo, 2016). The package supports 20+ machine learning algorithms to develop species distribution models, and facilitates the ensemble forecasting of species distributions.

Reference:
Naimi, B. & Araújo, M.B. (2016) sdm: a reproducible and extensible R platform for species distribution modelling. Ecography. 39: 368–375. DOI: 10.1111/ecog.01881

4: Co-design of Digital Twins within LTER-LIFE

Date and Location: Wednesday, 11 February, Rooms 10 & 11, 14:00
Conveners: Geerten Hengeveld (Netherlands Institute of Ecology)
Zhiming Zhao (University of Amsterdam)

In this workshop we introduce the LTER-LIFE infrastructure, where you will build digital twins of ecosystems. Digital twinning of an ecosystem requires that we bring together knowledge from different (sub)disciplines in ecology and environmental and life sciences. With the participants we will explore how LTER-LIFE supports the co-design of digital twins and the linking of data and models into reproducible analyses workflows. This workshop is hands-on and requires participants to bring their own laptop.

Exhibitions / Stands

Date and Location: Tuesday & Wednesday, 10 & 11 February, Air

LTER-LIFE, where you build digital twins for ecological research

Connecting the European research infrastructures eLTER (the network of long term ecological research sites) and Lifewatch ERIC (for supporting e-Science on biodiversity and ecology), LTER-LIFE aims to create the Dutch infrastructure for building digital twins for ecological research.

To do so, LTER-LIFE is developing a portfolio of digital services that can help ecologists to:

- Search and Find data and models that relate to their research site,
- Connect and integrate the data and models into analysis workflows and digital twins,
- Run these workflows and digital twins 'at scale',
- Share their research (data, models, scripts) according to FAIR principles.

We aim to do this with the different communities of ecological researchers. At NAEM 2026 LTER-LIFE will demonstrate the current state of the art in the services we develop, discuss with you the services that we are developing, and we ask for your input. Which services would you need? When would you, or your students, make use of the services that we showcase and how can we support you to tackle the hurdles that you encounter.
More information at LTER-LIFE.nl, or check out our beta services through lter-life-experience.org

Naturalis Research Infrastructures

At the 2026 NERN Congress, Naturalis Biodiversity Center will present its research infrastructures across multiple stands, including ARISE, eDentity, NLBIF, BGE, and BMD. We will engage with the Dutch ecology and biodiversity research community to explore opportunities for collaboration. Together, these stands illustrate how national and European research infrastructures support species recognition, biodiversity monitoring, and data integration across ecological research domains.
Representatives at the stands will showcase infrastructure programs that enable researchers, practitioners, and policymakers to make effective use of existing and emerging services for biodiversity observation, analysis, and reporting. Visitors will gain insight into how to access data, services, and support, and how to connect their own projects. Visitors can explore information materials and live demonstrations showing how these infrastructures can be applied in research projects, monitoring programs, and cross-sector collaborations at national and EU levels.

Each infrastructure contributes a distinct yet complementary role within the Dutch biodiversity data ecosystem: eDentity is a national environmental DNA (eDNA) infrastructure enabling large-scale biodiversity monitoring from soil, water, and air samples; ARISE builds an integrated infrastructure for semi-automatic identification and monitoring of multicellular species using eDNA and AI-driven recognition technologies; NLBIF serves as the national biodiversity data facility (the Dutch GBIF node) connecting Dutch data to international infrastructures; BMD (Biodiversity Meets Data) provides a Single Access Point and analytical tools for integrated biodiversity monitoring and forecasting; and BGE (Biodiversity Genomics Europe) coordinates DNA barcoding and genome sequencing efforts to advance genomic approaches to biodiversity research across Europe. Together, these infrastructures form an end-to-end pipeline from biodiversity observation to data integration, analysis, and application.

These stands are closely linked to Workshop 2: "The Ecosystem of Ecological and Biodiversity Research Infrastructures in the Netherlands" (Tuesday afternoon), offering a practical extension of the workshop by demonstrating how infrastructures function in practice and how the community can engage with them. Participants are encouraged to visit the stands before or after the workshop to explore concrete opportunities for engagement and collaboration.

