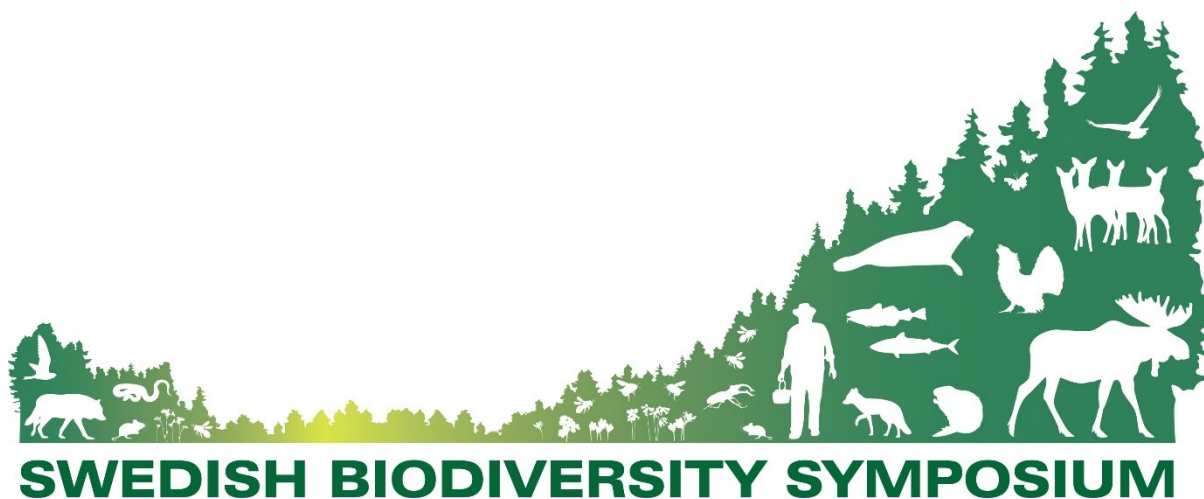
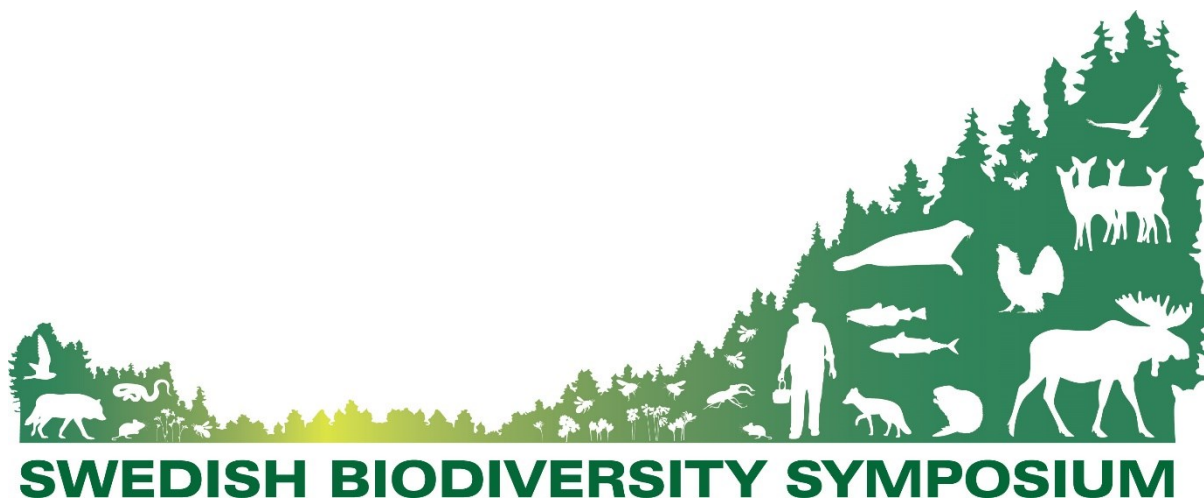




Book of Abstracts
21-23 October 2025
Gothenburg



Swedish Biodiversity Symposium 2025, Gothenburg

Editors: Lina Nikoleris, Therese Ek, Josefin Madjidian, Mats Björkman, Jenny Klingberg & Håkan Tunón

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Preface

This Book of Abstracts contains 117 abstracts presented at the inaugural Swedish Biodiversity Symposium (SBS), held in Gothenburg Sweden, on 21-23 October 2025, and showcases the outstanding expertise of Swedish biodiversity research.

The symposium featured an extensive programme comprising more than 28 sessions, including 250 oral presentations and panel discussions highlighting the recent advancements in biodiversity research, aiming to bridge science and policy to address biodiversity challenges.

300 authors reflected on global developments and addressed challenges and opportunities under the overarching broad theme *Transformative Change – from Knowledge to Action* (in Swedish: Samhällstransformation – från kunskap till handling) across topics such as conservation and restoration approaches, economic incentives and policy instruments, sustainable land use, biodiversity in relation to climate change and pollution, and the multiple services provided by ecosystems.

This symposium provided the first opportunity for colleagues from all professional capacities across Sweden to come together for inspiration and discussion on biodiversity. Clearly, it fulfilled an overdue need, as evidenced by the registration of more than 400 participants.

The strategic research area BECC (Biodiversity and Ecosystem services in a Changing Climate) at Lund and Gothenburg Universities, GGBC (Gothenburg Global Biodiversity Centre), Bolin Centre for Climate Research, SLU Swedish Biodiversity Centre (CBM) and the Swedish Environmental Protection Agency (SEPA), came together in autumn 2024 and declared their intention to jointly organise the inaugural Swedish Biodiversity Symposium (SBS2025) in Gothenburg, 2025.

Several additional organisations also expressed interest in being actively involved as partner organisations, and potentially stepping up to be main organisers in future symposia: the Swedish Society for Nature Conservation (SNF), World Wildlife Fund (WWF), Swedish OIKOS Society, SLU - Swedish Species Information Centre (SLU - SSIC), Gothenburg Botanical Garden, Centre for Sea and Society (HoS) and Region Västra Götaland (VGR).

Given the strong interest, SBS aims to continue as a science-policy interface forum for communication, dissemination, and discussion of evidence-based knowledge on biodiversity. The symposia provide an opportunity to gain new perspectives, learn from another, and engage in networking and new collaborations. SBS welcomes both national and international participants who work with biodiversity in any professional capacity, including those active in academia, government agencies, businesses, and NGOs.

The Swedish Biodiversity Symposium would not have been possible without the contribution of many people, including all the session chairs, who worked to select presentations and design the session.

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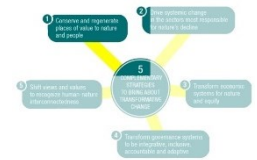
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Session S1 Landscape rewetting for biodiversity and climate: Promises and challenges

Session chairs: Peter Hambäck, Gustaf Granath, Nils Cronberg & Johannes Edvardsson.

Rewetting to restore wetland habitats is high on the political agenda as a tool to solve multiple societal goals, where the two currently most prioritised are climate mitigation and biodiversity conservation. Both the EU and the Swedish Government are developing action plans aiming to rewet substantial areas. The problem, however, is a lack of information on how rewetting should be done most efficiently and if different goals can be met simultaneously. Rewetting to reduce carbon emissions or to restore habitats for wetland organisms are not necessarily met with the same actions. Part of the problem is that we lack information on the needs of wetland organisms, and how ecological processes interact in shaping wetland habitats. For this purpose, researchers covering different wetland aspects (hydrology, biogeochemistry, ecology and biodiversity conservation) need to be integrated to develop better tools for biodiversity conservation in rewetting projects.

Which wetland biodiversity should we restore?

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Keywords: restoration, wetlands, EU:s species and habitat directive

Restoration of wetlands is an important large-scale tool in the biodiversity management. But what should be restored and how should we work?

Wetland biodiversity covers many scales from genes to landscapes. Meanwhile, when restoring wetlands, we usually work on intermediate scales, i.e. individual wetland types. Managing projects at other scales may improve biodiversity further. Restoring projects at landscapes level may add to large scale diversity and a functional green infrastructure.

The Swedish Wetland Inventory (SWI) covered all larger wetlands in Sweden. The wetland descriptions in SWI gives a chance to get reference points for restoring biodiversity. In addition, the presence of peat, may work as valuable archive of ancient vegetation, helping the understanding how vegetation has developed through time.

Today we work with the EUs habitat directive, and we just released the last report. This gives an indication on which wetland types should be prioritized for restoration to improve the conservation status of the wetland habitats.

Restored wetlands will have another biodiversity compared to what we had before being deteriorated or even destroyed. For diverse habitat types it should be argued to first conserving before restoring.

Restoring for biodiversity: Connecting hydrology and arthropod communities

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Keywords: Insect diversity, Wetland restoration, Hydrology

Rewetting the landscape is proposed as an important tool for mitigating biodiversity loss. It is also evident that raising the water table will change ecological communities and species compositions. However, wetland restorations take time and it is unclear what communities that will inhabit the restored wetlands, the same or different from the naturally undrained wetlands. In this talk, I will review the available knowledge on the connection between environmental factors, and particularly wetness of the wetland, on arthropod communities and on higher trophic levels. I will then also discuss how rewetting may restore these functions and how different goals are compatible. Finally, I will describe how additional management actions may be necessary to fulfill goals connected to these animal and plant communities.

Tree Encroachment in Peatlands: Consequences for Biodiversity, Hydrology, and Carbon Sequestration

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Keywords: Peatland Ecology, Tree Encroachment, Biodiversity Loss, Carbon Sequestration, Hydrological Change

Peatlands are globally important carbon sinks, vital for greenhouse gas (GHG) regulation, biodiversity conservation, and freshwater purification. However, their ecosystem services are increasingly threatened by climate change, nitrogen deposition, drainage, and peat extraction. Drier conditions can transform moss-dominated peatlands into tree-covered landscapes, reducing carbon uptake, accelerating peat degradation, and contributing to freshwater brownification. Moreover, an often-neglected concern is the loss of specialized peatland biodiversity, as habitat conditions shift, and sensitive species are displaced.

Tree colonization is accelerating across many Scandinavian peatlands, yet the links between vegetation change, hydrology, biodiversity, and carbon dynamics remain poorly understood. In this presentation, I synthesize ongoing research on the drivers and ecological consequences of this transformation using an integrated monitoring approach.

At four peatland sites in southern Sweden, we track Scots pine (*Pinus sylvestris*) growth with high-resolution dendrometers and monitor water-table dynamics using pressure sensors. Wood anatomical measurements and stable isotope ($\delta^{13}\text{C}$, $\delta^{18}\text{O}$) analyses in tree rings reveal environmental controls on tree physiology. Combined with vegetation inventories along gradients of tree cover, our results provide critical insights into how biodiversity shifts with advancing tree encroachment—highlighting the urgency of understanding and managing peatland transitions under changing conditions.

Understanding the effect of rewetting through plant composition

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Keywords: ecosystem services, indicators, plant communities, peat mosses, rewetting

Peatland rewetting is recognized as a key strategy for climate change mitigation and biodiversity conservation. With the implementation of the EU restoration law, peatland rewetting is expected to increase in the coming years. Currently, our understanding of the ecological consequences of rewetting —particularly vegetation development—remains limited. Vegetation plays a central role in mediating and reflecting ecological processes, making it a valuable indicator for assessing the outcomes of rewetting. Changes in plant communities can potentially inform us about nutrient dynamics, greenhouse gas fluxes, water levels, and shifts in habitat quality, all of which are related to ecosystem services. In this talk, I will present current knowledge on vegetation responses to peatland rewetting. I will also discuss how vegetation data can be used to evaluate the impacts of rewetting on ecosystem services such as carbon storage, water regulation, and biodiversity support.

Peatland restoration in Norway – status, future perspectives and carbon credits for upscaling

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Keywords: Peatland restoration, carbon credit, monitoring

Rewetting of drained peatlands is an acknowledged restoration measure to improve peatland functions and services. Saving remaining carbon stocks in belowground peat layers is especially important, but reestablishing the processes that allow for carbon sequestration is also crucial. Thus, peatland restoration has become an important action in climate change mitigation. In Norway, we can celebrate the first ten years of peatland restoration in 2025, and about 200 peatland sites have been restored during the last decade. Peatland restoration

became a large-scale activity in Norway through a national action plan on wetlands restoration released in 2015 – where the main aim was to reduce climate gas emissions. An updated action plan launched in 2020 included a broader emphasis on improving ecological condition in addition. Initiatives for upscaling have been evaluated through the project ARV, that has explored the possibility of financing peatland restoration using carbon credits. Here, we will give an overview of peatland restoration efforts in Norway, including an evaluation of ongoing monitoring and future needs. We will further present the initiative of upscaling through private financing and carbon crediting.

Is rewetting always the best choice for biodiversity?

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Keywords: rewetting, biodiversity, restoration, insects

Drainage of natural peatlands has affected biodiversity and resulted in a transition from wetland associated assemblages to forest assemblages. For ground vegetation this means that plants, especially those associated with open wetlands have declined with subsequent effects also on associated insects including pollinators and predatory beetles (carabids). Restoration of drained peatlands by rewetting (blocking of ditches) has the potential to benefit many species that have been negatively affected by the historic drainage activities. However, this benefit has not yet been shown in controlled experiments. Simultaneously, many ditches have developed characteristics that resemble those of natural streams and for such ditches rewetting might result in a decline of species associated with riparian habitats. In two projects we investigate the ecological values of ditches and the effects of rewetting of wetlands across Sweden. We compared ditches and streams and show that ditches can provide some of the ecological conditions as streams. We compared drained, restored and pristine wetlands and show that rewetting has some immediate effects on both vegetation and assemblage composition of arthropods. There are still large uncertainties about the ecological effects of rewetting and more knowledge is urgently needed to develop sustainable management strategies.

Poster presentation:

Chlorophyll-a and microcystin variations across wetlands located in mineral and peat soils in the south of Sweden.

Natàlia Corcoll¹, Bakanding Sanyang², Amelie Lindgren^{3,4 *}

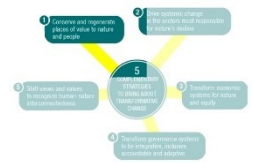
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Keywords: wetlands, rewetting, chlorophyll-a, microcystin, water quality

Past biodiversity efforts have focused on creating wetlands on mineral soils, but as rewetting peatlands for climate gain moves up the agenda, interest in their biodiversity outcomes is also growing. However, little is known about how the soil type affects water quality and in turn chlorophyll-a (Chl-*a*) and microcystin concentrations. Here, we examined the influence of wetlands characteristics (i.e. soil type, age, depth) and water quality on Chl-*a* and microcystin among 41 wetlands in south Sweden. Results show that the mean Chl-*a* tend to be higher (25 ± 21 mg/L) in young wetlands (<4 yrs) than in old wetlands (>4 years; 5 ± 2 mg/L), and 24% of the wetlands were above the threshold for eutrophic state (11 mg/L). Chl-*a* was positively correlated with microcystin, however, detected levels of microcystin were always below the threshold for human health risk (ie. 1 mg/L; World Health Organization). Altogether, this study shows that young rewetted peatlands tend to have a lower water quality (nutrient content and phytoplankton descriptors) than older ones or those located in mineral soils, regardless of age. This research highlights that improvements of water quality may develop over time.



Session S4 Scenario-based risk-analysis workshop for the management of marine invasive species in a changing climate

Session chairs: Lena Granhag, Maria Eggertsen, Leon Green & Björn Källström.

The session is carried out as a workshop where Swedish authorities gather experts on marine invasive alien species. The goal is to identify and bridge knowledge-gaps to develop an action plan for the likely introduction of a new invasive species in Swedish coastal waters – the door knocking blue crab (*Callinectes sapidus*).

The session starts with researchers giving short presentations on the developing methods and tools for handling marine IAS, with the blue crab in Sweden as an applied management example. Presentations will follow the invasion curve to:

- I. prevent introductions
- II. prerequisites for early detection and action
- III. track and identify
- IV. combat and exploit as a resource.

Adopting a functional diversity approach to demonstrate potential ecological consequences of introduced and invasive marine algae

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Keywords: Invasive algae, functional traits, coastal ecosystems

Non-native algae becoming invasive is a major driver of change in many coastal ecosystems. Understanding the ecological consequences of such introductions is therefore crucial. In this study, we apply a trait-based approach to examine potential differences between native and invasive algal communities in a subtropical environment. We selected a set of functional traits and applied them to the most commonly occurring native and invasive macroalgal species. The recently described alga *Chondria tumulosa* was included as a case study, to assess its potential invasiveness and impact on local assemblages. Our findings suggest that invasive macroalgae in Hawai‘i have introduced novel functional traits to local algal communities. These invaders occupy a distinct region of the functional trait space and should subsequently be carefully monitored and cause for concern, some more than others. An evaluation of *C. tumulosa* indicates that it has a high potential to become invasive, with the capacity to reduce functional diversity of coastal habitats. Overall, our study highlights the value of trait-based analysis as a tool for assessing the invasive potential of macroalgae. This approach helps clarify how non-native species may interact with existing communities and enhances our understanding of the broader ecological consequences of algal invasions.

Changing habitat distribution and dispersal patterns in a changing climate

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Keywords: climate change, ocean circulation, species distribution model, connectivity, marine invasive species

Marine biodiversity is increasingly affected by climate change, with sea surface temperature and salinity shifts driving species redistributions and altering ecosystem services. In brackish environments such as the Baltic Sea, Kattegat, and Skagerrak, both salinity and temperature are key variables, along with changing ice conditions. These factors influence the dynamics between native and non-native species, potentially altering ecological balances. Here we show the changing habitat distribution using species distribution modelling using limiting factors for the Blue crab, *Callinectes sapidus*, and dispersal patterns using Lagrangian particle tracking, for climate projections for RCP2.6, RCP4.5 and RCP8.5 (Representative Concentration Pathway) using CMIP5 forcing in Kattegat and Skagerrak, which in turn is an ocean area enclosed by Denmark, Sweden and Norway. It can be seen that the area of suitable habitats for the Blue crab is increasing in all climate scenarios with RCP8.5 being the most affected.

Chinese Mitten Crab in Swedish waters – risk, detection and management

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Keywords: Chinese mitten crab, Sweden, molecular methods, CLANCY, international co-operations

The Chinese mitten crab (*Eriocheir sinensis*) is listed among the world's 100 worst invasive alien species. It causes severe ecological and economic impact on freshwater systems. In Sweden, it was first recorded in the early 20th century in the Baltic Sea and later in Lake Mälaren and Vänern. To date, no juvenile stages have been detected, suggesting a non-established population. However, in March 2025 the risk level were increased to 'very high' due to a) climate change leading to warmer and shorter winter and b) the potential introgression with the cold-tolerant Japanese mitten crab (*E. japonica*). Both risks enable further spread and permanent establishment.

In the EU Interreg North Sea funded CLANCY project (2023-2028) we map the crab, we trap the crab and fill the gap through international co-operations between Belgium, Germany, France and Sweden. While countries like Belgium and Germany face mass occurrences, France and Sweden still struggle with effective detection and eradication. This presentation outlines the current status in Sweden, but also evaluate how molecular tools such as eDNA and introgression analysis are important in early detection. It emphasizes that international co-operations are needed for the development of effective decision trees and management concepts valid across European borders.

Environmental DNA for Early Detection and Monitoring of Invasive Species in the Skagerrak and Kattegat area

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Environmental DNA (eDNA) offers a powerful tool for early detection and monitoring of invasive species in marine and freshwater environments. This talk will explore how both COI metabarcoding and digital PCR (dPCR) approaches can be applied to the Skagerrak Kattegat area to improve scientific basis for management approaches. Metabarcoding provides broad detection capacity, including unknown or unexpected taxa, while species-specific dPCR assays offer high sensitivity and quantification of targeted invaders. I will present case studies using relative read abundance from COI data and dPCR-based quantification, and discuss their complementarity. Critical challenges include gaps and errors in reference databases, unresolved taxonomy, varying primer efficiency and interference from environmental inhibitors such as humic substances and heavy metals. Understanding these limitations is key to developing robust eDNA-based surveillance strategies for invasive species in northern aquatic ecosystems.

The physiological and environmental constraints to the establishment of the invasive Blue Crab, *Callinectes sapidus*

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Keywords: Invasive species, ecophysiology, prediction, phenotypic adaptation

In recent decades, the Atlantic blue crab (*Callinectes sapidus*) has expanded its range into European waters, also into the brackish and coastal zones of northern Europe. Understanding the physiological mechanisms behind their survival and potential establishment in cooler and less saline environments are crucial for predicting future invasions under climate change. Adult blue crabs exhibit remarkable euryhalinity, tolerating salinities ranging from 5 to over 35 PSU. However, early life stages such as eggs and zoeae show a much narrower tolerance window, generally requiring higher salinities and temperatures. Establishment of self-sustaining populations in northern Europe will depend on the availability of thermally and osmotically suitable habitats for reproduction and early development. Similarly, physiological plasticity and behavioral adaptability, including the ability to migrate in search of optimal conditions for reproduction and growth can enhance its capacity to exploit marginal habitats and may allow reproductive “hotspots”. Additionally, climate change is likely to extend the thermal window for reproduction and larval development in northern Europe, potentially transforming transient occurrences into permanent populations. This talk will present the physiological basis for the species establishment on the future Swedish coastlines, and highlight what experimental research into their physiology that is needed to predict their success.

eDNA detection of the invasive blue crab

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Keywords: eDNA, dPCR, invasive species, monitoring, blue crab

Environmental DNA (eDNA) is an effective tool to monitor invasive species, and target-species eDNA analyses based on quantitative PCR are relatively quick and cheap. Digital PCR (dPCR) applications are especially sensitive and potentially can detect very low level of the target species DNA, down to few copies per litre water. Due to these advantages eDNA-based methods are used to monitor many invasive aquatic species. The eDNA detection rate however varies between different organism groups, the crustaceans being a group that is often hard to detect with eDNA. A recent study applied eDNA methods in combination with citizen science observations to detect the invasive blue crab *Callinectes sapidus* in the Mediterranean Sea (Delrieu-Trottin et al. 2024, bioRxiv). The authors conclude that eDNA is an effective tool for monitoring the blue crab. Notably, 24 PCR replicates were analysed per locality with the detection rate at 4-83%. I will discuss the findings in the study and how we can use them to design an eDNA survey for localities with suspected appearances of the blue crab.

