biodiversa+
European Biodiversity Partnership

EUROPEAN PARTNERSHIP

2022-2023 Call for proposals

BiodivMon project catalogue

Improved transnational monitoring of biodiversity and ecosystem change for science and society

Co-funded by the European Union

biodiversa+
European Biodiversity Partnership

Biodiversa+

Biodiversa+ is the European Biodiversity Partnership supporting excellent research on biodiversity with an impact for society and policy. It was jointly developed by BiodivERsA – the predecessor of Biodiversa+ from 2005 to 2021 – and the European Commission as part of the EU Biodiversity Strategy 2030. It contributes to the ambition that "by 2030, nature in Europe is back on a path of recovery, and that by 2050 people are living in harmony with Nature".

Running from 2021 to 2028, Biodiversa+ aims at making the bridge between science, policy, and practice. It currently gathers 81 research programmers and funders as well as environmental policy actors from 40 European and associated countries to work on 5 main objectives contributing to a sustainable ecological transition in Europe:

1. Plan and support research and innovation on biodiversity through a shared strategy, annual joint calls for research projects and capacity building activities
2. Set up a transnational network of harmonised schemes to improve monitoring of biodiversity and ecosystem services across Europe
3. Contribute to high-end knowledge for deploying Nature-based Solutions and valuation of biodiversity in the private sector
4. Ensure efficient science-based support for policymaking and implementation in Europe
5. Strengthen the relevance and impact of pan-European research on biodiversity in a global context

For more information: www.biodiversa.eu

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The BiodivMon partners

1. Austrian Science Fund, AUSTRIA
2. Belgian Science Policy Office, BELGIUM
3. The Fund for Scientific Research – Wallonia, BELGIUM
4. The Research Foundation – Flanders, BELGIUM
5. Brazilian National Council of State Funding Agencies, BRAZIL
6. Brazilian National Council for Scientific and Technological Development, BRAZIL
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19. General Secretariat for Research and Innovation, GREECE
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21. Environmental Protection Agency of Ireland, IRELAND
22. Ministry of Universities and Research, ITALY
23. Autonomous Province of Bolzano/Bozen, ITALY
24. Ivorian Science, Technology and Innovation Fund, IVORY COAST
25. Latvian Council of Science, LATVIA
26. Research Council of Lithuania, LITHUANIA
27. National Agency for Research and Development, MOLDOVA
28. Ministry of Higher Education Scientific Research and Innovation, MOROCCO
29. Dutch Research Council, NETHERLANDS
30. Research Council of Norway, NORWAY
31. National Science Centre, POLAND
32. Portuguese Foundation for Science and Technology, PORTUGAL
33. Executive Agency for Higher Education, Research, Development and Innovation Funding, ROMANIA
34. Slovak Academy of Sciences, SLOVAKIA
35. Ministry of Education, Science and Sport, SLOVENIA
36. Department of Science and Innovation, SOUTH AFRICA
37. Spanish Biodiversity Foundation, SPAIN
38. Spanish State Research Agency, SPAIN
39. Spanish Centre for the Development of Industrial Technology, SPAIN
40. Swedish National Space Agency, SWEDEN
41. Swedish Environmental Protection Agency, SWEDEN
42. Swiss National Science Foundation, SWITZERLAND
43. National Science and Technology Council, TAIWAN
44. Ministry of Higher Education and Scientific Research, TUNISIA
45. Ministry of Agriculture and Forestry, TÜRKIYE
46. Scientific and Technological Research Council of Türkiye, TÜRKIYE

Contents

Introduction

The world faces a critical challenge: ecosystems are deteriorating, and biodiversity loss is accelerating

Human activity has severely altered vast portions of the planet, with up to 75% of terrestrial areas, 40% of marine environments, and 50% of rivers significantly impacted (IPBES 2018, 2019). In Europe, human activities have disturbed 96-98% of forests, and 85% of grasslands, heaths, and scrubs are in non-favourable conservation status, as are 90% of wetlands and more than 70% of marine habitats (JRC 2020). This degradation is driving a rapid increase in species extinctions and poses significant threats to human health, our societies, and economies. The economic cost of ecosystem service loss due to land-cover change and degradation amounts to trillions of USD annually (OECD 2019).

To address this crisis, global leaders have made commitments to protect and restore nature, aiming to safeguard a minimum of 30% of land and seas by 2030 and restore at least 30% of habitats and related ecosystem processes (CBD 2022, LPN 2021). In Europe, the EU Biodiversity Strategy for 2030 pledges to maintain or improve conservation trends and status for all protected habitats and species and aims that at least 30% of species and habitats currently in unfavourable conditions are restored to reach favourable conservation status or to show positive trends (European Commission 2020). The EU's Horizon Europe funding programme supports research and innovation to recover biodiversity, protect and restore ecosystems and their services, and manage natural resources sustainably.

Commitments to protect and restore nature

Biodiversity monitoring is essential to understand ecological status, dynamics, and trends, and to allow for effective and cost-efficient measures and their accurate evaluation. However, current data are biased towards certain taxonomic groups and lack comprehensive assessments of genetic and functional diversity. Knowledge gaps persist, including insufficient characterisation of habitat distribution, species status, and ecosystem health. Harmonising monitoring schemes, improving data collection, and deploying innovative technologies are essential to address these gaps. Efforts such as GEO BON and GBIF international networks aim to gather standardised biodiversity data, but challenges remain due to limited spatial,

Biodiversity monitoring is essential

temporal and species coverage, lack of standardised monitoring approaches, and data accessibility issues.

To overcome these hurdles, collaborative work across countries and ecosystems is key. Global legal frameworks such as the CBD, UNCLOS, RAMSAR, and CITES, along with the EU Biodiversity Strategy and several EU legislations, encourage a transnational approach for effective environmental management. Embracing participatory citizen science, improving education, and fostering the use of Earth Observation can bolster public understanding and aid conservation efforts. These efforts align very well with the Kunming-Montreal Global Biodiversity Framework (GBF) adopted at the 2022 UN Biodiversity Conference (CBD 2022).

Kunming-Montreal Global Biodiversity Framework

Science-based information on the status and trends of biodiversity are needed to guide prioritisation efforts, to identify the most important areas and species-specific measures for biodiversity and ecosystem protection and restoration, and to truly deliver on both the EU Biodiversity Strategy and the new global goals and targets. Meeting these challenges demands common methodologies, shared frameworks, and transnational cooperation. It involves optimising resource use, achieving comprehensive environmental coverage, and implementing policies that prioritise biodiversity protection and restoration.

Improved transnational monitoring of biodiversity and ecosystem change for science and society

Having identified such needs, the Biodiversa+ partners launched the 'BiodivMon' call on "Improved transnational monitoring of biodiversity and ecosystem change for science and society" in October 2022, co-funded by the European Commission under Horizon Europe. The relevance of this research topic was highlighted by the unprecedented number of eligible pre-proposals received: 262!

The call aimed at supporting 3-year transnational research projects advancing knowledge on biodiversity through monitoring, building on previous and existing efforts across Europe and beyond. Projects are expected to focus on improving knowledge of species distribution and abundance, but also to improve and scale up existing monitoring methods, or to develop and test new methods. In doing so, they will also contribute to the development of a better transnational system for monitoring biodiversity and ecosystems in Europe.

Following the evaluation process, 33 research projects have been selected for funding for a total amount of over 46 million euros. These projects cover genetics, species, ecological and functional diversity across terrestrial, freshwater and marine environments, including soils and the aerial domain. Congratulations to the winning consortia for the excellent quality of their proposals, and for their commitment to provide tools for better implementation and harmonisation of monitoring schemes across countries and regions to inform transformative policies and management!

33 research projects have been selected for funding for a total amount of over 46 million euros

We would like to warmly thank the members of the evaluation panel as well as the external reviewers who ensured a high-quality evaluation process and a fair ranking of the pre- and full proposals. We would also like to express our gratitude to the different ministries and funding agencies that participated in the call. Their efforts and contributions enabled the smooth implementation of the call and the funding of a high number of top-ranked proposals.

This brochure provides an insight into the call process, from the development of the call to the selection of proposals and their follow-up. It gives an overview of the profile of the submitted proposals and a short description of each of the 33 projects selected for funding.

We wish you a pleasant reading!

Rainer Sodtke
Biodiversa+ co-Chair

Magnus Tannerfeldt
Biodiversa+ co-Chair

Ron Winkler
Biodiversa+ co-Chair

Bastian Bertzky
Policy Officer, DG Research and Innovation, European Commission

Jessika Giraldi
Policy Officer, DG Environment, European Commission

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Overview of the BiodivMon Call

Summary of the BiodivMon Call

The BiodivMon call will contribute to advance knowledge on biodiversity through monitoring, building on previous and existing efforts across Europe and beyond. It aims to support transnational research projects that contribute to:

- refining, enhancing and upscaling existing methods, and/or developing, testing, applying and evaluating new methods to characterise, understand, and model biodiversity status, dynamics, and trends at relevant spatial and temporal scales;
- developing tools for better implementation and harmonisation of monitoring schemes across countries and regions;
- showing the power of (new and existing) monitoring information to inform transformative policies and management.

The call covers all environments, i.e. terrestrial, freshwater and marine.

Three major (non-exclusive) themes were addressed by the call

The priorities of the calls were structured in three themes. Projects could address one or several themes. Projects combining aspects from two or more themes were encouraged.

Theme 1: Innovation and harmonisation of methods and tools for collection and management of biodiversity monitoring data

The objective of this theme was to help in the development and implementation of new or improved approaches and technologies for monitoring biodiversity. It included the improvement of current monitoring approaches and technologies, from demonstration to large-scale application, across spatial scales, domains and taxa, and the evaluation of the ability to collect pressure variables together with state variables. Research under this theme could contribute to optimising the coverage and representativeness of biodiversity monitoring schemes to support and complement existing efforts and to harmonise existing operationalised protocols, methods and approaches for field data collection.

Theme 2: Addressing knowledge gaps on biodiversity status, dynamics, and trends to safeguard biodiversity and to reverse biodiversity loss

This theme focused on analyses to fill knowledge gaps on status of a broad range of taxa, with particular emphasis on indicator species and groups (for example pollinators or marine invertebrates). By enhancing methodology and data integration, research under this theme should help to provide comparable indicators of policy and management relevance and help to integrate various geographical scales into policy and management decisions.

Theme 3: Making use of available biodiversity monitoring data

This theme supported research that builds on and integrates existing knowledge, theoretical tools, data, etc. to provide new insights into biodiversity monitoring. In particular, this theme included the development and testing (e.g. evaluation of biases and uncertainties around biodiversity indices) of analytical tools and methods that improve the capacity of existing data to expand our knowledge of biodiversity status, dynamics, and trends across Europe, in line with the FAIR data principles.

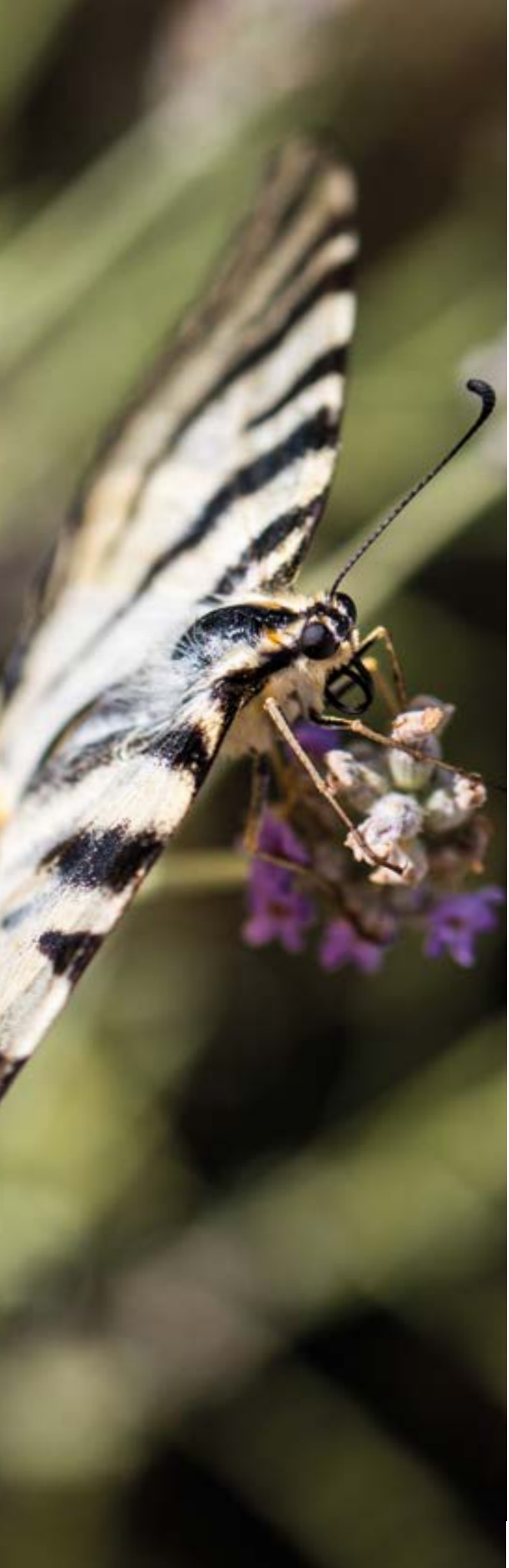
Type of research funded

This call targeted 3-years transdisciplinary projects, involving partners from at least three different countries participating in the call.

Given the nature of the research supported through this call, proposals had to engage different disciplines including biological, natural, technical, social, economic, political sciences and/or humanities.

With the aim of breaking down the silos between research and practice, projects had to demonstrate both scientific excellence and societal and/or policy impact.

The added value of international collaboration and the level of collaboration between teams from different countries also had to be clearly demonstrated to allow for upscaling of knowledge beyond the national level, or for comparative approaches between different local contexts. Contributions to global research programmes, assessment bodies, and multilateral environmental agreements, were encouraged.



Call process

The topic of this call, biodiversity monitoring, is a priority of the Biodiversa+ Strategic Research and Innovation Agenda (SRIA) and a key element of the Biodiversa+ Flagship Programme to better characterise, understand and report on biodiversity dynamics and trends. To significantly advance knowledge on this topic, Biodiversa+, together with the European Commission, decided to launch an ambitious joint call in 2022-2023.

The content and procedures for this joint call were defined by the 46 national and regional funding organisations from 33 countries that participated in the call. ANR, the French National Research Agency, with the support of NCN, the National Science Centre in Poland, hosted the Call Secretariat and thus played a key role in the implementation and success of the call.

The call was launched on 8 September 2022 with a deadline for submission of pre-proposals on 9 November 2022. Eligible pre-proposals were evaluated by an independent Evaluation Committee and shortlisted pre-proposals were invited to submit full proposals by 5 April 2023. Eligible full proposals were evaluated by the independent Evaluation Committee and external reviewers between April and early July 2023. Based on the results of the evaluation process and without modifying the ranking of the projects established by the independent Evaluation Committee, the funding organisations agreed on the number of projects to be recommended for funding in September 2023, allowing funded projects to start between 1 December 2023 and 1 April 2024.

All projects have a duration of 3 years. During their lifetime, they will be required to submit a midterm report and a final report.

Evaluation Committee

The composition of the Committee was similar between step 1 and 2.

Scientific experts

Chair of the Committee: Nathalie Pettorelli, Zoological Society of London, UK

Kofi Akamani, Southern Illinois University, USA

Peter Arcese, University of British Columbia, Canada

Fernando Ascensão, Ce3C – Centre for Ecology, Evolution and Environmental Changes, Portugal

Clement Atzberger, University of Natural Resources and Life Sciences, Austria

Isabelle Aubin, Great Lakes Forestry Centre, Canadian Forest Service, Natural Resources Canada, Canada

Yu-Chung Chiang, National Sun Yat-sen University, Taiwan

Nicola Clerici, Universidad del Rosario, Colombia

Richard Gregory (step 1 only), Royal Society for the Protection of Birds /University College London, UK

Grant Hamilton, Queensland University of Technology, Australia

Stephanie Hampton, Carnegie Institution for Science, USA

Ferenc Jordan, University of Parma, Italy

Dave Kendal, University of Tasmania, Australia

Hojka Kraigher, Slovenian Forestry Institute SFI, Slovenia

Anne Magurran, University of St Andrews, UK

Frank Masese, Department of Fisheries & Aquatic Sciences, University of Eldoret, Kenya

Louise McRae, Zoological Society of London, UK

Lina Mtwana Nordlund, Uppsala University, Sweden

Zuzana Musilova, Czech University of Life Sciences in Prague, Czech Republic

Piotr Nowicki, Institute of Environmental Sciences, Jagiellonian University, Poland

Nessa O'Connor, Trinity College Dublin, Ireland

Michael Pocock, UK Centre for Ecology & Hydrology, UK

Natasha Ribeiro, Eduardo Mondlane University, Mozambique

Oguz Turkozan, Aydın Adnan Menderes University, Türkiye

Davnah Urbach, Global Mountain Biodiversity Assessment, Switzerland

Yeqiao Wang, University of Rhode Island, USA

Monika Wulf, Centre for Agricultural Landscape Research, Germany

Alexandra Zieritz, University of Nottingham, UK

Policy/management experts

Chair of the Committee: Simon Gardner, Independent Consultancy, UK

Mora Aronsson, Swedish University of Agricultural Sciences, Sweden

Johnny Berglund, County Administrative Board of Västerbotten, Sweden

Karma Bouazza, Lebanon Reforestation Initiative, Lebanon

Peter Bridgewater, The Australian National University, Australia

Claire Brown, UNEP World Conservation Monitoring Centre, UK

Francisco Miguel Cortés Sánchez, Centro de Estudios y Experimentación de Obras Públicas, Spain

Roberto Crosti, Institute for Environmental Protection and Research, Italy

Judy Fisher, Fisher Research Pty Ltd, Australia

Adriana Ford, Imperial College London, UK

Frederik Forsberg, SEGES Innovation P/S, Denmark

David Gutiérrez, Red Cantábra de De Desarrollo Rural, Spain

Colin Hindmarch, Independent Consultancy, UK

Katia Hueso-Kortekaas, ICAI / Comillas Pontifical University, Spain

Peter Koncz, Duna-Ipoly National Park Directorate, Hungary

Manuel Lago, Ecologic Institute, Germany

Maria Cecilia Londono Murcia, Instituto Humboldt / GEO BON, Colombia

Ivone Pereira Martins, European Environment Agency, Denmark

Vinod Bihari Mathur, National Biodiversity Authority of India, India

Angela Morgado (step 1 only), Nature Portugal Association (ANP) – Contact WWF Portugal, Portugal

Nicholas Ozor, African Technology Policy Studies Network, Kenya

Simona Polakova, Ministry of the Environment of the Czech Republic, Czech Republica

Christian Prip, The Fridtjof Nansen Institute, Norway

Sunandan Tiwari (step 1 only), ICLEI – Local Governments for Sustainability, World Secretariat, Germany

Wouter Vanneuville, European Environment Agency, Denmark

Evaluation process

Proposals were evaluated by an independent Evaluation Committee in step 1 and by an independent Evaluation Committee and external reviewers in step 2. Both the Evaluation Committee and the external reviewers consisted of scientific experts, as well as policy-management experts and practitioners.

