

- **Building the European Biodiversity Observation Network (EU BON)**

Sustainable governance of our biological resources requires reliable scientific knowledge that meets the needs of society. Current biodiversity observation systems and environmental datasets are unbalanced in coverage and not integrated, limiting integrative analyses and implementation of environmental policies. EU BON presents an innovative approach towards integration of biodiversity information systems from on-ground to remote sensing data, for addressing policy and information needs in a timely and customized manner. EU BON will provide integration between social networks of science and policy and technological networks of interoperating IT infrastructures, resulting in a new open-access platform for sharing biodiversity data and tools, and greatly advance biodiversity knowledge in Europe. EU BON's 30 partners from 18 countries are members of networks of biodiversity data-holders, monitoring organisations, and leading scientific institutions. EU BON will build on existing components, in particular GBIF, LifeWatch infrastructures, and national biodiversity data centres. EU BON will 1) enable greater interoperability of data layers and systems through adoption of new standards; 2) advance data integration by new (modelling) technologies; 3) increase data mobilisation via scientific communities, citizen scientists, and potential data users; 4) develop strategies for future harmonizing and mainstreaming of biodiversity recording and monitoring; 5) improve analytical tools and services interpreting biodiversity data; 6) support the science-policy interface by timely information and scenario development; 7) link integrated, customized information to relevant stakeholders, and 8) strengthen overall European capacities and infrastructures for environmental information management. EU BON's deliverables include a comprehensive "European Biodiversity Portal" for all stakeholder communities, and strategies for a global implementation of GEO BON and supporting IPBES.

The project is funded under European Commission 7th Framework Programme.

- **Biodiversity in the dark: High-throughput sequence analyses of arctic fungal communities (BioFun)**

Fungi are key players in terrestrial ecosystems as decomposers, pathogens and mutualists. In arctic habitats, ecto- and ericoid mycorrhizal and root endophytic symbiosis dominate due to adaptation to highly organic, nutrient-poor soils. However, little is known about the fungal diversity in arctic habitats. Since most fungi do not produce conspicuous fruit-bodies, DNA-based methods are required to uncover the fungal diversity. The recently developed high-throughput sequencing techniques provide a great potential for exploring the fungal diversity, but these methods have their shortcomings and inherent biases. This project aims to 1) compare the relative performance of high-throughput sequencing tools; 2) develop strategies for standardization and improved quantitative view (through analysis of mock communities); 3) develop a global fungal identifier by integrating high-quality sequence databases, clustering, alignment and phylogenetics tools; 4) populate sequence databases with high quality reference data from fruit-bodies of arctic fungi; 5) disentangle the effects of underlying climatic, edaphic, plant-related, and confounding spatial factors on structuring arctic soil fungal communities and their relative diversity; 6) determine the fungal communities of relict arctic plants in temperate habitats; and 7) provide a prognosis of the gradual large-scale climate change on arctic plants and fungi (based on aims 5,6), with a perspective for developing conservation measures.

The project is funded under the EEA/Norwegian financial mechanism.

- **NATARC**

The Estonian research infrastructures roadmap *Natural history archives and information network* (NATARC) develops services related to hosting and computing of scientific repositories and data archives. Services are addressed to scientists of the whole world, but also to teachers, students, nature conservationists, government officials, organisations and others.

More information: <http://natarc.ut.ee/en/index.html>.

- **Host plant and litter effects on richness and niche differentiation of ectomycorrhizal and saprotrophic fungi**

The recent development of Next Generation Sequencing (NGS) techniques allows testing ecological hypotheses in microbial communities by enabling identification of thousands of organisms simultaneously. By combining NGS, field studies and manipulative experiments, this project team leading by Senior Researcher Leho Tedersoo aims to test the following alternative hypotheses: 1) greater host diversity promotes diversity of ectomycorrhizal (EcM) and litter saprotrophic fungi at the local scale; 2) litter quality affects the competitive balance between EcM and saprotrophic fungi and drives the community composition in both guilds of fungi; 3) host-specific EcM fungal species have a positive feedback to litter of their particular host due to long-term co-evolution and ecological adaptation to the habitat; 4) litter mixing has neutral to positive effects on diversity of EcM and saprotrophic fungi, depending on the scale of resource heterogeneity. The biological results are expected to provide novel, fundamental information on ecological relationships between plant diversity and fungal diversity that cover the aspects of direct (mycorrhiza) and indirect (saprobes) interactions involving resource heterogeneity and feedbacks from litter. In addition to answers to these fundamental biological questions, the project provides massive Next Generation Sequencing data for further developing and optimizing semi-automatic bioinformatics and statistical software, in which the project leader has been actively participating. The project provides further insights into forest management and biodiversity conservation planning from the fungal perspective.

The project is funded by Estonian Research Council (ERF9286).

- **DataCite Estonia**

The University of Tartu joined the DataCite organisation in 2014, becoming the sole organisation in Estonia with the right of assigning the unique DOI numbers to single objects and data collections. The DataCite Estonia project will develop a web-based platform for the registration of research data and establish a consortium that can be joined by all Estonian universities and research and development institutions.

More information: <http://datacite.ut.ee/>.

- **Development of Environmental Education on the base on collections of Estonian Museum of Natural History**

In cooperation with Estonian Museum of Natural History will cooperate in the environmental educational project, which one aim is to digitize and provide the botanical, zoological and entomological collection items in to the PlutoF database (https://plutof.ut.ee:8443/login_page.php).

- **Fungal biodiversity response to richness of living plants and litter**

Greater biodiversity of primary producers enhances the diversity of consumers along the food-chain due to enhanced niche differentiation and productivity. These plant biodiversity effects on microorganisms such as bacteria and fungi remain poorly understood because of their vast numbers and high cost of identification. Fungi play a key role in decomposition as saprobes and in mineral nutrition of plants as mycorrhizal mutualists. Molecular tools have provided important insights into fungal biodiversity, but traditional Sanger sequencing-based tools offer too low throughput for replicated studies in complex environments such as soil and plant tissue. Next Generation Sequencing (NGS) methods allow testing ecological hypotheses in microbial communities by identification of thousands of organisms from hundreds of samples simultaneously. This study addresses the effects of both living plants and litter on fungal biodiversity using NGS, a technique successfully implemented in our laboratory. The project is funded by Estonian Ministry of Education and Research and will be implemented by Senior Researcher Leho Tedersoo.

- **Projects funded by Environmental Investment Centre**

In University of Tartu Natural History Museum is continually ongoing projects funded by Environmental Investment Centre (<http://kik.ee/en>) in accordance with the Environmental Programmes rules and the relevant Regulation of the Minister of the Environment. The objectives of these programs and the activities supported are determined by a Ministry of the Environment regulation and base on the aim to develop and implement of environmental educational activities based on active studies, and to organize the environmental awareness-increasing activities and campaigns for different target groups.