Risk-analysis workshop for the management of marine invasive species in a changing climate - The blue crab scenario

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The spread of invasive species is one of the greatest global threats to biodiversity. The distribution of marine species changes over time, and a key question is whether this is due to human influence. Shipping is considered the most significant single vector for the spread of marine invasive species, as ships travel across large areas of the ocean in a short period of time. Marine species can be transported as stowaways in ships' ballast water as larvae or as adult individuals attached to the hulls. Since 2018, ballast water treatment has been a global requirement (International Maritime Organisation, IMO) and a strict regulatory framework to minimise hull fouling is under development (Biofouling Management Convention, likely to be implemented in 2029). To reduce hull fouling, bottom paint (antifouling) and Marine Growth Prevention Systems (MGPS) are used. The Hull MAintenance STrategy for Emission Reduction (HullMASTER) decision support tool can be used to analyse the effectiveness and environmental impact of different antifouling systems. Traffic and ports that pose a high risk of transfer are mapped by combining ship traffic patterns (Automatic Information System, AIS data) with the distribution areas of species of interest (with a high probability of establishing themselves and potentially causing significant negative impact). The Skagerrak-Kattegat sea area is bordered by Sweden, Denmark and Norway, and is therefore an example of where regional management of alien species across national borders is relevant. Regional action plans require consensus on action strategies. In the CLIMATE INVASIVES project, we are developing a basis for a regional action strategy in Skagerrak-Kattegat with the aim of modifying it so that it can also be used for other geographical areas.



Session S5 Integrated conservation approaches in Sweden – from genetic mapping to restoration

Session organisers: Gothenburg Global Biodiversity Center & Region Västra Götaland

Moderator: Mats Havström

Integrated ex/in situ conservation projects have proven successful, not only in restoring viable populations, but also in creating a public interest for biodiversity, hence promoting transformative change. Such projects depend on biological collections, both living and dead, for a number of reasons, for example to establish historical distributions, to verify reasons for species decline or to give access to genetic material of relevant provenance.

This session seeks to bring together geneticists, practitioners and policy makers to discuss the full spectrum of actions required to better understand and safeguard biodiversity in the field as well as in living collections, and make it available for nature restoration and conservation efforts in Sweden.

Biodiversity crisis – the role of botanical gardens as knowledge hubs and gene banks

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Keywords: conservation horticulture, integrated conservation, seed banking, nature restoration

To tackle the biodiversity crisis, there is no time for working in parallel tracks. The need for integrated in and ex situ conservation approaches is greater than ever.

Botanical gardens are platforms and infrastructures for conservation, research, education and communication. The well documented living collections work as windows to the world of plants, both for the public and professionals, giving botanical gardens a unique position as knowledge hubs and gene banks.

In collaboration with different partner institutions, Gothenburg Botanical Garden seeks to find innovative approaches to develop the field of integrated conservation, both regionally, nationally and globally. During the last decade, the garden has worked together with the County Administrative Board of West Sweden on an integrated approach to conserve threatened plant species in Western Sweden. Gothenburg Botanical Garden is now taking the next step, starting up a seed bank facility, which at a first stage will hold seeds from the regional threatened flora. The seed bank will not only work as a repository but also be actively used as an important source for nature restoration projects, research and education.

What are the next steps for integrated conservation? How can we collaborate across borders?

The SwedeSeed project – exploring conservation and production of regional seeds in southern Sweden

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Keywords: ex situ conservation, genetic biodiversity, regional seed bank, regional seed mix, seed production

SwedeSeed is an ongoing regional seed project started in late 2024. It is funded by The Swedish Board of Agriculture and the European Union, with support from the project partners. Until its conclusion in October 2027 the goal is to explore many aspects of regional seeds: as a means for ex situ conservation, habitat restoration, urban greening, raising public interest and as potential crops for local farmers. During three summers, seeds from a variety of grassland species will be collected throughout the region of Skåne for the purpose of seed production trials performed by Hushållningssällskapet and for long-term storage at NordGen; a small start of the very first regional seed bank of wild plant species in Sweden. Building on the hands-on experience from the SwedeSeed project along with the collected experiences of existing seed banks, seed companies and researchers nationally and internationally, the final aim is to produce best-practice recommendations for how Sweden can move toward creation of national and regional seed banks, how to perform sustainable seed collection from wild populations, and how production of regional seeds can be scaled to meet the increasing demand without risking loss of genetic diversity.

Regional genebank in the province of Östergötland

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Keywords: regional, genebank, redlisted, plants, transplanting

In 1990 the project Flora Guardians in Östergötland started and at the same time we started to cultivate the threatened species we met. From the beginning it was an exhibition garden where we wanted to show the problem with impoverishment of the flora. We started with 40 threatened plants located at Naturcentrum in Linköping. After contact with the Nordic genebank, NordGen 2005 we provided seeds from our garden for longtime conservation in freezers. The number of cultivated species increased to around 90 and seeds from several rare plants in Östergötland are now stored at NordGen. The last five years we have also practicing to plant out species to strengthen small populations in different parts of the province. We started with *Cerastium brachypetalum*, which only have one locality in Östergötland. 2024 we focused on *Dracocephalum ruyschiana* and *Salix hastata* subsp. *vegeta*. This year we plan to plant out *Oxytropis pilosa* at places on the mountain of Omberg. Together with Östergötlands Naturalhistoriska Förening we are cultivating *Cypripedium calceolus* in order to expand the current four plant sites.

Integrated conservation approaches for Nordic Crop Wild Relatives

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Keywords: Crop wild relatives, ex situ conservation, in situ conservation, genebank

Crop Wild Relatives (CWR) are wild species, subspecies or populations closely related to cultivated crops. They often contain unique genetic traits, such as resilience to climate stresses, that are absent in the domesticated crops. This makes CWR vital for crop improvement as these traits can be transferred into related crops, supporting food security and promoting sustainable agriculture in the Nordic region. Examples of CWR from the Nordic area include *Phleum alpinum*, *Daucus carota* ssp. *carota*, and *Fragaria vesca*, wild relatives to the forage crop timothy, carrot and strawberry, respectively.

Since 2015, NordGen has coordinated a collaborative effort among the Nordic countries to strengthen CWR conservation. The main aims included improving in situ conservation, expanding the ex situ collection, developing an integrated approach that connect the two conservation strategies, as well as increasing knowledge on CWR. Substantial achievements have been made, including mapping of Nordic CWR diversity, conducting field inventories, analysing genetic diversity, expanding the ex situ collection of CWR at NordGen, and communicating about CWR through exhibitions, webinars, policy recommendations, etc.

This integrated approach offers a scalable model for safeguarding plant genetic resources in a changing climate and underscores the strategic role of CWR in the future of Nordic agriculture.

Reintroduction of the black stork (*Ciconia nigra*) to Sweden – a feasibility study.

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Keywords: conservation, translocation, species restoration, wetland, Ciconiidae

The elusive black stork was breeding in Sweden until the 1950-ties but is listed as extinct since 2000. This large black and white wader is not endangered globally, but the distribution range is wide, and the occurrence is scattered. The species is solitary during breeding and prefer old growth, undisturbed forests with 10-20% broadleaved trees with shallow, good quality waters for fishing. In seven counties in the south of Sweden over 18% of suitable habitats (of total area) has been identified using Geographic Information System modelling. The overlapping presence of beaver is perceived as positive. This feasibility study aims to cover current knowledge of the biology of the black stork, acquisition, breeding and husbandry of black storks in captivity, with the possibility of future black stork restoration in Sweden. Scientific data and knowledge will be complemented with practical experience from ongoing conservation and restoration projects throughout Europe. National expertise from Nordens Ark and the Swedish white stork project will be consulted. The study also cover legislation, ethical and socio-economical aspects of a reintroduction of black stork in Sweden.

The effects of forest restoration on forest structure

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Keywords: Forest restoration, Rewilding, Biodiversity, Forest structures

For centuries, human use has changed the structure of forests, which has led to the disappearance of species that depend on old-growth forest structures e.g. deadwood. To counteract the negative effects of forestry, there is a growing interest in forest rewilding and restoration. Even though a good understanding of how restoration practices affect forest structures is a key element of effective restoration projects, little research has been done comparing the effectivity of passive restoration methods to active ones when trying to recreate old-growth forest structures.

During this talk, the impacts of active and passive restoration (or rewilding) practices on forest structures in Swedish Ecoparks will be discussed. A Before-After Control-Impact design and LiDAR data were used to study the effects of active restoration practices versus natural regeneration on forest structure. Additionally, our results show that natural disturbances may decrease the necessity of active restoration practices. Understanding the long-term effectivity of passive and active restoration practices will improve our ability to conserve and restore important habitat structures in forest ecosystems and, therefore, preserve forest biodiversity. Ultimately, this talk will increase our understanding of the relationship between different forest restoration practices and forest structures.

Poster presentations

The Swedish National Gene Bank – preserving and utilizing older garden plants for the future

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Keywords: Gene Bank, Conservation, Biodiversity, Cultural heritage, Horticulture

The Programme for Diversity of Cultivated Plants, Pom is the Swedish national programme for cultivated plant diversity. The programme is intended to be an adaptive tool for creating a sustainable way to conserve and utilize the plant riches of Sweden.

The Swedish National Gene Bank for Vegetatively Propagated Horticultural Crops is a prominent and important outcome of the programme. In the National Gene Bank for older

historical garden plants, heirloom vegetables, traditional ornamentals, perennials, heritage fruits and berries medicinal plants from all over the Sweden are preserved for the future.

The National gene bank consist of a central collection located in Alnarp at the Swedish University of Agricultural Sciences, SLU as well as several local gardens as botanical gardens, open-air museums, cultural reserves, municipal facilities and local heritage associations. All locations are field gene banks with ex-situ conservation.

The plant collection in the National gene bank is a living archive for transformative change with regard to conservation, resilience, culture and innovation by for example preserving genetic diversity, reviving cultural heritage and local food cultures, reintroducing older garden plants and enhancing climate adaptations.

Assessing risk and opportunities of assisted evolution in eelgrass restoration.

Maru Bernal Gómez*¹, Marlene Jahnke¹

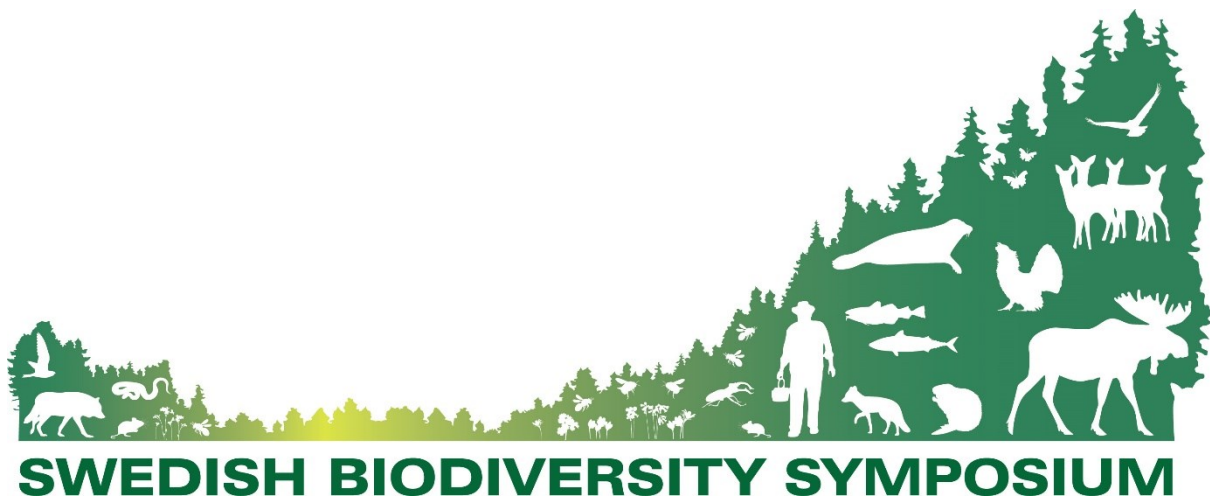
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Keywords: assisted evolution, resilience, risk-benefit assessment, genetic diversity, eelgrass restoration

The unprecedented rate at which climate change is altering ecosystems and accelerating biodiversity loss, raises concern that current restoration efforts may not enable species to adapt quickly enough. This concern has led to consider more direct interventions such as assisted evolution strategies, which aim to enhance resilience in vulnerable populations by introducing more tolerant or genetically diverse individuals. While such approaches are becoming technically feasible, the genetic risks and consequences of such interventions remain largely unexplored, particularly in marine ecosystems. To address this gap, we compiled and analyzed research evidence and case studies involving assisted evolution in seagrass and related systems to identify advantages, risks and decision-making factors that could promote evidence-based interventions in the future. Our goal was to synthesize relevant information that could serve to develop practical guidelines for conducting risk-benefit assessments before implementing assisted evolution in eelgrass (*Zostera marina*) meadows in Sweden.

22 October





Session S6 From forests to oceans and beyond: Can supply-chain transparency and biodiversity indicators drive more sustainable production practices?

Session chairs: Alexandre Antonelli, Caroline Franca, Toby Gardner, Florian Gollnow, Sara Hornborg, Torsten Krause, Martin Persson, Jakub Truszkowski, & Maria Ölund.

This session explores the role of supply-chain transparency in curbing biodiversity loss and promoting sustainable production practices. Advances in technology and data analytics are improving the ability to trace commodities like timber and food, while regulations such as the EU Deforestation Regulation mandate greater supply-chain traceability and transparency. However, the effectiveness of transparency in driving change at scale remains uncertain.

The session will feature presentations of recent work of researchers and initiatives including Trase, World Forest ID, and the Swedish Life Cycle Center on methods and data for improving transparency and measuring biodiversity impacts in timber and agri-food supply chains. Experts will discuss challenges in translating transparency into actionable strategies that incentivise biodiversity-friendly practices. By fostering interdisciplinary collaboration, the session aims to bridge the gap between knowledge and action, ensuring that global supply chains actively support biodiversity conservation.

Poster presentations:

What is the optimal land use to secure and promote biodiversity at organic beef farms in Sweden?

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Keywords: Biodiversity, Organic Beef Production, Forest Production, Nature Conservation

The aim was to identify optimal combination of land use and biodiversity for organic beef farms in Sweden. In the field, biodiversity of vascular plants, bird, insects and fungi were assessed in small plots along transects from grazed, open semi-natural pastures to dense coniferous forest. Using images of drones, aerial photography and satellites, the field results were upscaled to 1 km². Biodiversity was ranked based on species richness and habitats for birds and insects, from 1 to 7, where the lowest value was given to arable land and highest to grazed, open, old growth forest. The highest biodiversity was found in an open forested island in Småland and the lowest in a pasture-forest in Hälsingland.

To assess potential long-term effect of a land use on biodiversity, we extrapolated the impacts for the following scenarios over a 100-year period: Current Land Use continues, Maximum Meat Production, Optimal Nature Conservation management, Maximum Coniferous Forest Production, Maximum Broadleaf Forest Production. We found that the scenarios Optimal

Nature Conservation management reached fastest the highest biodiversity, followed by Maximum Broadleaf Forest production. Optimal Nature Conservation was also the most profitable with current reimbursement for high biodiversity. Maximum Coniferous Forest Production resulted in largest biodiversity losses. What is the optimal land use to secure and promote biodiversity at organic beef farms in Sweden?

Development of a planetary boundary-based Biodiversity scale

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Keywords: biodiversity impact; LCA; planetary boundaries

Our global food system is a key driver of biodiversity loss. Although challenging, quantifying biodiversity impact is crucial for companies and the public sector to assess their footprint and establish reduction targets. Together with industrial partners from the food industry and a large reference group, we developed a life cycle impact assessment (LCIA)-based database. By applying a method recommended by UNEP's Life Cycle Initiative, the database provides estimates of the biodiversity impact of foods from various origins worldwide. The unit used is Potentially Disappeared Fraction (PDF). PDF is commonly used for biodiversity LCIA, but it is unfamiliar to the public and difficult to interpret, which limits its usefulness and calls for the need of further guidance. Inspired by the RISE Climate Scales, we developed a Biodiversity scale (1-5), based on assessed planetary thresholds for biodiversity loss (Extinctions per million species years (E/MSY) and land use) for ten food groups (e.g. Proteins, Carbohydrates, Vegetables, fruits and berries) and approximately 300 food products from 195 countries. Translating PDF to a scale facilitates the interpretation of the biodiversity impact of foods, which will support informed decision-making and data-driven actions to reduce the negative biodiversity impact of production and consumption of food.

eDNA meets LCA - Linking monitoring with decision-making through high-throughput field-data for biodiversity impacts in agriculture

Lindsay Holsen^{*1}, Elin Rööf¹, Karolina Jörgensen¹; Rasmus Einarsson¹; Eveline J. Krab¹

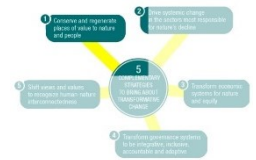
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Keywords: Life Cycle Assessment, agriculture, eDNA, earthworms,

Environmental impact assessments such as Life Cycle Assessment (LCA) are essential for linking biodiversity monitoring to policy in the agri-food sector, particularly regarding biodiversity impacts. However, accurately capturing the effects of agricultural practices on biodiversity remains challenging due to ecosystem complexity and limited data. The growing use of environmental DNA (eDNA) metabarcoding in agricultural monitoring offers a

promising solution by reducing the required expertise and time in the field, and enabling broader sampling of challenging taxa such as earthworms and other soil biodiversity. When combined or validated with traditional methods, eDNA metabarcoding provides high-throughput, scalable estimates of diversity and community composition. In this study, we applied eDNA metabarcoding to soil samples from cropped and ley fields in Sweden to assess earthworm biodiversity under different land uses. These biodiversity metrics were then related to land use and management variables to establish characterization factors for LCA directly from field data and eDNA results. Our study demonstrates the value of integrating eDNA-based methods with existing LCA methodology to improve agricultural biodiversity monitoring and support better-informed, field-based policy decisions for biodiversity conservation in agri-food systems.



Session S7 The New Urban Conservation – meeting growing ambitions for green cities

Session chairs: Marcus Hedblom, Anna S. Persson & Johan Kjellberg Jensen,

Urban nature is gaining attention in policy and research, with growing evidence that cities impact conservation, public health, and nature relationships. Urban ecosystems provide services and nature interactions for people living in cities (the majority of the world), shaping conservation support. Cities can also be biodiversity hotspots, offering refugia for species disfavored by intensive agriculture and forestry.

Recognizing this, urban ecosystems are now highlighted for biodiversity conservation by the UN (2022) and EU (2024). However, these big ambitions and short time frames for creating green, sustainable cities pose challenges for stakeholders, practitioners, and researchers. What changes will the new conservation policies require from practitioners? What scientific evidence is needed for effective implementation? Most importantly, how do we translate knowledge into action?

This transdisciplinary session explores how implementing new urban nature goals affects practice, research, and their cooperation. It covers urban conservation ecology, policy, and real-world implementation, from both research and practice.

How to effectively find areas where habitat restoration measures will be most successful

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Keywords: European Nature Restoration Law; GIS-tool, Urban planning

To reach the goals of restoring nature and improving the conditions for biodiversity within urban areas we need effective planning tools that are both reliable and simple to use. A new modelling framework that estimates the spatial variation in habitat functionality for any landscape has recently been developed. The method combines predictions of habitat quality with estimates of landscape connectivity in a way that has proven to fit observed distribution patterns of many different organisms very well. In this talk, I will present how the new modelling framework can be used in urban planning to identify areas where different measures that either aims to improve the habitat quality or to increase habitat connectivity have the greatest potential to be successful. The method creates maps that show how the potential for successful restoration measures varies within the whole landscape of interest. These maps give a unique possibility to overview alternative possibilities to improve the conditions for biodiversity within cities.

Planting forest in a residential area

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Keywords: micro forest, residential area, outdoor education, urban planning, sustainable development

Many dense urban areas require more greenery of benefit to people and other species part of local ecosystems. While many nature-based solutions take departure in the interests of people, the Miyawaki micro forest puts the requirements of the local ecosystem first. In 2025, a local housing company in collaboration with a society for nature conservation, will realize a micro forest in a residential area in Malmö. It will be 200 square meters with restricted access housing a glade, and paths, and surrounded by meadows. The overall aim is to add evidence to the literature on regreening with a focus on biodiversity. How can residents, non-profit organizations, and experts from practice and research collaborate? How can the project create a pedagogical arena fostering meaningful connections with nature and community-based co-creation? What concerns and benefits do different stakeholders raise about the development of a microforest? Data collection takes place during meetings between academia and local stakeholders and at workshops involving residents in the planning, planting, and management of the site. The study should illustrate how one can implement biodiverse land in an urban space by adding knowledge on how to reconcile different perspectives and ambitions in the process.

Ecology vs. Bureaucracy: What 30 years of green planning taught us about power and practice

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Keywords: Urban biodiversity; Green infrastructure; Spatial planning; Science–policy interface

For over 30 years, Ekologigruppen has developed a unique expertise in resilient ecological networks and landscape planning within the Swedish planning context. Our involvement in the early 1990s with the green wedges of the Stockholm Region marked the beginning of a sustained engagement in integrating ecological values into spatial planning. Since then, we

have produced green structure plans, biodiversity strategies, and related planning documents for municipalities and regional authorities across Sweden.

