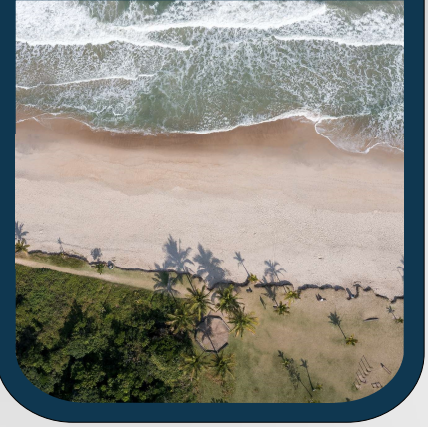
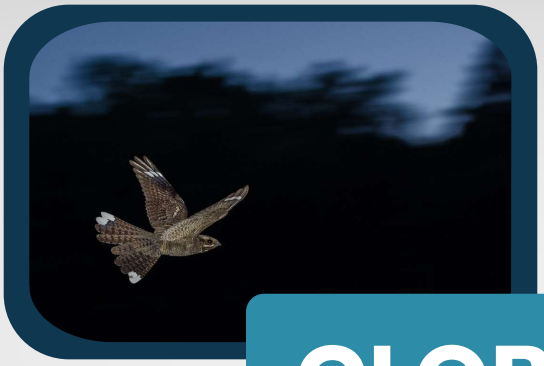




GHENT UNIVERSITY

GLOBAL CHANGE ECOLOGY

OVERVIEW

WHAT

Learn how **climate change**, **habitat fragmentation**, **land-use change**, and **pollution** impact terrestrial, freshwater, and marine ecosystems. Focus on understanding **ecological**, **evolutionary**, and **societal impacts on biodiversity,** applying insights to conservation and nature-based solutions.

WHY

Studying Global Change Ecology is essential for understanding ecosystem responses to rapid environmental shifts. This knowledge **helps predict** future changes, **supports** targeted **conservation**, **sustains** essential **ecosystem services**, and informs **policy decisions**.

HOW

Core courses

- **Climate change and mitigation:** What responses can populations, species, ecosystems show?
- **Spatial Processes and patterns in biodiversity:** What ecological and evolutionary processes shape the the spatial organisation of biodiversity?
- **Ecosystem dynamics:** How do dynamics of organisms and ecosystems change over time. What can we learn from the past?
- **Ecophysiology**: How do environmental changes affect physiological processes? What are the consequences for species dynamics?
- **Behavioural ecology:** How is an organism's behavior adapted to its environment, ensuring survival, reproduction, and population persistence?
- **Ecological modelling**: How can we model ecological and evolutionary changes to forecast natural systems?
- **Human and political ecology: a global perspective**: How are ecological and social systems connected, and influenced by politics and economics?

In-Depth courses

- Specialist methods in ecology: Individual Based Modelling, Conservation Genetics, and Multivariate Data Analysis of Biological data.
- System specific ecology of Microbial, Freshwater, Marine and Soil environments.

GHENT UNIVERSITY

GLOBAL CHANGE ECOLOGY

FOCUS@UGENT

Understanding drivers of biodiversity change

Understanding biodiversity change drivers is vital to addressing ecosystem shifts. Natural and human-driven factors, such as habitat destruction, climate change, pollution, invasive species, and overexploitation, interact, amplifying their impacts. Identifying and addressing these factors in terrestrial, marine, and freshwater systems is key to developing effective conservation strategies to preserve biodiversity.

Eco-evolutionary dynamics

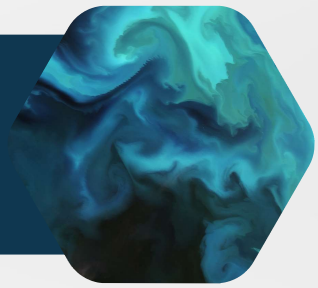
Co-evolutionary dynamics show that evolution occurs rapidly, with ecological and evolutionary changes influencing each other on similar timescales. Eco-evolutionary dynamics are studied in relation to global anthropogenic stressors, where species must quickly adapt in physiology, behavior, and life history, which can, in turn, affect their ecosystems.