Proposals were evaluated according to specific guidelines and on the basis of the following specific criteria, which were defined and communicated in advance to applicants:

- Criteria applied in step 1 (pre-proposal stage): (1) fit with the scope of the call; (2) novelty of the research; (3) impact.

- Criteria applied in step 2 (full proposal stage): (1) scientific excellence; (2) quality and efficiency of implementation; (3) impact.

At each step, proposals were given three scores according to the above criteria. While the three criteria had the same weight in step 1, they had different weights in step 2, with a slightly higher weight for scientific excellence than for impact and a higher weight for impact than for implementation. Thresholds were defined for each criterion and proposals with scores below these predefined thresholds were neither ranked nor considered for funding.

For the first step, the Evaluation Committee meeting was organised online from 31 January to 2 February 2023; and for the second step, the Evaluation Committee meeting was held in person at the Zoological Society of London from 27 to 29 June 2023. During these meetings, the Evaluation Committee members had the opportunity to discuss the pre- and full proposals and to agree on the final scores to be attributed to the pre- and full proposals.

This evaluation process led to the establishment of a final ranking list of the best proposals, which was sent to the Call Steering Committee, composed of the national and regional funding organisations participating in the call. The funders then decided on the maximum number of top-ranked projects to be funded, strictly following the ranking list.

From the Evaluation Committee Chairs

It was a pleasure to serve as co-Chairs of the Evaluation Committee of the 2022-2023 Biodiversa+ Call entitled "Improved transnational monitoring of biodiversity and ecosystem change for science and society" (BiodivMon). This call aimed to support research contributing to (i) refining and enhancing and upscaling existing methods, and/or developing, testing, applying and evaluating new methods to characterise, understand, and model biodiversity status, dynamics, and trends at relevant spatial and temporal scales; (ii) developing tools for better implementation and harmonisation of monitoring schemes across countries and regions; and (iii) showing the power of (new and existing) monitoring information to inform transformative policies and management.

Appropriate, rigorous, and up-to-date data to improve knowledge about the state and trends of biodiversity constitute a basic requirement for the transition of all human activities and economies to a positive path for nature. Developing common methodologies and shared frameworks through collaborative work across countries that face similar challenges, similar policy targets and similar ecosystems is particularly important. Because of this, a number of regional and international agreements and directives strongly encourage a transnational approach to optimise resource use and to achieve adequate coverage for environmental management and protection. This call directly aimed to address this need, providing an opportunity to advance knowledge on biodiversity through monitoring, building on previous and existing efforts across Europe and beyond.

The call attracted competitive and high-quality submissions at both the pre-proposal and full proposal stages, receiving 262 eligible pre-proposals and 108 eligible full proposals. The funded 33 transdisciplinary and innovative research projects represent a substantial financial commitment of over €46 million, including contributions from the European Commission. The funded projects addressed topics across all the three, previously introduced, non-exclusive, themes and will contribute knowledge across diverse ecosystems: terrestrial ecosystems, inland waters and coastal and marine ecosystems.

Over the 2022-2023 period, we really appreciated working with our multinational and dynamic group of Evaluation Committee members, who provided enlightening and constructive assessments of the quality of the pre- and full proposals. The high level of collegiality made chairing the scientific and policy-management subcommittees easy and pleasant, and ensured fair and adequate evaluation of each submission. We were lucky enough to be able to gather in person at the Zoological Society of London for the evaluation of the full proposals, which made the whole experience particularly memorable and conducive to open and candid exchanges between scientists and practitioners of diverse backgrounds. The Call Secretariat played a key role in facilitating our tasks, working efficiently and making the entire process run smoothly.

This call was a fantastic opportunity to support efforts towards advancing knowledge on biodiversity through monitoring, encouraging transdisciplinary and transnational research likely to deliver impacts on the ground. It was also an occasion to help boost monitoring efforts for poorly known organism groups and attract research on technologies that may have the potential to help overcome key monitoring gaps. Because the screening process included evaluating proposals based on international management and policy contexts, we trust these 33 projects will be highly relevant both in terms of generating new scientific knowledge but also in advancing policy and solutions to enhance nature protection and recovery.

Prof. Nathalie Pettorelli
Scientific co-Chair of the Evaluation Committee

Dr Simon Gardner
Policy-management co-Chair of the Evaluation Committee

Analysis of the call results

Analysis of the call results

Overall figures of the call

	No. of proposals	No. of teams	Budget
Submitted pre-proposals	262	1,693	292.6 M€
Submitted proposals	108	777	140.0 M€
Selected proposals	33	250	48.5 M€

Table 1: Overall figures of the BiodivMon Call

With a total of 262 eligible pre-proposals submitted and 1,693 participating teams (Table 1), this 2022-2023 call attracted the highest number of proposals in a Biodiversa+ call, demonstrating the strong interest of the scientific community in the different topics and themes of the call.

Of the 262 pre-proposals received, the Call Steering Committee decided to fund the 33 highest ranked proposals for a total amount of over 46 million euros, which represents a success rate of 12.6%. This success rate was slightly lower than the average success rate for Biodiversa+ calls, which stands at 14.2% (17.2% for the 2021-2022 BiodivProtect Call and 12.8% for the 2020-2021 BiodivRestore Call).

Thanks to the high flexibility of several funding organisations who agreed to increase their budget, it was possible to fund the maximum number of top-ranked proposals (33 funded projects), despite the particularly competitive nature of the call (36 for the 2021-2022 BiodivProtect Call and 22 for the 2020-2021 BiodivRestore Call).

Geographical origin of the applicants

On average, pre-proposal teams were composed within 6.4 partners applying for funding.[1]

The vast majority (Figure 1, 96.4%) of the teams that submitted a pre-proposal were from the countries of the 23 funding organisations involved in the funding of the call, i.e. Austria, Belgium, Brazil, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy (including the Autonomous Province of Bolzano/Bozen), Ivory Coast, Latvia, Lithuania, Moldova, Morocco, Netherlands, Norway, Poland, Portugal (including the Azores), Romania, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Taiwan, Tunisia, and Turkey.

The remaining 3.7% came from European countries not participating in the call[2] (1.6%), in particular the United Kingdom (0.8%). The remaining 1.6% of the applicants came from non-European countries not participating in the call, i.e. the United States of America (0.4%), Canada (0.2%), Argentina (0.2%), Israel (0.2%), Mexico (0.2%), Kenya, Madagascar, Algeria, Brunei Darussalam, Cameroon, Cape Verde, Chile, Colombia, Comoros, the Democratic Republic of Congo, Ghana, India, Indonesia, Japan, Maldives, Senegal, the United Republic of Tanzania and Uganda.

Teams from countries not participating in the call applied as subcontracted or self-funded Partners.

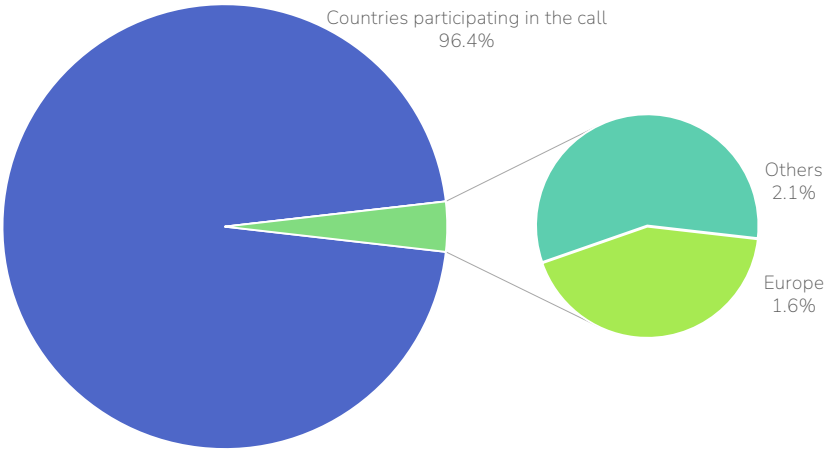
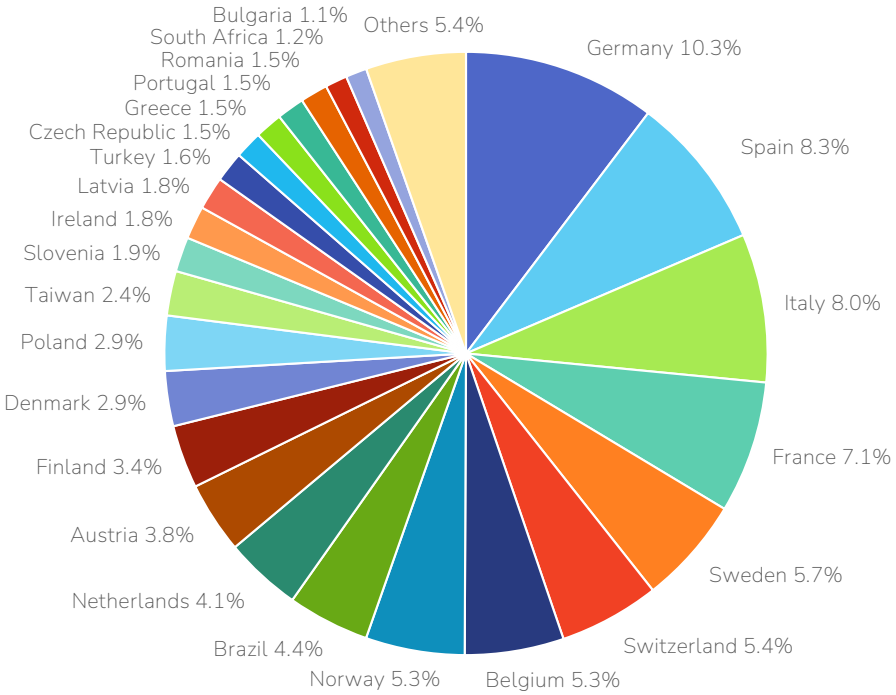


Figure 1: Geographical origin of the applicants participating in the 2022-2023 BiodivMon Call

1. Median = 6, min. = 3 and max. = 25 partners per pre-proposal.
2. United Kingdom (0.8%), Croatia (0.2%), Faroe Islands (0.1%), Albania (0.1%), Andorra (0.1%), Armenia (0.1%), Cyprus (0.1%), Georgia (0.1%), Greenland (0.1%), Iceland (0.1%), Luxembourg (0.1%), Serbia (0.1%), and Ukraine (0.1%).

Reserved and requested budgets

The reserved budgets for the participating countries were published during the announcement of the call (33.9 M€ in total) and the funding organisations could set a funding cap per project, which might have influenced the budget requests made by applicants. The highest values of both reserved (Figure 2) and requested budgets (Figure 3a) were observed for Germany, Spain, Italy, and France.



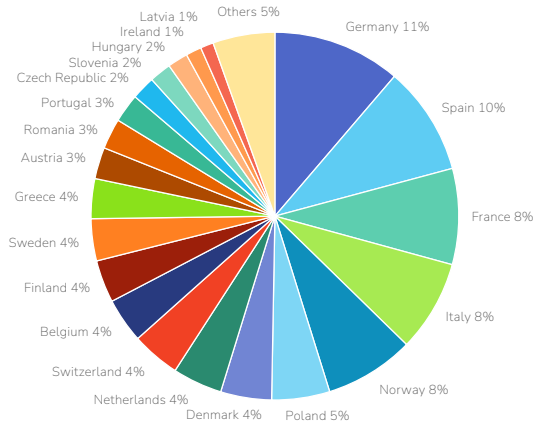
Others: Estonia 1.0%, Morocco 0.9%, Tunisia 0.9%, Hungary 0.7%, Slovakia 0.7%, Lithuania 0.4%, Ivory Coast 0.4%, and Moldova 0.3%

Figure 2: Distribution of the reserved budget among participating countries in the 2022-2023 BiodivMon Call

In some cases, the national reserved budgets were insufficient compared to the financial demands from the successful applicants. Yet, thanks to their flexibility and the use of part of the European Commission co-funding as a common pot, this did not jeopardise the call outcome. On the other hand, some funding organisations did not use their reserved budget, due to a lower success of their research community (Figure 5).

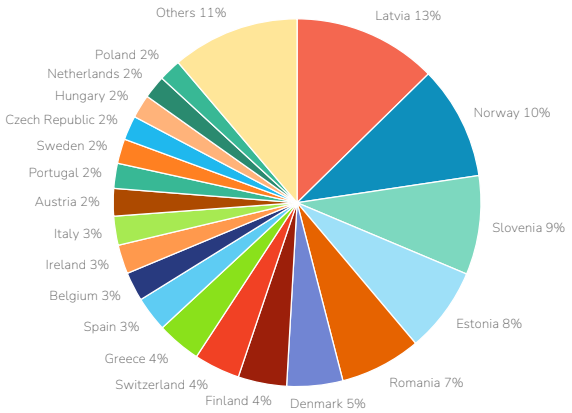
Ultimately, the 33 top ranked projects could be funded, strictly following the ranking list established by the Evaluation Committee.

Figure 3a



Others: Türkiye 0.9%, Estonia 0.8%, Morocco 0.8%, Brazil 0.6%, South Africa 0.5%, Taiwan 0.5%, Tunisia 0.3%, Bulgaria 0.3%, Slovakia 0.3%, Lithuania 0.3%, Moldova 0.05%, and Ivory Coast 0.04%.

Figure 3b



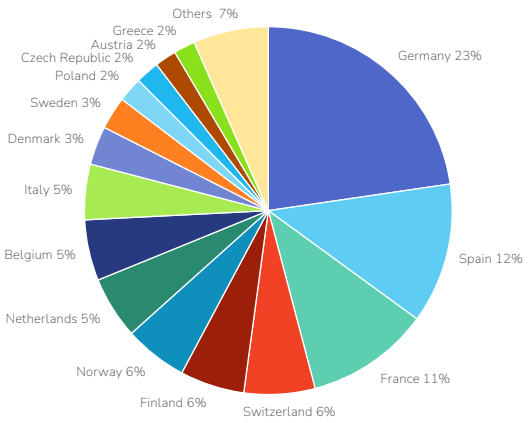
Others: Lithuania 1.3%, Moldova 1.2%, Germany 1.2%, France 1.2%, Bulgaria 1.1%, Ivory Coast 1.0%, South Africa 1.0%, Morocco 0.9%, Slovakia 0.9%, Tunisia 0.9%, Türkiye 0.3%, Brazil 0.1%, and Taiwan 0.1%.

Figure 3: Distribution of the total budget requested to participating countries by the applicants in the submitted pre-proposals in percentage of absolute values (Figure 3a) and values normalised[3] according to the size of the national research community (Figure 3b)

Despite a relatively low participation in terms of requested budget (Figure 3a), the scientific communities of some countries, such as Latvia or, to a lesser extent, Slovenia, Estonia and Romania, appear to have responded well to this call when the budget requests are normalised according to the estimated number of researchers from all scientific themes in each country (Figure 3b). Unfortunately, we do not have figures on the size of the biodiversity research communities per se, which would have improved the normalisation.

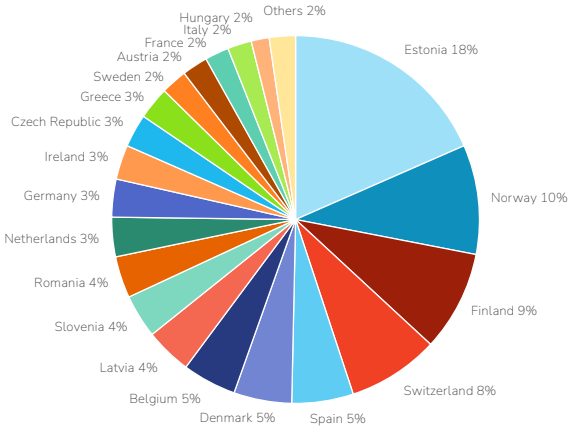
The teams funded through the 2022-2023 BiodivMon call came from 23 different countries (Figure 4a). Again, it is worth comparing the funding amounts between countries, both in absolute terms and in terms of amounts normalised by the estimated number of researchers across all scientific disciplines in each country (Figure 4b). For example, the total awarded budget for Estonia, Latvia, Slovenia, and Romania is much higher compared to other countries when taking into account the size of the national research community than when looking at absolute values.

Figure 4a



Others: Estonia 1.5%, Ireland 1.2%, Romania 1.0%, Hungary 1.0%, Portugal 0.9%, Slovenia 0.6%, Latvia 0.3% and Türkiye 0.1 %.

Figure 4b



Others: Poland 1.14%, Portugal 1.13% and Türkiye 0.04 %. Same data sources and methodology as Figure 3b.