Through this long-term consultancy work, we have closely followed the introduction and implementation of new legislation and planning concepts. We have witnessed how politically governed organisations gradually adopted frameworks such as ecosystem services, biodiversity, and green infrastructure—concepts that today form key pillars of sustainable urban and regional development. Our work has also revealed the practical challenges and institutional dynamics involved in translating scientific and policy concepts into municipal planning practice.

This presentation will offer reflections from three decades of practice, focusing on how ecological knowledge is mediated, reinterpreted, and occasionally resisted within planning processes. By sharing empirical examples and critical observations from the frontline of Swedish planning, we hope to contribute to a deeper dialogue between research and practice.

Biodiversity in the Stone-built City – Evaluating Projects in Stockholm

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The City of Stockholm has upgraded its environmental program, focusing on ensuring "a Stockholm with vibrant ecosystems."

The City of Stockholm continuously undertakes a large number of development and renovation projects such as squares, parks, playgrounds, quays, or streets. These are often complex projects with many conflicts of interest. How strong is biodiversity in relation to other important aspects such as safety, accessibility, mobility, functionality, climate adaptation, infrastructure, or investment costs?

And how can collaborations with science enhance and ensure that the latest findings on, for instance, plant beds, water supply, and plant materials are implemented in built environments?

White Architects have carried out several different projects for the City of Stockholm. These are often collaborations with various competencies, experts, and suppliers to ensure climate-secured and long-term built environments through nature-based solutions. Through our completed projects, we can draw conclusions about how goal documents and policies are translated into built environments.

During the session, we intend to review and test some completed projects as the large-scale Slussen project to smaller projects like playgrounds and parks, to see what lessons we can learn as we move towards sustainable cities. To further follow up on the implementation of goal documents, we interview, among others, the city gardener and municipal ecologist in Stockholm.



Fig1. Illustration of Katarinaparken at Slussen Stockholm

Can an updated *Biophilia hypothesis* inform urban greenspace planning?

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Keywords: city inhabitants; nature orientation; individual preference; biodiversity contrasts

Contact with nature is positive for most city dwellers. But the effects are unevenly distributed: those who have a stronger nature orientation experience a higher positive effect than those with a lower nature orientation. An updated version of the *Biophilia hypothesis* ("the innately emotional affiliation of human beings to other living organisms") may serve as starting point for analysis and measures. We suggest the interplay between inheritance AND environmental influences (e.g. social context) is the basis for individual connections to nature and living organisms. There is variation in people's response to urban greenspace but all ages can benefit from nature, for example: (1) Infants and young children thrive in nature, their immunological responses, cognitive development, and mental health are enhanced by contact with greenspace, they also identify animals at early age. – Plan for regular direct contact with natural areas with diverse vegetation, including climbing-trees, and preferably interactions with animals. (2) Adults with higher connection to nature may appreciate large and species-rich greenspaces, whereas those with lower connection may prefer manicured nature. – Plan for diverse green environments, from small well-kept to large wild ones. Finally, plan for greenspace with rich songbird diversity which likely will be healthy for most city dwellers.

Poster presentation:

Poop scoops for bat conservation in Slottsskogen Park, Gothenburg, Sweden

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Keywords: diet, metabarcoding, Slottsskogen, urban park

Slottsskogen, one of Gothenburg's largest parks, which actively promotes biodiversity conservation, lacks research on the park's bat population. Thus, this master's thesis study aims to fill this gap by conducting an inventory of bat species in the park and investigating their diet composition across three seasons in 2024. Traditionally, studies on bat diets have relied on manual visual identification of food items in gut contents or guano samples, which often yield limited or biased results. Therefore, we will utilize DNA metabarcoding that allows precise identification of prey species from bat fecal samples (guano), offering greater taxonomic resolution. Based on our sample size, we will test if (i) there are significant seasonal changes in diet composition of *Pipistrellus pygmaeus*, and (ii) if significant intraspecific dietary differences exist in *Eptesicus nilssonii* in summer. By identifying their preferred insect prey, the park can make informed decisions regarding habitat management, such as selecting the appropriate flora to attract preferred insects or restoring habitats important for bat foraging. Overall, this study aims to contribute to the conservation of bat populations in Slottsskogen while raising public awareness about the importance of bats in ecosystem services, emphasizing their role in pest control and overall ecosystem health.

Building Biodiversity: From evidence to action in urban landscapes

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Keywords: Urban biodiversity; Ecological design; Transdisciplinary practice

At Ekologigruppen, we have long-standing experience in translating ecological evidence into practical design and planning strategies that enhance biodiversity. Through collaborations with municipalities, developers, and private landowners, we have worked across scales — from butterfly parks and species-rich wetlands and meadows to biodiversity-focused interventions in courtyards and urban blocks.

A key to this work is the interdisciplinary collaboration between ecologists and landscape architects. By combining ecological knowledge with design thinking, we create spaces that not only support species and habitats but also fit within social, technical, and aesthetic

frameworks. This integration is critical to making biodiversity actionable in real-world planning and construction projects.

In our presentation, we reflect on how working across disciplines allows us to move from abstract ecological goals to physical environments with ecological function. Designing for biodiversity is not just about choosing the right species but shaping environments that allow them to thrive over time—ecologically, spatially, and institutionally. In this presentation, we will share lessons from projects where biodiversity has been embedded into planning processes and built environments. We explore methods that support interdisciplinary collaboration and highlight how biodiversity can be made visible, measurable, and maintainable in urban development.



Session S8 Transformative change for biodiversity and climate

Session chairs: Anna Forslund

There is a scientific consensus on the need for transformative change in society and the necessity of addressing both climate change and the biodiversity crisis simultaneously. In this session, we invite short and focused presentations on various scientific or societal endeavors exploring such transformative change, with a focus on issues related to biodiversity and climate change.

The Palette Economy – Balancing biodiversity, climate and financial considerations in a business context

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Keywords: biodiversity management; sustainable business; balanced decision-making

Our society faces a triple planetary crisis including biodiversity loss, climate change and pollution (UN, 2025). We identified in a recent interview study with global businesses that biodiversity is not prioritized like climate or financials. These interviews together with a business survey and literature review, confirms the challenge of managing biodiversity in a business context.

To achieve transformative change, the business sector needs to incorporate biodiversity in a holistic way. The balanced scorecard could improve decision-making for business managers with broad set of measures and increased understanding of interrelationships. It moves away from silo-structures and enable problem solving (Kaplan & Norton, 1992). To manage multiple planetary crisis, we suggest a balanced scorecard influenced approach including biodiversity and climate in line with IPBES Nexus Assessment (IPBES, 2024).

The presentation focuses on the proposed “Palette Economy” with nature as a non-human stakeholder to navigate business essential environmental risks (Kopnina et al., 2024). This new decision-making approach aims to manage time and information asymmetries in business models, business cases and incentive programs, and to balance biodiversity, climate and financial considerations. Business benefits are improved applied decision-making identifying risks and opportunities. We will further develop this new concept in a case study context.

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Forest pathways achieving biodiversity & climate mitigation targets on different time horizons

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Keywords: forestry, biodiversity, climate, scenario, optimization

We aim to identify sustainable forest management pathways that support a growing bioeconomy and multifunctional forests, while mitigating climate change and preserving biodiversity. Our approach involves simulating diverse forest management scenarios for Sweden (specifically the national forest inventory plots) over 30- and 80-year horizons. We apply multi-objective optimization to balance goals for harvest levels, ecosystem services, biodiversity, and climate change mitigation (evaluated through life-cycle assessment). We utilize models for a wide range of species across various habitats and regions. This presentation introduces our initial work on jointly optimizing biodiversity and climate objectives. Key questions addressed include: How should we manage and harvest the Swedish forest to make conservation species increase with 50% and obtain maximal climate change mitigation? This will consider both the alternative of storing carbon in the forest or substituting fossil-based products and energy. Will the management be different if the time horizon is year 2050 or 2100? Moreover, can we reach the 50% increase of conservation species and what will be the effect on climate mitigation if we apply BAU forestry and today's set-asides versus if we apply forestry according to the EU Biodiversity Strategy, i.e. 10% strict protection and 20% closer to nature forestry?

Forest degradation, restoration and conservation in Sápmi – threats, opportunities and barriers for transformative change

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Keywords: reindeer pastoralism, landscape ecology, sustainability science, Indigenous law

Forest degradation and how it is measured must be defined in relation to some general ecological integrity of specific forest landscapes, including human-nature relationships. We argue that for boreal forests in Sápmi, the wellbeing of semi-domesticated reindeer is an indicator of such integrity as their grazing patterns have co-evolved with the forest landscapes of northern Fennoscandia through land use since time immemorial. Forest

degradation in reindeer pastoral contexts occurs at the landscape scale and with multiple causes and observable impacts. The knowledge of Indigenous Sámi reindeer pastoralists and decades of research about reindeer pastoralism both signal an alarming degradation of these forests. These insights have largely been ignored in law and policy development, resulting in continued forest degradation on Indigenous lands.

We present insights from the Mähtse project, in which researchers and Sámi reindeer pastoralists have worked across scales to implement restoration measures and design conservation schemes that combat and reverse forest degradation at the landscape scale. These initiatives incorporate both biodiversity and climate mitigation, and face both opportunities and barriers in legal frameworks and market forces. The presentation covers the project's struggle for transformative change, including the influence of recent EU laws on nature restoration, forest monitoring and deforestation.

Towards nature-based planning in municipal planning – lessons from a case study

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Keywords: Municipal planning, biodiversity, ecosystem services, nature-based solutions

Sustainable development of metropolitan regions implies energy and transport effectiveness, while simultaneously promoting biodiversity (BD) and ecosystem services (ES), including climate adaption. Nature-based solutions (NBS) have been put forward to address these complex and often conflicting demands on landscapes. To avoid fragmented and disconnected NBS planning efforts, transformative change of the spatial planning system is. This study aims to explore planning activities for promoting BD and ES in current planning practice in Sweden, in the rapidly growing metropolitan region of Stockholm. We conducted a case study involving three adjacent municipalities in a gradient from urban to peri-urban landscapes, addressing questions of NBS for transformative change. We found that despite high ambitions in policies and plans, planning often seems to be reactive, and in late stages of e.g. urban development, many NBS initiatives are lost due to economic priorities. Success stories tend to relate to proactive and long-term joint activities related to individual municipalities. We found an overall lack of coordination and joint framework to promote BD and ES across the landscapes. Ways forward would be to enhance integrated landscape thinking across planning siloes, merging the currently rather separate planning efforts into a proactive nature-based planning, jointly addressing main sustainability issues.

The East Vättern Scarp Landscape biosphere reserve - from conflict to dialogue and cooperation

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Keywords: measurable goals, sustainable production, biodiversity, habitat thresholds

The East Vättern Scarp Landscape (Östra Vätterbranterna) is one of Sweden's seven biosphere reserves – a mosaic landscape with high biological and cultural values. It has a unique mix of deep lakes, open semi-natural grasslands and old-growth forests on the steep slopes. In 1998 a forum for resolving conflicts between landowners, authorities and local conservation groups were started with focus on conservation of biodiversity in the area, especially on forest land. After several years, the project turned into a dialogue phase where various aspects of the use of the different values of the forest were discussed including grazed areas. Over time, it developed into more of a collaborative project. The next step forward was to describe concrete goals and ideas for how ecologically functional landscapes could be achieved. A landscape ecological gap and functionality identified habitat threshold values for a number of species and these were used to map the functionality and create measurable goals for ecological sustainable landscapes. Based on this, we identified models for sustainable production in East Vättern Scarp Landscape where ecology, economics and human well-being can go hand in hand. The way to achieve success is collaboration between a variety of actors.

The Cornwall Beaver Project: A case study of rewilding and institutional transformation to create wetlands

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Keywords: rewilding, wetlands, geomorphological processes, institutional transformation

This case study applies a social-ecological systems framework to the story of an experiment to learn about use of beavers to create wetlands and reduce flood risk. Lessons learned from the project are interwoven with the accounts of similar work elsewhere in the UK and in Europe that show how innovation and social learning leads to changes in the relationship between humans and beavers, and institutional changes that provide a regulatory framework to support the large-scale reintroduction of beaver. Use of the social-ecological systems framework encourages a focus on the importance of geomorphological processes that regulate habitat for biodiversity conservation and the various social processes of scaling out, up and deep that lead to institutional change. In this regard, the case study serves as an example of the kinds of conservation practices and supporting research required to change the existing paradigms that currently favour over-exploitation of biodiversity to support economic growth. The emerging coevolution of beavers and humans illustrate how the paradigm of human domination of nature may be replaced with stewardship of nature. The use of the social-ecological framework illustrates how reductionist science and systems

science can be used together to improve our understanding of ecosystem and landscape processes.

From landfill to bird sanctuary

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Keywords: circular economy, biodiversity, restoration, transformation, mass balance

The project epitomizes the transformative shift from environmental knowledge to actionable sustainability. The project involves the conversion of the Lassabacka landfill into a biodiversity-rich natural area of Fågelbäcka. This endeavor highlights how thoughtful, knowledge-driven initiatives can lead to meaningful ecological restoration and community enrichment.

Primary objective was not only to remediate a polluted site, but to create a haven for local flora and fauna, fostering a thriving ecosystem. Through strategic planning and innovative techniques, the site has successfully transformed a once degraded landscape into a sustainable, multifunctional green space that benefits both the environment and the local community.

In Swecos presentation, we discuss the methodologies employed, focusing on the critical steps and key catalysts that facilitated this transformative change. We highlight the importance of interdisciplinary collaboration between ecologists, engineers, and local stakeholders to achieve the project's objectives. By sharing the success and lessons learned from Lassabacka, I aim to inspire and provide actionable insights that can bridge the gap between environmental knowledge and practical, impactful action.

Join me to explore how strategic circular and environmental restoration can serve as a model for future sustainability projects, ensuring the preservation of biodiversity for the benefit of our planet and our communities.

Poster presentation:

Assessing the Biodiversity Footprint of Wheat Production: A Case Study within the CircHive Project

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Keywords: Life cycle assessment, Land use change, LC-Impact, ReCiPe H

Biodiversity, the foundation of ecosystem integrity, is increasingly threatened by agricultural practices such as wheat farming. This decline undermines essential ecosystem services, including pollination, water purification, and soil fertility—key factors for sustainable agriculture and environmental health.

As part of the EU-funded CircHive project, which seeks to standardize biodiversity impact assessments for businesses, this study evaluates the biodiversity footprint (ecosystem quality) of wheat production across three farms supplying a pasta producer. Using the end-point LCA methods ReCiPe and LC-Impact, the analysis examines the effects of land use changes, resource consumption, and emissions on biodiversity.

Results, presented in figure 1 and 2, reveal substantial variation in biodiversity footprint, with key degradation drivers including land occupation, acidification, and climate change. Biodiversity-positive interventions, such as hedgerows and flower strips, effectively reduced the footprint in LC-Impact but ReCiPe did not reflect similar benefits, highlighting methodological differences in ecological valuation. These insights are essential for, especially, agricultural companies to refine sustainability strategies and mitigate biodiversity loss through optimized agricultural practices.

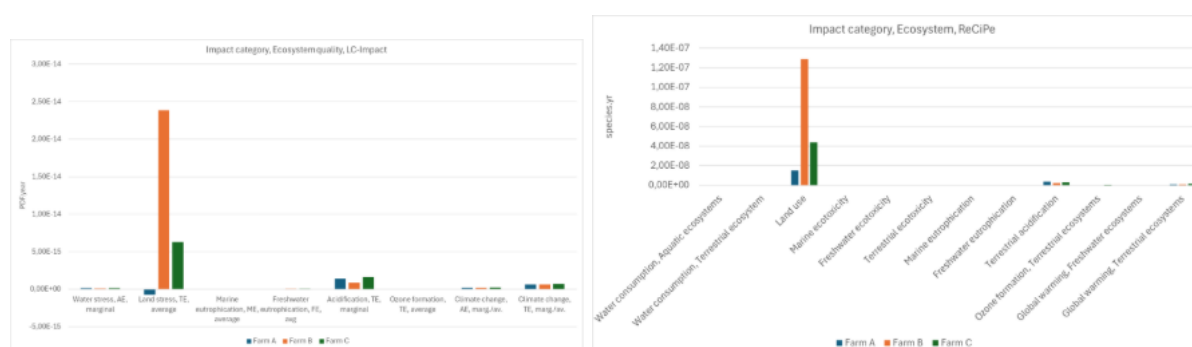


Figure 1. Impact categories contributing to potential disappeared fraction of species using the LC Impact method. Figure 2. Impact categories contributing to potential disappeared fraction of species using the

Mutilla europaea on Öland and its alvars.

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Keywords: *Mutilla europaea*, alvars, Öland, distribution, bumblebees

The females of *Mutilla europaea* (Linnaeus 1758) are nest parasites of bumblebees (*Bombus* spp.). Until recently *M. europaea* was classified as extinct on the island Öland in the Baltic Sea for reasons that were hard to explain scientifically. The species was still observed on the alvars on Gotland (another Baltic island) and in Estonia. New records on Öland have come to light and a more complete pattern of the distribution of *M. europaea* in Northern Europe is starting to form. The (re)discovery of *M. europaea* on Öland may represent a break in the general trend. The species may have increased in numbers, possibly due to conservation measures. From a biodiversity perspective, this is an example of how potential conservation measures can have positive effects but at the same time create new problems if they are not monitored. Since *M. europaea* parasitizes bumblebees and their numbers continue to decline on Öland, the species may be a contributing factor to the decline in bumblebees.

Effects of Species-Rich Forage Mixtures and Harvest Strategies on Biodiversity, Carbon Sequestration, and Yield

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Keywords: biodiversity, grass and clover, pollinator, harvest, agriculture

Field experiments in Denmark and Sweden have examined how species-rich forage mixtures affect yield, carbon sequestration, and pollinator diversity. Trials in Denmark showed that mixtures containing grasses, herbs, and legumes such as red and white clover produced comparable yields to fertilized grass-dominated leys, while increasing soil carbon storage due to deeper root systems. Legume nitrogen fixation also reduced fertilizer needs, contributing to lower climate impact.

Mixtures with multiple species significantly supported pollinators, especially bumblebees and hoverflies. Surveys showed that forage leys with clover and herbs consistently attracted more flower-visiting insects than mixtures of just grass and clover.

In Swedish trials, leaving parts of the field unharvested during the second cut led to a marked increase in pollinator abundance—particularly in late July and early August, when floral resources are otherwise scarce in the landscape.

Preliminary results indicate that combining multi-species seed mixtures with adaptive harvesting strategies can enhance farmland biodiversity without compromising forage yield. This approach presents a promising avenue for more sustainable grassland management.

Biodiversity future in critical earth system forests under a green growth socio-economic pathway

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Keywords: Biodiversity modeling, tropical and boreal forests, land-use change, shared socio-economic pathways, representative concentration pathways

Boreal and tropical forests underpin critical Earth system functions, including carbon storage and climate regulation, making their preservation essential for a safe operating space for humanity. Biodiversity is key to sustaining these functions, yet climate and land-use changes are driving its loss. Current estimates suggest that tropical forests are facing ongoing

biodiversity decline, but that land-use change under a sustainability-oriented Shared Socioeconomic Pathway (SSP1–RCP2.6), may alleviate some losses. Under the same scenario, boreal regions show a more dampened loss in species richness with spatially variable responses. However, current biodiversity assessments tend to rely on methods that miss fundamental ecological processes such as species demography and dispersal – critical for forecasting long-term metapopulation viability and ecosystem functionality. To address this gap, we apply a novel multi-species modeling framework that integrates demographic and dispersal processes into traditional habitat suitability estimates. Focusing on multiple key functional groups within mammals, we simulate biodiversity trajectories under SSP1–RCP2.6 to evaluate the feasibility of achieving a nature-positive trajectory—in this case, defined as population abundance equal to or above 2015 baselines—by 2100. Finally, our approach highlights the feasibility of large-scale simulations of metapopulation dynamics for global change research.

Remote sensing of microclimates for pollinating insects in semi-natural grasslands

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Keywords: Climate, biodiversity, bee, butterfly, geography

Climate change is increasing the frequency and magnitude of heat waves, a cause of severe stress to insect pollinators. Flying insects are highly dependent on tolerable weather conditions for flight initiation and normal biological function, but conservation efforts to mitigate the impact of heatwaves on biodiversity and related ecosystem services are currently lacking. Semi-natural grasslands are biodiversity hotspots which provide a variety of nesting and foraging resources for pollinators that can spill over into surrounding agricultural areas, benefitting crop production. These grasslands vary in topographic heterogeneity, woody vegetation cover, and herbaceous vegetation, all features which produce microclimates that may buffer or amplify ambient temperatures.

We used remote sensing to model the thermal properties of semi-natural grasslands in southern Sweden, determining the landscape features which contribute to temperature stability or amplification. We relate this data to pollinator surveys performed in each grassland to evaluate if pollinators utilize cooler microclimates in warmer landscape conditions as a means of environmental temperature regulation. We found microclimates created by landscape features were utilized by certain insect species for both cooling and warming regulation, and grasslands with more heterogeneous features provided more thermal stability both within day and across season.