Ecological interactions: from competion to foodwebs

Ecological interactions shape species coexistence, survival, and adaptation, stabilizing ecosystems and supporting biodiversity. These relationships, from mutualism to competition, are influenced by evolutionary history and environment. Research on the genetic and ecological basis of interactions in microbial, plant, and animal networks helps understand biodiversity patterns across marine, terrestrial, and freshwater gradients.

Reconstructing and predicting biochemical cycles

Reconstructing past and predicting future biogeochemical cycles helps understand climate and ecosystems. Studying past changes reveals variability, resilience, and vulnerabilities, while future predictions guide resource management, climate mitigation, and biodiversity conservation. Paleoenvironmental research uses lake sediment records and employs remote sensing and robotics to study carbon cycles and ecosystem dynamics across oceans and continents.



Integrating ecology into society

Integrating ecology into society and conservation bridges scientific knowledge with social values, policy, and sustainable development. Recognizing humans as part of ecosystems, this approach links ecosystem health to human well-being. By leveraging expertise, it fosters a future where ecosystems and communities thrive together, using Nature-based Solutions to build resilience against environmental challenges.

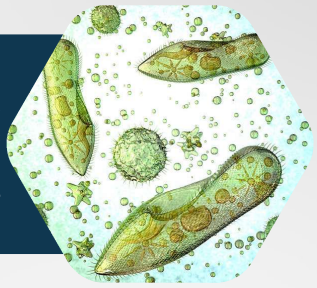
GHENT UNIVERSITY

GLOBAL CHANGE ECOLOGY

RESEARCH IN THE PICTURE

The (un)appreciated role of microbes in ecosystems

We study the biology, ecology, and interactions of microorganisms across diverse habitats, focusing on their roles in biogeochemical cycles and ecosystems. We explore their genetic potential, activity, and responses to environmental changes, highlighting their importance in nutrient cycling, primary production, and greenhouse gas dynamics. We investigate their importantce for ocean carbon cycle using innovative remote sensing technologies.

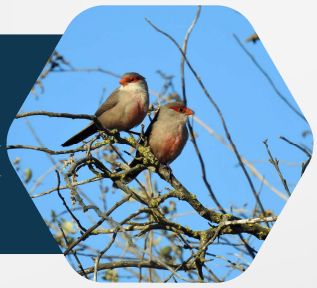


Foodwebs and ecosystem functioning of marine environments

Human activities and climate change impact marine ecosystems, focusing on food web structure and energy flow. Using food web models, we examine how complexity, stability, and commercial species production change under various pressures. Our research targets sand extraction, offshore wind farms in the North Sea, and glacier melting in Greenland fjords.

Cognition and behavioural flexibility in birds

Learning and behavioral flexibility are important cognitive mechanisms that allow birds to thrive in a wide array of environments. Our research helps explain decision-making in dynamic situations, such as avoiding predators or optimizing foraging. By integrating animal cognition, neuroscience, and behavioral ecology, we aim to understand how birds inhibit risky actions and make critical decisions.



Understanding insect decline

To understand what drives arthropod distributions, we study traits like reproduction, growth, and dispersal. Integrating this knowledge into models, we aim to create detailed forecasts of their diversity under global change. The work also supports conservation efforts, including managing rare and invasive species, enhancing habitat connectivity, and addressing urban biodiversity loss.

Biodiversity as a key component in Nature-based Solutions

Nature-based Solutions use healthy ecosystems to protect people, enhance infrastructure, and support biodiversity. For example, coastal dunes provide natural coastal defense, shaped by interactions among plants like marram grass, sand movement, and climate. These bio-geomorphological feedbacks are studied with the aim to develop predictive digital models. We specifically study how NbS impact biological connectivity and resilience to climate change.