Figure 4: Distribution of awarded budget to the successful applicants in absolute values (Figure 4a) and values normalised according to the size of the national research community (Figure4b)

3. Values normalised according to the size of the national research community, i.e. full-time equivalent researchers per million inhabitants multiplied by the million inhabitants of the country. Note that, depending on the country, the requested budget may or may not include salaries for permanent positions. The size of the population (in 2022) and of the national research community (in 2021, except for South Africa in 2020, Morocco in 2016, Brazil in 2014, and Ivory Coast in 2005) were taken from World Bank data. Except for Taiwan, for which the population size (in 2023) was taken from the National Statistics of the Republic of China and the size of the national research community (in 2021) from the Organisation for Economic Co-operation and Development (OECD).

Success rate per country

Research teams from Germany, Estonia, Finland, Switzerland, and Belgium applying to this call had a particularly good success rate in the second step of the evaluation process (ratio of granted to requested funded amounts), i.e. above 30% (Figure 5). However, these figures should be treated with caution for some countries due to the low number of proposals submitted.

Despite the participation of Brazil, Bulgaria, Ivory Coast, Lithuania, Moldova, Morocco, Slovakia, South Africa, Taiwan, and Tunisia in the call, none of the 33 funded projects involved a research team from these countries, reflecting the fact that all these countries were no longer involved in the second step of the evaluation process.

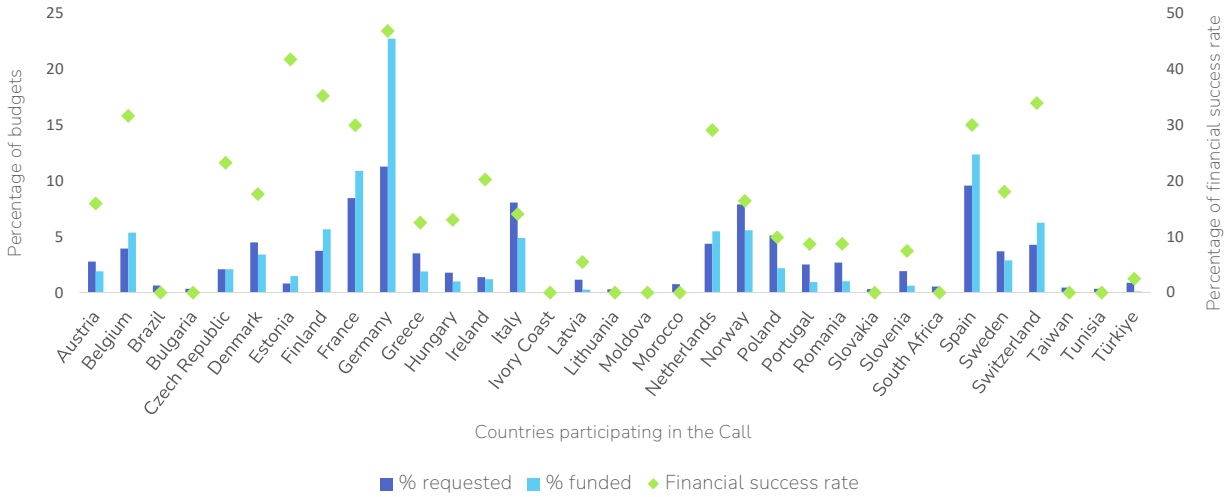
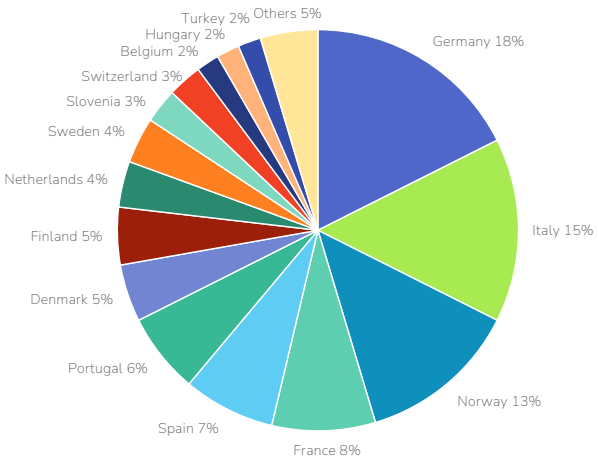


Figure 5: Percentage of budgets requested at the submission stage (step 2) and after selection (funded) for each country participating in the funding of the call, together with the percentage of financial success rate

Geographical origin of project coordinators

Figure 6a



Others: Austria, Ireland, Ivory Coast, Poland, and Romania (each 1%)

Figure 6b

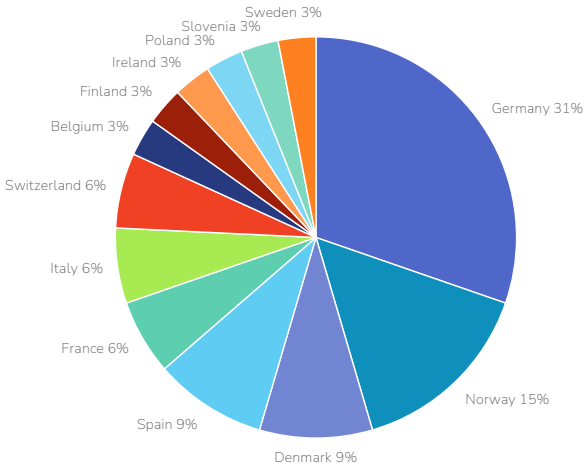


Figure 6: Geographical origin of coordinators in submitted full proposals (Figure 6a) and funded projects (Figure 6b)

At the full proposal stage, the project coordinators represented 20 countries participating in the call (Figure 6a), while the coordinators of pre-proposals represented 30 countries participating in the call (no coordinators from Morocco, Slovakia, and Taiwan).

At the end of the process, the coordinators of the funded projects come from only 13 countries (Figure 6b). Again, these figures should be treated with caution as they only represent the geographical distribution of the coordinators. Nevertheless, it can be noted that coordinators from Germany, Norway, Denmark, and Spain were particularly successful.

Gender balance in consortia

Figure 7a

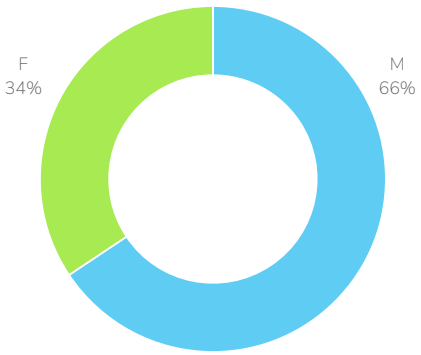


Figure 7b

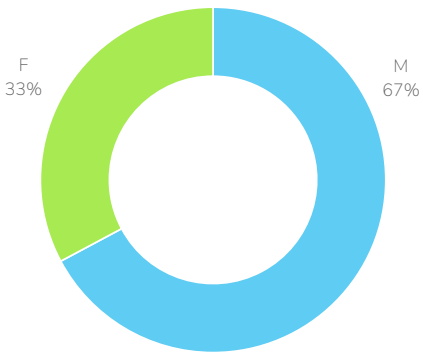


Figure 7: Gender balance in submitted full proposals (Figure 7a) and funded projects (Figure 7b) consortia[1]

At the full proposal stage, the consortia were composed of 34% female and 66% male coordinators and principal investigators (Figure 7a). This unequal gender balance was similar for the pre-proposal consortia (35% female, 65% male), reflecting the composition of the biodiversity research communities that applied to the call. At the end of the process, the composition of the funded consortia is equivalent (Figure 7b). Considering coordinators only, funded projects had a 42% female representation, while pre-proposals had a 35% female representation

1. Gender balance percentage (F for female and M for male) of the coordinators and principal investigators of partners, based on the declaration of the applicants. Applicants were given the option to indicate an 'other' gender and/or not to comment.

Private/Public organisations balance

Figure 8a

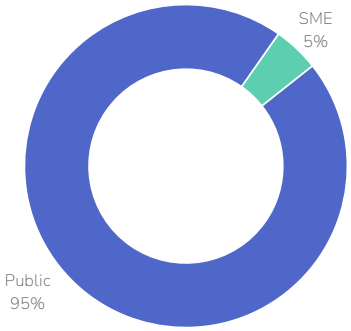


Figure 8b

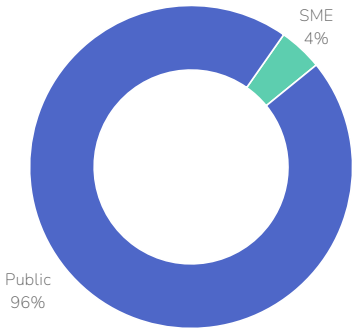


Figure 8: Distribution of requested funding in submitted full proposals (Figure 8a) and funded projects (Figure 8b) by types of organisations[4]

The organisations funded by the call are mainly public (Figure 8b) and the proportion of small and medium-sized enterprises funded is similar to the proportion that applied to the call, i.e. 5% of SMEs in the full proposals (Figure 8a). Even if the subcontracted and self-funded SMEs involved in the selected consortia are added, the overall representation of private organisations is equivalent (6%) and in line with their initial involvement in the full proposals (6%).

Call themes and sub-themes addressed by the proposals

The BiodivMon Call covers three main themes: "Innovation and harmonisation of methods and tools for the collection and management of biodiversity monitoring data" (theme 1), "Addressing knowledge gaps related to biodiversity status, dynamics, and trends in order to reverse biodiversity loss" (theme 2), and "Making effective use of available biodiversity monitoring data" (theme 3). A project could address several themes.

Project coordinators had to indicate which theme(s) they were applying for during the submission phase.

Overall, there was more interest in theme 1. Themes 1, 2 and 3 were fairly equally represented in both full proposals and funded projects (Figure 9).

Figure 9a

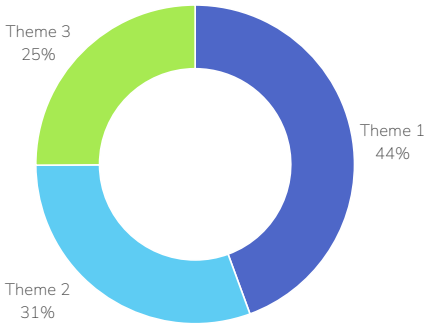


Figure 9b

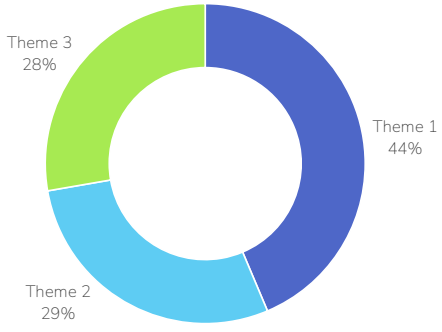


Figure 9: Themes 1, 2 and 3 as a percentage of full proposals (Figure9a) and projects funded (Figure9b)

4. Percentage based on applicants' declaration, private organisations include small and medium-sized enterprises (SMEs) and exclude associations, private foundations, private universities.

Studied environments

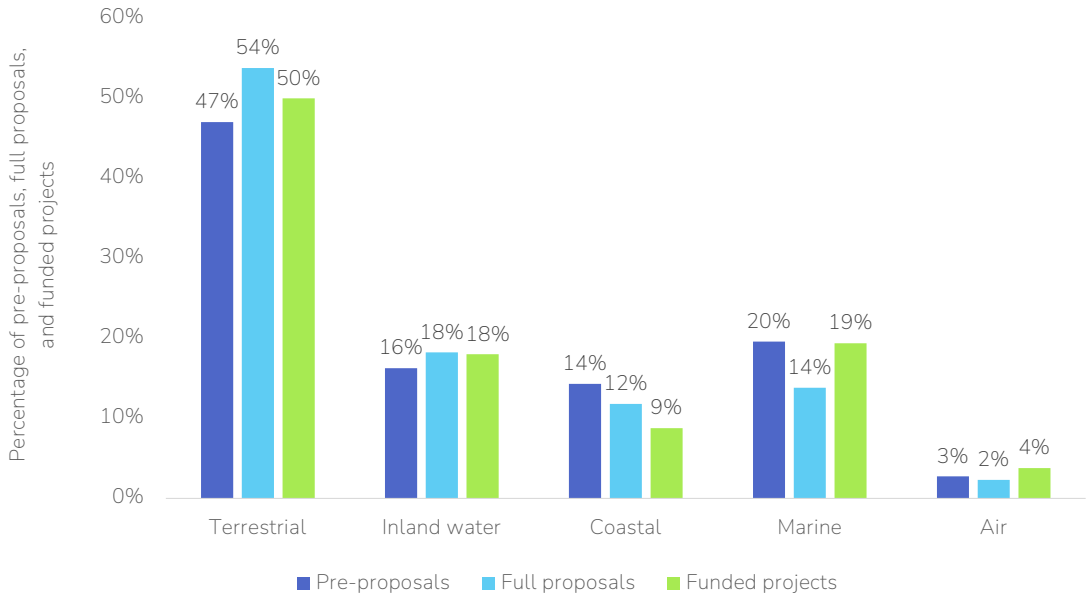


Figure 10: Distribution of pre-proposals, full proposals and funded projects by studied environment. A proposal may address several environments

The majority of proposals and funded projects focused on terrestrial ecosystems (Figure 10), with fewer projects focusing on freshwater, marine/coastal and air environments. This is a general tendency in Biodiversa+ calls and may be due to the fact that there are other well-known funding sources for marine biodiversity research at European level.

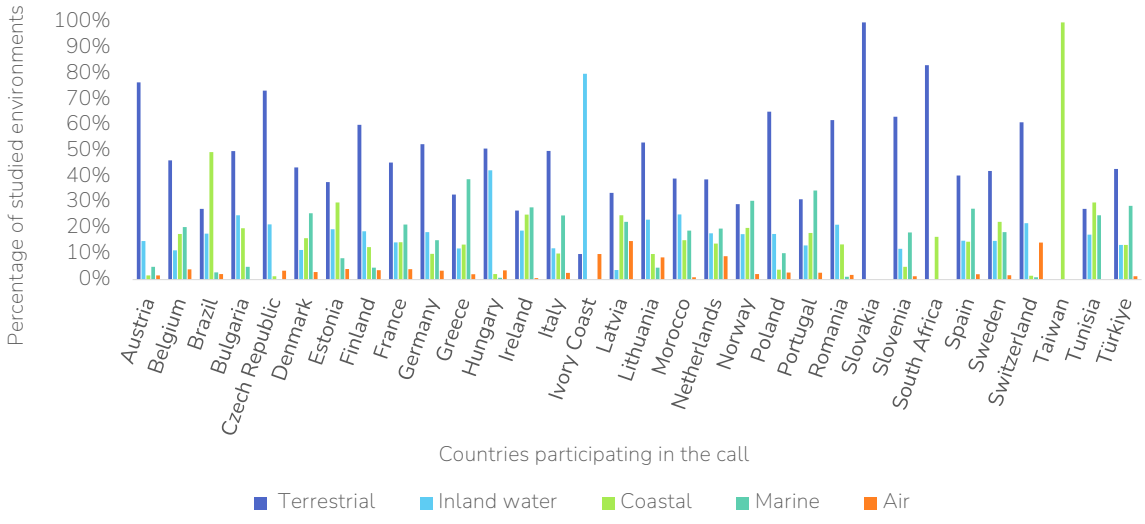


Figure 11: Percentage of studied environments in full proposals by country

Hungary had the highest proportion of full proposals submitted focusing on inland waters. Greece and Portugal were among the countries with the highest proportion of full proposals focusing on marine environments. Taiwan and Brazil had the highest proportion of full proposals focusing on coastal environments (Figure 11). These figures should be treated with caution due to the small number of teams from some countries.

Conclusions

The analysis presented above provides a good insight into the implementation and results of the BiodivMon Call. The following aspects have been identified as useful for future calls:

- Overall, the high number of pre-proposals received shows the relevance of the topics of this call for the research communities.

- Unfortunately, several countries and regions that participated in the call did not have any teams in the 33 proposals selected for funding. This was the case for Brazil, Bulgaria, Ivory Coast, Lithuania, Moldova, Morocco, South Africa, Taiwan, and Tunisia. This situation can largely be explained by the fact that these teams were not well represented in the pre-proposals, and subsequently in the full proposals. Biodiversa+ will continue its efforts to better mobilise smaller and/or less successful research communities to improve their participation and ultimately their success rate in the calls.

- Thanks to the initial balance of funds reserved by the countries (33.9 M€) and the flexibility of the funding organisations to increase their budget if necessary and/or to use the European Commission contribution as a common pot, the BiodivMon partners were able to fund the highest number of top ranked projects, strictly following the ranking established by the independent evaluation committee. This results in a success rate of 12.6% due to the very high competitiveness of this call, with 262 eligible pre-proposals received. In comparison, the 2021-2022 BiodivProtect Call received 212 pre-proposals, albeit with a higher initial reserved budget (€35.9 million).

- Biodiversa+ will now implement a series of activities and dialogues with the funded projects to enhance and promote their results and impact.

Presentation of the 33 funded projects

Dasypoda sp. visiting Cistus salvifolius.

ANTENNA – Making technology work for monitoring pollinators

Context

In the light of ongoing pollinator declines and their exceptional relevance for human food security, economy, and the functioning of ecosystems, the EU Pollinators Initiative has defined '*establishing a comprehensive monitoring system*' as its first action. The currently developed European Pollinator Monitoring Scheme (EU PoMS) will represent a stronghold of transnational monitoring, though several major gaps remain. Modern technologies, such as robotics, computer vision, and molecular methods, can complement such approaches to overcome key monitoring gaps by increasing taxonomic and geographic coverage, speed, efficiency of identification, and temporal resolution. However, technology readiness differs among available tools and further research is needed to design, advance and adapt technology towards integrated pollinator monitoring, together with context-specific guidance on how to best combine approaches based on their synergistic value and cost-efficiency.

Main objectives

ANTENNA aims to fill key monitoring gaps through advancing innovative technologies that will underpin and complement EU-wide pollinator monitoring schemes. ANTENNA will:

1. advance automated sample sorting and image recognition tools from individual prototypes to systems adoptable by practitioners;
2. expand pollinator monitoring to under-researched taxa, ecosystems, and pressures;
3. quantify the added value of novel monitoring systems relative to economic costs;
4. provide a framework for combining multiple data streams and for developing near real-time forecasting models;
5. upscale from local demonstrations to large-scale implementation of novel methods and provide context-specific guidance for the choice and combination of monitoring methods and indicators for policy and end users.