Three Phases of Biodiversity and Climate Transformations

Kimberly Nicholas^{*1,2}

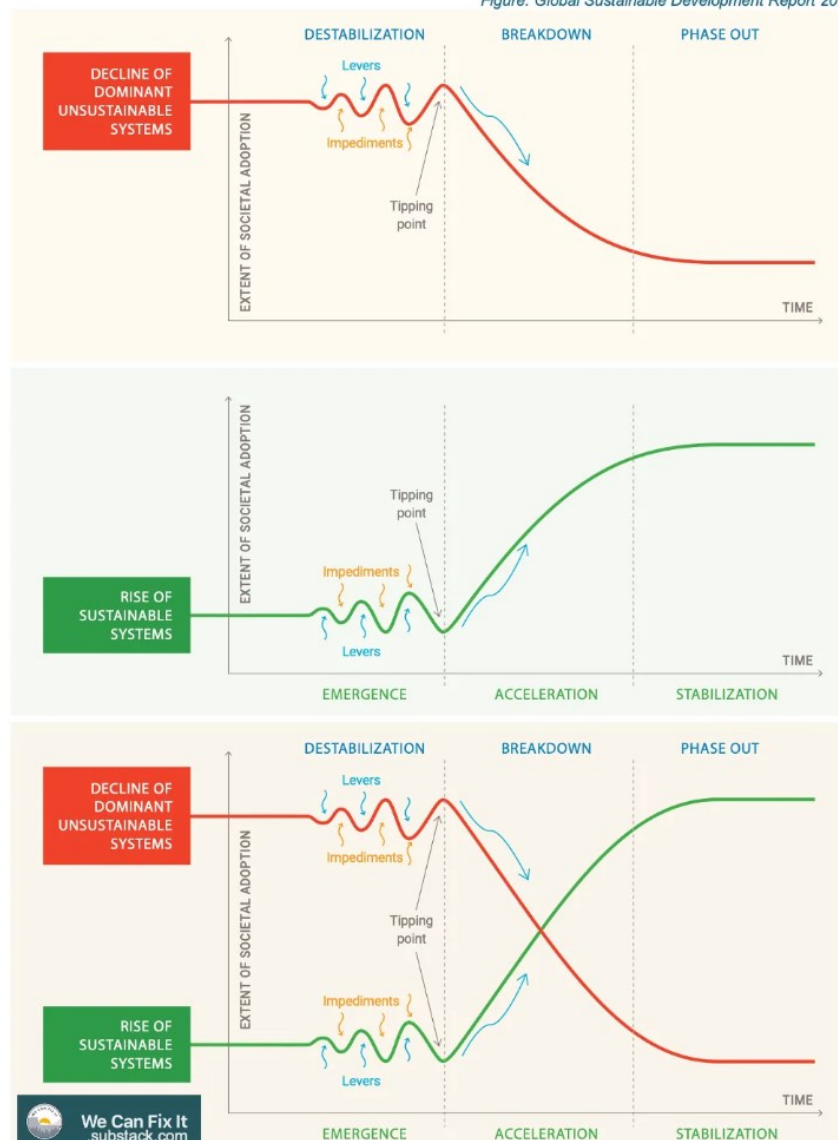
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Sustainability transformations are necessary to avoid the catastrophe of business as usual, but how to encourage such transformations is poorly understood. Here I use two recent frameworks of Avoid-Shift-Improve (Creutzig et al., 2022) and the Three Phases of Transformation, synthesized by the Global Sustainable Development Report (2023) to systematically map current and potential solutions to the climate and biodiversity crises that can support (and hinder) sustainability transformations. Across technical, political, economic, and cultural domains, I will propose empirical examples and theoretical principles that can help identify and support potential levers of transformation to scale up, as well as identify dominant system elements that need to be destabilized and phased out.

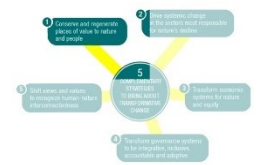
THREE PHASES OF TRANSFORMATION

Figure: Global Sustainable Development Report 2023



Three phases of transformation:

Emergence, acceleration, and stabilization unfold on two tracks: phasing out harmful systems and scaling up sustainable ones. For sustainability to rise, unsustainability must decline. Levers (like policy and innovation) help; impediments (like vested interests) resist. Source: Global Sustainable Development Report 2023.



Session S10 The transformative role of Research Infrastructures in supporting excellence in science and policy decision making

Session chairs: Matthias Obst & Margret Steinhorsdottir.

Swedish ecosystems are under intensive anthropogenic pressure requiring well-coordinated and cost-effective management strategies, as well as efficient science-policy interfaces. In this process, infrastructures play a critical role - not only through provision of important data for decision making, but also by offering collaborative platforms for scientists and policymakers.

We'll use this session to bring together representatives from key infrastructures serving monitoring and management of biodiversity. Talks, posters, and discussions should focus on how these infrastructures work today and how they may interact in the future. The goal of the session is to identify important transformative actions to be implemented by infrastructure networks in the medium term, including but not limited to:

- Implementation of cost-effective and scalable services for monitoring and management of biodiversity
- Generation of critical data products and tools for biodiversity management
- Boosting performance of infrastructures through coordination, collaboration, and increased interoperability

Standardized biodiversity monitoring – leveraging research infrastructures to get the best out of citizen science

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Keywords: Biodiversity monitoring, Systematic monitoring, Birds, Butterflies, Moths

Data from long-term standardized monitoring schemes of biodiversity is gaining more and more interest from the scientific community, in addition to its very basic purpose of “just” monitoring biodiversity changes in space and time. The reason is of course the threats that biodiversity face from changes in land use and climate. Inadvertently, the standardized protocols in monitoring have proven to provide excellent datasets both for deeper analysis of causes of biodiversity change and for modelling future scenarios. Most generic and large biodiversity monitoring schemes, notably in birds and butterflies, are based on large numbers of volunteers making observations according to standardized protocols, often close to where they live. In this session we want to highlight two important side-effects of biodiversity monitoring schemes and how research infrastructures can support these. 1. Citizens gain a better understanding of the scientific method. 2. Monitoring also gives them experience at various geographic scales. They see their local nature with new eyes and learn how their local findings translate to the scale of nations and continents. "Standardized biodiversity monitoring – leveraging research infrastructures.

Habitat diversity as a taxon-dependent tool for predicting red-listed forest species

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Keywords: Biodiversity proxies, Boreal forests, Conservation value assessment, Habitat diversity, Red-listed species

Habitat features linked to species niches are often used as proxies for biodiversity, typically through assessments of habitat diversity. However, these proxies are rarely evaluated in managed forest landscapes. As forests face increasing demands to address climate and biodiversity crises, Conservation Value Assessments (CVAs) based on habitat diversity are gaining traction to inform conservation and management decisions. We evaluated two widely used CVA protocols to determine their effectiveness in predicting the occurrence of red-listed species in boreal forests. The CVAs successfully predicted occurrences of wood-inhabiting red-listed bryophytes and fungi, but were less effective for epiphytic and epixylic lichens, or for capturing patterns across all three taxo-ecological groups. We identified threshold CVA values beyond which the probability of finding red-listed species exceeded 50%, helping define conservation priority zones. Additionally, sites with red-listed species consistently supported higher local richness of non-red-listed species within the same groups. These results suggest that CVAs based on habitat diversity are effective tools for identifying conservation priorities for some taxa. However, to fully capture forest biodiversity, especially across diverse ecological guilds, CVAs should be complemented with additional approaches targeting species-specific and microhabitat-level variation.

Getting to Know the Unknown – Identifying Biodiversity Blind Spots in Sweden through GBIF Occurrence Data

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Keywords: biodiversity data gaps, GBIF, data mobilization, data availability

High-quality biodiversity data is essential for ecological research, conservation planning, and environmental policy. The Global Biodiversity Information Facility (GBIF) play a crucial role by aggregating and standardizing biodiversity records from diverse sources, enabling open access for researchers and decision-makers. However, data coverage is often uneven on spatial, temporal and taxonomic levels, limiting the accuracy of biodiversity assessments, long-term monitoring, and targeted conservation efforts.

In this project, we conduct a data gap analysis of GBIF-mediated biodiversity data for Sweden to identify critical deficiencies and guide future data mobilization efforts. By comparing cleaned occurrence records with an idealized reference dataset, we will assess

actual data coverage against this baseline. This allows us to highlight under-sampled regions, underrepresented taxonomic groups, and periods with limited records.

Our results will provide a foundation for targeted data mobilization by national agencies, researchers, and citizen science initiatives. By guiding efforts to fill critical data gaps, this project contributes to a more complete and balanced representation of Swedish data within the GBIF data infrastructure. This, in turn, improves the quality and usability of openly accessible biodiversity data, strengthening its value for ecological research, policy development, and long-term biodiversity monitoring aligned with national priorities and global commitments.

The transformative power of marine research stations: the Kosterhavet National Park example

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Keywords: Kosterhavet National Park, living lab, co-management, Tjärnö Marine Laboratory

Kosterhavet National Park is the first marine national park in Sweden. It encompasses unique marine environments around the 247 m deep Koster trench, connected with deep waters in the North Atlantic, and a home for 12,000 marine species. The national park was open in 2009 after a long negotiation process involving authorities, municipalities, local communities, stakeholders and researchers. Tjärnö Marine Laboratory, Gothenburg University, located at the border of the National Park, has played an important role in the process by providing biodiversity data, establishing trust relationships with the fishermen and other local stakeholders, and acting as a dialog arena. Today the Kosterhavet benefits both people and nature and combines protection of unique marine environments with tourism and sustainable shellfish fishing. It is governed by the Kosterhavets delegation, a unique organisation with representatives from the Västra Götaland County Administrative Board, Tanum and Strömstad municipalities, the local community associations, the local fishermen's organization and the Tjärnö Marine Laboratory. In other words, this is an excellent example of a “living lab” (even if the term has not been coined at that time yet). Let's look what made it a success story, and how we can apply the model in other places!

How can the Swedish National Data service support the support the biodiversity community?

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Keywords: FAIR; Open Science; Interoperability;

The Swedish National Data Service (SND) is a national research infrastructure supporting accessibility, long-term preservation, and responsible reuse of research data. Central to SND's mission are three key services:

- Researchdata.se – a national data portal offering integrated access to datasets from multiple repositories, including SND's own DORIS, the Swedish Biodiversity Data Infrastructure (SBDI), and the Swedish Infrastructure for Ecosystem Science (SITES).
- SND DORIS – a repository for publishing and sharing datasets from individual research projects, supporting high FAIR compliance.
- The SND Network – a nationwide community promoting best practices in data management across institutions.

We will share insights from ongoing efforts to improve data and metadata interoperability and integration, focusing on environment- and biodiversity-related infrastructures. The goal is to highlight how SND's services can support the biodiversity community by improving data discovery, enabling data reuse, facilitating information exchange between organizations, and strengthening links between research and environmental monitoring.

We welcome discussion on how these services can better support biodiversity science and open research, and how SND can collaborate more effectively with related infrastructures to meet the needs of the biodiversity community.

Poster presentation:

A toolbox for metabarcoding data in the Swedish Biodiversity Data Infrastructure (SBDI)

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Keywords: Biodiversity informatics, Amplicon sequencing, eDNA, GBIF, Living Atlas

The Swedish Biodiversity Data Infrastructure (SBDI) provides a national platform for publishing, harvesting, and analyzing species observation data, supporting interdisciplinary research on biodiversity and ecosystems. Recognizing the growing importance of molecular methods such as metabarcoding of environmental DNA for documenting the diversity of life across all kingdoms and biomes, SBDI has developed a suite of tools and services for DNA-derived biodiversity data. These include: 1) a submission guide that simplifies the process of depositing raw sequence reads and metadata in the European Nucleotide Archive (ENA); 2) a flexible and user-friendly workflow (nf-core/ampliseq) for denoising and taxonomic annotation of metabarcoding data into classified Amplicon Sequence Variants (ASVs); 3) a web interface (ASV portal) for submitting and exploring ASVs and associated species

occurrence records in SBDI, with features such as sequence alignment (BLAST) search, taxonomic filtering, and download of condensed Darwin Core (DwC) archives; and 4) an R package (asvoccuR) for transforming downloaded DwC archives into ASV table format, facilitating integration into R-based analysis workflows.

Assessing connectivity and habitat suitability of the green infrastructure in boreal forest of Sweden

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Keywords: green infrastructure, connectivity, continuity forests, restoration, Sweden

Global natural and primary forests, vital for biodiversity, are shrinking due to human activities. Fennoscandia's boreal forests have faced intense clearcutting since the mid-20th century, leaving limited old-growth areas. Sweden has formally protected some primary forests, but other High Conservation Value Forests (HCVF) remain unprotected, though both are part of a national HCVF network. Recently mapped "proxy continuity forests" (pCF), older forests uncut since the mid-1900s, offer potential for strengthening this network as green infrastructure. This study analyzes pCF's role by evaluating spatial overlap with HCVF, conducting connectivity analysis, and assessing habitat suitability for virtual pine, spruce, and broadleaf specialists. Results show that including pCF outside HCVF significantly boosts the structural connectivity of protected forests. Regional differences exist in securing habitat through unprotected primary forests. Adding these forests greatly increases habitat for low-demanding spruce and pine species. However, insufficient broadleaf forests remain for associated species. The study concludes that landscape-scale forest restoration is crucial, particularly for high-demanding pine and spruce species and broadly for broadleaf-dependent species.

The Swedish Reference Genome Portal: A new service facilitating access and discovery of genome data studied in Sweden

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Keywords: Genome sequencing and annotation; data visualization; outreach tool

The Swedish Reference Genome Portal (<https://genomes.scilifelab.se/>) is a new service aiming to facilitate access and discovery of genome data of non-model eukaryotic species studied in Sweden. For each species, the portal aggregates taxonomic data, genome assemblies and annotation tracks, metadata, and links to external resources in a single place. The genome data is displayed in an embedded JBrowse 2 genome browser, allowing for visual representation of a variety of data types, and sharing of sessions between users. With this service, we aim to make genomics data more accessible for all users regardless of their prior level of bioinformatics knowledge, and promote FAIR data sharing. The poster will introduce key features of the Genome Portal and illustrate how researchers affiliated to Swedish institutions can submit their data. We are always interested in new additions to the portal! If you are interested, please contact us.



Session S11 Leveraging the transformational potential of digital technologies for biodiversity conservation and governance

Session chairs: Björn-Ola Linnér, Victoria Wibeck & Juliana Porsani

Digital technologies are transforming biodiversity conservation and governance. Tools like satellites, drones, camera traps, and acoustic sensors can capture data globally, enhancing species discovery and ecosystem monitoring, particularly when paired with genetic sequencing and AI. These technologies also provide standardized, verifiable environmental data, enabling governmental and private actors to set and report on measurable targets. Additionally, they hold promise for more equitable, transparent, and direct benefit-sharing with local communities, including indigenous peoples, who often serve as environmental stewards.

However, these potentials are accompanied by challenges and risks, including issues related to data ownership, the environmental and climatic costs of the digital revolution itself, and the further marginalization of traditional ecological knowledge. Considering these unprecedented opportunities but also risks, for this panel we invite scholars and practitioners to share and discuss different perspectives and experiences on how digital tools could be harnessed responsibly and inclusively to tackle the biodiversity crisis.

Taxonomy in action: a look at different technological approaches.

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Keywords: Data standardisation; taxonomic capacity; citizen science

TETTRIs - a Horizon funded project - aims to transform taxonomy's role in biodiversity by boosting taxonomic capacity, training experts, engaging citizen scientists, and developing innovative digital tools, ensuring accessible, sustained, and integrated taxonomic knowledge for research, conservation, and decision-making across Europe.

In an effort to engage citizens in taxonomic activities, TETTRIs launched a cascade funding program for 12 third party projects, here we will present the perspectives and lessons learned by 3 of these projects regarding the use of different technologies.

CRYPTERS studies wolf spiders' genetics using multilocus markers and other genetic markers to identify isolated populations. Combining genetic insights with climate-driven habitat models, they craft targeted conservation strategies for Mercantour-Alpi Maritime Park.

TNLS is creating a unified name-matching system using stable identifiers to accurately link species names across large datasets. This transparent tool enhances biodiversity research by connecting data despite naming differences. Future plans include integration with marine and plant datasets.

[FOOTPRINTS-CITSCI](#) engages the public in tracking wildlife by documenting animal footprints, using citizen science to gather data on elusive species. Combining public participation with machine learning, the project enhances biodiversity monitoring, supports conservation, and fosters nature connection, making wildlife study accessible and impactful across Norway's diverse ecosystems.

Automation and artificial intelligence in biodiversity: Case studies from foraminiferal research

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Keywords: Foraminifera, computer vision, artificial intelligence, automation, image analysis

Technological advancements in automation and artificial intelligence in recent years have had profound effects on the processing of visual data, with fruitful applications in medical science, manufacturing, agriculture, and beyond. Biodiversity research has also been an important target for these new methodologies, particularly with regard to classification and segmentation (i.e., localization via pixel-wise classification) tasks that allow for rapid taxonomic identification and cataloguing of organisms when handling large populations, both in situ (e.g., wilderness camera traps) and ex situ (e.g., collected samples processed and imaged in labs). We present three case studies on the use of automation and computer vision with foraminifera (shell-building protozoa used extensively in environmental and climate studies), including: (1) segmentation of planktonic foraminifera from fossil samples across the K-Pg mass extinction; (2) segmentation/quantification of modern planktonic foraminifera from both plankton tows and sediment cores from the Central Arctic Ocean; and (3) segmentation/identification of benthic foraminifera from the Swedish west coast for environmental monitoring. These studies illustrate the breadth of possible applications of AI and automation in biodiversity research, demonstrating their utility in the face of increasing threats to ecosystems and the need to rapidly and accurately monitor, quantify, and collect biodiversity data.

Harnessing digital technologies for marine biodiversity conservation: Forecasting non-indigenous species with genetic data and habitat suitability models

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Keywords: Genetic monitoring, Habitat Suitability Models, Marine Protected Areas, Non-Indigenous Species, Biodiversity Conservation.

Digital technologies are transforming biodiversity conservation by enabling precise, scalable monitoring of ecosystems. This project integrates genetic data from Autonomous Reef Monitoring Structures (ARMS-MBON) and Habitat Suitability Modeling (HSM) using the BIOMOD2 framework to enhance the detection and forecasting of non-indigenous species (NIS) in European waters. High-throughput sequencing of COI and 18S markers, alongside thorough manual curation, identified 63 NIS across diverse European marine regions. These occurrences are combined with environmental variables from Bio-Oracle (e.g., temperature, salinity, distance to land) to generate HSMs, predicting current and future habitat suitability for these species under multiple climate scenarios. Projections will be used to predict areas vulnerable to future invasions and will further be assessed against Marine Protected Areas (MPAs) and primary shipping routes, providing insights into NIS spread and guiding management strategies. This approach demonstrates how digital technologies, including genetic monitoring and predictive modeling, can support transparent, scalable, and data-driven biodiversity management while acknowledging potential challenges.

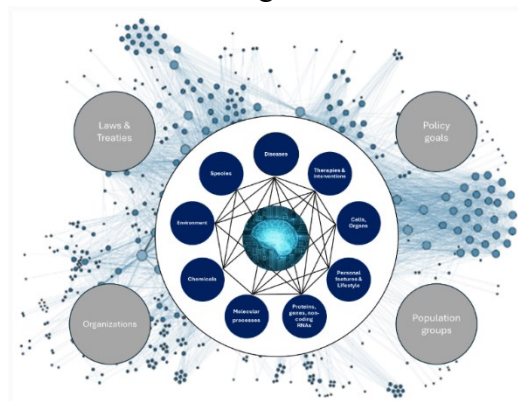
Using artificial intelligence to optimize ecological restoration for climate and biodiversity

Daniele Silvestro^{1,2,3,4,13}, Stefano Gorla^{3,5}, Ben Groom^{6,7}, Piotr Jacobsson⁸, Thomas Sterner^{3,9,13}, Alexandre Antonelli^{2,3,10,11,12,13}

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The restoration of degraded ecosystems can provide critical contributions to help mitigate climate change and bend the curve of biodiversity loss. Depending on the primary objective – such as maximizing carbon sequestration or protecting threatened species – and within the boundaries of budget constraints, different spatial priorities have been identified at global and regional scales. Funding mechanisms to support such work comprise public sources, philanthropy, and the private sector, including the sales of carbon and biodiversity credits. However, effectively exploring tradeoffs between restoration objectives and estimating the price of biodiversity and carbon credits to design financially viable projects remain



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Keywords: artificial intelligence, information extraction/synthesis, environment, nexus, knowledge graphs

We face closely intertwined crises related to biodiversity, climate change, global health and inequality. Unfortunately, the knowledge that could help overcome these existential crises is scattered across millions of scientific articles, reports, policy documents, databases, and individual datasets, far exceeding human processing capabilities. This hinders evidence-based research, innovation and policymaking that would enable a sustainable transformation.

Artificial intelligence (AI) can help overcome this problem by rapidly identifying and synthesizing information on a large scale. We have developed an easy-to-use customizable AI tool that extracts information about key entities such as species, habitats, chemicals, environmental processes, genes/proteins and diseases from any large text collections. We use this to extract information from large scientific literature databases, which is then visualized in intuitive interaction graphs (“nexus knowledge graphs”) and further enriched with information from databases and datasets. This helps reveal the intricate interplay between ecosystems and human society from molecular pathways to complex systems leading to actionable insights. For example, we can reveal links and feedback loops connecting

individual pollutants and environmental processes with various species and habitats or identify research biases and knowledge gaps. Thereby, our tools can support decision-making related to biodiversity, climate change, medicine, human society in various contexts and enable meaningful transformative change.