Poster session 1

#	Name	Poster title
1	Martijn Bakker	Bending, not breaking: How *Typha angustifolia* copes with low water levels
3	María Belenguer	DSS-AWERE: Decision Support System for Adaptive Wetland Restoration
5	Matty Berg	Towards Sustainable Peat Meadows
7	Titus Breuning	Toekomst van SynBioSys/Future of SynBioSys
9	Gabriel Charvalakis	AI assisted monitoring of insect attraction to light at night
11	Leonor Coelho	Balancing Biodiversity in the Pioneer Zone: Spartina's role in promoting aboveground macrofauna while limiting belowground communities
13	Rezgar Darvand	Remotely sensed 3D ecosystem structure indicators to explain biodiversity distribution
15	Tom Diserens	Wolf predation and risk response in a beaver colony during drought
17	Ron Geurts	Capturing belowground dynamics of tropical forests in a land surface model
19	Maarten van Hardenbroek	Exploring a gradient in salt marsh communities via network analysis
21	Anne Hendriks	A Design-based Approach to Salt marsh Restoration
23	Tom Heuts	Rewetting hotspots for breeding birds
25	Joseline Houwman	IPBES is looking for you!
27	Jorn Knuit	Scaling up biodiversity monitoring in agricultural landscapes
29	Farah Kootstra	How does large herbivore grazing affect plant and macro detritivore species communities along a salt marsh inundation frequency gradient?
31	Eva Lansu	Sediment dynamics around mussel and oyster reefs
33	Freddie Mckendrick	Size-selective depletion of benthic prey by red knots in the western Dutch Wadden Sea
35	Lotte Mens	The role of collective action in bending the curve of biodiversity loss
37	Esther Moinat	Exploring weed community assembly in strip cropping systems
39	Ester Lepere Oloije	Seeds of Conflicts: Re-greening increases livestock depredation
41	Andrew Oringer	A Case for Experiential and Place-Based Ecology Education for Liberal Arts and Sciences Students in South Limburg
43	Daniil Scheifes	Nutrient-acquisition strategies across N:P stoichiometry and biomass gradients in herbaceous plant communities
45	Arjun Shandilya	Downgraded: Assessing how the news media portrayed the change in wolf protection status in Europe
47	Yvet Telgenkamp	Fourteen years of functional vascular plant type removal on a raised bog in Store Mosse National Park, Sweden
49	Joes ten Thij	Love thy neighbour - Utilizing associational resistance for biological control of *Thrips tabaci* in leek
51	Kyra van Valkengoed	From Sea to Inland: Direct and Indirect Drivers of Plant Diversity in Dutch Coastal Dunes
53	Duarte Viana	A Decision Support System based on Ecosystem Digital Twins for the adaptive co-management of Mediterranean wetlands
55	Anne Wolma	Killing two birds with one stone, by rewilding climate buffer wetlands.
57	Nienke Zwaferink	Architects of the Intertidal - Thermal window of exercise performance of the ecosystem engineer *Lanice conchilega*
59	Merel Hilderink	Time is Ticking: Unveiling Tick-Borne Disease Hazards in the Face of Biodiversity Loss and Climatic Change

Poster session 2

#	Name	Poster title
2	Tia l'Amie	Weathering Change: Apple Orchard Pollinators Show Different Group-Level Responses to Shifting Weather Patterns
4	Gijs van Beilen	Recoupling the islands: How do mobile consumers couple island habitats in lake systems?
6	Marieke van den Bogert	Source-sink relationship in a House Sparrow population in the Netherlands
8	Kaïn van Calcar	Sparkling Seas: Bioluminescence across scales, an overlooked trait shaping plankton ecology
10	Natali Caro Marin	What do trees have to tell?
12	Yuheng Chen	Impacts of plant richness on soil nutrient availability and leaching
14	Elham Ebrahimi	camtrapReport: An R Package for Automating Camera-Trap Data Reporting in Wildlife Monitoring
16	Judith Epping	Macroinvertebrate community effects of the biopesticide Azadirachtin under different temperature scenarios
18	Antoine Grenier-Journe	Big troubles in little lakes: Top-Down and Bottom-Up control drives blue-green algal bloom dynamics in mesocosms
20	Sylvana Harmsen	Soil remineralisation with silicate rock powder: effects on plant quality and ungulate foraging
22	Dindi Hiddink Verberne	Identifying bottlenecks for subtidal seagrass restoration: the role of waves and light limitation
24	Saskia Hilgers	Sunny side down: effects of peat inversion and water table management on raised bog restoration
26	Malaurie Hons	Reconnecting land and water: How restoration shapes riparian carabid communities
28	Andrea Kölzsch	HABITRACK: Habitat tracking for the conservation of huntable bird species
30	Julia Mayr	Quantifying Belowground Stability from Minirhizotron Data
32	Gea van der Lee	Caddisfly where are you? Following the movement of *Halesus Radiatus* using PIT-tags
34	Tom van der Meer	Worm-mediated nutrient dynamics in riparian buffer zones
36	Berber Meulepas	The impact of nitrogen deposition and heat stress on herbivorous insects: nettle-feeding Lepidoptera as model organisms
38	Rafaela Paulo Teixeira	Sediment compaction: A Hidden Barrier to Bird Foraging in Managed Coastal Habitats?
40	Max van der Ree	Dispersal sows the seeds of resilience
42	Eleonora Saccon	Accelerating salt marsh development in double dike projects through channel network design
44	Natanja Schuttenhelm	Evidence based trophic rewilding with large herbivores
46	Kevin Van Sundert	Soil nutrient regulation of forests under climate change
48	Xenia Sterl	A review of dynamics in spatial savanna models
50	Zarah Tomesen	Pollinator dependence of wild plant communities
52	Annegreet Veeken	Nutrient imbalances shift plant trait distributions across fertility gradients
54	Lisenka de Vries	Modelling goose movements across the Netherlands
56	Long Yang	Annual field crops enhance predators and aphid biological control in perennial walnut orchards
58	Marit Hertlein	Effects of canopy openness and forest-management intensity on decomposition rates and decomposer communities of different necromass types