Main activities

ANTENNA will identify stakeholder needs in terms of usability and design, current limitations, opportunities for improvement, and desired outcomes to improve the adoptability and added value of novel monitoring approaches. On this basis, we will improve methods for automated sample sorting and classification, and develop a new pollinator camera trap ready-for-use by citizen scientists to increase public awareness and harness the increased power of widespread data collection. We will test the applicability and complementarity of several novel methods in relation to traditional sampling methods across a large biogeographical gradient within and outside the EU. Novel analytical methods will be developed to inform near-real time forecasting models. Based on developed frameworks, data standards and pipelines to integrate multiple monitoring data streams, we will provide a roadmap for enhanced European-wide pollinator monitoring.

ANTENNA builds on a close integration of stakeholders such as citizen scientists, practitioners, NGOs, and policy makers by applying a theory of change model addressing co-design, feedback on results from field-testing, and co-implementation. The results of ANTENNA will contribute to and be actively promoted in major European and global initiatives such as the EU Pollinators Initiative, Biodiversity Strategy, Nature Restoration Law, and the CBD Plan of Action 2018-2030.

Partners of the project

Department of Community Ecology, Helmholtz Centre for Environmental Research – UFZ, Halle, Germany

Department of Research and Education, Naturalis Biodiversity Center, Leiden, Netherlands

Center for Quantitative Genetics and Genomics, Aarhus University, Aarhus, Denmark

Doñana Biological Station, Spanish National Research Council, Seville, Spain

Department of Geography, University of the Aegean, Mytilene, Greece

Complex System Group, Technical University of Madrid (Universidad Politécnica de Madrid), Madrid, Spain

School of Natural Sciences, Trinity College Dublin, Dublin, Ireland

Duration

01/02/2024 - 31/01/2027

Total grant

Approx. 1.5 mil. €

More information

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BIG_PICTURE - Developing data management and analytical tools to integrate and advance professional and citizen science camera-trapping initiatives across Europe

Context

Europe's wildlife is undergoing dramatic changes. Successful conservation efforts during the 20th century have led to dramatic recoveries of many large mammal species, such as wolf, lynx, red deer, and roe deer across the continent. Some species, like the golden jackal, have also expanded dramatically to occupy new areas. However, the continent on which these species are recovering and expanding is very different from the historic and prehistoric landscapes of the past. Europe is now a human-dominated landscape, with high human densities, massive habitat modification and many potential conflicts between recovering wildlife and the activities and interests of people. In addition, climate change, land-use change, changes in human values and invasive species represent drivers of an ever-changing environment. The result is that there is often a need for constant adaptive management of wildlife species and populations, which requires access to up-to-date, accurate and robust data on their distributions and trends.

Main objectives

The main objective of the BIG_PICTURE project is to bring together the enormous amount of species data that is collected by the thousands of wildlife camera traps (automatic cameras) distributed across Europe by professional researchers, citizen scientists and other private individuals. By developing the appropriate electronic infrastructure (databases and artificial intelligence-driven image processing capability) and statistical tools for data analysis, the BIG_PICTURE project will facilitate the sharing, integration and joint analysis of data collected by many different institutions, allowing continental-scale assessments of species' status.

Main activities

BIG_PICTURE will have 5 main areas of activity.

1. We will examine the legal and institutional issues that enable or constrain data sharing.
2. We will build procedures to connect different databases and develop robust AI-enabled image processing tools.
3. We will develop best practice procedures for different statistical analysis tools that can be best applied to different types of data.
4. Using the results of the previous parts, we will conduct some demonstration analyses to show the added value of data sharing.
5. Finally, we will ensure the dissemination of the project's tools, focusing on a diversity of end users, including wildlife / nature managers at regional, national, and European levels, hunters, foresters, naturalists and scientists, as well as the general public.

The expected impacts of the project include (a) motivating data sharing, by creating easy to use and efficient mechanisms and demonstrating the value of doing so, (b) enhancing our knowledge of wildlife status and ecology across Europe, (c) provide guidance for management and conservation activities, and d) increasing public awareness of the spectacular recovery of our continent's wildlife and of the challenges represented by "living with success" in conservation.

Bedgers: a key question is how badgers vary their seasonal activity in the face of climate change.

Partners of the project

Department of Forestry and Wildlife Management, Inland Norway University of Applied Sciences, Koppang, Norway

NINA Lillehammer, Norwegian Institute for Nature Research, Lillehammer, Norway

Department for National Park Monitoring, Bavarian Forest National Park, Grafenau, Germany

Department of Wildlife Management and Invasive Species, Research Institute for Nature and Forest, Brussels, Belgium

Centre for Functional Ecology and Evolution, CNRS Campus, Montpellier, France

Animal Ecology Unit, Research and Innovation Centre, Edmund Mach Foundation, Trentino, Italy

Institute for Complex Systems – Florence Section, National Research Council of Italy, Sesto Fiorentino, Italy

Department of Public Law and Governance, Tilburg Law School, Tilburg, Netherlands

Population Ecology Research Unit, Mammal Research Institute, Bialowieza, Poland

Department of Biology, University of Florence, Florence, Italy

Institute for Game and Wildlife Research, University of Castilla-LaMancha, Ciudad Real, Spain

Department of Wildlife, Fish and Environmental Studies, Swedish University of Agricultural Sciences, Umeå, Sweden

Faculty of Mathematics, Natural Sciences and Information Technology, University of Primorska, Koper, Slovenia

Faculty of Environmental Protection, Velenje, Slovenia

Biotechnical Faculty, University of Ljubljana, Slovenia

Department of Migration, Max Planck Institute of Animal Behavior, Radolfzell, Germany

Department of Environmental Sciences, Wageningen University, Wageningen, Netherlands

Duration

01/03/2024 - 28/02/2027

Total grant

Approx. 2,3 mil. €

More information

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Schooling damselfish Chromis chromis at Giannutri Island (Tuscan Archipelago, Western Mediterranean)

Partners of the project

Department of Biology, University of Pisa, Pisa, Italy

Department of Coastal Systems, Royal Netherlands Institute for Sea Research (NIOZ), Den Burg, Netherlands

Department of Biology, University of Naples Federico II, Naples, Italy

Faculty of Biosciences and Aquaculture, Nord University, Bodo, Norway

Department of Marine Sciences, University of the Aegean, Mytilene, Greece

Marine Biodiversity Exploitation and Conservation, University of Montpellier, Montpellier, France

AZTI Foundation, Department of Marine Research, Sukarrieta, Spain

Self-financed partner: Marine Community Laboratory, Israel Oceanographic and Limnological Research (IOLR), Haifa, Israel

Duration

01/04/2024 - 31/03/2027

Total grant

Approx. 1,7 mil. €

More information

Lisandro BENEDETTI-CECCHI
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BioBoost+ - Boosting the frequency and scale of marine Biodiversity monitoring using digital imagery and artificial intelligence

Context

Developing rapid, informative, and robust biodiversity assessments is crucial to evaluate progress in evidence-based conservation and management strategies of marine biodiversity. BioBoost+ is designed to improve non-invasive, cost-effective, and high-frequency sampling and identification of marine biota by applying state-of-the-art Artificial Intelligence (AI) technology with digital imagery. These include real-time monitoring via camera networks and citizen science groups. These methods will be applied to a wide range of taxa, from habitat-forming species (seagrass meadows, shellfish beds, and macroalgal canopies), indicator species of ecological and economic importance (e.g. coastal fish, lobsters, shorebirds), invasive species, and understudied groups (from microscopic, free-floating animals to rare fish). BioBoost+ enhances biodiversity monitoring within European regional seas from the Mediterranean, North and Norwegian Seas to support ongoing conservation interventions such as habitat restoration projects and Marine Protected Areas (MPAs).

Main objectives

BioBoost+ aims to:

1. harness biodiversity imaging to enable end-to-end data streams and analysis, from image acquisition using in situ camera networks to automated updating of indicators to support planning, restoration, conservation, and management of marine biodiversity;
2. scale-up digital data acquisition through engagement with citizen science programs and other stakeholders (industry, scientists, policy-makers), empowering a multidisciplinary approach to broaden the scales of biodiversity monitoring;
3. automate analyses of seabed habitat data (e.g. seagrasses, shellfish beds, macroalgal forests) and foster the use of drone and satellite images to map human pressures and assess the success of habitat restoration and MPAs;
4. use high-frequency time series and systematic analysis of habitat data to produce improved measures of biodiversity under present-day and future climate change scenarios, supporting adaptation and mitigation policies.

Main activities

BioBoost+ applies AI to identify and enumerate species from photographs and videos. AI will be tested in demonstration areas using in-water and aerial images applied to (a) satellite imagery to extract large-scale biodiversity drivers, such as oceanographic and habitat features and human pressure from maritime activities (fish farms, boat tracks, windfarms, marinas), and (b) video and still images of zooplankton, seabed fauna and fish to accelerate semi-automated enumeration of species abundance. These data will indicate biodiversity change. Interactions with relevant stakeholder groups are planned at all stages of the project to co-design automated observation networks of marine biodiversity. Activities build on already existing relationships with stakeholders which include regular meetings with policy makers, workshops, attendance to industry events and to scientific and policy conferences. Knowledge and technological achievements are disseminated through online resources and direct engagement, to facilitate their exploitation by end users, policy makers and the general public. For example, simple web interfaces (Shiny Apps) will allow end-users to interact directly with data and to visualise trends and changes in indicators. Improved biodiversity monitoring will allow to better understand large-scale phenomena, such as thresholds, regime shifts and species invasions in vulnerable ecosystems, improve the capacity to predict the impacts of multiple stressors, and develop better indicators of marine ecosystem health.

BioMonI - Biodiversity monitoring of island ecosystems

Context

Oceanic islands contribute disproportionately to global biodiversity, hosting many endemic species with unique evolutionary and functional adaptations that reflect life in isolation. Simultaneously, islands are epicentres of biodiversity change, particularly vulnerable to anthropogenic disturbances such as habitat loss, climate change, and the introduction of non-native species. The impact of these anthropogenic drivers on islands has far-reaching implications, which BioMonI will emphasise, underscoring the importance of oceanic islands and related monitoring efforts at national, regional, and global levels.

BioMonI aims to empower local and regional stakeholders by providing them with standardised monitoring protocols, historical baselines, quantitative estimates, and co-develop future scenarios of Essential Biodiversity Variables (EBVs) and Ecosystem Service Variables (EESVs).

Main objectives

BioMonI aims at building a global long-term monitoring network specifically tailored to the pressing needs of biodiversity conservation and monitoring on islands. BioMonI will develop and implement a novel approach that considers mobilising existing monitoring data, identifying gaps in these data as well as in existing monitoring efforts, and developing and harmonising monitoring schemes for island biodiversity across the oceanic islands of the European Union and beyond.

Specifically, we will focus on:

1. leveraging historical archives on EBVs and ESVs and providing the biodiversity informatics and IT infrastructure needed to facilitate their valuation;
2. providing optimised and standardised field sampling protocols and tested methods that combine long-term monitoring with emerging technology such as environmental DNA and remote sensing;
3. conducting targeted resurveys and establishing a network of new long-term monitoring plots;
4. scaling up the monitoring of biodiversity and ecosystem structure, functioning, and services using remote sensing, macro-ecological modelling, and future scenarios.

Main activities

BioMonI encompasses different spatio-temporal scales, from unlocking palaeoecological archives to scenarios of future island biodiversity. Plot-based monitoring within BioMonI-Plot focuses on monitoring plant diversity, vegetation, and habitat structure using classic vegetation surveys and terrestrial laser scanning, as well as genetic and genomic tools. Unmanned aerial vehicles and satellite imagery will be used for scaling up field-based data and deriving EBVs and ESVs. Societal impact will be achieved through the creation and release of products such as maps of EBV and EESV for analysing the drivers of biodiversity change and evaluating future scenarios. Additionally, monitoring information will be made easily accessible across archipelagos to stakeholders, including researchers, citizen scientists, conservation managers, (non-)governmental organisations, and public institutions.

BioMonI will extend the Nature Futures Framework to adapt it to the island context, identify relevant actors and their interactions, and evaluate management strategies to achieve the goals of the CBD Post-2020 Global Biodiversity Framework (GBF). This process will be developed in close collaboration with local and regional stakeholders to ensure comprehensiveness and create ownership of the results among stakeholders and communities.

Oceanic islands are hotspots of bio-diversity with many endemic species that show remarkable evolutionary and functional adaptations in response to a life in isolation.

Partners of the project

Department of Biodiversity, Macroecology & Biogeography, University of Göttingen, Germany

Department of Botany and Biodiversity Research, University of Vienna, Austria

cE3c – Centre for Ecology, Evolution and Environmental Changes/Azorean Biodiversity Group (GBA), CHANGE – Global Change and Sustainability Institute, University of the Azores, Portugal

Department of Botany, Ecology, Plant Physiology, Biology Section, University of La Laguna, Spain

Institute of Biology, Laboratory of Conservation Biology, University of Neuchâtel, Switzerland

Plant Populations and Bio-aggressors in Tropical Ecosystems Joint Research Unit, University of La Réunion, France

Institute of Natural Products and Agrobiology, Spanish National Research Council (CSIC), Spain

Duration

01/03/2024 - 28/03/2026

Total grant

Approx. 1,7 mil. €

More information

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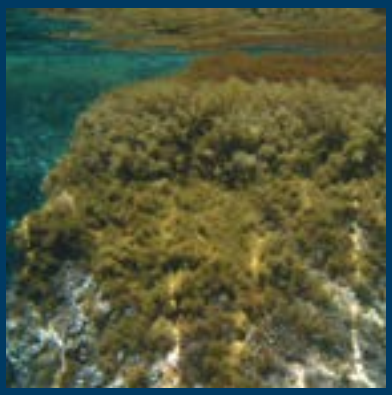

Algal forests, once thriving in rocky reef ecosystems, are increasingly threatened in the Mediterranean Sea due to global changes and multiple local stressors.

Partners of the project

Sicily Marine Centre, Zoological Station Anton Dohrn, Palermo, Italy

Department of Marine Sciences, University of the Aegean, Mytilene Greece

Department of Social Anthropology, Stockholm University, Stockholm, Sweden

Department of Marine Ecology, The Spanish National Research Council, Blanes, Spain

Department of Biology, University of Pisa, Pisa, Italy

Department of Intelligent Systems, Delft University of Technology, Delft, Netherlands

Future Oceans Lab, University of Vigo, Vigo, Spain

Self-financed partner A: Department of Marine Biology, Israel

Oceanographic and Limnological Research, Haifa, Israel

Self-financed partner B: Centre for Marine Research, Ruder Boskovic Institute, Rovinj, Croatia

Duration

01/03/2024 - 28/02/2027

Total grant

Approx. 1,1 mil. €

More information

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CAMBioMed - Coordinated and Adaptive Monitoring of Biodiversity change across Mediterranean rocky ecosystems

Context

Rocky reefs are a hotspot of Mediterranean marine biodiversity. At the same time, these ecosystems are highly impacted by multiple human activities and global change. The Mediterranean Sea has already suffered from rapidly increasing overexploitation and mass mortalities due to heatwaves. Such biodiversity shifts have affected ecosystem functioning and compromised conservation efforts. Long-term data are essential for evaluating ecosystem responses to disturbances (including global changes), providing baselines to evaluate change, and assessing the effectiveness of management measures in securing ecosystem structure, function, and services provision. In CAMBioMed, we will develop an adaptive monitoring framework together with stakeholders, propose a novel toolkit for efficiently monitoring Mediterranean rocky ecosystems, and enable decision-makers to answer critical questions about the conservation of changing marine rocky ecosystems.

Main objectives

CAMBioMed aims to:

1. harmonise and improve monitoring designs, capitalising on the partners' long experience in national monitoring programs and the use of innovative tools (e.g. eDNA metabarcoding, satellite remote sensing, and artificial intelligence) for monitoring rocky reefs across the Mediterranean Sea;
2. improve our knowledge on the response of Mediterranean marine ecosystems to global and local stressors, by conducting extensive fieldwork and integrating an unprecedented volume of historical and new data;
3. provide a roadmap and practical guidelines for adaptive monitoring that incorporates social perceptions and values to contribute to the effective conservation of rocky reef ecosystems in the Mediterranean Sea, with a view to help and fulfil the objectives of the Biodiversity Strategy for 2030 and secure human wellbeing.

Main activities

CAMBioMed is a transdisciplinary project combining natural sciences (marine biology & ecology), technological sciences (computer sciences & engineering), and social sciences (social anthropology & environmental economics). The main activities are to develop an adaptive monitoring framework for Mediterranean rocky reefs and track large-scale and long-term ecosystem changes along environmental gradients; support upscaling of monitoring using innovative tools, such as drones, computer vision, and e-DNA metabarcoding; and promote the monitoring of biodiversity and ecosystem changes with citizen science and anthropological assessment of social, economic, and cultural contexts. CAMBioMed will co-develop the research activities by consulting stakeholders at different levels, from high-level policy stakeholders (e.g. national ministries) to case study stakeholders (e.g. local fishers) and the general population by means of interviews, focus groups and/or workshops. This engagement is built upon ongoing stakeholder interactions with partners in existing projects and citizen science initiatives that will be upscaled by CAMBioMed to design and develop the adaptive, relevant and useful monitoring framework. CAMBioMed will provide a more comprehensive assessment of ecosystem health, allowing for the monitoring program to evolve in response to changing conditions, and for decision-makers to answer critical questions related to biodiversity conservation in a changing Mediterranean Sea.

CoForFunc - Toward a biome-scale monitoring of the Congo basin Forest Functional composition

Context

Expected strong climate, demographic and economic changes in Central Africa threaten the sustainability of ecological, social, and economic services that the Congo Basin Forests (CBF), the second World's largest rainforest, provide to humanity. In addition to deforestation, anthropogenic environmental impacts will lead to dramatic changes in forest tree functional composition with potential deleterious feedbacks on carbon and water cycles among other services.

