

Strategic plan 2017–2020, BECC challenge theme "Effective strategies for biodiversity conservation under the combined pressures from climate change and land use change"

Background and vision

Although habitat loss and degradation are the main drivers of current biodiversity loss, climate change is a growing threat to biodiversity. A changing climate may affect species both *directly* because species respond to changes in temperature and precipitation, and *indirectly* because climate change induces changes in land-use as part of climate change adaptation and mitigation strategies. Importantly, direct and indirect effects may together amplify the threats to biodiversity, for example because induced land-use changes may constrain species' abilities to adapt to a changing climate. Well-functioning ecosystems are also a necessity for mitigation and adaptation to climate change. Within biodiversity research and landscape ecology there is a need to focus on both climate change and land-use change effects, but hitherto research in these fields have almost exclusively considered land-use change and climate change in isolation.

Furthermore, biodiversity research has largely neglected to consider additional factors that may modify the impact of climate change, such as the impact of invasive species and pathogens, or adaptation measures. In addition, many biodiversity models – such as forecasts of species distributions – are overly simplistic, as they are based on just few biologically relevant parameters, and do not take into account e.g. biotic interactions, species-specific abilities to disperse or adapt evolutionary. *A grand challenge is therefore to develop a scientific basis for effective and biologically meaningful conservation strategies under on-going and future global changes.* Such strategies need to integrate the need to protect and maintain high-quality habitat for in situ biodiversity, e.g. using traditional conservation interventions, and enhancing the ability of species to adapt to, or escape from, climate change, as well as for mitigation and adaptation strategies at large.

A key challenge within evidence-based conservation is to find effective ways to integrate evidence into decision support systems, and especially to integrate evidence based in the natural and social sciences. This integration of evidence into decision support systems is dependent on a better understanding of the context in which local, national and international decisions and strategies for biodiversity conservation are made and implemented. These decisions and strategies cannot be seen as separate from other environmental decisions or wider societal priorities. As an example, green infrastructure has rapidly become one of the main policy tools for biodiversity conservation, but green infrastructure is in addition targeting a broader set of ecosystem services and ecosystem-based adaptation strategies, with possibly conflicting outcomes on biodiversity conservation. Finding effective biodiversity conservation strategies demands identifying whether synergies or trade-offs between conservation goals and other societal needs emerge, and if so, under which conditions. Considering cost-effectiveness and uncertainty related to competing conservation strategies is equally important.

Strategy

The long-term strategy of the biodiversity theme links to the challenges and opportunities identified below (adopted with slight modifications from the [strategic plan](#) of BECC):

An increasing demand for food, fibre, bioenergy, wood and other products leading to intensified agriculture and forest production may be expected to negatively impact other ecosystem services and biodiversity. A key challenge will be to identify solutions for a green economy that balance and exploit potential synergies between biodiversity and various classes of ecosystem services, including agricultural and forest yields. However, current models are weak in their ability to predict the impacts of climate and landscape changes on biodiversity, while empirical evidence for hypothesised systematic effects of biodiversity changes on ecosystem functioning remains sparse and contradictory. More generally, there is a need to highlight synergies and conflicts between different ecosystem services, and among alternative policies, for example green production, climate adaptation, cultural values and conservation of rare species. [...] The development of landscape ecology and landscape genetics research opens for a unique potential to develop studies striving to identify synergies between conservation and provision of ecosystem services.

The ambition of the biodiversity theme is to address these challenges and opportunities by pursuing the strategies listed below.

- To identify opportunities and possibilities to strengthen our competence and allocate resources to reach the [grand challenges](#) underpinning the theme
- To inspire researchers in the BECC community to pursue novel interdisciplinary research on biodiversity both within natural sciences and between natural and social sciences
- Strengthen research on joint effects of climate change and land-use change on biodiversity, in synergy with other variables, e.g. by increasing collaborative efforts with the strategic research area MERGE
- Strengthen collaborative biodiversity research between LU and UGOT
- Develop a collaboration between the BECC network and the Gothenburg Global Biodiversity Centre (GGBC)
- Strengthen the already strong research on trade-offs and synergies between biodiversity conservation and enhancing ecosystem services by joint research efforts together with the two other BECC themes
- Increase links between biodiversity research and training at BSc, MSc and PhD levels via (i) organising, or facilitating and encouraging the establishment of, new courses, (ii) contributing to already existing courses and workshops in the research school ClimBEco, and (iii) organising possibilities for master students and PhD students affiliated with BECC to participate in student-driven systematic review papers