Participants

#	Name	Institute
1	Haidi Abdullah	Univ. Twente
2	Baig Abdullah Al Shoumik	Maastricht Univ.
3	Cassandra van Altena	NIOO
4	Laura Antão	University of Turku
5	Liesbeth Bakker	NIOO
6	Martijn Bakker	RU
7	Swarnendu Banerjee	UVA
8	Luis Barba Escoto	RUG
9	Janna Barel	UU
10	Leonardo Bassi	NIOO
11	Gijs van Beilen	RU
12	María Belenguer Manzanedo	Doñana Biological Station
13	Joscha Beninde	VU
14	Matty Berg	VU
15	Dylan Bergen	NWO
16	Paul Berghuis	NIOZ
17	Sanne Bethe	VU
18	Sam Bielen	NIOO
19	Koos Biesmeijer	Naturalis
20	Allert Bijleveld	NIOZ
21	Jannes Boers	Vlinderstichting
22	Marieke van den Bogert	WUR
23	Sina Bohm	WUR
24	Fleur Bokma	UU
25	Roeland Bom	NIOZ
26	Giulia Bongiorno	WUR
27	Chiel Boom	Sovon
28	Rosa Boone	VU
29	Christiaan Both	RUG
30	Lotte Bouwman	WUR
31	Janneke de Bresser	RUG
32	Titus Breuning	WUR
33	Hanna ten Brink	UVA
34	Alanna Brown	Faunabeheereenheid Noord-Holland
35	Sander Buddendorf	NIOO
36	Andrea Budiša	NIOO
37	Sofie Buesink	RUG
38	Nelleke Buitendijk	Faunabeheereenheid Noord-Holland
39	Emily Burdfield-Steel	UVA
40	Max Burgoon	NIOZ
41	Kaïn van Calcar	WUR
42	Natali Caro Marin	WUR
43	Gabriel Charvalakis	NIOO

#	Name	Institute
44	Yuheng Chen	UU
45	Chiu Cheng	HZ University of Applied Sciences
46	Marjolijn Christianen	WUR
47	Marielos Peña Claros	WUR
48	Leonor Coelho	RUG
49	Sarane Coen	UU
50	Lydia Cornu	WUR
51	Eva Corssmit	Naturalis
52	Luuk Croijmans	WUR
53	Janske van de Crommenacker	Vogelbescherming
54	Genesis Daquinan	Leiden Univ.
55	Rezgar Darvand	UU
56	Xenia Davide	WUR
57	Steven Declerck	NIOO
58	Stefan Dekker	NIOO
59	Zoë Delamore	WUR
60	Camille Delavaux	NIOO
61	Jerry van Dijk	UU
62	Laurens Dijkhuis	UU
63	Tom Diserens	Polish Academy of Sciences
64	Manon van den Dolder	WUR
65	Anne van Doorn	WUR
66	Nemi Dorst	Naturalis
67	Anemieke Drost	NIOO
68	Eva Drukker	WUR
69	Sjoerd Duijns	Sovon
70	Fleur van Duin	Leiden Univ.
71	Elham Ebrahimi	WUR
72	Abraham van Eijnatten	UU
73	Bruno Ens	NIOZ
74	Judith Epping	WUR
75	Klemens Eriksson	RUG
76	Maike Fallböhmer	RUG
77	Thijs Fijen	WUR
78	Katrin Fleischer	VU
79	Alejandra Sarai Gallo Sandoval	WUR
80	Hans van Gasteren	Min. van Defensie
81	Reinier van der Geest	Naturalis
82	Jan Geisler	NIOO
83	Jelyn Gerkema	UU
84	Ron Geurts	VU
85	Arash Ghoddousi	WUR
86	Evy Gobbens	WUR
87	Carla Grashof-Bokdam	WUR
88	Antoine Grenier-Journe	NIOO