Main objectives

Through a unique European research consortium and transnational collaborations with Central African country experts, CoForFunc aims at developing an integrated approach for the monitoring of tree functional diversity of the CBF to support biome-scale assessment of their vulnerability to expected climate change and human-induced transformations. Such monitoring requires (i) initiatives that go beyond national scales, and (ii) indicators derived from primary observations that inform the state and dynamics of Essential Biodiversity Variables (EBVs). This work will contribute pragmatically to the post-2020 goals of the Convention on Biological Diversity that call for improved integration of biodiversity data for supporting management, conservation and restoration actions. It also supports the 2022 United Nations Biodiversity Conference of the Parties (COP15) engagement to reach 30% protected areas globally by 2030, which need to matter for both biodiversity and people, and account for their vulnerability to ongoing global changes.

Main activities

Activities are geared towards resolving key challenges, specifically to:

1. gather, harmonise and share existing data to provide ground-truth estimates of multiple dimensions of tree diversity in the CBF;
2. connect existing forest plots to develop a regional network of observatories for a consistent monitoring of functional dynamics;
3. characterise variation in functioning of canopy species along environmental gradients, combining in situ phenological, ecophysiological and functional trait measurements;
4. develop an upscaling chain from field data, to proximal (drone) and intermediate high- and coarse-resolution (satellite) remote sensing data, especially time-series of images provided by recent and upcoming Earth Observation Systems, to quantify biome-scale EBVs;
5. combine biome-scale EBVs and environmental drivers to assess CBF vulnerability to expected changes (based on trend analyses and space-for-time substitution approaches).

The project relies on close collaborations with self-financed African academic partners (universities), as well as operational (forest and conservation) services for the development of the forest observatories, which includes technology transfer and capacity development actions. Project outcome will be disseminated by leveraging central African stakeholder networks, such as the Research Network on Central African Forests (R2Fac), the Central African Forest Commission (COMIFAC) and the UNESCO Regional Post-Graduate Training School on Integrated Management of Tropical Forests and Lands (ERAIFT).

Flowering Erythrina cf. excelsa Baker (Fabaceae) tree from UAV survey of canopy phenology conducted in December 2023 over Bouamir forest in the Dja Biosphere Reserve, South Cameroon.

Partners of the project

IRD-AMAP lab, Laboratory of botAny and Modeling of Plant Architecture and vegetation, Montpellier University, France

MPI-BGC, Max Planck Institute for Biogeochemistry, Department of Biogeochemical Integration, Jena, Germany

CREAF, Ecological and Forestry Applications Research Centre, Barcelona, Spain

Gembloux Agro-Bio Tech, Liège University, Belgium

LaboSystE, Plant Systematics and Ecology Laboratory, Higher Teacher's Training College, Yaoundé University, Cameroon

ENEF, National Water and Forestry School, Mbalmayo, Cameroon

ISSGEA, Higher Institute of Geographic, Environmental and Planning Sciences, Denis Sassou-N'Guesso University, Brazzaville, Congo Republic

ERAIFT, Regional Post-Graduate Training School on Integrated Management of Tropical Forests and Lands, Kinshasa University, Democratic Republic of Congo

Duration

01/03/2024 - 28/02/2027

Total grant

Approx. 702 tshd. €

More information

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Small headwater streams are particularly prone to overconsumption of fresh water by human society

Partners of the project

Department of Freshwater Ecology, Norwegian Institute for Water Research (NIVA), Oslo, Norway

Division River Ecology and Conservation Genetics, Senckenberg Research Institute, Hamburg, Germany

Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam, Amsterdam, Netherlands

Department of Environmental Science, Stockholm University, Stockholm, Sweden

WaterITech, Skanderborg, Denmark

Duration

01/04/2024 - 31/03/2027

Total grant

Approx. 1.2 mil. €

More information

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DESTRESS - DEciphering temporal trends and safe operating spaces for river biodiversity within the context of multiple STRESSors

Context

Growing human demand for clean freshwater and accelerating climate change are putting increasing pressure on river ecosystems worldwide. Human freshwater consumption mainly involves the abstraction of groundwater or surface water for drinking and irrigation of agricultural land. Increasing urbanisation further disrupts the cycle through centralised discharges of wastewater and urban runoff. This combination of climate change-induced extreme weather events, human freshwater consumption, and urbanisation leads to a significant increase of flow extremes in river systems (droughts and floods) that threatens riverine biodiversity as well as freshwater supply for human society and food safety. In order to identify the quantitative limits of sustainable freshwater use (i.e. the Safe Operating Space (SOS)), the minimum flow requirements of riverine biodiversity need to be quantified.

Main objectives

The overall objective of DESTRESS is to provide guidance and actionable knowledge needed to balance freshwater needs between riverine biodiversity and human society. This project will enable a faster and more informed transition towards biodiversity-positive management and policies in river catchments with multiple functions and potentially conflicting interests.

Main activities

DESTRESS is spearheaded by the Aquatic Synthesis Research Centre (AquaSYNC) and will synthesise and analyse unique and comprehensive time series of European riverine macroinvertebrate monitoring data to identify temporal trends in ecological and biological trait composition, abundance, and common biodiversity metrics (based on >2,000 sites across 23 European countries; 1968-2020, average 15 years of sampling). Temporal biodiversity trends will be linked to simulated hydrological regimes for a subset of the sites and to existing European data on measured contaminant exposure to analyse pressure-response relationships and identify biodiversity change points along existing gradients of hydrological and contaminant stress. The pressure-response relationships will be used to define SOS for riverine biodiversity in the context of their water quality and quantity requirements.

Through co-creation processes with key stakeholders at local, national, and European level, the concept of SOS will be applied to relevant case study examples to understand management, end user, and legislative requirements for the effective development of the SOS concept in these areas. These inputs will be key for the SOS concept development in DESTRESS, ensuring that the final guidance document is operational, relevant, and meets the legislative requirements of end users, managers, and competent authorities across EU member states. The guidance document will enable evidence-based decision-making on freshwater consumption, supply, and treatment to balance water quantity and quality needs between freshwater biodiversity and human society.

DNAqualMG - Innovative transnational aquatic biodiversity monitoring using high-throughput DNA tools and automated image recognition

Context

Comprehensive and reliable data are essential to understand biodiversity status and drivers, predict trends, and guide management and restoration in the context of European and international regulations, such as the European Green Deal, the Nature Restoration Law, the EU Biodiversity Strategy and Kunming-Montreal Global Biodiversity Framework. Two emerging approaches hold great promise to improve current biodiversity data generation: DNA-based and automated image-based assessment methods. DNA metabarcoding in particular provides high taxonomic resolution for collected samples and enables the detection of yet undescribed species. In contrast, image-based methods can provide reliable data on species' abundance, size, structure, and biomass, but can only identify specimens to coarser taxonomic levels (e.g. genus or family). Combined, these complementary approaches offer the potential for greatly enriched biodiversity data, while both approaches can be largely automated to produce FAIR biodiversity data for large sample sizes. DNAqualMG proposes to further develop, test, and harmonise DNA-based and automated image-based biodiversity monitoring in rivers by targeting the most typically assessed taxonomic groups in routine freshwater biomonitoring, i.e. invertebrates and diatoms. Building on its results and together with relevant stakeholders, DNAqualMG will propose a biodiversity monitoring roadmap to fully seize the potential of these new methods into the existing policy context of the EU Water Framework Directive (EG/2000/60, WFD) and to maximise synergies between existing environmental monitoring programmes, jointly improving aquatic biodiversity and ecosystem management.

Main objectives

DNAqualMG will develop and test an efficient and effective approach to monitor freshwater invertebrates and diatoms with novel DNA and automated image-based biodiversity assessment methods. Together with stakeholders involved in environmental monitoring, the consortium will develop a roadmap for European freshwater biodiversity monitoring using these methods, within the existing and well-established context of the WFD.

Main activities

The performance of the DNA-based and automated image-based methods for freshwater biodiversity monitoring of diatoms and invertebrates will be tested using 150 samples from rivers in eight different countries. To improve processing speed of invertebrate environmental samples, automated procedures, including a robotic arm for sorting, will be developed. To maximise biodiversity data comparability, formal standardisation of DNA-based methods will be initiated within CEN or ISO. Building on these outcomes and together with national and international stakeholders, DNAqualMG will co-develop a roadmap for these novel methods' uptake as part of the WFD and other key directives for improved and harmonised biodiversity monitoring in Europe to support better decision-making.

Freshwater invertebrate samples are collected with nets in the field in the context of the European Water Framework Directive.

Partners of the project

Aquatic Ecosystem Research, University of Duisburg-Essen, Essen, Germany

Program of Environmental information, Finnish Environment Institute (SYKE), Jyväskylä, Finland

Alpine Centre for research on trophic networks and limnic ecosystems (UMR CARRTEL), French National Institute for Agriculture (INRAE), Food and Agriculture, Food and Environment, Thonon, France

Department of Invertebrate Zoology and Hydrobiology, Faculty of Biology and Environmental Protection, University of Lodz, Lodz, Poland

School of Biology & Environmental Science, University College Dublin, Dublin, Ireland

Faculty of Information Technology, University of Jyväskylä, Jyväskylä, Finland

Research Centre in Biodiversity and Genetic Resources (CIBIO), BIOPOLIS Association Vairão, Portugal

Faculty of Science, Department of Geography, Masaryk University, Brno, Czech Republic

Department of Biology and Ecology, University of Nis, Nis, Serbia

UNESCO Chair Sustainable Management of Conservation Areas, Carinthia University of Applied Sciences, Villach, Austria

Phycology Working Group, Faculty of Biology, University of Duisburg-Essen, Essen, Germany

Department of Mechanical and Production Engineering, University of Aarhus, Aarhus, Denmark

Department of Water, Atmosphere and Environment, University of Natural Resources and Life Sciences, Vienna, Austria

Research Group Diatoms, Botanic Garden and Botanical Museum, Berlin, Germany

Department of Aquatic Sciences and Assessment, Swedish University of Agricultural Sciences, Uppsala, Sweden

Department of Aquatic Ecology, Faculty of Biology, University of Duisburg-Essen, Essen, Germany

Duration

01/03/2024 - 28/02/2027

Total grant

Approx. 2 mil. €

More information

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Marine benthic invertebrates.

Partners of the project

Department of Ecology, Environment and Plant Sciences, Stockholm University, Sweden

ILVO Marine Research/Marine Genomics Lab, Flanders Research Institute for Agriculture, Fisheries and Food Ostende, Belgium

Department of Evolutionary Biology, Ecology and Environmental Sciences, University of Barcelona Spain

Marine Biology Research Group, Biology Department, Faculty of Sciences, Ghent University, Ghent, Belgium

Marine Research Centre, Finnish Environment Institute, Helsniki, Finland

Estonian Marine Institute, University of Tartu, Tartu, Estonia

AquaBiota Water Research ABWR AB, Stockholm, Sweden

Duration

31/03/2024-31/03/2027

Total grant

Approx. 878 thsd. €

More information

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DNASense - From gene to landscapes: development of environmental impact assessment tools for marine biodiversity monitoring using eDNA and remote sensing techniques

Context

In recent decades, many ecosystems, including marine benthic coastal habitats, have experienced a loss of biodiversity. This decline in benthic diversity has a significant impact on the functioning of coastal ecosystems, particularly on services such as water quality. Monitoring programmes are essential to understand the consequences of biodiversity loss and to guide effective management and conservation efforts. However, for practical and financial reasons, traditional methods often overlook microscopic communities, the most diverse component of marine ecosystems.

Two recent technological advances offer opportunities to overcome these limitations: high-throughput sequencing of environmental and community DNA allows monitoring of previously overlooked ecological communities; and remote sensing can use satellite data to infer macroalgal distributions over large spatial and temporal scales. To effectively integrate these advances into biodiversity monitoring frameworks, it is crucial to develop practical indicators that can be applied within existing regulatory frameworks.

Main objectives

DNASense aims to advance, integrate, and harmonise the use of eDNA, community DNA, and remote sensing techniques to monitor multiple dimensions of benthic biodiversity. Key objectives include developing new biodiversity assessment indicators from eDNA datasets, cost-effectively enhancing the monitoring of benthic ecosystems, and integrating these indicators into tools for policy application within the EU Marine Strategy Framework Directive.

Main activities

We will investigate biodiversity trends and drivers for poorly known groups like meiofauna, marine fungi, and benthic prokaryotes, alongside less studied aspects like genetic and functional diversity. We will use long-read sequencing technology for direct mitochondrial DNA sequencing (mitometagenomics), addressing taxonomic bias and classification issues associated with high-throughput methods like metabarcoding. We will also use remote sensing methods to quantitatively map macrophytobenthos on hard and soft shallow bottoms, with calibration against existing visual census programmes.

The project aims to inform marine biodiversity management practices and policies at various levels. We will actively engage with stakeholders like HELCOM, the Mediterranean Action Plan (MAP), the Conference of Peripheral Maritime Regions (CPMR), and the North Sea Commission. We will use our data to develop new indicators for effective biodiversity assessment, and we will disseminate our findings through comprehensive reports and policy briefs.

Key expected outcomes include:

1. improved understanding of spatial and temporal dynamics in benthic biodiversity;
2. increased coverage and representativeness of current macrophytobenthos monitoring programmes;
3. new indicators for the use of eDNA data;
4. the harmonisation and integration of eDNA and remote sensing indicators into existing marine habitat quality and biodiversity monitoring tools.

EMPHATIC - E-DNA, Microbiomes, Photogrammetry and Hormones - Assessment Techniques In Cetaceans

Context

Cetaceans are strictly protected, strategically important, sentinel species, playing important roles in ecosystem functioning, including enhancing productivity and carbon sequestration. Even so, their populations are threatened by multiple stressors with cumulative effects. Changes in cetacean distribution and evidence of a deterioration in their individual health and condition can provide an early warning of future population decline, but these are often not detected through traditional monitoring. In the context of the identified gaps in knowledge and monitoring, EMPHATIC will address cetacean monitoring challenges related to distribution range and health, and respond to policy needs by developing relevant indicators of cetacean population status. The project combines several emerging research topics, using non-invasive techniques applicable to live animals: environmental DNA (eDNA) to assess distribution; study of the respiratory tract microbiomes; images collected with drones for photogrammetry to evaluate body condition; and hormone content to derive stress levels.

Main objectives

The overall goal of EMPHATIC is to provide tested monitoring tools, employing non-invasive, innovative, and complementary methodologies to assess cetacean distribution, diversity, and health status. Specifically, EMPHATIC aims to:

1. generate and implement monitoring tools and analytical methodologies, addressing cetacean distribution and health;
2. deliver solutions to relevant policy actors, and regional stakeholders, including the monitoring toolbox for environmental assessments at the national and European levels;
3. engage citizens by training them for sample collection, thus increasing spatio-temporal coverage of available data;
4. enhance methodologies and develop indicators to report cetacean distribution and health and support policy-makers;
5. use biodiversity data and make it available in appropriate repositories for integrated data assessments.

Main activities

EMPHATIC will:

- implement a working methodology based on the seawater eDNA analysis for cetacean detection, and consequently for application to long-term monitoring of cetacean diversity, distribution, and ultimately population trends;
- employ a novel integrated analysis to develop a population health index based on the microbiome of the respiratory tracts (blow and necropsy samples), stress levels (blow hormone content), and body condition (photogrammetry and necropsy data);
- work to integrate the developed techniques into the survey design and analytical pipelines of existing monitoring efforts, and ultimately into long-term sampling programmes, involving citizen science-based initiatives for sample collection, and liaison with competent authorities.

The work will focus on the “Bay of Biscay and Iberian Coast” and the “Western Mediterranean” sub-regions, targeting the following species: harbour porpoise, common dolphin, bottlenose dolphin, sperm whale, and fin whale. We will engage with stakeholders who could directly (policy-makers/governmental) or indirectly (assessment or advisory bodies) leverage EMPHATIC results in support of science-driven policy. The data, protocols, and analytical pipelines generated will be published in open access repositories and databases to facilitate wider application.

Inception - drone image of a drone sampling blow from a sperm whale (Physeter macrocephalus) in the Mediterranean Sea.

Partners of the project

Aquatic Biotechnology Laboratory and Marine Ecology and Resources Group. Institute of Marine Research, Spanish National Research Council (IIM-CSIC), Vigo, Spain

Oceanographic Centre of Vigo, Spanish Oceanographic Institute, Spanish National Research Council (IEO-CSIC), Vigo, Spain

Interdisciplinary Centre of Marine and Environmental Research (CIIMAR), University of Porto, Matosinhos, Portugal

Pelagis Observatory, La Rochelle University (LRUniv), La Rochelle, France

CIMA Research Foundation (International Centre for Environmental Monitoring), Savona, Italy

Directorate General for Natural Resources, Safety and Maritime Services (DGRM), Lisbon, Portugal

Duration

01/03/2024 - 28/02/2027

Total grant

Approx. 586 thsd. €

More information

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Local biodiversity monitoring to inform decisions in land-use and conservation management in southern Sweden.

Partners of the project

ISOE – Institute for Social-Ecological Research, Frankfurt am Main, Germany

CzechGlobe – Global Change Research Institute of the Czech Academy of Sciences (UVGZ), Brno, Czech Republic

Department of Biology & Centre for Environmental and Climate Science, Lund University, Lund, Sweden

Duration

01/01/2024 - 31/12/2026

Total grant

Approx. 800 thsd. €

More information

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ENABLElocal - Enabling use of biodiversity monitoring data in local conservation management

Context

Local land-use and conservation management practices are key drivers of biodiversity change. However, the integration of biodiversity monitoring data into local-scale conservation management is hampered by the limited taxonomic and ecological scope of existing data, insufficient spatio-temporal coverage for the local context, or restrictions on the availability and accessibility of data products, despite their relevance for local decision-making. At the same time, biodiversity knowledge and data held at the local level by conservation practitioners and authorities are rarely fed into biodiversity data infrastructures to inform broader research on management practices and policy. Therefore, bridging these gaps between biodiversity monitoring efforts and data infrastructures for policy recommendations at the national or transnational levels, and practical decision-making on land-use and conservation management at local scales is of utmost importance.