Digital Promises and Perils: Perspectives and Experiences from Indigenous Peoples and Local Communities

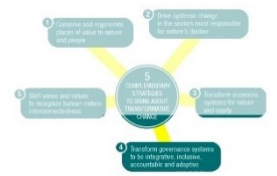
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Keywords: digitalisation, indigenous Peoples and Local Communities (IPLCs), data sovereignty, biodiversity governance, epistemic plurality

This presentation centres on how digital technologies are being harnessed by Indigenous Peoples and Local Communities (IPLCs) to advance biodiversity governance and territorial rights. Drawing on event ethnography and interviews with IPLC leaders at COP16 (Cali, 2024), we move beyond both techno-optimism and dystopian critique to analyse how digital tools simultaneously enable visibility, recognition, and coordination while also generating dependencies, exposure, and epistemic compromises. By foregrounding ongoing, on-the-ground experiences, the findings show that digitalisation fosters new ways of seeing and knowing: counter-mapping, sensors, and digital platforms render territories, harms, and values legible to bureaucracies and legal systems, opening avenues for the recognition of rights and lived experiences. However, this enhanced agency comes with risks of data appropriation by external actors, territorial exposure, infrastructural dependence, and the erosion of ancestral epistemologies. The accounts also highlight practices of resistance (such as selective data disclosure, refusal of specimen extraction, and careful curation of shared information) through which IPLCs assert control over knowledge production and circulation. We argue that the stakes of digitalisation lie less in the tools themselves than in questions of data governance and infrastructural control. A research and policy agenda centred on data sovereignty, community-controlled infrastructures, and forms of participation that respect epistemic plurality is essential if digital technologies are to maximise their potential to empower IPLCs and strengthen biodiversity protection in their territories.



Session S12 Är svensk naturvårdsförvaltning transformativ? Behov av förändrade perspektiv i skydd och skötsel av biologisk mångfald, från forskning till implementering

Sessions ordförande: Anna Forslund

Seminarier utforskar hur transformativ svensk naturvårdsförvaltning är och om det finns behov av förändrade perspektiv i skydd och skötsel av biologisk mångfald. IPBES senaste rapport "Assessment Report on the Underlying Causes of Biodiversity Loss and the Determinants of Transformative Change and Options for Achieving the 2050 Vision for Biodiversity" är utgångspunkt för seminariet. Korta presentationer av åtgärder och strategier inom svensk förvaltning följs av en paneldebatt på temat, "Är svensk naturvårdsförvaltning transformativ?"

Hur effektivt är svenskt områdesskydd i att minska habitatförlust vid förändringar i markanvändning och klimat? / The role of area-protection in reducing habitat loss in an age of climate and land-use change

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Keywords: Naturvård, miljömål 30 x 30, områdesskydd, biologisk mångfald, habitatförlust / Nature conservation, 30 by 30, area-protection, biodiversity, habitat loss

En vanligt förekommande åtgärd för att skydda habitat och biologisk mångfald är att bevara värdefulla naturområden som nationalparker, naturreservat och andra typer av skyddade områden. Miljömålet att skydda 30% av världens yta tills 2030 närmar sig. Därför är det extremt viktigt att bedöma hur effektiva de nuvarande skyddade områden i Sverige är, i en tid då både ändringar i klimat och markanvändning drabbar den biologiska mångfalden. I detta projekt utvärderar vi om skyddade områden minskar habitatförlust genom att följa förändringar i habitat, från den historiska ekonomiska kartan till modern marktäckedata, i såväl skyddade som oskyddade områden. Vi analyserar vilken roll klimatförändringar spelar i hur mycket habitat som behålls i skyddade kontra oskyddade områden. Vi jämför även effektivitet av svenska skyddade områden i ett internationellt sammanhang och undersöker hur olika typer av områdesskydd – (1) formella skyddade områden med bevarande av höga naturvärden som huvudsyfte, som t.ex. naturreservat, (2) andra effektiva areal-baserade skyddsåtgärder (OECMs), som t.ex. militära övningsfält, och (3) formella skyddade områden med bevarande av landskapet som huvudsyfte, som t.ex. riksintressen för naturvård - bidrar till bevarande av habitat.

(in English)

One of the most common ways to protect against habitat destruction and benefit biodiversity is to preserve valuable pieces of nature in national parks, nature reserves and other protected

areas (PAs). With the 30 by 30 target of protecting 30% of the world's surface by 2030 drawing closer, it is crucial to assess the effectiveness of the current Swedish PA network, compared to an international context, in an era of both climate and land-use change. We assess if PAs prevent the loss of valuable habitat by following the changes in habitat from digitized historical land-use maps to modern day land-use maps, both in protected areas and outside in unprotected areas. We test which role climate change plays in how much habitat is retained in protected versus unprotected areas. We also present how different type of protected areas – (1) formal protected areas with the main purpose to conserve biodiversity and habitats, such as nature reserves, (2) other effective area-based conservation measures (OECMs), such as military training areas, and (3) formal area designations to protect a landscape, such as national interests for nature conservation (riksintressen för naturvård) – contribute to retention of habitat.

Vilka transformativa förändringar för att vända den nedgående trenden i biologisk mångfald i vårt jordbrukslandskap?

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Keywords: Naturrestaurering; jordbrukslandskap; biologisk mångfald; implementering

Naturrestaureringsförordningen sätter ambitiösa, långsiktiga och bindande mål för att förbättra förutsättningar för biologisk mångfald i våra ekosystem, och vända de nedgående trender i mängd och kvalitet av värdefulla habitat, djur och växtpopulationer. För jordbrukslandskapet medför detta utmaningar i form av målkonflikter med produktion och lönsamhet, komplexa samspel med redan existerande, olösta ekologiska och socio-ekonomiska hållbarhetsproblem, inklusive en högre grad av global osäkerhet. Med utgångspunkten i den nyaste forskningen kommer jag att belysa vilka transformativa perspektiv och ansatser – inom ekologi, teknik, styrmedel och samhället - kan behövas för att kunna genomföra den systemiska och storskaliga förändringen som krävs för att både restaurera natur och bedriva hållbart jordbruk.

Implementing the Nature Restoration Regulation in Swedish forests

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Keywords: Biodiversity, Resilience, Multifunctionality, Stakeholders, Value chains

As a part of the EU-project SUPERB on upscaling forest restoration, we provide an overview of what the Nature Restoration Regulation implies for Sweden and suggest a set of recommendation for its implementation. These build on experiences from the Vindelälven-Juhtátahkka Biosphere Reserve, as a Swedish SUPERB case study, and broadly on knowledge gained on European scale from the project. We define restoration as actions that strengthen the ecological functionality of forests and forest landscapes, including biodiversity and resilience – while taking into account other aspects such as timber and forest resources, reindeer husbandry, recreation, tourism and other societal benefits. We emphasize the role of individual forest owners and the opportunities that come with alternative forestry methods, while also acknowledging barriers such as conflicting legal frameworks, economic constraints, and modified timber supplies. Recommendations include enhancing landscape-level planning, improving collaboration among practitioners, researchers, and stakeholders, and developing adaptive financial and regulatory instruments to support long-term restoration outcomes. A successful implementation of the regulation could be a starting point for a future-oriented forest management focusing on multifunctionality recognizing the many values that forest and forest landscapes provides and opens for new value chains in the forest sector.

How to fund protection and restoration of marine habitats

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Keywords: Biodiversity finance, ecosystem restoration, eelgrass, governance.

The Kunming-Montreal Global Biodiversity Framework recognise the urgent need to restore degraded ecosystems. Yet a significant gap remains between restoration targets and the financial resources available to achieve them. Traditional mechanisms like area-based protection are vital but insufficient, particularly in the face of competing land uses and limited enforcement. New financial instruments—including biodiversity offsets and emerging biodiversity credit markets — offer complementary approaches that may help close this gap, though their design and implementation raise complex ecological and ethical questions.

This presentation explores the interplay between conventional and innovative funding mechanisms through the lens of eelgrass restoration — one of the most productive habitats, playing vitally important roles in the marine food web and as carbon sink. The rapid decline of this habitat in Sweden as well as globally, have generated restoration initiatives. Despite both technical and ecological challenges, funding restoration in coastal areas, often without clear property rights, is specially demanding. Drawing on the case of eelgrass, we discuss the effectiveness and limitations of traditional conservation mechanisms, and examine how some market-based tools might be integrated to enhance restoration outcomes. We will also discuss

governance considerations necessary to align these instruments with biodiversity goals and ensure ecological integrity.

Uppföljning av åtgärder för adaptiv naturvårdsförvaltning – samverkan kring hotade vilda pollinatörer som exempel

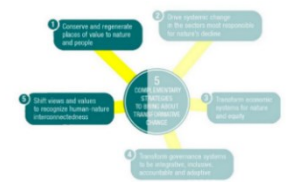
Maj Rundlöf^{*1}, Maria von Post¹, Georg K.S. Andersson¹, Weronika Axelsson Linkowski², Pavel Bina², Mikael Hellman³, Niklas Johansson⁴, Karin Johnson⁵, Cecilia Kardum Hjort¹, Tommy Karlsson⁶, Annika Lydänge⁷, Ola Olsson¹, Peter Olsson¹, Pål Axel Olsson¹, Pyret Ovesson⁸, Lars B. Pettersson¹, Gabrielle Rosquist⁹, Henrik G. Smith¹, Martin Stjernman¹, Michael Tholin¹⁰

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Keywords: adaptiv förvaltning, Naturrestaureringsförordningen, pollinatörer, samverkan

Naturrestaureringsförordningen ger möjligheter att vända de negativa trenderna för biologisk mångfald. Genom att följa upp de åtgärder som genomförs, kan lärdomarna bidra till adaptiv förvaltning och effektivare åtgärder i framtiden. Här lyfter vi ett exempel på hur bevarandeinsatser i samverkan kan utvärderas och några lärdomar vi tar med oss. Under åren 2020–2022 genomfördes bevarandeåtgärder för vilda pollinatörer inom åtgärdsprogram (VIP ÅGP), fokuserade på hotade solitärbin knutna till sandiga gräsmarker. Satsningen finansierades av regeringen, koordinerades av Naturvårdsverket, genomfördes av åtta länsstyrelser, kommuner och entreprenörer och utvärderades av Lunds universitet och externa biexperter. Uppföljningen planerades här efter att åtgärderna genomförts men tillsammans med de samverkande organisationerna. Tre lärdomar från VIP ÅGP-uppföljningen är att: 1) om uppföljning finns med tidigt i planeringen kan den designas resurseffektivt och med god riktighet, 2) standardisering av både planering och uppföljning av åtgärder som spänner över flera organisationer möjliggör en sammantagen utvärdering och 3) taxonomisk expertis ger högkvalitativa data som underlättar framtida uppföljning - lärdomar som har tagits med i ansökan om ett nytt åtgärdsprojekt. Metoder och data av god kvalitet kommer vara av ökad vikt framöver genom Naturrestaureringsförordningen, bland annat för pollinatörer, och är en förutsättning för adaptiv naturvårdsförvaltning och bevarad biologisk mångfald.



Session S13 Culture and transformative change

Session chairs: Katarina Saltzman

A transformative change in society stems from an understanding of urgency based on natural scientific facts. However, for it to happen, it must also be deeply rooted in the human mind and culture. In this session, we invite short and focused presentations (7+3 minutes) addressing various scientific and societal endeavors that explore the relationship between transformative change, biological diversity, and human culture—including the arts.

More than Water: Perceived Impacts of River Changes on People and Biodiversity

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Keywords: Cultural values, Biodiversity perception, Socio-ecological systems, Mixed-methods research, Sustainable river management

Rivers offer a range of values including recreation, aesthetics, inspiration, and sense of place. Understanding how people relate to nature, perceive river values, and experience the effects of restoration is key to balancing ecological conservation with sustainable development. In Sweden, public debate around river restoration often centers on weighing environmental benefits against the loss of fossil-free hydropower and potential impacts on cultural heritage. While restoration efforts typically emphasize hydrological or ecological outcomes, local residents' perspectives are often overlooked or included too late in the process. This study examines how communities and stakeholders experience and perceive landscape changes involving river restoration and hydropower. We focus on perceived changes in biodiversity and the natural environment, using a mixed-methods approach to explore how people's views are shaped by their connection to rivers and habitual use. The role of local communities, e.g., their participation and perceived influence in governance, and the types of knowledge they value in decision-making processes is also analyzed. Our findings highlight the need to better integrate local voices and diverse knowledge systems into river restoration planning for outcomes that benefit both ecosystems and society.

Social movements for more-than-human justice and representation

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Keywords: More-than-human representation, post-anthropocentrism, species embassy, species ambassador, Rights of Nature

It can be argued that the root cause of today's biodiversity crisis is destructive and greedy manifestations of anthropocentrism. The much-needed shift to post-anthropocentrism is a truly transformative change.

I will provide an autoethnographic account of two contemporary movements working to strengthen biodiversity and challenge anthropocentric notions of justice and representation. These movements, which seek to highlight and mainstream biodiversity in the public sphere, can be seen as supporters and amplifiers of specialist biodiversity scientists in their role as sentinels (Fossen, 2025).

The first example is the “Confluence of European Water Bodies” network, which represents about 30 damaged and/or threatened water bodies from all over Europe. The people involved are scientists of all kinds, lawyers, environmental activists and, last but not least, artists and cultural workers. In fact, the whole movement is very much art-driven. Another unifying factor is the legal tool and transformative idea of “Rights of Nature” that is embedded in the agendas of the participating groups.

The second example is a loosely connected network of advocacy groups from Northern Europe who are challenging anthropocentric notions of representation by exploring and staging “species embassies”. In September 2025, these groups will organise the “Nordic Summit of Species” in Århus.

The Craft Laboratory. Garden and Landscape Crafts - Indispensable Tools for Biological Cultural Heritage Preservation

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Keywords: Craft science; traditional knowledge; garden and landscape crafts; biological cultural heritage

Biological cultural heritage (BCH) comes in many forms. From the multitude of vegetables and perennial flowers pertaining to historical gardens to the overwhelming diversity of a well-managed meadow. Whereas “wild” diversity (including BCH) forms the basis for ecosystem services, the diversity of our grown heritage contains genetic diversity that may prove important in the face of climate change.

Besides both being under threat, all these different types of BCH have one thing in common – craftsmanship. The knowledge of what to do, how to do, when to do, and not least – when not to do. Hence, while craftsmanship in gardening and landscape management is indeed skills of the hand, to an equal extent it is the skills of the eyes, where timing of a correctly measured effort is key. This tacit knowledge has traditionally been passed on from master gardener to apprentice and (in the case of landscape management) from parent to child. It also holds important keys to the reconstruction, restoration and preservation of biodiverse ecosystems and future food.

This talk presents how the Craft Laboratory in Mariestad works with the rediscovery and dissemination of traditional garden and landscape crafts; in research, education and outreach through professional networks and publications.

Fire and herbivory – key drivers of temperate open ecosystems and biodiversity

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Keywords: consumer control, fire, herbivory, open ecosystem

The decline of open habitats is an important reason behind the ongoing loss of biodiversity. Understanding the drivers of habitat openness is a key factor in preventing the continued loss of these ancient ecosystems. In other continents, fire and herbivory are well-studied and identified as important processes in preventing succession in open habitats. However, in Europe, the concept of consumer control, i.e. the consumption of plant biomass by fire and large mammalian herbivores, is poorly studied, especially in the northern temperate areas.

In a large field experiment in a Swedish wood-pasture, we studied how prescribed grass fire and cattle, alone or in combination, affected the survival and growth of woody vegetation. The study included both planted tree saplings of common European species and natural regeneration. In addition, we studied the effect of these consumers on the establishment and reproduction of open habitat forbs of local origin. Without fire and herbivory, the woody vegetation soon dominated and out-shaded the forbs, leading to conversion from an open grassy ecosystem to a forest.

Our experiment provides experimentally based insight into underlying mechanisms of landscape openness in regions where abiotic factors support the formation of dense temperate forest.

Reimagining Outdoor Recreation: The Role of Place for Outdoor Reconnection

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Keywords: Outdoor Recreation; Human-Environment Relations; Place-Based Connections; Pro-Environmental Attitudes

Spending time outdoors is often praised as a remedy for the modern disconnection from other-than-human lifeforms and their environments. Such contact is vital for nurturing pro-environmental attitudes in an era of ecological crisis. In the Nordic countries, outdoor recreation is embedded in many people's lifestyles, suggesting a close relationship with nature.

Challenging this understanding of outdoor recreation, the presentation draws on empirical insights from single-day recreational walks to reflect on the transformative potential of outdoor recreation. Using the concept of place, it introduces a distinction between outdoor recreation and outdoor reconnection. The former typically involves passive appreciation of nature, often made possible by car travel and focused on new or unfamiliar landscapes. The latter, by contrast, emphasises active engagement and care for the environment, fostering deeper, place-based connections.

Because place is rooted in personal attachment and familiarity, this distinction becomes crucial. While outdoor recreation may offer temporary escape, outdoor reconnection invites sustained presence and responsibility – encouraging care for the persistence of the environments we come to know intimately. Lastly, this elaboration is also an exploration on how thinking through place offers new ways of understanding and relating to biodiversity.

Protecting elephants through science and dance: a powerful environmental education approach

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Keywords: African savannah elephant; Conservation; Ethology; Dance; Environmental education.

Loxodonta africana faces an uncertain future due to significant anthropogenic pressures including habitat loss, human-elephant conflict, and poaching. Addressing these challenges requires conservation efforts at both local and global levels, supported by robust legislation, scientific research, and education.

Art, particularly dance, has emerged as a dynamic tool for enhancing traditional educational methods by conveying scientific content in different ways. Dance can highlight the similarities between human and non-human bodies, fostering a deeper understanding and tolerance of elephants. Additionally, it serves as a powerful tool to convey information and increase awareness.

This work explores a novel initiative that combines science and dance to raise awareness about elephant conservation. Two methodologies were developed in two countries. In Portugal, dance students created a choreographic piece focused on elephant behaviour and the threats posed by poaching, which was subsequently presented to an audience. Meanwhile, in Botswana, several dance improvisation workshops engaged regular school students in exploring elephant behaviours and addressing human elephant conflict through movement.

The effectiveness of the methodologies was assessed through surveys, showing positive impacts on young people's education and awareness. By connecting young audiences with

elephant ethology and its threats, this innovative project offers a creative pathway for effective conservation education.

Fostering Learning at the CampLab: Developing Multispecies Living lab in the Wild

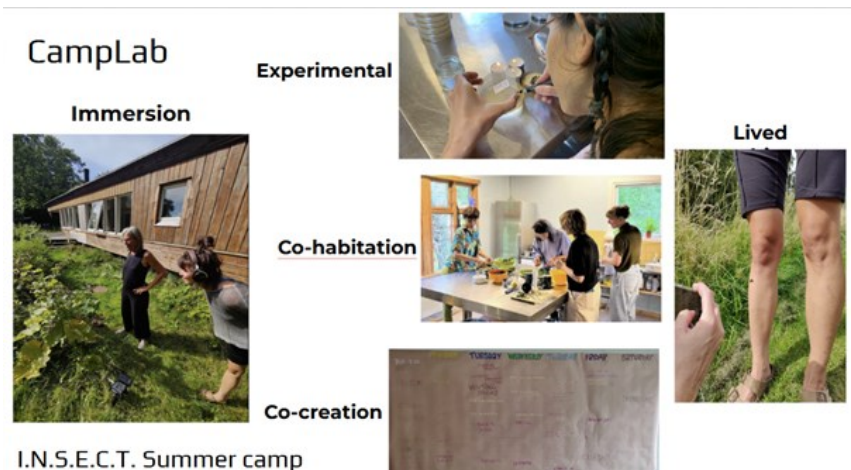
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Keywords: Multispecies design; Living lab; Learning; CampLab; Insects

Biodiversity decline represents one of the most urgent challenges. Living labs, innovative approaches based in real-life settings drawing on co-creation with multi-stakeholders, have been recently used as a possible solution to transform relationships of local communities to biodiversity. However, traditional living labs are often robust and challenging to set-up and sustain. We need to develop a novel approach which still holds the transformative potential for change but is possible to be sustained with less resources. To address this issue, we propose a CampLab. CampLab is an alternative type of living lab, which combines various ways of learning about and engaging with biodiversity. This lab enables integration of scientific, embodied and aesthetic knowledge, leading to development of more holistic and transformative relationships to biodiversity. We have developed this approach during I.N.S.E.C.T. Research summer camp, an annual event which brings together an interdisciplinary collective that works towards improving insect biodiversity through multispecies design. In our presentation we want to introduce the key building blocks of the CampLab, which each foster learning about insect biodiversity are: Immersion; More-than-human centered cohabitation site; Full co-creation; Experimental approach; Lived ethics daily explorations.



Poster presentation:

Oak-trees and Humans: Relation-Shaping Nature Care

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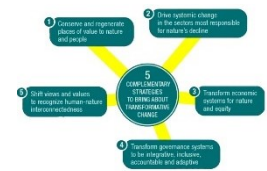
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Keywords: Care, Oak-Trees, Reconnection, Relational, Transformative change.

The project “Oak-trees and Humans: Relation-Shaping Nature Care” was one of the selected projects in the 2024 Region Västra Götaland call: “Civil society solutions for climate and biodiversity.” The project is based on scientific evidence of the current critical situation of oak both as a species and as a habitat in today's overgrown former open oak landscapes. It also recognises the special responsibility that Sweden and the Västra Götaland region have in the European context to care for oaks throughout their life cycle.

The transformative dimension of the project is that it challenges deeply ingrained ideas about technocratic management and the role of experts in nature management and conservation. Instead, the project promotes the involvement of civil society to develop relational practices of care and reconnection. Such practices can be found in the Swedish cultural heritage, and some still exist today, for example mowing guilds. Our project is a continuation of this heritage, extending it to the oak's life-world and the more than 1000 species living in the oak's environment, and pointing to a more relational and connected approach to the oaks in our everyday landscapes.

In our presentation we will share experiences and early findings from this ongoing project.



Session S15 Advancing social science dimensions on biodiversity to spur transformative policy and action

Session chairs: Stephen Woroniecki, Maria Ölund, The Focali research network, Tuija Hilding-Rydevik & Johanna Tangnäs,

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services states that transformative change is urgent. It's necessary to address the global interconnected crises related to biodiversity loss and the underlying causes of nature's decline and bring about a just and sustainable world in harmony with nature. However, spurring transformative policy and action is no straightforward task, and requires new types of approaches and knowledge. Social sciences can help in this task, by reframing the issue of biodiversity and asking powerful questions from a wide range of starting points.