#	Name	Institute
89	Koen Greuell	LifeWatch
90	Marvin Groen	Leiden Univ.
91	Sebastiaan Grosscurt	Leiden Univ.
92	Alena Gsell	Leiden Univ.
93	Maarten van Hardenbroek	RUG
94	Sylvana Harmsen	WUR
95	Franklin Harris	WUR
96	Yann Hautier	UU
97	Shuiqing He	WUR
98	Tjisse van der Heide	NIOZ
99	Lia Hemerik	WUR
100	Anne Hendriks	NIOZ
101	Geerten Hengeveld	NIOO
102	Justus Hennecke	WUR
103	Marit Hertlein	TU Dresden
104	Tom Heuts	RU
105	Dindi Hiddink Verberne	RUG
106	Merel Hilderink	WUR
107	Saskia Hilgers	UU
108	Anouschka Hof	WUR
109	Catrien Hoffman	UU
110	Malaurie Hons	University of Antwerp
111	Iris Hordijk	WUR
112	Joseline Houwman	RU
113	Floor Hugenholtz	NWO
114	Lies Jacobs	UVA
115	Monique de Jager	UU
116	Marinda Javaux	WUR
117	Henk van der Jeugd	NIOO
118	Marije Jousma	RUG
119	Sannimari Käärmelahti	RU
120	Martijne Kannekens	Leiden Univ.
121	Rosemarie Kentie	NIOZ
122	Eun-Jeong Kim	RUG
123	Alya Kingsland-Mengi	UU
124	David Kleijn	WUR
125	Jorn Knuit	UU
126	Jazz Kok	WUR
127	Andrea Kölzsch	RU
128	Tjitske Kooistra	NIOZ
129	Guusje Koorneef	NIOO
130	Farah Kootstra	RUG
131	Bart Kranstauber	UVA
132	Johannes Krietsch	NIOZ
133	Rob Kroes	UVA

#	Name	Institute
134	Hans de Kroon	NERN
135	Marijke van Kuijk	UU
136	Marije Kuiper	Vogelbescherming
137	Thomas Lameris	RUG
138	Tia l'Amie	WUR
139	Carlijn Lammers	UU
140	Hugo Langezaal	NIOO
141	Merel Lanjouw	WUR
142	Eva Lansu	NIOZ
143	Gea van der Lee	WUR
144	Ingrid van de Leemput	WUR
145	Casper van Leeuwen	RU
146	Daan Lichtenberg	NIOO
147	Hans Linssen	UVA
148	Emiel van Loon	UVA
149	Jantsje van Loon-Steensma	Van Hall Larenstein
150	Laura Mansier	UVA
151	Bruno Marcos	UVA
152	Dominic Martin	WUR
153	Tomonari Matsuo	WUR
154	Julia Mayr	UU
155	Freddie Mckendrick	NIOZ
156	Eline van der Meer	RUG
157	Tom van der Meer	WUR
158	Melanie Meijer zu Schlochtern	WUR
159	Lotte Mens	RUG
160	Berber Meulepas	RU
161	Esther Moinat	WUR
162	Wolf Mooij	NIOO
163	Joeri Morpurgo	Leiden Univ.
164	Elly Morrien	UVA
165	Babak Naimi	UU
166	Janne Nauta	WUR
167	Simon Niessen	UVA
168	Evy de Nijs	UVA
169	Catherine Nistha	WUR
170	Bart Nolet	NIOO
171	Sietze Norder	UU
172	Han Olff	RUG
173	Ester Lepere Oloije	Leiden Univ.
174	Andrew Oringer	Maastricht Univ.
175	Elizabeth Alejandra Ortiz Duran	WUR
176	Thomas Osinga	UU
177	Pieter Otte	RUG
178	José van Paassen	WUR