Main objectives

ENABLElocal follows three research objectives:

1. to identify local land-use and conservation management needs and issues that can be informed by biodiversity monitoring data, and describe the social challenges of a data integration;
2. to match data demands with existing species and habitat data across spatio-temporal scales, to identify gaps, and to assess the capacity to fill the gaps via remote sensing-based biodiversity monitoring;
3. to enable data integration across scales by leveraging instruments and capacities in local decision-making for land-use and conservation management.

Main activities

To achieve these objectives, we employ a transdisciplinary research approach with stakeholder participation in all phases of the research process. A series of workshops and interviews with local practitioners in land-use and conservation management, as well as researchers and decision-makers, will identify practice-relevant research questions, develop a mutual exchange of knowledge, and generate policy recommendations, products, and tools for application and outreach. These “living labs” will be conducted in three case studies located in the partner countries, focusing on conservation and land-use practices in a) a biosphere reserve (CZ), b) biodiversity hotspot areas on sandy soils (SE) and c) extensive apple orchard meadows (DE).

The participatory research aims at immediate transformative effects in the local case study settings and to develop generalised recommendations for policy and research at national and international level. Overall, the project aims to enable data flows among conservation management actors, biodiversity monitoring schemes, and national, European, and global data infrastructures, and to evaluate data usefulness for supporting decision-making in local land-use and conservation management. Outcomes from local case studies will be synthesised into openly accessible knowledge products (a practitioners’ handbook, a report on the outcomes of the local workshops in local languages) and presented at an international practitioners’ workshop (free online event) to support capacity building beyond the participating case study practitioners.

ForBioMon - Boosting FORest BIOdiversity MONitoring in Europe through smart combination of existing data

Context

The EU's lack of harmonised forest monitoring data poses a risk to its forests and policy goals, including climate, rural development, sustainable bioeconomy, and biodiversity. While National Forest Inventories (NFIs) provide extensive data, they focus more on wood resources than biodiversity dynamics. The NFIs, which started about two decades ago, also don't capture longer-term changes in biodiversity, leading to a 'shifting baseline syndrome'. To understand recent biodiversity changes in forests, the NFI data should be complemented with monitoring data from the mid-20th century. Such long-term data have recently become available through the forestREplot database, which includes data from more than 5,000 (quasi)permanent understorey vegetation resurvey plots from about 80 regions across temperate Europe. These data are ideally benchmarked against data coming from more frequently monitored, truly permanent plots using highly standardised protocols. The network of 561 permanent ICP Forests-Level II sites meets these criteria. The challenge now is to effectively combine these data sources, gain additional insights from their joint analysis, and tailor the output to the information needs of different end users.

Main objectives

ForBioMon aims to enhance forest biodiversity monitoring in Europe by smartly combining three existing forest monitoring schemes (NFIs, forestREplot, ICP Forests) and engaging a wide range of stakeholders. The project focuses on understanding long-term biodiversity changes, the environmental drivers behind these changes, mapping forest biodiversity trends, and providing guidance for future monitoring.

Main activities

ForBioMon is novel in its approach, combining the largest EU forest plant monitoring schemes and using advanced statistical modelling and remote sensing data to predict plant biodiversity changes in European forests. The project focuses on three types of activities to guide future monitoring:

- mobilising and integrating the different data sources to derive a set of Essential Biodiversity Variables (EBVs) as high-level indicators of biodiversity change;
- linking trends in EBVs to spatial and temporal gradients of environmental drivers, to understand, upscale, and map biodiversity changes in temperate forests in Europe. The project will also explore the potential of including less studied groups like ground floor bryophytes and lichens, as well as historical land-use variables and remote sensing products, to explain biodiversity trends more comprehensively;
- engaging stakeholders throughout the scientific process, to provide additional strategic advice on the outputs of the project, data sharing policies, etc. Consultation and collaboration are done via workshops, questionnaires, and a steering group, along with targeted communication and outreach.

The understory plant community typically accounts for most of the plant diversity in forest ecosystems. In ForBioMon, we combine understorey vegetation data from three existing forest monitoring schemes to understand, upscale, and map biodiversity changes in temperate forest in Europe.

Partners of the project

Forest & Nature Lab, Department of Environment, Ghent University, Ghent, Belgium

Institute of Ecology and Evolution, Friedrich Schiller University Jena, Jena, Germany

SLU Swedish Species Information Centre, Swedish University of Agricultural Sciences, Uppsala, Sweden

Department of Vegetation Ecology, Institute of Botany of the Czech Academy of Sciences, Brno, Czech Republic

Duration

01/04/2024 - 30/03/2026

Total grant

Approx. 912 thsd. €

More information

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Adobe Firefly AI generated image from the prompt "A Forest Network; concept about WEB 3 technology, blockchain and sustainable environmental stewardship

Forest-Web-3.0 – Mobilising, harmonising and incentivising forest biodiversity and environmental monitoring data through Web 3.0 technology

Context

Forests are vital for sustaining life on earth. They harbour most of the terrestrial biodiversity and play a major role in buffering climate change impacts. Protecting forests and assessing and monitoring biodiversity are therefore extremely important for mitigating the dual climate and biodiversity crisis (IPCC & IPBES) and contribute to key targets of international policy frameworks, including the Post-2020 Global Biodiversity Framework, and more recently the Forest and Climate Leaders' Partnership (FCLP). To effectively meet these targets, scientists increasingly require findable and accessible ecological data necessary for addressing priority questions important for society. However, despite forests being one of the most intensively studied habitats on the planet, current database initiatives on forest biodiversity have significant gaps. Moreover, within the realms of open science (i.e. transparency at all stages of the research process) extant primary ecological data are often difficult to find.

Main objectives

Through Forest-Web-3.0, biodiversity research data will become increasingly discoverable and its reach and potential impact will extend across a wider variety of end users, in particular stakeholders engaged in forest conservation. Furthermore, the project aims to showcase the potential economic value of biodiversity data. Leveraging Web-3 technologies and digital twins of forest ecosystems, Forest-Web-3.0 will evidence a novel requisite paradigm, one where economies tied to resource extraction (deforestation) can be balanced with economies tied to resource preservation (proforestation), offering financially feasible alternatives towards safeguarding forests and, in-turn, driving systematic and sustainable commitments to nature protection.

Main activities

Forest-Web-3.0 will spearhead a shift among academics from biological data curation to data stewardship, mobilising FAIR forest biodiversity and environmental data by utilising blockchain architecture in the design and implementation of a distributed and decentralised ecological data network.
We will also use mobilised data resources in concert with earth observation data to validate and improve the ecological realism of forest digital twin models, which are designed to capture ecosystem integrity and used to evidence and execute nature-based economies within a Web-3.0 regenerative finance ecosystem.
Through this pairing of mobilised data and enhanced digital twin models, and in concert with the growing voluntary biodiversity credit market, we will communicate to forest land-owners economic incentives for preserving high-integrity forests. The ambition here is to generate an understanding and favouring of revenues tied to proforestation and, in turn, mobilise new actors towards safeguarding and stewarding biodiversity.

Partners of the project

Norwegian Institute for Nature Research (NINA) – Bergen Department, Bergen, Norway

Department of Informatics, University of Bergen, Bergen, Norway

Department of Research, Single Earth, Tallinn, Estonia

Research Center Plants and Ecosystems, University of Antwerp, Antwerp, Belgium

Duration

01/02/2024 - 31/01/2027

Total grant

Approx. 750 thsd. €

More information

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FunDive - Monitoring and mapping fungal diversity for nature conservation

Context

Fungi constitute one of the largest groups of organisms on earth with central importance for ecosystem functioning. Many fungi are highly specialised and associated with threatened habitats, such as old-growth forests, ancient grasslands and forests on nutrient-poor or calcareous soils. They provide key habitats or resources for other organisms such as orchids and saproxylic beetles, as well as food, income, and outdoor leisure for humans. Finally, they play a crucial role in carbon cycling, regulating both carbon uptake and release in terrestrial ecosystems. Despite their obvious relevance for understanding nature and ecosystem change, fungi have traditionally been neglected in biodiversity conservation. They were not included in the Bern Convention and the EU Habitats Directive, and as a result, fungal conservation is mainly relying on local and national initiatives of variable nature. Corroborating this, fungi were recently identified as a highly overlooked taxonomic group in European nature monitoring by the Europa Biodiversity Observation Network (EuropaBon).

Main objectives

The main objective of FunDive is to bring fungi firmly on the European biodiversity map. We will explore spatio-temporal changes in fungal communities and analyse how well the Habitats Directive captures fungal biodiversity. Further, we will develop and test new tools and methods for fungal biodiversity mapping and monitoring, combining citizen science and standardised sampling of environmental DNA (eDNA). Finally, an important objective is to consolidate open data resources underlying collaboration on fungal biodiversity by substantially improving taxonomic identification and data linked to DNA-based fungal occurrences.

Main activities

FunDive will combine citizen science, AI tools, sporocarp- and eDNA-based monitoring to provide a state of the art for mapping and monitoring fungal biodiversity. We will evaluate the strengths and weaknesses of the different methodologies to develop complementary approaches with a focus on nature conservation. Further, in order to improve direct comparisons of eDNA versus sporocarp - based data, we will work to provide a substantially enhanced platform for the consistent naming of fungal taxa supported by DNA barcodes obtained from well-annotated reference material. As part of the project, we will engage with mycological societies and disseminate our results not only to the scientific community, but also to governmental and non-governmental organisations working in conservation and at the science-policy interface. By these activities we aim to provide improved practical tools for:

- threat assessment, including red listing of fungi;
- assessing how well red-listed fungi are protected in conservation areas and EU-habitat types;
- engaging citizen scientists in biodiversity discovery and monitoring;
- monitoring ecosystem functioning and biodiversity to provide (i) early warnings of climate change impact on ecosystem functioning (ii) indicators of critical nitrogen loads, and (iii) indicators of conservation status, especially in forests and grassland habitats.

Leucopholiota decorosa is an extremely rare agaric associated with pristine deciduous forests where it lives on decaying wood.

Partners of the project

Center for Macroecology, Evolution and Climate, Globe Institute, University of Copenhagen, Copenhagen, Denmark
Department of Biosciences, University of Oslo, Oslo, Norway
Faculty of Biology, University of Warsaw, Warsaw, Poland
Faculty of biology, chemistry & earth sciences, University of Bayreuth, Bayreuth, Germany
Faculty of Applied Sciences, Department of Cybernetics, University of West Bohemia, Pilsen, Czech Republic
Biodiversity and Conservation Biology, Federal Institute For Forest, Snow And Landscape Research WSL, Birmensdorf, Switzerland
Laboratory of General and Agricultural Microbiology, Agricultural University of Athens, Athens, Greece
Department of Biomedical Sciences, University of Cagliari, Cagliari, Italy
Department of Research and Education, Naturalis Biodiversity Center, Netherlands
Natural History Museum and Botanical Garden, University of Tartu, Tartu, Estonia
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Research Group Mycology, Ghent University, Ghent, Belgium
Research Institute for Nature and Forest, Brussels, Belgium
Department of Agricultural and Food Sciences, University of Bologna, Bologna, Italy
Faculty of Science, Department of Zoology, University of South Bohemia, Ceske Budejovice, Czech Republic
Department of Plant Anatomy, Eötvös Loránd University, Budapest, Hungary
Ecology of Fungi, University of Bayreuth, Bayreuth, Germany
Mycology Department, Real Jardín Botánico, The Spanish National Research Council, Madrid, Spain
Research Centre in Biodiversity and Genetic Resource, BIOPOLIS association, Vairao, Portugal
Department of Interaction, Ecology and Societies, Center for Functional and Evolutionary Ecology, Montpellier, France
Department of Cybernetic, Faculty of Electronic Engineering, Czech Technical University in Prague, Prague, Czech Republic
Department of Life Sciences and Systems Biology, University of Turin, Turin, Italy
Finnish Museum of Natural History, University of Helsinki, Helsinki, Finland
MycoKey, Tirstrup, Denmark
Botany Department, Natural History Museum Stuttgart, Stuttgart, Germany
Danish Mycological Society, Hillerød, Denmark
Polish Mycological Society, Warsaw, Poland

Duration

01/01/2024 - 31/12/2026

Total grant

Approx. 3,7 mil. €

More information

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The Apollo is an iconic butterfly typical of European mountain meadows assuring the pollination of characteristic plant species. Although the species presents large genetic diversity, its fragmented populations are threatened by climate change in several European countries.

Partners of the project

Copenhagen Zoo, Copenhagen, Denmark

Research Institute for Nature and Forest (INBO), Genetic Diversity, Geraardsbergen, Belgium

Stockholm University, Division of Population Genetic, Department of Zoology, Stockholm, Sweden

University Freiburg, Wildlife Ecology and Management, Freiburg, Germany

Nord University, Faculty of Biosciences and Aquaculture, Bodø, Norway

Norwegian Institute for Nature Research (NINA), NINAGEN Centre for Biodiversity Genetics, Trondheim, Norway

National Research Institute for Agriculture, Food and the Environment (INRAE), Biogeco, Cestas, France

Royal Zoological Society of Antwerp, Centre for Research and Conservation, Antwerp, Belgium

The Edmund Mach Foundation, Forest Ecology Unit, Research and Innovation Centre, San Michele all'Adige, Italy

Luleå University of Technology, Department of Social Sciences, Technology and Arts, Luleå, Sweden

The Morton Arboretum, Center for Tree Science, Lisle, USA (Self-financed partner)

Duration

01/03/2024 - 28/02/2027

Total grant

Approx. 1,7 mil. €

More information

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GINAMO - Genetic Indicators for NAture MOnitoring

Context

Genetic diversity is the foundation of biodiversity and essential for the long-term survival, adaptation, and resilience of populations, species, and entire ecosystems. While genetic diversity has long been neglected in biodiversity policy and management, the current Convention on Biological Diversity (CBD) Kunming-Montreal Global Biodiversity Framework (GBF) now includes genetic diversity monitoring, including for wild species. Tools and indicators to assess and monitor genetic diversity are available, but are rarely applied due to the gap in knowledge transfer between conservation science and application. GINAMO assesses and delivers science-based and co-designed best practices and guidelines for the use of genetic diversity indicators. This will enable the routine integration of genetic criteria and indicators into biodiversity monitoring and assessments, from policy at regional, national, and EU levels, to global conventions and obligations. A key component of GINAMO is the use of facilitated group decision-making processes to partner and co-decide from the outset with the stakeholder community, so that all resources produced meet their concerns, reporting duties, and monitoring needs, and are more likely to be adopted. Easy-to-apply, standardised and automated workflows will be co-created for assessing genetic indicators at various transboundary geographical scales.

Main objectives

GINAMO uses existing open access genetic and non-genetic data (including Earth observation data) to best determine accurate estimates of the two genetic diversity indicators of the GBF: 1) the proportion of populations within species with an effective population size N_e greater than 500, and 2) the proportion of populations of a species maintained. To maximise the implementation and reporting of these indicators, GINAMO designs, facilitates, and scientifically evaluates co-creation processes in which GINAMO scientists and country stakeholders collaboratively develop methodologies and workflows that are scientifically sound, appropriate, and achievable for nature management and policy.

Main activities

GINAMO focuses on generating best practices for assessing effective population size from genetic data and evaluating genetic indicators based on non-genetic data from multiple sources. Additionally, GINAMO evaluates how satellite earth observation data can be used to generate proxies to monitor genetic diversity. Workflows for existing and newly generated information will be standardised to provide easily accessible data for researchers, nature managers and policy makers. GINAMO activities follow a co-creation approach under professional guidance and scientific evaluation, so that methods and products are produced together by policy makers, nature managers and practitioners, and scientists.

GRASS4FUN - Monitoring the contribution of European grasslands to the conservation of soil biodiversity and ecosystem function under multiple global change stressors

Context

Natural grasslands and cereal fields play a fundamental role in supporting biodiversity conservation and sustainable food production. They provide multiple ecosystem services, but also involve significant trade-offs (e.g. food production vs. soil carbon sequestration). Yet, unlike aboveground plants and animals, the capacity of European protected areas to conserve plant and soil microbial diversity and ecosystem services in natural grasslands under global environmental changes is virtually unknown. Moreover, we know very little about how cereal fields will respond to multiple co-occurring global change stressors, such as drought, pesticides and over-fertilisation, which are threatening the conservation of soil biodiversity and function as well as food production.

Main objectives

GRASS4FUN will combine European-wide observational and experimental approaches to meet four research objectives. Objectives 1 & 2 will evaluate whether protected areas promote soil biodiversity and multiple ecosystem services in European natural grasslands, and will additionally monitor the microbial diversity and function in cereal fields. In Objectives 3 & 4, GRASS4FUN will further investigate whether multiple global change stressors impact the microbiome and function of European natural grasslands and cereal fields.

Main activities

We will conduct a European-level survey across grasslands' triplets with different land-use intensities (from protected and unprotected natural grasslands to maize and wheat fields). The sampling in cereal fields will support the monitoring that the Global Crop Microbiome Initiative started in these sites 3-5 years ago. We will further combine the modelling and mapping of soil biodiversity and function across climate and land cover change scenarios with a manipulative study using microcosms subjected to multiple global change stressors.

A grassland from Andalusia, Spain. Grasslands cover ~40% of terrestrial ecosystems, support high rates of plant and insect biodiversity, and provide key ecosystem services such as soil carbon sequestration and forage for livestock.