In this session we will discuss what applying lenses from social sciences perspectives can reveal about biodiversity related problems and what societal conditions ultimately drive loss of biodiversity and impede action. Through contributions from social scientists and from practitioners this session aims to demonstrate how social science dimensions on biodiversity can help to lay the ground for transformative change in ways that are useful for policy and action. Since the input of social sciences has repeatedly been pronounced as important for biodiversity policy and practice, here we present an opportunity to delve deeper into these opportunities via talks, joint discussions and a concluding research-policy-practice panel.

On the imbalanced structures in biodiversity research and how to handle them

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Keywords: interdisciplinarity, SSH research, institutional changes

This presentation aims to discuss strategies and possible ways forward for improving interdisciplinarity in biodiversity research. It builds on my own experiences from engagements in projects, funding bodies, government advisory boards and multilateral platforms on local to global levels.

Notwithstanding the growing recognition that knowledge about humans and the human society must be included to accurately address the nature crisis, the remaining natural sciences dominance poses challenges for scholars from social sciences and humanities (SSH) entering the field. SSH researchers in biodiversity research often find it necessary to consider issues like – What gaps to start handle?; How to assure enough scientific quality from SSH perspectives?; How to recognize if ones influence is little more than an ‘SSH-alibi’?; How to balance between the urgency for actions and the need for complex analysis? The challenging issues relate to scientific collaboration as well as to interprofessional collaboration, as the nature conservation sector is largely populated by people with their education from biology.

Networking with SSH peers has proven to be constructive and helpful for addressing those matters. Overarching strategies for improving interdisciplinarity include institutional changes in academia, in governments and among funders.

Do more data really lead to better biodiversity protection? A social science perspective from ENABLElocal

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Keywords: Biodiversity data, Social science perspectives, Stakeholder engagement, Transformative change

Despite growing investments into biodiversity monitoring infrastructures, a critical question remains: Does having more data lead to more effective biodiversity policies and practices? The ENABLElocal project explores this question through a social science lens, focusing on the often-overlooked gap between data supply and actual demand by local decision-makers.

Through a combination of stakeholder workshops and surveys conducted in Czechia, Germany, and Sweden, we assess how different actors perceive, use, or disregard biodiversity data and the factors that influences how they are used, or not. Our findings suggest that transformative change is not only hindered by a lack of data availability, but also by institutional, cultural, and epistemic mismatches between those who produce data and those expected to act on them.

In a policy landscape where ‘more data’ is often seen as inherently better, we argue for a more reflexive and relational approach. Social sciences can help reframe biodiversity governance by foregrounding power, values, and usability, not just data quantity. This presentation reflects on methodological and conceptual implications of ENABLElocal and invites discussion on how to meaningfully integrate social science perspectives in biodiversity research and policy programmes like Biodiversa+.

Strategies for initiating and accelerating transformative change towards biodiversity: a cross-case analysis of nine European case studies

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Keywords: strategies, approaches, biodiversity innovation, cross-case analysis

This paper presents key findings from a cross-case analysis of nine case studies of biodiversity innovations and initiatives across Europe, covering a broad range of

geographical contexts and different sectors with high impact on biodiversity development (agriculture, urban development, marine/aquatic systems and forestry). Our empirical basis is data from informant interviews with researchers who follow and/or engage in participatory research in the case studies. The aim is to identify potentially fruitful strategies/approaches to support biodiversity gains while simultaneously supporting social sustainability (e.g. justice and equity). Through thematic analysis, we identify patterns in the strategies used to initiate and accelerate biodiversity innovations and initiatives in the different cases and discuss their transformative potential for biodiversity. The analysis mixes inductive and deductive features, drawing on previous research into e.g. transformative innovation and transformative governance strategies. The results show an emphasis on e.g. participatory grassroots empowerment, challenging ideas/discourses and power structures (including lobbying activities and activism) and networking to be among the main strategies used. There is a strong emphasis on information related strategies (e.g. knowledge/learning). Identifying and making use of bureaucratic opportunities is also a key strategy, including projectification in terms of raising financial resources and gaining access to competencies.

Setting the stage for multispecies justice in nature-based solutions

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Keywords: multispecies justice, more-than-human world, nature-based solutions, human-nonhuman relationality, governance

Previous research underscores the importance of addressing biodiversity loss within the framework of environmental justice. Some scholars introduce the concept of multi-species justice to recognize the needs and rights of non-human species and their agency. However, the concept remains largely theoretical, and practical entry points and strategies for its implementation are still unexplored. This paper focuses on operationalizing the concept of multi-species justice within the context of climate resilience and explores the practical barriers to addressing justice beyond humans in nature-based solutions (NbS) governance. Through focus group interviews with policymakers and practitioners across five European regions, this research investigates what justice means to them, how they relate it to NbS, and the extent to which nature and its stakeholders are perceived and integrated into their decisions from a relational justice perspective. The study explores the position of human and non-human connectedness through a lens of justice that transcends a human-centric perspective. It identifies the preconditions necessary for overcoming barriers to recognizing non-humans in decision-making processes. The paper confirms that two essential shifts are needed in decision-making processes. First, the recognition of non-human beings as actors with agency (ontological). Second, the embedding of diverse, continuous, and collaborative ways of knowing (epistemological).

‘Crafting’ agroecological ‘valuations’ in Sweden

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Keywords: craft, epistemic, valuation, ecosystem services, agroecology

Conventional agri-food systems have been connected to multiple interconnected issues such as biodiversity loss; health concerns; pollution; climate impacts (Pradhan et al., 2017).

This study responds to calls for social lenses and interdisciplinary transformation (Hebinck et al., 2021; Rööös, 2017), by developing a theoretical framework that brings together ‘craft’ from a degrowth perspective, with ‘valuation’ from a resourcification perspective.

‘Craft’ explores the ‘epistemic’ relationship between the producer and the product – shifting focus towards the process as a ‘whole’ (Rennstam and Paulsson, 2024). Simultaneously, ‘valuation’ aims to broaden and possibly reframe discussions on ecosystem services (Huber, 2016).

The project utilizes ethnographic data from 480 hours of observations on a small-scale agroecological farm in south Sweden, along with semi-structured interviews with actors.

It problematizes questions such as ‘what’ should be valued or measured and ‘how’; but also ‘whether’ it should be measured at all. It steers dialogues towards indirect values (Gómez-Baggethun et al., 2013) -- insurance: blue-green infrastructure enhancing biodiversity and water cycles towards resilience; health: knowledge about the origins of food; socio-cultural: spiritual engagement through craft, or activating the collective through epistemic communities. It explores how these values, while inherent in agroecological principles, have often been diluted, misinterpreted or co-opted.

Biodiversity and human wellbeing linkages from restored forests in India and Nepal

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Keywords: Human wellbeing, forest restoration, rural population, global south

The UN “decade for ecosystem restoration”, Bonn challenge and other international agreements aim to restoration millions of hectares of land in the coming decades. Many of the areas targeted for forest restoration in the global south are ecosystems with high biodiversity and a large resource-dependant population. Although forest restoration interventions often aim to improve ecological outcomes while providing societal benefits, the linkages between biodiversity and multi-dimensional human wellbeing outcomes is not well understood.

Drawing on a unique primary dataset of 50 villages and 1500 households combined with plot-level forest data on biodiversity and ecosystem functionality of 600 forests in Himalayan India & Nepal, we study how biodiversity relates to diverse human wellbeing outcomes – including material and economic needs, socio-cultural values, aesthetic experiences, and recreational activities. Our work advances knowledge of how biodiversity restoration objectives may also contribute to livelihoods and wellbeing of rural populations, with important insights for restoration policy and planning of interventions.

Both resource and heritage: A relational approach to forest owners' decision-making

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Keywords: forest management, human-forest relationship, biodiversity

Since the 1990's, Swedish forest policy emphasizes actors' responsibility for navigating goals of production, climate mitigation, and biodiversity protection. With private forest owners owning about half of the productive forests, there has been a growing scholarly interest in the values, motivations, and decisions held and made by private forest owners. This body of research has often focused on forest owners as foremost driven by economic motivation in their management. Other aspects of landownership, like sense of place, identity, and culture, have so far gotten less attention. Inspired by the recent surge in research and policy around relational values, the purpose of this study is to understand the relations between owners and their forests, what activities that shape these relations and how in turn they affect decision-making around biodiversity, climate mitigation, and wood production. Using walking interviews as a method, 22 private forest owners in Southern Sweden were interviewed in May-December 2024. The forest owners commonly expressed a strong connection to their forest, often as part of local or familial history, as identity formation and a rural livelihood. When it comes to decision-making, examples show relational values being connected both to taking biodiversity protection measures, as well as acting for maintained and increased production. The study contributes with nuances to the research area of relational values and gives empirical insights on what enables and hinders biodiversity policy implementation in privately owned forests.

How people collaborate for reconnecting to, with or in nature explored through pluralistic narratives

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Keywords: multi-functional landscapes, conservation, agency, place-based, urban-rural gradient

Conservation efforts face increasing pressures from surrounding land uses and conflicting goals, threatening vital social-ecological connections. Isolated actions or areas are vulnerable, and maintaining connectivity—both ecological and social—remains crucial. Yet while ecological links are often recognized, the social dimensions of connection receive far less attention in biodiversity policies. Social science perspectives on place-making, values, boundaries, and relationships are essential to inform and transform biodiversity governance.

The project RECONNECT explores how social connections shape conservation-related collaborations that strengthen human–nature relationships. Case studies from Göttingen (Germany) and Stockholm (Sweden) examine place-based values, framings of nature, and the role of power, politics, and agency in local biodiversity governance. Applying a relational lens to institutional change, the project highlights how social boundaries and cross-sector partnerships influence policy-relevant outcomes. In both cases, narratives express plural values that, combined with organizational analysis, reveal which collaborations need strengthening for safeguarding biodiversity embedded in human dominated landscapes.

We demonstrate how combining social science approaches can generate new insights into cross-scale collaboration, address fragmented human–nature relationships, and surface dominant landscape values. By recognizing and deliberating diverse value systems, RECONNECT contributes to more inclusive, just, and transformative biodiversity policies in landscape management.



Session S18 Transformative change - from knowledge to action

Session chairs: Marie Stenseke

Knowledge is essential for transformative change, but it is not enough to drive action. In this session, we invite short and focused presentations (7+3 minutes) that explore catalysts for overcoming the critical gap between knowledge and action. How can we facilitate transformative change and preserve biodiversity—for its own sake and for ours?

Methods and innovation as obstacles to transformative change?

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Keywords: Transformation, governing, policy, action, CBD

In a broad range of literature on environmental governance, as well as in policy documents and recommendations, the need for updated methods, more knowledge, innovative tools and cross-silo cooperation are suggested. I question whether these aspects of form, instruments and design always catalyst change? Results from my study of how sustainability goals are implemented in regional development policy show that prioritizing measures of form and knowledge can conceal both underlying conflicts and the urgency for more substantial initiatives for change (Tangnäs, 2024). One popular method to enhance sustainability today is policy integration. In the context of biodiversity, this means including biodiversity considerations and goals into various other policies and sectors. The importance of this “mainstreaming” has been formalized in the original text of the Convention on Biological Diversity since 1992, and has since increasingly been recognized as a central strategy for implementation. However, the effects of policy integration in sustainability policy in terms of real effects are questioned. How can we make it work when it comes to addressing biodiversity loss? Or should be leave it be, and turn to vertical decision making again? Can non-governmental actors contribute with more vigorous initiatives, acknowledging the colliding interests that are at stake?

The Nature Futures Framework: a flexible tool to support the development of scenarios and models of desirable futures for people, nature and Mother Earth

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Keywords: IPBES; Scenarios; Models; Nature futures; Plural values;

Scenarios are vital for envisioning transformative pathways and guiding decision-makers toward desirable futures. Current biodiversity scenarios often focus predominantly on socio-economic impacts, marginalize local and relational values, and lack inclusivity in knowledge systems, limiting their potential to drive meaningful transformation. The Nature Futures Framework (NFF), developed under the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), responds to this challenge by positioning nature and biodiversity at the heart of scenario development. Structured around three core value perspectives—Nature for Nature, Nature for Society, and Nature as Culture/One with Nature—the NFF facilitates participatory and inclusive co-creation of biodiversity scenarios across multiple scales. This presentation introduces the framework and showcases recent applications that demonstrate its potential to inspire action, support value-explicit decision-making, and contribute to the 2050 Vision of “Living in harmony with nature.” It also identifies ongoing challenges and future research priorities, such as improved integration with quantitative models. By linking knowledge to practice, the NFF helps operationalize transformative change and inform biodiversity governance with inclusive and hopeful futures.

Structure and agency: barriers and possibilities for transformative change among private forest owners

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Keywords: forest owners, structure, local agency, alternative forestry, transformative change

Forestry in Sweden is currently dominated by clear-cut forestry, which has been the dominant forestry practice since the emergence of the Swedish pulp- and paper industry in the early 20th century. At the same time, clear-cut forestry is now increasingly challenged, not the least in connection with the detrimental effects on forest biodiversity, which has also raised calls for alternative and continuous-cover forest management practices.

This presentation concerns the interplay between structural constraints and local agency in the possibilities or barriers for alternative forest practices among private forest owners in southwestern Sweden. Based on 23 interviews and three local workshops, we identify forest management norms, uneven knowledge access, industrially oriented markets and the perception of top-down regulations as key mechanisms which counteract alternative forest practices in private forestry. We also give examples of forest owners who are adopting alternative practices and examine how these emerge in bottom-up contexts depending on horizontal collaboration, experimentation and practical- and knowledge-wise self-sufficiency. Finally, we argue that a broader adoption of alternative forestry practices depends on systemic changes which combine such bottom-up initiatives with top-down reforms, overcoming constraints in current market structures, advisory systems and lingering distrust in environmental regulations.

Nurturing landscape stewardship - articulating and connecting care and plural knowledge for transformative change

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Keywords: co-producing knowledge and action, multi-actor dialogues, relational values

We present insights from consecutive research projects and continuous engagement on the Swedish island Öland. Through a series of dialogues for co-producing knowledge and action with the landscape at the core, we explore water governance for handling scarcity and synergies between viable farming and biodiversity management. The island of Öland features a mosaic farming landscape comprising both smallholder and large-scale farms, a rich cultural heritage, and it is a biodiversity hotspot. In recent years, Öland has suffered from the impacts of climate change, primarily droughts and water scarcity, making climate adaptation and landscape governance crucial. Dialogue, transdisciplinary knowledge co-production, and network- and relationship-building, function as catalysts for mobilizing stewardship as a pathway for transformative change. Our place-based approach explores relational values as an entry point to connect different actors, move away from siloed thinking and action, and shift how issues of landscape governance are usually discussed. The process establishes new alliances between diverse actor groups, while building capacity for better, more constructive, and unusual dialogues. We present process, design, and implementation, discuss the role of engaging with care and relational values, and how this can catalyse long-term engagement in landscapes with plural values.

TETTRIs: Catalysing Action for Transformative Change in Biodiversity Conservation.

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Keywords: capacity building, Knowledge–action gap, taxonomy, biodiversity

Despite extensive scientific knowledge, conservation efforts frequently lag behind biodiversity decline. Compounding this challenge is the decline of taxonomic expertise, essential for identifying and describing biodiversity. This presentation draws on key outcomes and future directions extracted from the EU-funded TETTRIs project (Transforming European Taxonomy through Training, Research, and Innovation for Sustainability) exploring practical strategies for closing the knowledge–action gap and embedding taxonomy into science-based policy and conservation.

TETTRIs brings together European experts with a vision: to make taxonomic knowledge accessible, sustainable, and integrated into decision-making processes. The project emphasises enablers of transformative change, including policy alignment, capacity building, institutional innovation, and citizen science co-creation strengthening taxonomic expertise and transferring scientific knowledge to society.

Through real-world examples and cross-sector collaboration, TETTRIs demonstrates how to translate knowledge into action and scale-up European biodiversity conservation. A key outcome is a blueprint for taxonomic capacity building, offering strategic and practical guidance to support decision-makers, researchers, and practitioners. This framework provides training tools, coordination mechanisms, and strategies to attract talent, connect scientists with citizens, and strengthen a future-ready taxonomic system.

Ultimately, TETTRIs provides the tools and pathways needed to close knowledge gaps and drive the long-term transformation of taxonomy in support of biodiversity conservation.

Bridging Knowledge and Practice in Forest Restoration - A Case for Evidence-Based Fire-Mimicking Methods

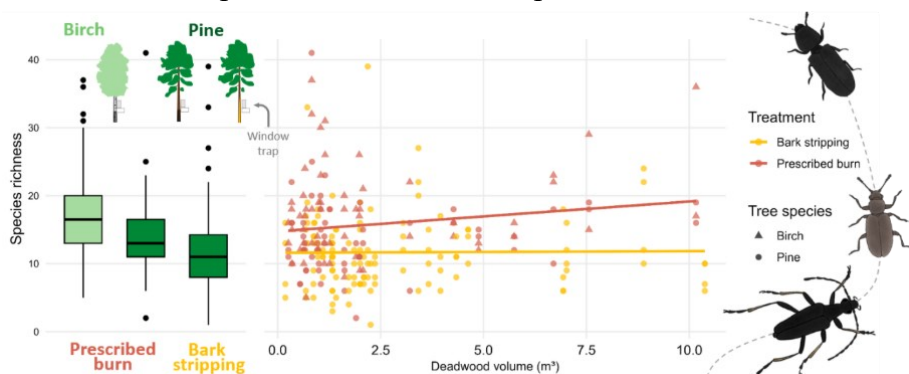
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Keywords: Prescribed burning; Fire-mimicking restoration; Deadwood diversity; Beetle communities

In boreal forest restoration, disturbance-based methods are increasingly used to support biodiversity. However, some practices, such as bark stripping (“*katning*”), are being implemented as fire-mimicking alternatives without scientific evaluation, potentially replacing more ecologically functional methods like prescribed burning. In this study, we compared the short-term impact of prescribed burning, an established restoration method, and bark stripping on beetle communities in central Sweden. Using small window traps, we sampled beetle communities on treated trees one to three years post-treatment. Trees in prescribed burn sites supported greater beetle abundance, species richness, and diversity than bark-stripped trees. Burned birches, in particular, hosted more species and a more distinct community composition than burned pines, despite their smaller size. Beetle richness and diversity also increased with



deadwood volume, underscoring the importance of structural abundance and complexity for effective restoration. These findings highlight the limitations of bark stripping as a short-term substitute for fire and the generally underestimated ecological value of birch in post-fire habitats. By providing empirical evidence of biodiversity outcomes across restoration methods, this research addresses a key knowledge–action gap in forest management. To support transformative change, restoration strategies must be grounded in ecological function and validated through field-based outcomes.

Fast-growing broadleaved trees and their implications for forest biodiversity under climate-driven transformation

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Keywords: Biodiversity, Climate mitigation, Sustainable forest management, Fast-growing broadleaves, Land-use change

Sweden aims to reach net-zero by 2045, and forest-sourced bioenergy will be a central means of achieving this. Whereas Norway spruce provides most bioenergy in southern Sweden, this tree species is increasingly vulnerable to climate-related stressors, prompting calls for diversification to increase resilience while maintaining high biomass production.

One pathway to diversification is via the use of fast-growing broadleaves (FGB). FGB combines intensive silviculture with native or non-native tree species, simplifies forest structure, and may thereby negatively impact biodiversity. However, FGB may nevertheless also provide suitable habitat for some broadleaf-associated species, with the net outcome for forest biodiversity as yet unclear.

With this knowledge gap in mind, we surveyed epiphytic lichens – key indicators of forest biodiversity - in FGB stands of birch, poplar, and hybrid aspen. We found that native FGB supported higher diversity, but red-listed species could be found in even non-native stands. Species composition differed across all tree species, indicating how FGB alternatives can support distinct lichen assemblages.

By providing evidence on how FGB choices affect biodiversity, forest stakeholders can make more informed decisions of direct relevance to integrating climate change mitigation with biodiversity goals — a crucial step in the societal transformation toward more sustainable and multifunctional landscapes.

Poster presentation:

Farming with Nature and People: Collaborative Community-Driven Pathways for Biodiversity-Positive Agriculture

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Keywords: Multi-stakeholder collaboration, community-based monitoring and implementation, biodiversity-friendly agriculture

Transformative change in agriculture depends on more than technical knowledge. It requires placing local actors at the centre of innovation. Across diverse landscapes, inclusive partnerships are bridging the gap between global ambition and local action to scale biodiversity-positive farming systems.

Drawing from experiences in Latin America and Southeast Asia, this presentation explores how smallholders, communities, expert organizations and institutions co-develop nature-based solutions rooted in place-based knowledge. In Costa Rica's Osa Peninsula, farmers are integrating biodiversity conservation with low-carbon practices. In Mexico and Malaysia, native vegetation corridors and participatory strategies strengthen pollination and natural pest control. In Colombia, Community-Based Monitoring enables farmers to track ecological outcomes, adapt their practices, and lead regenerative transitions. Meanwhile, in Malaysia's oil palm landscapes, biodiversity-friendly pest management demonstrates a scalable model for reconciling productivity with conservation.

These cases reveal a common catalyst: transformation happens when local actors are co-creators—not passive recipients—of knowledge and solutions. Grounding innovation in community-led action, and aligning it with global frameworks, offers a replicable pathway for regenerative agriculture. These experiences provide timely insights for donors, policymakers, and practitioners seeking to accelerate resilient, equitable transitions in food and farming.