#	Name	Institute
179	Xiaobin Pan	UU
180	Aranya Pathak Broome	UU
181	Rafaela Paulo Teixeira	NIOZ
182	Emma Penning	NIOZ
183	Stephan Peterse	Faunabit
184	Fons van der Plas	WUR
185	Thijs van der Plas	WUR
186	Remco Ploeg	WUR
187	Kim Poldner	RUG
188	Emma Polman	UVA
189	Lourens Poorter	WUR
190	Sanne Poppeliers	WUR
191	Gerrit Potkamp	RUG
192	Barbara Prack McCormick	RUG
193	Herbert Prins	WUR
194	Casper Quist	WUR
195	Jip Rademakers	WUR
196	Niels Raes	Naturalis
197	Parinaz Rashidi	UVA
198	Max van der Ree	UU
199	Floris van Rees	NIOZ
200	Katrin Rehlmeyer	RUG
201	Valérie Reijers	UU
202	Pieter Riesenkamp	RUG
203	Meta Rijks	Staatsbosbeheer
204	Kenneth Rijsdijk	UVA
205	Jorien Rippen	RUG
206	Marjolein Robijn	NWO
207	Bjorn Robroek	RU
208	Nils van Rooijen	WUR
209	Femke de Ruiter	RUG
210	Eleonora Saccon	NIOZ
211	Luis Enrique Santamaría Galdón	Doñana Biological Staiton
212	Mariet Sauerwein	NIOZ
213	Daniil Scheifes	UU
214	Sara Schneemann	WUR
215	Merlijn Schram	NIOO
216	Maarten Schrama	Leiden Univ.
217	Natanja Schuttenhelm	WUR
218	Josef Settele	Helmholtz Center for Environmental Research
219	Arjun Shandilya	Maastricht Univ.
220	Andjin Siegenthaler	Univ. Twente
221	Laura Simoes	WUR
222	Anna Slowik	WUR
223	Chris Smit	RUG

#	Name	Institute
224	Merel Soons	UU
225	Astrid Souren	Naturalis
226	Jessica Spadon	Naturalis
227	Julia Stahl	Sovon
228	Xenia Sterl	UU
229	Hanneke Suijkerbuijk	WUR
230	Kevin van Sundert	Maastricht Univ.
231	Esther Swankhuisen	RUG
232	Noa Tabak	UU
233	Laura Tack	UVA
234	Tohar Tal	Faunabeheereenheid Noord-Holland
235	Yvet Telgenkamp	RU
236	Ralph Temmink	UU
237	Marijn Teunizen	Koninklijke Luchtmacht
238	Joes ten Thij	Leiden Univ.
239	Peter van Tienderen	UVA
240	Zarah Tomesen	WUR
241	Christopher Tyson	WUR
242	Kyra Valkengoed	UU
243	Annegreet Veeken	UU
244	Gert Jan van der Veen	Van Hall Larenstein
245	Ciska Veen	NIOO
246	Michiel Veldhuis	Leiden Univ.
247	Mandy Velthuis	WUR
248	Joris van de Ven	Naturalis
249	Wilco Verberk	RU
250	Erik Verbruggen	University of Antwerp
251	Koen Verhoeven	NIOO
252	Mink Verschoor	UU
253	Duarte Viana	Doñana Biological Station
254	Inês Vicente	UU
255	Lisanne van der Vijgh	NIOZ
256	Nacho Villar	NIOO
257	Eric Visser	RU
258	Marcel Visser	NIOO
259	Fleur van Vliet	Waardenburg Ecology
260	Arie Vonk	UVA
261	Anne Vorenkamp	NIOZ
262	Zita Voskuilen	RUG
263	Stefan Vriend	NIOO
264	Jorad de Vries	WUR
265	Lisenka de Vries	NIOO
266	Melanie de Vries	RUG
267	Tessel de Vries	UU
268	Renske Vroom	Greifswald University

#	Name	Institute
269	Fleur Vrouwenvelder-Slegers	UU
270	Giulia Vultaggio	NIOO
271	Dedmer Van de Waal	NIOO
272	Brenda Walles	NIOZ
273	Danyang Wang	WUR
274	Shengnan Wang	UU
275	Simone Weidner	Louis Bolk
276	Yannick Wiegers	UU
277	Wietse Wiersma	WUR
278	Lars Willighagen	RU
279	Keara Windels	WUR
280	Anne Wolma	WUR
281	Chong Xu	UU
282	Long Yang	CAAS
283	Maaike van der Zanden	NIOO
284	Jens van der Zee	WUR
285	Britt van Zelst	WUR
286	Nienke Zwaferink	RUG