Partners of the project

Institute of Natural Resources and Agrobiology of Seville. Spanish National Research Council (IRNAS-CSIC), Seville, Spain

Institute of Natural Resources and Agrobiology of Seville. Spanish National Research Council (IRNAS-CSIC), Seville, Spain

Union of Small Farmers and Ranchers (UPA), Madrid, Spain

German Centre for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig, University of Leipzig, Leipzig, Germany

Agroecology and Environment, Agroscope, Zürich, Switzerland

Institute for Biodiversity and Ecosystem Dynamics. University of Amsterdam, Amsterdam, Netherlands

French National Research Institute for Agriculture, Food and Environment, INRAE, Beaucouzé, France

Department of Life Sciences. Centre for Functional Ecology, University of Coimbra, Coimbra, Portugal

Institute of Agricultural Sciences. Spanish National Research Council. (ICA-CSIC), Madrid, Spain

Fundación Global Nature, Fuentes de Nava, Spain

Duration

18/12/2023 - 17/12/2026

Total grant

Approx. 1.7 mil. €

More information

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Composite image of vertically integrated density of birds extracted from weather radars in Europe on a night of intense bird migration (18-10-2017 19:00 UTC). Green – orange reflectivity due to birds.

HiRAD – Harmonising and integrating Radar-based approaches for monitoring Aerial bioDiversity

Context

Trillions of birds and insects use the airspace and, through their movements, link otherwise separated habitats, communities, and ecosystems. They impact various ecological processes, raise human-wildlife conflicts, and provide services (pollination, seed-dispersal, pest control, nature's contribution to people) and disservices (pathogen dispersal, agricultural damage) that are relevant to human agriculture, economy, and health. Quantifying their numbers and movements, and understanding the drivers of (changes in) their spatio-temporal distribution is key to preserving aerial diversity. Although the aerial habitats are essential for a large proportion of the global biodiversity, they are poorly monitored and largely absent from legislation and policy. Monitoring aerial biodiversity remains a challenge due to the numbers of individual organisms involved and the large scale at which their movements take place. Fortunately, radar technologies provide opportunities to continuously measure the movements of animals through the air, which are often invisible to the human eye.

Main objectives

We will develop innovative research software tools that support the collection, harmonisation, visualisation, analysis, and integration of biological data from different existing radar systems, ranging from small-scale biological radars to weather radars across Europe. We will use automated radar systems to continuously monitor the aerial movements of birds and insects, providing detailed information on the intensity, timing, altitude, and spatial scale of mass movements for the full range of taxa and all individuals. These sensors can provide a quantification of animal fluxes and flight behaviours at unprecedented detail and scales.

Main activities

We will a) create tools to easily and freely access high-quality radar data, b) harmonise different biological data products from radars within and across national borders, c) improve the taxonomic classification of biological objects observed by radars, and d) create novel biodiversity monitoring products by integrating the information from the different radar systems. In proof-of-concept studies, we will identify large-scale spatio-temporal relationships, e.g. between land cover and insect and bird diversity and abundance.

Our project will contribute to alleviating the ever-increasing human-wildlife conflicts in a crowded airspace by providing stakeholders with urgently needed tools that indicate areas of current and potential future conflicts.

We will engage with stakeholders from sectors as diverse as conservation, meteorology, wind energy, and aviation safety, to ensure that we create tools and products that can be used to resolve diverse societal challenges.

Partners of the project

Institute of Forest, Snow and Landscape WSL, Birmensdorf, Switzerland

Institute of Biodiversity and Ecosystem Dynamics, University of Amsterdam (UvA), Amsterdam, Netherlands

Institute for Nature and Forest (INBO), Brussels, Belgium

Finnish Meteorological Institute, Helsinki, Finland

Agroscope, Zurich, Switzerland

SFP A - Swiss Bird Radar, Winterthur, Switzerland

SFP C - German Aerospace Centre, Braunschweig, Germany

SFP D - Royal Netherlands Airforce, Breda, Netherlands

SFP E - Actions at EBMF, New York, USA

Duration

01/04/2024 - 31/03/2027

Total grant

Approx 1,6 mil. €

More information

Silke BAUER
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IMPACT - Integrated Monitoring of Parasites in Changing Environments

Context

Parasites are typecast as biological villains due to their threats to human health and wildlife conservation, despite most metazoan parasites having no zoonotic potential, and constituting an overwhelming proportion of current biodiversity. Unsurprisingly, parasites remain the most neglected components of biodiversity management strategies, and completely absent from conservation discussions, unlike their more charismatic free-living hosts. Furthermore, the decline and disappearance of parasites is seldom a focus in long-term or distribution monitoring programs, and the value of parasites as integrative biological indicators remains under-exploited due to the lack of cost-effective monitoring tools for detecting broad-scale biodiversity changes.

Main objectives

IMPACT will address the overall goal of providing evidence-based knowledge to support the integration of parasites into aquatic biodiversity monitoring directives and environmental decision-making. Specifically, IMPACT will determine the spatial-temporal status and long-term trends of European freshwater fish parasite biodiversity; develop an innovative molecular tool kit for integrating fish parasite diversity assessments into aquatic biodiversity monitoring; and gain knowledge about stakeholders' perceptions of parasites and their role in environmental governance.

Main activities

Key IMPACT activities include mapping the status and long-term trends of European freshwater fish parasite biodiversity; merging traditional monitoring techniques with eDNA technologies to support widespread parasite biodiversity monitoring in aquatic ecosystems; and elucidating the role of parasites in environmental governance. As a consequence, IMPACT will break down key barriers to the inclusion of parasites in transnational biodiversity and ecosystem change monitoring by co-developing a framework with environmental decision-makers to facilitate the explicit inclusion of parasites in national and international biodiversity management and conservation strategies. Specific policy actions will include national policy briefs on the challenges and opportunities for integrating parasites in environmental governance, and a pan-European policy brief on lessons learned from IMPACT and advice on future collaboration and knowledge exchange for integrating parasites in biodiversity monitoring and conservation management policies.

Argulus coregoni - a parasitic crustacean of European freshwater fishes.

Partners of the project

Department of Salmonid Fishes, Norwegian Institute for Nature Research, Trondheim, Norway

Department of Invertebrates, Natural History Museum of Geneva, Geneva, Switzerland

Marine & Freshwater Research Centre, Department of Natural Sciences, Atlantic Technological University, Galway, Ireland

Department of Coastal Systems, NWO I – Royal Netherlands Institute for Sea Research, Texel, Netherlands

Cavanilles Institute of Biodiversity and Evolutionary Biology, University of Valencia, Valencia, Spain

Laboratory of Helminthology, Biology Centre of the Czech Academy of Sciences, Ceské Budejovice, Czech Republic

Department of Aquatic Ecology, University of Duisburg-Essen, Essen, Germany

Institute of Geography and Sustainability, University of Lausanne, Lausanne, Switzerland

Department of Arctic and Marine Biology, UiT The Arctic University of Norway, Tromsø, Norway

Department of Aquatic Ecosystem Research, University of Duisburg-Essen, Essen, Germany

Duration

01/01/2024 - 31/12/2026

Total grant

approx. 900 thsd. €

More information

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Elecampane (Inula helenium L.) and its pollinators/flower visitors, an example of an organismic interaction whose significance is not yet understood.

Partners of the project

Department of Biology, Botany, University of Kassel, Kassel, Germany

University of Oslo, Natural History Museum, Oslo, Norway

Evolutionary Ecology group, Naturalis Biodiversity Center, Leiden, Netherlands

International Biodiversity Infrastructures, Naturalis Biodiversity Center, Leiden, Netherlands

Institute of Applied Biosciences/ Agrobiotechnology and Molecular Breeding Lab, Center for Research and Technology-Hellas, Thessaloniki, Greece

School of Agriculture, University of Lisbon, Lisbon, Portugal

Research Center in Biodiversity and Genetic Resources (CIBIO), Associação Biopolis, Vairão, Portugal

Molecular Biotechnology of Plants and Micro-organisms, KU Leuven, Leuven, Belgium

Unité de Modélisation Mathématique et Informatique des Systèmes Complexes (UMMISCO), French National Research Institute for Sustainable Development (IRD), Bondy, France

"Stejarul" Research Centre for Biological Sciences, National Institute of Research and Development for Biological Sciences, Piatra Neamt, Romania

University of Applied Sciences Western Switzerland (HES-SO) - Geneva, Switzerland

Plazi, Bern, Switzerland

Department of Biology and Environmental Science, Linnaeus University, Kalmar, Sweden

Catalogue of Life/Species 200/ Checklistbank, Catalogue of Life HQ, Leiden, Netherlands

Duration

01/04/2024 - 31/03/2027

Total grant

Approx 2,5 mil. €

More information

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METAPLANTCODE - Harmonising plant metabarcoding pipelines in Europe to support monitoring activities in the field of plants and their functional organismic networks

Context

Plants drive terrestrial ecosystems, play significant roles in soil and food webs, and can influence human health. Currently, an estimated two out of five plant species are threatened with extinction. Plant loss will affect other groups of organisms and the environment in ways that are not yet understood, as plants have important functional dependencies in complex organism networks, including pollination, mutualism, parasitism, dispersal, and herbivory. Accelerated identification and monitoring is needed to better understand and mitigate the forces driving the current changes in plant diversity. Plant metabarcoding, which involves analysing environmental DNA (eDNA) to identify taxa, can be standardised and automated, making it suitable for high-throughput, large-scale, and long-term monitoring. This technique provides a scale and accuracy in biodiversity surveys that was previously unattainable.

Main objectives

METAPLANTCODE presents a unique collaborative and transnational approach to test, optimise, harmonise and recommend best practices for plant metabarcoding for samples with varying degrees of species complexity, contamination, and DNA degradation using case studies across Europe. The innovative combination of accelerated molecular plant monitoring and the integration of diverse biodiversity data with optimised and automated pipelines will fill knowledge gaps on the state of biodiversity, interdependencies, and dynamics.

Main activities

The METAPLANTCODE project aims to test and optimise pan-European case studies on metabarcoding, provide best practice recommendations, optimise analysis pipelines for species identification, and create easy-to-use reference databases. The project will identify and specify gaps, publish best practice documents on FAIR data publishing of plant metabarcode data to GBIF and the INSDC databases, and implement ELIXIR-compatible multimodal DL models in novel tools for stand-alone metabarcoding analyses using different data sources. The project will also enhance species identification accuracy through GBIF records and metadata, and map regional, national, and international botanical taxonomic checklists, red lists, and floras to the Catalogue of Life (COL) through COL ChecklistBank. Furthermore, taxonomic and floristic literature will be semantically enriched with new entity recognition and relationship extraction modules to support the enhanced identification of species via domain-specific descriptive/phenotypic features. An interface will be provided to link taxonomic names to treatments, identify homonyms and synonyms, and facilitate the conversion and annotation of flora, red lists, and ecological treatments. All METAPLANTCODE products will be available at project end FAIR+. The project will support knowledge transfer with associated partners and stakeholders from the start. Relevant stakeholders will be identified, priorities set, communication channels established, monitored, and revised as needed. Greater stakeholder engagement, training, and outreach efforts will be undertaken to ensure that plant metabarcoding becomes a routine standard for biodiversity monitoring in Europe and beyond in the future.

MiDiPeat - Monitoring of peat microbial diversity through vegetation properties and its implication for carbon dynamics across European peatlands

Context

Peatlands are highly water-saturated ecosystems, where slow decomposition of organic matter makes them the most important terrestrial storage of carbon (C). Peatlands are also of societal importance since they are providing recreational values or even livelihood through natural products and tourism for local communities. Large areas of peatlands in Europe have been drained for forestry, food and energy production, or simply for settlement. Land-use change enhances microbial decomposition and increase atmospheric greenhouse gas (GHG) emissions, resulting in C storage loss, thereby accelerating climate change. Still, monitoring of microbial diversity in peatland ecosystems after land-use change has received very little attention, even though microbes play a key role in major ecosystem services such as maintaining the balance between GHG emissions, C storage, nutrient cycling, and water quality. MiDiPeat produces comprehensive and harmonised monitoring data on microbial taxonomic and functional diversity in peatlands and how it varies in relation to nutrient levels, land use, and management regime. Restoration of peatlands aims to reverse biodiversity loss and restore ecosystem functions. MiDiPeat assesses taxonomical and functional microbial diversity along geographical and environmental gradients of peatlands through a harmonised monitoring approach. It will use previously hidden data on microbial diversity to establish proxies for the success of peatland restoration through establishing links with plant traits and methane cycling. This will provide valuable input for decision-making linked to land use and management of degraded peatlands. The overarching aim is to develop monitoring of peatland microbial diversity across land-use categories by establishing links between key microbiome functions, plant community characteristics, peat biochemistry and GHG fluxes.

Main objectives

1. To assess microbial diversity and plant traits in peatlands to understand how changes in land-use are reflected in GHG fluxes.
2. To identify the key peat properties, plant diversity parameters and functional traits that are linked with microbial diversity.
3. To develop cost-effective plant diversity-based tools to monitor impacts of land-use changes in peatlands in terms of microbial diversity and GHG fluxes.

Main activities

4. Novel scientific publications about functional diversity of soil microorganisms, their linkage to GHG fluxes and to plants and peat chemistry across European pristine, drained and restored peatlands.
5. Workshops and seminars with regional and national stakeholders to plan monitoring tools, increase awareness and knowledge on soil biodiversity across peatland types in Europe and how to use the novel information in land-use management (the long-term impacts on restoration practices).
6. Dissemination materials and guidebook about microbial-based indicators for planning and monitoring peatland restoration projects for stakeholders and for policy-making concerning land-use, maintenance of soil biodiversity and legislation.
7. Research-based knowledge to be used in education and science projects aimed at students at different educational institutes (elementary schools, forestry schools, graduate schools, universities, and applied sciences).

Methane measurements from a Southern Boreal bog with a floating chamber system.

Partners of the project

Natural resources, Soil ecosystems, Natural Resources Institute Finland (LUKE), Helsinki, Finland

Helmholtz Centre Potsdam, German Research Centre for Geosciences (GFZ), Potsdam, Germany

Faculty of Science and Technology, Institute of Molecular and Cell Biology, University of Tartu (UTAR), Tartu, Estonia

Faculty of Science, University of South Bohemia in Ceske Budejovice (USB), Ceske Budejovice, Czech Republic

Duration

01/01/2024 - 31/12/2026

Total grant

Approx. 927 thsd. €

More information

Krista Peltoniemi
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Worker of the mound-building red wood ant Formica polyctena.

Partners of the project

Animal Ecology I, University of Bayreuth, Bayreuth, Germany

Department of Biology, University of York, York, UK

Department of Biology, University of Florence, Florence, Italy

Institute for Alpine Environment, Eurac Research, Bolzano / Bozen, Bolzano / Bozen, Italy

Institute of Soil Biology and Biogeochemistry, Biology Centre of the Czech Academy of Sciences, Ceske Budejovice, Czech Republic

Hungarian Department of Biology and Ecology, Babeș-Bolyai University, Cluj-Napoca, Romania

Natural Resources Institute Finland (Luke), Helsinki, Finland

Royal Belgian Institute of Natural Sciences, Brussels, Belgium

Terrestrial Ecology Unit, Univeristy of Gent, Gent, Belgium

Duration

01/01/2024 - 31/03/2027

Total grant

Approx. 1,5 mil. €

More information

Heike FELDHAAR
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MonitAnt - Developing a European-level Monitoring strategy for mound-building Formica Ants and symbiont communities residing in nest mounds

Context

Mound-building *Formica* ant species (MBF) are considered keystone species in temperate and boreal forests of Eurasia. Due to their large colony size and long-lasting nests, they impact the functioning of forest ecosystems in many ways and across several trophic levels. Nest mounds of MBF are cohabited by many different arthropod species, and other invertebrates, so-called myrmecophiles. Thus, a change in abundance and distribution of MBF will have repercussions on ecosystem processes and on diverse taxa depending on them. Forest management, deforestation, and fragmentation of forests have been shown to negatively impact MBF, resulting in their protection within EU countries and their inclusion in the IUCN red list. Data on population trends are nonetheless sparse due to the lack of an established and widely used monitoring scheme at national or EU level. In addition, we know hardly anything about geographic patterns of the occurrence of myrmecophiles within nest mounds, especially along climatic or altitudinal gradients. Due to their conspicuous nest mounds and their cultural embeddedness, Formica ants are ideal to engage the public in citizen science projects.

Main objectives

The aims of this project are to

1. compare existing monitoring strategies for MBF at the European level and use expert knowledge to develop and validate a harmonised monitoring strategy for policy makers and a recommendation for citizen science projects to facilitate monitoring of distribution and population trends of MBF;
2. characterise the diversity of myrmecophiles within nests along climatic, altitudinal, and fragmentation gradients to assess the importance of MBF as umbrella species using metabarcoding;
3. monitor genetic diversity of MBF along climatic and forest fragmentation gradients and establish thresholds for reproduction of MBF in managed forests to identify requirements for stable populations;
4. develop recommendations for conservation, based on a synthesis of the results and deliver a cost-effective and efficient common monitoring scheme based on open science principles to enable a Europe-wide comparison of the threat status, distribution and population trends of MBF and associated species.

Main activities

We will provide best practice guidelines for a citizen-science approach and test a semi-automated monitoring approach based on remote sensing using drones or hand-held devices that will facilitate the assessment of population trends of mound-building *Formica* ants (MBF) across Europe. For the first time we will characterise myrmecophile diversity of MBF nests along the large climatic, altitudinal, and forest fragmentation gradients covered by the participating partner countries. Genetic diversity within colonies and thresholds for reproduction and survival will be established by assessing presence/absence of colonies, size of nest mounds, and presence of pathogens along these gradients, which will allow us to provide recommendations to foresters for the conservation of MBF. Communication of results to different stakeholders and to the general public to facilitate conservation of MBF will be through talks, brochures, and videos in different languages.

MOOBYF - Monitoring the Open-Ocean BiodiversitY with Fishers

Context

Pelagic ecosystems encompass marine organisms and environmental features located in the open ocean. Figuring among the largest ecosystems on Earth, they are increasingly recognised for their important role in supporting human societies. First, pelagic species provide important food sources for humans and are an essential supply for food security in many developing countries. Second, pelagic ecosystems play a critical role in climate processes, being one of the largest long-term carbon sink in the biosphere.