From multidisciplinary courses to practical training and action – an example from UEF and eNaBIS EU/Horizon project

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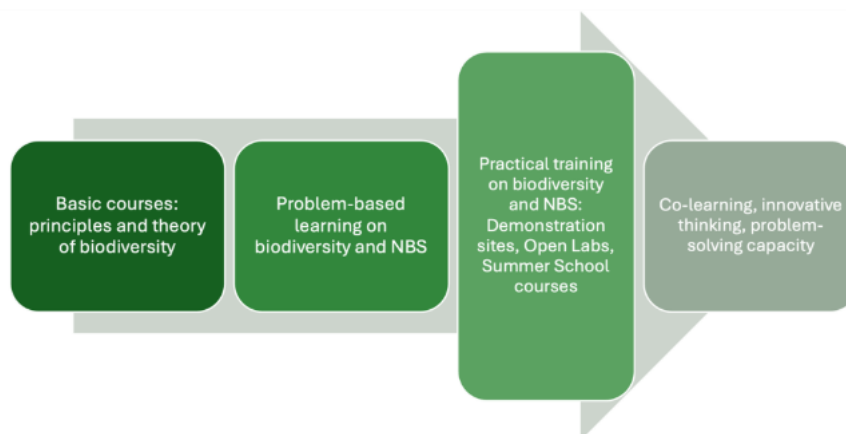
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Keywords: biodiversity, nature based solution, education

In this presentation we show an example of transformative education pathway on biodiversity and Nature Based Solutions (NBS) from University of Eastern Finland (UEF) and eNaBIS

EU/Horizon project, starting from theoretical courses co-created in collaboration with a multidisciplinary team of teachers, researchers and stakeholders and proceeding to problem based learning and practical training in demonstration sites, Open Labs and Summer School courses, focusing on peatland restoration and regenerative forest management. Multi- and interdisciplinary education is essential for improving our understanding about interlinkages between climate change, biodiversity, water and food security and health and for identifying opportunities for collaboration across sectors and scales, contributing to synergistic and holistic management, coherent and coordinated decision-making and governance. Sound scientific basis for the multi- and interdisciplinary courses can be achieved only by intensive cooperation of teachers, researchers and stakeholders with different professional backgrounds and field of science. For example, combining expertise from biology, environmental science, economy, societal science, policy, engineering, land-use change and health has potential to produce attractive courses for the students coming from different study disciplines. Besides the research skills, exposure to real research environments and local problems foster innovative thinking and problem-solving capacity of the students and young researchers.



Forestry's effect on European species richness: a meta-analysis using primary forests

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Keywords: forest management, biodiversity, species richness, primary forest, Europe

Assessing land-use impact on forest biodiversity requires understanding baseline conditions found in undisturbed ecosystems, for which primary forests, with little to no direct human impact, are good references. This meta-analysis of 13 European studies, comparing species richness in managed secondary and primary forests, shows a negative effect of forestry in 71% of boreal studies, while no clear patterns emerged in temperate studies. Our results show high variability in effect sizes across studies, methodological differences, and dominance of

local research. These factors, combined with the low number of studies, limit our ability to confidently estimate a generalized European effect size that would be representative of a true overall effect of forestry on species richness while using primary forests as references. To enable more robust large-scale analyses, increased efforts to map and define primary forests, implement standardized European biodiversity assessment guidelines, and measures of other biodiversity metrics (e.g. abundance, composition) are needed.

Predicting the impacts of climate change on bats at their distribution limit

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Keywords: bats, climate change, acoustic survey, Scandinavia (3-5 keywords)

Climate change models predict that, in general, species adapted to northern conditions will decline in the southern part of their range and the centre of their distributions will retreat northwards, as the temperature increases. Bats are expected to respond to global warming in accordance with these predictions, but this response will vary across species and habitats. Scandinavia includes the northern range limit of 19 bat species. Predicting the impacts of climate change on species ranges is important for species conservation planning. Using autonomous acoustic recording stations, we sampled bat assemblages at 435 sites across Scandinavia, obtaining recordings of 10 bat species. These data, along with current and future climatic and environmental conditions, are being used to develop models predicting the future distributions of each species. We aim to assess changes in species richness, relative changes in total potential range area for each species, the proportion of currently suitable areas remaining under various climate scenarios, and to rank species according to their sensitivity to climate change along their northern range limit. The presentation will focus on the modelling approach and framework used in this study to inform bat conservation strategies under future climate scenarios.

Investigating the impact of honeybees on the oligatoric bee *Andrena marginata*

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Keywords: Wild bees, competition, honeybees

Pollinators have been under threat for decades, with habitat loss and climate change contributing to their decline. In Sweden, approximately one-third of all bee species are red-listed. One growing concern is increasing presence of generalist honeybees, which forage on a wide range of flowering plants and have created competition with the local wild bees. This issue becomes partially critical when considering oligatoric bee species that rely on a single plant species for nectar and pollen, need to compete for the resource. One such bee is *Andrena marginata*, a solitary bee that only visits *Succisa pratensis*. *Andrena marginata* has been considered threatened in Sweden, largely due to changes in their habitat. Yet, to which extent honeybee overlap in pollen collection is unclear.

This study aims to investigate the potential competition between *Andrena marginata* and honeybees in nature reserves in Western Sweden. The project will assess: 1) the abundance of *A. marginata* in the area, 2) the proximity and density of honeybee hives and their potential influence on *A. marginata* populations, and 3) whether other pollinators are also competing for *S. pratensis* as a resource. This initial study explores honeybee impacts on *A. marginata*, informing pollinator competition and future conservation efforts.

Norms in protection of biodiversity when contrasted to societal values – the role of pedagogy to raise awareness

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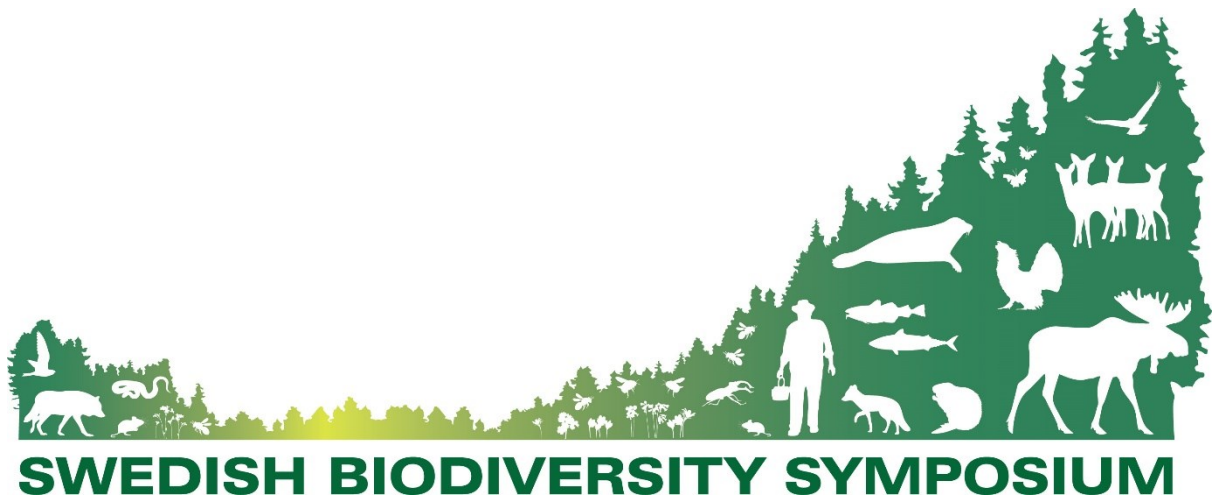
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Keywords: Biodiversity protection, Biodiversity awareness, action

Recent studies have demonstrated that the pace of global biodiversity decline is increasing despite the rising evidence that biodiversity underpins crucial ecosystem services essential for human wellbeing. A major reason for this antagonism is that people's claim to have a strong interest for biodiversity is resulting in numerous beneficial actions by groups, whereas societal norms may lead to counteractive behaviour of individuals. Therefore, we argue that awareness and evidence on the importance of biodiversity do not necessarily increase protection of it. In an ongoing crossdisciplinary research program (<https://www.hh.se/forskning/forskningsprogram/trains---transformation-innovation-och-normstudier.html>), our aim is to extend research on the concept of norms to include expectations embedded within and across different systems of actions: natural/biotic, economic/technical, legal/bureaucratic, and cultural. Here we will discuss different perspectives on how production goals may counteract biodiversity goals, where large-scale changes to policies are needed to achieve the global goals. In addition to large-scale measures, we will have a specific focus on when social norms are leading to individuals contributing to protection of biodiversity and when not, based on conflicts where costs and/or risks for the individual are involved. This will be illustrated by experience from pedagogy of a bachelor's program in nature conservation and biodiversity.

23 October





Session S21 Nature-based solutions – is something new under the sun?

Session chairs: Henrik Smith, Emily Boyd & Paul Miller

Nature-based solutions (NBS) mobilise natural ecosystem processes to support the delivery of ecosystem services such as climate mitigation and adaptation. A key role is played by biodiversity, either acting as a mechanism behind the generation of ecosystem services or being a co-benefit. We focus on key questions, critically for the ability of NBS to be able to tackle the twin crisis of climate change and biodiversity loss: Is biodiversity critical as a mechanism for the functioning of NBS? Does NBS contribute to biodiversity conservation as such? We provide a historical overview of NBS as a policy tool, illustrate its implementation in practice, discuss the scientific underpinning of NBS with a special focus on the role of biodiversity, illustrate the multitude of ecosystem-services/nature's contribution to people that can benefit from NBS, and propose ways forward.

The dual role of biodiversity in nature-based solutions

Biodiversity at the Core of Nature-based Solutions: Linking Conservation and Climate Mitigation

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Keywords: Nature-based solutions (NbS), biodiversity, carbon sequestration, ecological resilience, conservation

Nature-based solutions (NbS) are widely promoted as responses to the intertwined challenges of biodiversity loss and climate change. Yet many interventions focus predominantly on carbon sequestration, risking short-term gains at the expense of ecological resilience and biodiversity conservation. To address this imbalance, we developed and validated a conceptual framework that identifies how biodiversity contributes both to NbS functioning and to their long-term stability. Applying the framework to evidence from mixed-species forests, we find that biodiversity–carbon relationships are most often represented by species richness. However, richness offers limited explanatory power compared with structural and functional dimensions. Mechanisms such as canopy stratification, trait complementarity, and redundancy more strongly predict carbon storage and persistence, particularly under disturbance. Resilience pathways, soil biota, and threatened taxa remain critically underexplored. This reflects a persistent asymmetry in which biodiversity is framed as a driver of carbon rather than a conservation outcome. By integrating ecological mechanisms with contextual drivers such as environmental heterogeneity, disturbance regimes, and historical legacies, the framework provides a foundation for designing NbS that align biodiversity and climate objectives. NbS must function not only as effective carbon sinks but also as resilient, multifunctional systems that support long-term conservation goals.

Nature-based solutions and human well-being – some insights from environmental psychology

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Keywords: biodiversity decline, conversation, communication, mental health, pro-environmental behavior

Nature-based solutions are often described as win-win strategies that use “nature” to address societal challenges such as climate change, while supporting human well-being. Yet, research into the latter is limited. From a birds-eye perspective, biodiversity crucially underpins well-being, through ecosystem services it supports. However, zooming in on individual experiences, the picture becomes more complex. In this talk, we present some insight from environmental on human-biodiversity relationships and on how individuals may relate to and make sense of global biodiversity decline in the private sphere.

People may relate to nature and biodiversity directly, through sensory and physical contact with natural environments, or indirectly, through vicarious experiences such as media representations or conversations. Traditionally, research on the connection between nature and human well-being has focused on direct contact with “green space”, often overlooking the role of biodiversity itself. While contact with biodiverse spaces can benefit well-being, people’s psychological responses to “nature” appear more strongly tied to holistic impressions of environments (e.g., perceived safety, coherence) than to measured biodiversity or recognition of specific species.

At the same time, biodiversity and its decline also influence well-being indirectly through vicarious experiences. Using a mixed-methods design, we will present findings from a study in which we investigated how participants from Southern Sweden make sense of global biodiversity decline: how they feel about it, how they talk about it in private conversation, and how those are related to mental health and pro-environmental action. We argue that integrating such psychological insights is essential for realizing the promise of nature-based solutions as win-win solutions.

Establishing the concept of NbS Services to promote biodiversity, well-being and scalable solutions: NBSPLUS project

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Keywords: nature-based solutions, biodiversity loss, transformative change, climate change adaptation, sustainable development

Human-induced climate impacts and biodiversity loss continue to severely impact ecosystems and communities globally. Holistically designed nature-based solutions (NbS) offer cost-effective, multifunctional measures safeguarding biodiversity, enhancing water cycle sustainability and promoting well-being. However, understanding of factors affecting NbS multifunctionality remains limited, along with a lack of scalable assessment methods, including baselines for NbS benefits. Existing services prioritize sector-specific products, impeding the advancement of transdisciplinary NbS approaches. The 3-year Biodiversa+ NBSPLUS project aims to overcome these limitations by establishing the concept of NbS Services. NBSPLUS employs a suite of transdisciplinary approaches, demonstrated in Sweden, Spain and Canada, engaging stakeholders and using citizen science, to integrate and upscale local knowledge for transformational interventions. The main activities include (i) developing a multi-level governance framework to assess the aims and effectiveness of NbS, accounting for societal equity/justice; (ii) exploring the value of novel bioindicators, including collection through citizen science approaches, to develop a habitat-overarching biodiversity monitoring framework for assessing the ecological consequences of NbS adaptation; (iii) co-producing a method for wet-dry stress-testing of NbS efficacy to resolve land-use and climate-induced pressures, including integration into existing impact models; and (iv) co-designing scalable, participatory planning tool for increasing transparency, stakeholder engagement and multifunctional benefits of NbS.

Poster presentation

‘Ecological Loss and Damage’: defining, measuring and governing for biodiversity loss in a changing climate

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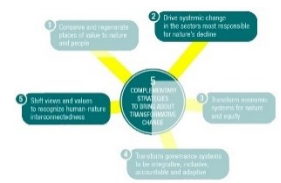
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Keywords: CBD, ecosystem services, extinction, L&D, UNFCCC

‘Ecological Loss and Damage’ (eL&D), the adverse impacts of climate change on ecosystems and their biodiversity, impacts livelihoods directly and indirectly through changes in their regulating and supporting roles in climate mitigation and adaptation. eL&D fits within the Loss and Damage in the United Nations Framework Convention on Climate Change (UNFCCC) and might qualify for compensation from the new ‘Fund for Responding to Loss and Damage’ (FRLD). Although the measurement of these various losses and damages and attribution to climate change is inherently challenging, we argue that the categorisation of biodiversity and ecosystem services as only non-economic losses not only underestimates their importance to local communities but also risks undermining the capacity of vulnerable societies to mitigate and adapt to climate change. While the modalities of FRLD remain to be agreed upon, considering the different components of eL&D and how they relate to the various typologies of Loss and Damage has important implications for financing it within or beyond the current UNFCCC framework, which should be addressed. We argue also that financing more proactive conservation strategies can contribute to unlocking the potential for a just social-ecological transition in line with the Paris Agreement.



Session S25 Species adaptation to environmental change: the need to integrate genetic diversity into monitoring, spatial planning, and restoration.

Session chairs: Linda Laikre, Kerstin Johannesson, Pierre De Wit, Mikael Pontarp & Henrik Smith.

The biodiversity crisis has fundamental consequences for our society, affecting species survival, and ecosystem services, eg, pollination of crops in agricultural landscapes, production of fish in coastal regions, and carbon sequestration of forests. While conservation efforts have historically focused on species richness and short term effects, recent advances underscore the critical role of evolutionary processes in shaping biodiversity resilience and function. In agricultural systems, rapid evolutionary changes, such as, the evolution of pesticide resistance, are well-documented. In marine systems, rapid adaptation to environmental changes are documented in mollusc and fish species. These evolutionary dimensions remain largely overlooked in both conservation.

Monitoring genetic diversity over contemporary time with new DNA- and proxy-based indicators

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Keywords: Conservation policy implementation, CBD, Swedish Environmental Objectives, effective population size, genomics, Kunming-Montreal Global Biodiversity Framework

Genetic diversity is the basic component of biological variation and carries key roles for biological evolution and adaptive capacity of populations. Four main processes threaten genetic diversity; loss of genetically distinct populations, reduced population size, human induced selection, and spread of non-native genepools. Recently monitoring strategies and indicators to allow early detection of these threats have been developed in science-management collaboration and application is now initiated.

The indicators are of two basic types – those that are based on DNA-analyses including genomic techniques and those that are simpler and do not necessary need DNA-data. The latter type use population occurrence and size as proxies for genetically distinct populations and effective population size (N_e). These proxy-based indicators have been developed for the context of the UN Convention on Biological Diversity (CBD) which recently adopted a new Global Biodiversity Framework late 2022 with a strong goal and target for genetic diversity. The CBD also adopted the indicators proposed by conservation genetic scientists. Several countries, including Sweden, are now applying these indicators and recent results will be presented here. The overall results indicate that populations are largely maintained over contemporary timeframes, but population sizes are often too small to assure genetic adaptive capacity.

Landscape driven isolation and inbreeding in specialist grassland butterflies

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Keywords: insect decline, landscape genomics, genetic load, inbreeding

Land use change from agricultural intensification is a major driver of declines in insects. However, little is known about how these changes impact the genetic diversity of species and populations, even if this diversity is vital to their long-term persistence. We investigate the impacts of land use change on genetic diversity across twelve widespread and specialist grassland butterflies in southern Sweden. While we find low levels of inbreeding and high population connectivity in widespread grassland species, we find that the studied specialist species have higher rates of inbreeding and greater differentiation with low contemporary effective population sizes. In three of the studied species, we directly assess changes in genetic diversity using museum samples, finding that higher inbreeding and differentiation in the specialist species is recent, estimated to have increased in the past 30-40 years. Higher rates of inbreeding in modern samples have increased homozygosity of weakly deleterious mutations, potentially depressing fitness. Combining this genomic data with land cover data, we highlight that inbreeding is higher in populations embedded in landscapes with less grassland area, identifying regions where specialist insects are at risk of genetic erosion and highlighting a need for habitat restoration focused on connectivity to maintain genetic diversity.

Evolutionary plant–pollinator responses to anthropogenic land-use change: impacts on ecosystem services

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Agricultural intensification at field and landscape scales, including increased use of agrochemicals and loss of semi-natural habitats, is a major driver of insect declines and other community changes. Efforts to understand and mitigate these effects have traditionally focused on ecological responses. At the same time, adaptations to pesticide use and habitat fragmentation in both insects and flowering plants show the potential for rapid evolution. Yet we lack an understanding of how such evolutionary responses may propagate within and

between trophic levels with ensuing consequences for conservation of species and ecological functions in agroecosystems. Here, we present a novel conceptualization of evolutionary change induced by agricultural intensification at field and landscape scales and emphasize direct and indirect effects of rapid evolution on ecosystem services. We exemplify by focusing on economically and ecologically important interactions between plants and pollinators. We showcase available eco-evolutionary theory and plant–pollinator modelling that can improve predictions of how agricultural intensification affects interaction networks. We highlight how combined trait-based ecoevolutionary modelling, functionally explicit quantitative genetics, and genomic analyses may shed light on conditions where evolutionary responses impact important ecosystem services.

Drifting *Furcellaria lumbricalis* is genetically distinct compared to attached conspecifics – implications for seagrass conservation

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Keywords: Drift algae – *Furcellaria lumbricalis* – Seagrass – Restoration – Clonality

Along the Swedish west coast, drifting mats of the red alga *Furcellaria lumbricalis* have replaced several seagrass meadows following extensive eelgrass losses, and are now inhibiting both natural recovery and restoration of seagrass meadows. These mats form dense, persistent aggregations exceeding 50 hectares in shallow bays. However, their origin and mechanisms of spread remain unclear. As *F. lumbricalis* typically grows attached to hard substrates, the presence of large drifting populations suggests the existence of a free-living form. Given the spatial proximity of both forms, gene flow via sexual reproduction is plausible.

To investigate this, we collected both attached and drifting *F. lumbricalis* from four sites along the Swedish west coast and the Baltic Sea. DNA was extracted and sequenced to assess genomic and reproductive differentiation.

Preliminary analyses reveal that the drifting form is genetically distinct from its attached counterparts and exhibits higher levels of clonality, indicating a greater reliance on asexual reproduction. This suggests that the drifting mats can expand independently of attached populations. These findings have important implications for seagrass conservation and restoration, as mitigating the impact of drift algae is key for successful efforts in these areas.

The genomics behind rapid adaptation to low salinity in Pacific oysters along an invasion front

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Keywords: Skagerrak, Marine Biodiversity, Connectivity, Population genetics

The global biodiversity crisis has now been internationally recognized to have fundamental consequences for the future of our societies, and recent efforts such as the global biodiversity framework adopted at the COP15 in Montreal in 2022 highlight the gravity of the threat. However, not only biodiversity at the species level is under threat, but also within-species genetic biodiversity which provides the foundation for species' abilities to adapt to environmental change. The genetic structuring of species into populations, among which genetic exchange is limited, has fundamental consequences for our efforts to manage natural resources, not least in the marine environment. For example, subdivided populations are more sensitive to overharvesting, and may be adapted to local conditions which could make them either more or less sensitive to projected future environmental change. Thus, management efforts should focus on the population- rather than species- level in most cases. In this presentation, I will give an overview of the current state of knowledge of how a wide variety of marine species in the Skagerrak are structured geographically and how they are connected to the rest of the world, and also discuss management implications.

PlantEra, adaptations to the past investigated in the present

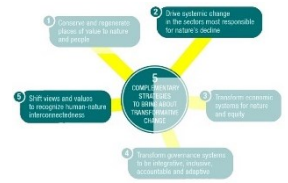
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Keywords: Trait acclimation, Cryptic adaptations, Extreme CO₂

Plants transitioned onto land a long time ago (approximately 500 million years). Since then, land plants have undergone profound morphological and molecular adaptation, making them fit the terrestrial environment. During their long history on land, the Earth has also experienced numerous changes to its climate and atmosphere, suggesting that the morphological and physiological process optimizations observable in plants today have experienced numerous rounds of experimentation caused by extremes in plant growth conditions. We have grown a variety of species, with a wide range of lineage ages, in chambers which mimic the extreme atmospheric CO₂ concentrations predicted for Earth's prehistory. After allowing adequate acclimation to these conditions, we now report our early findings of physiological and molecular adaptations. These are interpreted in the light of the by-gone climates, testing whether adaptations may persist in the genetics of extant species.



Session S28 Raising awareness and action for biodiversity - the potential of places and pedagogy

Where did all the species go? The history and future of species in Swedish biology education

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Keywords: Species knowledge, lexical ecological literacy, biodiversity, cognition

Learning names of species of plants and animals was once pivotal in the Swedish educational system. However, educational biodiversity vanished from the curricula in the 1960s, and the effect was poor knowledge of species (Palmberg et al, 2015). The aim of this paper is primarily to understand in what pedagogical context the rapid shift came about, and how lexical ecological literacy (Lisberg Jensen, 2025) can be reintroduced to enhance public biodiversity support.

Scholars emphasise the need for "nature connection" (Beery et al, 2023; Chawla, 2020), or "sense of place" (Woods et al, 2024). As important as these aspects are, they often remain vague about the didactic what, why and how (comp. Klafki, 1995). Applying an evolutionary informed model of learning (Geary 2008), could be central to reconstructing didactic strategies for education for lexical ecological literacy.

This study is based in a quantitative historical overview of species listed in Swedish curricula ca 1840-2020, and an analysis based in academic debates on cognition, experience, and the structure of knowledge. A result should be a developed conceptual framework for lexical ecological literacy, important when it comes to fields like ecology and biodiversity, as well as to nature connection and to sense of place.

Rewilding with Children –Nurturing Biodiversity and Environmental Stewardship through Nature-Based Learning

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Keywords: Nature-based education, Biodiversity awareness

Growing up in urban environments, children are becoming increasingly disconnected from nature, with consequences for their well-being and future environmental stewardship. Så vilda!, an outreach initiative which has engaged over 20,000 children and hundreds of educators in creating wildflower habitats on school grounds. This presentation will highlight

the key success factors, showing how school grounds can be reimagined as vital, vibrant ecosystems that benefit both children and the planet.

Rewilding schoolyards fosters direct, sensory-rich connections with nature, supports urban biodiversity, and promotes curiosity, play, and inquiry-based learning, aiding both cognitive and emotional development.

The initiative aims to empower children as active agents of change, raise awareness of native wildflowers, promote plant awareness and increase biodiversity. Co-created with botanists and educators this approach demonstrates how nature-based education and partnerships with botanical gardens can bridge formal and informal learning, cultivate emotional connections to nature, and contribute to sustainable futures.

Så vilda!, led by Gothenburg Botanical Garden and now part of the Interreg North Sea project EXPBIO. A recently started research project linked to Så vilda! will be actively investigating the development of children's perceptions of wildflowers and biodiversity, while determining the key drivers behind their willingness to engage in action for biodiversity.

Lära och leva med insekter – Handlingskompetens för att bevara biologisk mångfald

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Keywords: Handlingskompetens, Insekter, Kooperation, Aktörer, Utbildning

Biologisk mångfald minskar snabbt, både i Sverige och globalt. För att möta denna utmaning krävs ökad kunskap och handlingskraft. I projektet Lära och leva med insekter arbetar Karlstads universitet tillsammans med flera samarbetspartners för att sprida biodiversitetsutbildning och samtidigt skapa livsmiljöer som gynnar insekter vid skolor och i offentliga miljöer. Projektet bygger på begreppet handlingskompetens och sker i samverkan med bland andra Håll Sverige Rent (Grön Flagg), Naturskolan Karlstad, Karlstads kommun och Karlstads Bostads AB. Genom detta samarbete sprids utbildningsmaterialet Actions for Insects nationellt och lärare får stöd i sitt arbete lokalt. Projektet inkluderar även universitetskurser där framtida biologer och lärare utbildas i biologisk mångfald och hållbar utveckling. Tillsammans med kommunen och bostadsbolaget har flera tusen kvadratmeter traditionella gräsmattor redan omvandlats till artrika miljöer (se Figur 1). Presentation visar resultat från projektet och hur samarbete och utbildning kan bidra till ökad medvetenhet och engagemang för att bevara biologisk mångfald.



Figur 1a och 1b:
Genom projektet
har vi omvandlat
flera skolområden
från gräsmattor
till mer artrika
miljöer.
Förändringarna är
baserade på

elevernas idéer och genomfördes i samarbete med Karlstads kommun. Dessa nya miljöer skapar möjligheter för utomhusundervisning om biologisk mångfald.

Nature Connectedness through art-science

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Keywords: Nature Connectedness, Music, Mindfulness, Biodiversity

As biodiversity loss accelerates, fostering a deeper sense of connection between people and the natural world is more urgent than ever - especially among younger generations. This talk introduces an innovative art-science initiative developed as part of the TETTRIs project and the global Sounds Right campaign, which makes NATURE an official artist.

This talk will focus on field excursions where young people are brought into nature alongside a biologist and musicians. Participants engage in meditative listening exercises, learn to identify local species, and co-create original songs inspired by nature. Pre- and post-excursion assessments were used to measure changes in their nature connectedness using the Inclusion of Nature in Self (INS) index.

By integrating scientific learning with exploration using the senses, and artistic expression, this approach offers a compelling model for interdisciplinary environmental education. It not only enhances ecological literacy but also cultivates nature connectedness and the pro-environmental-behaviour and better mental health that comes with it.

Oak Trees and Humans: Reconnection through Place-Based Practice

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Keywords: Oak-Trees, Relational Pedagogy, Place, Care, Reconnection.

This project explores the dual role of ancient oaks as both ecologically vital habitats and pedagogical agents in fostering place-based environmental engagement. Sweden, home to a significant share of Europe's veteran oaks, carries a particular responsibility to safeguard these trees amidst pressing ecological threats such as overgrowth, land exploitation, and climate change. Recognizing the oak's value beyond its biological function, the project initiates a civic and educational movement grounded in participatory and relational pedagogy. Central to the initiative is the concept of place—understood not merely as a geographic locale but as a dynamic site of learning, care, and co-existence. Through local engagement and collaborative knowledge-making, the project mobilizes communities to explore the cultural, ecological, and emotional dimensions of human–oak relationships. Inspired by environmental education, critical pedagogy, and biocultural conservation, the project promotes situated learning experiences that cultivate ecological awareness, civic responsibility, and intergenerational stewardship. The oak functions symbolically and materially as an “ark”—a gathering point for reimagining human embeddedness in the more-than-human world. In doing so, the project not only contributes to the preservation of oak habitats and biodiversity, but also to the development of pedagogical models that support sustainable, place-responsive ways of living, learning and reconnecting.

Reimagining Biodiversity Education Through Botanic Gardens: The BGE 2025 Survey and Interactive Biodiversity Education Map

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Keywords: education, public engagement, botanic gardens, survey

Botanic gardens serve as ‘living museums’ with immense potential for biodiversity education; however, the ways they facilitate learning and public engagement remain insufficiently studied. The Botanic Garden Education (BGE 2025) survey aims to address this gap by providing an updated and comprehensive overview of educational practices, resources, and challenges faced by botanic gardens worldwide. Nearly two decades after the last international survey (Kneebone & Willison, 2007), this new initiative seeks to generate policy-relevant insights through data collected from directors and educational staff. The survey explores five core areas: institutional mission and priorities, educational staff composition, educational methods and resources, future challenges, and partnerships.

This project aims not only to provide critical data to support transformative change in botany and biodiversity education but also to bring this data to life through a digital outreach tool. We invite collaboration between researchers and creative professionals to develop an interactive world map for biodiversity education. This map will visualise global participation of botanic gardens and other cultural institutions, showcasing diverse approaches to education and public engagement with biodiversity. It intends to enhance the accessibility of emerging innovative practices, stimulate cross-regional dialogue, and foster new interdisciplinary partnerships.

Poster presentationer:

Naturlyftet – kunskap, känsla och kreativitet

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Keywords: network campaign, nature relation, the biodiversity plan

Vår omsorg om naturen föds ur vår relation till den. Men i en värld där vi allt mer distanseras från landskap, arter och ekosystem, förlorar vi också förståelsen för vår samhörighet. Och konsekvenserna blir förödande – det hotar livet på jorden.

Det är bakgrunden till Naturlyftet, en kraftsamling som ska leda till mer kunskap, medvetenhet och aktivitet för natur och biologisk mångfald i Sverige 2025-2030. Satsningen bidrar även till kommunikation som krävs för genomförandet av FNs räddningsplan för biologisk mångfald och EUs naturrestaureringslag nationellt. Naturlyftet sker i samverkan mellan organisationer som kommunicerar natur, biologisk mångfald och friluftsliv inom nätverket Naturens år.

Vi presenterar Naturlyftet och exempel på hur kommunikation och aktiviteter bland en mångfald av olika aktörer kan ge Naturlyftet vingar. Vi diskuterar hur Naturlyftet kan utvecklas och förstärkas genom samverkan mellan forskning och civilsamhälle.

Exploring peatlands through story-driven science communication: A narrative approach to ecological literacy in children

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Keywords: narrative popular science, peatland ecosystems, story-driven learning, biodiversity, environmental education

To raise awareness about the importance of nature among children and raise ecological literacy, we developed a story-driven science communication project around the fictional character Myrtassen who invites the audience to explore a peatland. The magical Myrtassen can change in size and brings us down to the scale of cloudberries, mosses and bacteria. We meet the organisms that make up the unique biodiversity of mires, and travel to the bottom of the peat to see how it began – just after the latest Ice Age.

To bring Myrtassen's world to life, we used watercolour paintings and digital techniques to create an educational package aimed at children aged 9–12 years, consisting of:

- i) a digital online story,
- ii) posters that double as illustrated fact sheets, and
- iii) an activity bundle for hands-on engagement.

In this project, funded through the Norwegian research council, we collaborate with visitors' centres and schools, thereby reaching both formal and informal learning arenas. By wrapping scientific content in a story-driven learning environment, we expect the audience to gain a relationship with peatlands, facilitating learning about peatlands and their ecosystem functions. Ultimately, we hope that peatlands will be seen as ecosystems of high ecological and cultural value.

Figure. Introduction page from the activity bundle, which also introduces mires. Here, the magical character Myrtassen lounges in a floatie in a bog pool, while Mio, the child, watches from the safety of the relatively dry hummock.



Making Biodiversity Visible: Species Representation on Signs in Västra Götaland's Nature Reserves

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Keywords: Ecological literacy, Nature-based learning, Pedagogical tools, Insect conservation

Nature blindness – the inability to recognize and name plants and animals – can limit people's appreciation of nature and might hamper conservation efforts. In particular, knowledge of insect species is often limited and insects are rather associated with negative feelings. In nature reserves, information signs are key tools for providing on-site knowledge about species, habitats, and biodiversity. When thoughtfully designed, signs can make ecological information visible, relatable, and memorable and could connect visitors with nature.

Although nature reserves aim to protect biodiversity, insects appear to be less frequently featured in management and communication. We investigate whether this pattern is reflected on information signs, potentially limiting visitors' awareness and engagement.

Here, we will present first results on how different taxa are portrayed on information signs in reserves in Västra Götaland, with a focus on insects. In collaboration with Västkuststiftelsen,

we will analyse over 300 signs to assess: how many species are depicted overall and per sign, which groups are most or least represented, how species are portrayed (e.g. illustration, names, description), and which ecologically relevant insect species are underrepresented based on occurrence data. We will then develop conceptual suggestions for information sign to further reduce nature blindness.

Nature-based learning at Botaniska - Gothenburg Botanical Garden

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Keywords: outdoor education, botanical garden, biodiversity, plant awareness

Botanical gardens play a valuable educational role in raising awareness of the importance of plant diversity and the needs for its conservation. Gothenburg Botanical Garden holds about 20,000 plant species from all over the world. With such a diversity of ecosystems at hand, we offer a variety of curriculum-based lessons and outdoor activities for students of all ages all year round.

Our programs range from lessons focusing on seasonal changes, ecology or pollination biology, growing edible plants and investigating nature's cycles in the school garden, to interdisciplinary workshops on flax preparation or the cultural history of cereals. We also offer teacher education and creative family activities during school breaks. In order to learn from different perspectives and to enlarge our tool case of didactic methods, we always enjoy collaborating with other stakeholders.

Our goal is to integrate outdoor learning in all school subjects, to inspire teachers to work with nature as a classroom and to encourage children and young people to engage in nature, science and sustainability.

The time for species knowledge is now!

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Keywords: biodiversity, botanical gardens, taxonomic impediment

How can we spark people's interest for the fascinating world that is Botany?

The climate and the biodiversity crisis are the main focuses in both education and media. But are we prepared to tackle these important issues? To understand biodiversity, or the loss of biodiversity, it is essential to also know the building blocks of biodiversity – species! There has never been a time when species knowledge has been more important than now! How do we spread our knowledge inside and outside the classroom?

As a botanical garden, we have a broad platform for communication of botanical knowledge. People arrive happy and excited and (most often) by their own choice, that's a good start! We also have strong presence on social media. By combining the digital content, podcast and personal interaction in the garden at events, lectures and guided tours, we can reach a mixed target group. This is where we can spread and encourage interest in species knowledge; give people the information they didn't know they wanted.

We will present challenges and new possibilities on how people can interact with botany!

The Fyris River Walk – a concept for promoting awareness and action for biodiversity in Swedish schools

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Keywords: ecological literacy, education for sustainable development, nature-based learning, school curriculum

Ecological literacy is of key importance to understand ecosystem complexity and the required transformative actions needed to protect and restore biodiversity. Yet ecological literacy is fast declining in our modern society. This decline is also evident throughout the school system – a change which is particularly troublesome as the school children of today will be the decision-makers and biodiversity stewards of tomorrow. However, given the magnitude of the Swedish school system and its unparalleled importance in educating children, it may conversely be seen as an untapped resource through which ecological literacy may be promoted. Accordingly, we argue for a broad advancement of nature-based learning throughout the entire school system, with activities developed in close adherence to the school curriculum to foster an interest and fascination for biodiversity. We present a concept of how such an advancement of nature-based learning can be implemented at the high school level. In Uppsala, we have developed the Fyris River Walk, an outdoor education day in which students experience the biodiversity along the Fyris River through various practical activities. These activities have been developed in close adherence to the aims, goals and central contents of multiple subjects as specified in the Swedish high school curriculum.

Ekologisk litteracitet som samtillblivelse genom fältarbete: Studier av praktiker för ekologiundervisning

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Keywords: ekologisk litteracitet, fältarbete, utomhusundervisning

Avhandling som presenteras handlar om fältarbete i ekologiundervisning. Syftet har varit att undersöka vad ekologiskt fältarbete gör och vilken betydelse fältarbete får för produktionen av ekologisk litteracitet. Utifrån teorier om relationell materialism har det praktiska och känslomässiga utbytet mellan människor, andra arter och icke-levande ting i fältarbete utforskats.

Avhandlingsarbetet är etnografiskt inspirerat och baserat på två studier av fältarbete. Den första studien handlar om en naturguidekurs på gymnasiet där en undervisningsgrupp övernattar i ett naturreservat för att uppleva orrspel. Den andra studien handlar om en folkhögskolekurs med fokus på hållbarhet och naturgemenskap. Det empiriska materialet består av video- och ljudinspelningar från båda platserna.

Resultaten visar på fältarbetets unika möjligheter till samtillblivelse med andra arter, landskap och icke-levande ting. I avhandlingen har jag kombinerat begreppen samtillblivelse och intoning med ekologisk litteracitet för att synliggöra, analysera och förstå det som är oersättligt. Det unika som sker i ett möte med andra organismer eller ting blir en betydelsefull del i utredandet av begreppet ekologisk litteracitet. Ett av avhandlingens huvudsakliga bidrag är att visa hur fältarbetets olika processer tar form som en praktik där fakta kan blandas med lek och fantasi och där nyfikna möten blir utgångspunkt för undervisning där människan kan förstås som jordbunden.

Biodiversity Awareness: The conceptualising of a new educational approach

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Keywords: Biodiversity, Education, Conceptualising, Awareness, Action-Competence

To sustain life on Earth it is important to understand human awareness of biodiversity. The social imperative to do so is the current extinction crisis, and the need for education to enable humans to understand and act pro-environmentally. The aim of these four exploratory workshops, funded by The Swedish Research Council (Vetenskapsrådet) is to conceptualise a new approach to biodiversity awareness that can be used to boost research and implementation in formal and informal education. The workshop participants include experienced researchers and early career researchers from three universities in Sweden and Austria. These participants have a diverse range of methodological and conceptual knowledge and skills with which to develop a conceptual framework for mapping biodiversity awareness in adults, adolescents and children, and methods of studying it. We believe this work will help us to understand challenges and opportunities in our societies related to biodiversity awareness and education. The presentation will review the results of the first 3-day workshop held in Gothenburg, Sweden, August 2025, in which the central

focus lies in the development of shared conceptualisations of plant, insect, and biodiversity awareness, and to create an understanding of how plant and insect awareness relate to pro-environmental action-based competencies.

Golfbanan som utomhusklassrum – pedagogisk markanvändning

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Keywords: Utomhusundervisning, Tätortsnära natur, Golfbanor

Tätortsnära grönområden exploateras när städer och orter förtätas och breder ut sig. I diskussioner om utomhusundervisning lyfts ofta bristen på tillräckligt stora och varierande grönområden fram som ett hinder. I detta sammanhang blir tätortsnära natur på golfbanor viktig och en nödvändig resurs för utomhusundervisning, för att utbilda framtida generationer om natur och biologisk mångfald. En golfbana består 50-60 % av varierande naturområden som inte används i spelet och som omfattas av allemansrätten.

Konceptet Golfbanan som utomhusklassrum följer den svenska läroplanen LGR22 och syftar till att använda golfbanan som pedagogisk resurs och lärmiljö för undervisning i skolans alla ämnen och samtidigt bidra till ökad kunskap om svenskt friluftsliv, natur och allemansrätten, ökad rörelse, samt möjlighet att prova på idrotten golf.

Ett pilotprojekt genomfördes 2018 på Motala GK tillsammans med Smedsby skolan i Motala. Konceptet har nu spritts till skolor och golfklubbar i Stockholm, Göteborg, Jönköping, Sölvesborg, Karlshamn och Örbyhus. Totalt har 1500 elever fått använda golfbanan som utomhusklassrum.

Erfarenheter visar att golfbanans naturområden, till exempel skogsbryn, ängsmarker, dammar, är lämpliga för utomhusundervisning; samarbete mellan golfklubbens verksamhet och skolan fungerar väl; elevernas inlärning och samarbetsvilja förbättras, stressnivån minskar, rörelseglädjen och intresset för natur och friluftsliv ökar.

Projektet genomförs av Svenska Golf förbundet och STERF och stöds av Svenskt Friluftsliv, Naturvårdsverket och Riksidrottsförbundet.

The Biodiversity Collage – a tool to raise awareness of biodiversity

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Keywords: workshop tool, collaborative, IPBES, awareness, ecosystems

This poster will present the workshop tool "Biodiversity Collage" which offers a participatory and creative experience that promotes awareness of biodiversity and encourages participants to reflect on their role in its preservation. The workshop provides a tool to understand the challenges and pressures around biodiversity, through a fun, collaborative, visual and accessible workshop, based on the IPBES report. During the workshop, the participants explore ecosystems and build a collage by arranging cards containing scientific information from the IPBES report, with guidance from a trained facilitator. A debriefing session follows to address emotions, discuss solutions, and encourage participants to take action. The workshop concept was first developed in France in 2018 and has since then, been translated to English and offered to over 18 000 people, both as in person and online workshops. It requires no prior knowledge but is intended for everyone who is interested in understanding the complex issues of biodiversity better. It provides a great tool to raise awareness and create discussion about biodiversity within a broad range of target groups, including e.g. businesses, authorities and the public. A Swedish version of the tool has recently been developed, using local examples of ecosystems based on research from Swedish universities.

For more information:

www.fresquedelabiodiversite.org.



A Living Classroom for Lifelong Learning – Nature Interpretation and Place-Based Education in the Kristianstads Vattenrike Biosphere Reserve.

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Keywords: (biosphere classrooms, sense of place, ecological literacy, visitor sites, naturum visitor centre)

How can landscape-based learning foster engagement and action for biodiversity? In Kristianstads Vattenrike Biosphere Reserve, education, sense of place, and nature interpretation have evolved together for over two decades – through close collaboration among educators, ecologists, researchers, and the local community.

Through the visitor centre Naturum Vattenriket and 21 outdoor visitor sites with open-air museums and "biosphere classrooms," nature-based learning is offered for all ages. These

accessible, hands-on sites are rooted in both ecology and cultural history. They serve not only as gateways to nature, but also as spaces for teaching, training, research, and conservation.

Each biosphere classroom is equipped with field materials, questions, and inspiration – encouraging discovery and practical action, from studying bladderwrack to creating sandy patches for biodiversity.

The presentation highlights how these places build ecological literacy and inspire active choices. Examples include “Seaweed Summer School,” Biosphere Camps, and the EU-funded project Supported by Nature, where learning sites demonstrate nature-based solutions that benefit the Baltic Sea.

With long-term collaboration and a strong educational framework, Vattenriket shows how landscapes can become living classrooms – where knowledge leads to action and connections to nature grow.