Pelagic biodiversity is currently subject to major stressors from human activities and climate change. As a consequence, the conservation status of several pelagic species is a source of major concerns. Due to its sparseness, remoteness and vastness, the open ocean is difficult to access and monitor. As a result, the diversity trends and status of pelagic species still remain poorly assessed.

Main objectives

The objective of the project is to develop monitoring platforms to observe the open ocean and its biodiversity in collaboration with fishers.

Main activities

At the core of the MOOBYF project is the fact that thousands of platforms already exist in the open ocean and are regularly maintained by fishers: the so-called Fish Aggregating Devices (FADs). FADs are artificial buoys or rafts deployed offshore by fishers to catch fish. They exploit the associative behaviour of many tropical fish species, which form aggregations around floating objects. The project aims at using these FADs as scientific platforms to access the open ocean and monitor its pelagic biodiversity with fishers. The project focuses on three main study areas located in the Indian Ocean: Mayotte (French overseas department), the Maldives and Indonesia. In these areas, three main taxonomic groups of species are studied: teleost fishes, elasmobranchs (sharks and rays) and cetaceans.

Several innovative monitoring techniques are combined, ranging from molecular ecology (eDNA, metabarcoding), underwater acoustics (echosounders and bioacoustics) as well as underwater videos, supported by the use of artificial intelligence. The project also employs a citizen-science approach that builds upon the traditional and ecological knowledge of fishers, empowering them to promote community-based ocean monitoring and ocean sustainability. This heterogeneous data is combined and harmonised to build integrated biodiversity indicators.

The knowledge on pelagic biodiversity produced by MOOBYF is the platform on which all knowledge-holders exchange, learn and create close connections to promote the long-term use of such monitoring schemes and the sustainable use of pelagic ecosystems. The results of the project will support several end users, from fishers (by improving the sustainability of their fishing practices) to national and international policy makers, such as fisheries management organisations.

Artisanal tuna fishers nearby a Fish Aggregating Device in Indonesia

Partners of the project

MARBEC research unit (Marine Biodiversity Exploitation & Conservation), French National Research Institute for Sustainable Development (IRD), Sète, France

Research Center for Fishery, National Research and Innovation Agency (BRIN), Cibinong, Indonesia

Fisheries Unit, Maldivian Marine Research Institute, Malé, Maldives

Biodiversity, Ecology, Evolution / Laboratory of Functional and Evolutionary Morphology, University of Liège, Liège, Belgium

Institute for the study of anthropic impacts and sustainability in the marine environment, CNR - National research Council, Roma, Italy

Social Science Department, Leibniz Centre for Tropical Marine Research - ZMT GmbH, Bremen, Germany

Department of Biology, University of Padova, Padova, Italy

Duration

01/04/2024 - 30/03/2027

Total grant

Approx. 1,1 mil. €

More information

Manuela CAPELLO
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Estuaries and coastlines are undergoing drastic human-induced changes. However, much of the biodiversity of aquatic fungi in these ecosystems is unknown and not routinely monitored.

Partners of the project

Institute of Microbiology, University of Applied Sciences and Arts of Southern Switzerland, Mendrisio, Switzerland

Molecular Ecology Group (MEG), National Research Council of Italy, Water Research Institute CNR-IRSA of Verbania, Verbania, Italy

Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB), Stechlin, Germany. Institute of Biochemistry and Biology, Potsdam University, Potsdam, Germany

Department of Aquatic Sciences and Assessment, Swedish University of Agricultural Sciences, Uppsala, Sweden

Faculty of Biosciences, Fisheries and Economics, UiT The Arctic University of Norway, Tromsø, Norway

Department of Marine Biology and Oceanography, The Institute of Marine Science of the Spanish National Research Council (ICM-CSIC), Barcelona, Spain

Institute of Technology, University of Tartu, Tartu, Estonia

Norwegian Institute for Nature Research, Tromsø, Norway

Group on Earth Observations Biodiversity Observation Network, McGill University, Montreal, Canada

Global Center for Species Survival, Indianapolis Zoo, Indianapolis, Indiana, USA

Duration

01/04/2024 – 31/3/2027

Total grant

Approx. 1,7 mil. €

More information

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MoSTFun – Monitoring Strategies and Tools to address knowledge gaps on aquatic Fungal biodiversity

Context

Aquatic fungi govern critical ecosystem processes involved in supporting, provisioning, and regulating services. Aquatic fungi are responsible for instance for carbon and nutrient cycling, breakdown of pollutants, and control of microalgal blooms in aquatic ecosystems. However, they are not included in any routine and large-scale biodiversity monitoring programme. This gap in current biodiversity monitoring programs precludes any valuing of aquatic fungi species by private and public stakeholders, as well as their conservation, which ultimately threatens the many services and benefits that aquatic fungi provide to society. MoSTFun will pave the way for the inclusion of aquatic fungi into routine biodiversity monitoring programmes at the continental scale.

Main objectives

MoSTFun will develop the knowledge, approaches, and network needed to initiate routine monitoring of aquatic fungi biodiversity across the environmental, biogeographic, and political landscape of the European continent. It will also fill gaps in currently not routinely monitored ecosystems with intense human impacts, such as glaciers and estuaries, and not routinely monitored emerging threats, such as the spread of anti-fungal resistance genes. In addition to producing novel data and knowledge, MoSTFun will also take the first steps towards implementation of biodiversity monitoring programmes for aquatic fungi through intensive stakeholder engagement. It will coordinate for this purpose with established global initiatives including the Biodiversity Observation Network of the Group on Earth Observations (GEOBON) and IUCN. Their engagement will also support the transfer of knowledge and guidelines to other regions and continents.

Main activities

MoSTFun will collect and reanalyse published datasets and metagenomes to understand aquatic fungi biodiversity across Europe. It will also reanalyse DNA from other biodiversity monitoring programmes targeted at other organism groups and measure aquatic fungi biodiversity to complement these datasets. It will perform novel sampling in case studies in environments that lack biodiversity monitoring programmes such as glaciers and estuaries. It will use these datasets to develop monitoring approaches and guidelines for aquatic fungal biodiversity and integrate them into established monitoring concepts, in particular Essential Biodiversity Variables. It will coordinate stakeholder engagement and coordination with related initiatives throughout the project and beyond with a novel Knowledge-to-Action hub on aquatic fungi biodiversity.

MOTIVATE – Monitoring of Terrestrial habitats by Integrating Vegetation Archive Time series in Europe

Context

Reversing the biodiversity crisis requires precise quantification of the spatial patterns and temporal trends of biodiversity loss, as well as knowledge of links to the main drivers of global change. Monitoring the trajectory of biodiversity is therefore a cornerstone of EU environmental legislation. However, assessments are not yet well harmonised across countries. MOTIVATE aims at improving the characterisation and reporting on the state and trends of European terrestrial habitats and plant biodiversity, in order to provide a deeper understanding of the pressures and drivers underlying biodiversity changes in Europe.

Main objectives

MOTIVATE will substantially improve the quality of reporting on the conservation status of the EU's terrestrial habitats, by combining so-far untapped data with remote sensing, modelling and extrapolation methods. This will improve the standardisation of reporting and support national conservation agencies and decision-makers.

Main activities

MOTIVATE will integrate expertise and techniques from different knowledge domains, namely vegetation science, biodiversity modelling, remote sensing and human geography. At its core is the community-owned database of vegetation plot time series ReSurveyEurope, integrating on-the-ground data with ongoing monitoring under the Habitats Directive. These data will be used to produce both habitat- and species-specific assessments of plant biodiversity status and trends, and to develop workflows for upscaling these results using remote sensing, and for attributing drivers to the observed changes based on biodiversity modelling. In addition, MOTIVATE will establish pipelines to collect additional vegetation-plot time series in the future, and invest in capacity-building to secure the involvement of future generations in the continued sampling of time-series. Knowledge exchange among multiple stakeholders will help understanding how biodiversity data can be integrated with broader public perceptions. This will improve how monitoring data is put into practice by decision-makers.

Vegetation sampling in mountain grassland in Gran Sasso National Park, Italy

Partners of the project

Faculty of Natural Sciences I, Institute of Biology / Geobotany and Botanical Garden, Martin Luther University Halle-Wittenberg, Halle, Germany

University of Rostock, Rostock, Germany

Department of Botany and Biodiversity Research, University of Vienna, Vienna, Austria

Biodiversity Research Institute (IMIB), University of Oviedo, Mieres, Spain

Department of Biological, Geological and Environmental Sciences, Alma Mater Studiorum - University of Bologna, Bologna, Italy

Department of Sciences, Roma Tre University, Rome, Italy

Faculty of Science / Department of Botany and Zoology, Masaryk University, Brno, Czech Republic

Faculty of Humanities, University of Oulu, Oulu, Finland

Duration

01/04/2024 - 31/03/2027 (provisional)

Total grant

Approx. 1,4 mil. €

More information

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Thornback ray (Raja clavata)

Partners of the project

Science Directorate, Loughs Agency (LA), Carlingford, Ireland

Research Department, Flanders Marine Institute (VLIZ), Ostend, Belgium

Environment and Climate Department, Norwegian Research Centre (NORCE), Bergen, Norway

Department of Biological Resources and Environment, French Institute for Ocean Science (IFREMER), Brest, France

National Institute of Aquatic Resources, Technical University of Denmark (DTU), Silkeborg, Denmark

Environmental Integration Unit, French Marine Energies (FEM), Brest, France

Department of Wildlife, Fish and Environmental Sciences, Swedish University of Agricultural Sciences (SLU), Umeå, Sweden

Danish Fishers Producer Organisation (DFPO), Copenhagen, Denmark

Ocean Tracking Network (OTN), Dalhousie University, Halifax, Canada

Duration

02/01/2024 - 31/12/2026

Total grant

Approx. 1,6 mil. €

More information

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NorTrack - The Northeast Atlantic Marine Tracking Network

Context

Adequate management of marine species requires knowledge on their ecology, needs, and the threats they face. Doing so also requires the creation of robust evidence-based methods that are undertaken collaboratively, strategically, and at a sufficient scale. Within this context, acoustic telemetry offers the perfect tool, particularly when used as part of large collaborative networks of infrastructure. NorTrack will leverage ongoing acoustic tracking projects across the Northeast Atlantic (NEA) region of Europe and expand on those to inform species-based biodiversity management. NorTrack represents a major step towards an operational and permanent European Tracking Network (ETN) to coordinate aquatic animal tracking efforts at a scale that will be usable to make progress on international marine management and planning. Such a network represents a major win for European biodiversity monitoring initiatives, conservation, and policy.

Main objectives

The main objectives of NorTrack are:

1. coordinate the deployment of strategic aquatic tracking infrastructure across the NEA;
2. harmonise data collection methods, sharing platforms and protocols;
3. apply data to address knowledge gaps, identify priority conservation areas, and inform stakeholders and management agencies.

Main activities

NorTrack will achieve these objectives through a strong and dynamic consortium of nine partner institutions from across the NEA region. The collaborative effort will first deploy and maintain six key infrastructures to track marine fishes, followed by a coordinated fish tagging effort, ensuring high quantity and quality of detections of a wide range of vulnerable and commercially sensitive species.
The project will also develop an open database for archiving and accessing animal tracking data, building on current best practices at national, EU, and international levels.
Stakeholder engagement and collaboration are at the heart of the project, with continuous identification and engagement planned throughout. Results will be analysed and disseminated to the scientific community, stakeholders, policy makers, and the public via publications, a project website, data visualisation, policy briefs, public meetings, online webinars, symposiums and workshops, and participation in international and national conferences. NorTrack will report on how knowledge and data produced within the project can be integrated in NEA policy to improve conservation and management of studied species.

SEAGHOSTS - Winged ghosts wandering the oceans: the global spatial ecology and conservation of the world's smallest and elusive seabirds, the storm petrel (*Hydrobatidae & Oceanitidae*), across the Mediterranean and the NE Atlantic Ocean

Context

Understanding the spatial ecology of free-ranging fauna is needed for the effective conservation of global biodiversity. Patterns of distribution and trophic ecology differ among species, and they often face different anthropogenic threats. In addition, merging spatial and trophic ecology with integrative taxonomy has enormous potential for defining accurate Conservation Units (CU). SEAGHOSTS aims to build on limited knowledge of the spatial and trophic ecology of the storm petrel species (*Hydrobatidae* and *Oceanitidae*) and their populations breeding in Europe. Specifically, it aims to assess the major at-sea threats storm petrels face on their Mediterranean and NE Atlantic breeding grounds and on their suspected Southern Atlantic wintering grounds. These threats include climate change, renewable energy infrastructures, aquaculture, and contamination, including plastic exposure. Storm petrels are excellent sentinels of the marine ecosystem because: (a) they are highly pelagic, covering vast distances for foraging and migrating, (b) they feed on low trophic level prey, therefore responding sooner than larger seabirds to environmental changes, (c) they are long-lived, and (d) they are extremely sensitive to anthropogenic threats. Until now, their small body size and secretive behaviour has posed a major constraint on their study.

Main objectives

1. Examining the spatial distribution and trophic ecology of the storm petrels that breed along Europe;
2. Understanding the annual distribution, migratory connectivity and at-sea behaviour of storm petrel populations inhabiting European seas;
3. Establishing the Conservation Units for the storm petrels that breed in Europe through integrative taxonomy;
4. Evaluating the overlap between the spatio-temporal distribution and abundance of storm petrels and the cumulative effects of human activities at sea;
5. Producing a practical toolkit for improving research and conservation of storm petrels at colony sites.

Main activities

SEAGHOSTS will combine available biologging, genetic and isotopic data with newly collected data over the project to fill important geographic gaps across Europe. This transnational project will combine ultra-miniaturised tracking devices, habitat modelling, bulk and compound-specific stable isotope analysis, diet DNA metabarcoding analysis, geometric morphometrics, and microplastic determinations. This multidisciplinary methodology, combined with multi-colony and multi-species monitoring, will provide new essential knowledge on year-round, metapopulation distributions of storm petrels (O1, O2), an updated list of storm petrel CU inhabiting European seas (O3), and a review on how diverse human activities at sea may affect oceanic habitats of seabirds (O4). Overall, this knowledge will help identifying priority conservation areas across international boundaries, i.e. Marine Protected Areas. The project will also quantify any detrimental effects of research on such small seabirds and will assess restoration techniques that increase their breeding performance (O5), directly contributing to their effective management and conservation, both on land and at sea. SEAGHOSTS, which includes 16 partners from 12 countries, will fill knowledge gaps on the distribution of marine biodiversity, but will also make use of available biodiversity data and contribute to the harmonisation of monitoring methods. Finally, we are already working with a broad range of stakeholders who are supportive of SEAGHOSTS given the urgent need to protect one of our least known group of seabirds.

Aerial view of Praia Islet, Azores, Portugal – one of the study sites where we will track Monteiro's storm petrel (Hydrobates monteiroi) and band-rumped storm petrel (Hydrobates castro).

Partners of the project

Department of Evolutionary Biology, Ecology and Environmental Sciences, Universitat de Barcelona (UB), Barcelona, Spain

Department of Biology, University of Balearic Islands (UIB), Palma, Spain

FCiências.ID - Association for the Research and Development of Sciences (FCiências), Lisbon, Portugal

Hellenic Ornithological Society / BirdLife Greece (HOS), Athens, Greece

Okeanos - Institute of Marine Sciences, University of the Azores, Faial, Portugal

Norwegian Institute for Nature Research (NINA), Norway

Department of Biological, Chemical and Pharmaceutical Sciences and Technologies, University of Palermo (UNIPA), Palermo, Italy

Department of Environmental Science and Policy, University of Milan (UMIL), Milan, Italy

Area per l'Avifauna Migratrice (BIO-AVM), Italian Institute for Environmental Protection and Research (ISPRA), Ozzano dell'Emilia, Italy

Department of Ecoscience, Aarhus University (AU), Aarhus, Denmark

Behavioural Ecology & Ecophysiology group, Department of Animal Ecology & Systematics, Justus Liebig University (GieU), Giessen, Germany

South Iceland Nature Research Centre (SINRC), Vestmannaeyjar, Iceland

Society for the Study and Protection of Nature in Brittany (BV), Brest, France

University College Cork (UUC), Ireland

World Seabird Union (WSU), USA

Wildlife Research Division, Environment and Climate Change Canada, Mount Pearl, Canada

Cardiff School of Biosciences, Cardiff University, Wales, UK

Duration

01/04/2024 - 31/03/2027

Total grant

Approx. 2 mil. €

More information

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Image of a bumblebee pollinator captured while conducting automated monitoring of plant-pollinator interactions. Artificial intelligence can locate the insect in the image and place a bounding box around it and can identify the insect to family, genus and even species.

Partners of the project

Department of Species Interaction Ecology, Helmholtz Centre for Environmental Research, Leipzig, Germany

Biology Department, Catholic University of Leuven, Leuven, Belgium

Department of Biology of ecosystems, University of South Bohemia, Ceske Budejovice, Czech Republic

Ecology and Genetics Unit, University of Oulu, Oulu, Finland

Institute of Ecology and Botany, Centre for Ecological Research, Vácrátót, Hungary

Alpine Wildlife office, Gran Paradiso National Park, Torino, Italy

Department of Taxonomy and Ecology, Babeș-Bolyai University, Cluj-Napoca, Romania

Institute of Biology, University of Latvia, Riga, Latvia

Duration

01/04/2024 - 31/03/2027

Total grant

Approx. 1,7 mil. €

More information

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SEPPI - Standardised European monitoring of plant-pollinator interactions

Context

Interactions between plants and pollinators shape how both respond to environmental drivers and are critical to our food security and the maintenance of ecosystem services offered by wild plants. Both EuropaBON and eLTER have emphasised the necessity of simultaneously monitoring plants, pollinators, and their interactions, with the added requirement that this monitoring should be as inexpensive and as automated as possible. Such standardised monitoring throughout Europe would allow for trends in pollinators and in the ecosystem service of pollination to be detected in near time, allowing for rapid management interventions. The unanswered scientific question is whether rapid automated methods can detect trends with the same rigour that is currently possible with traditional methods in pollination ecology.

Main objectives

SEPPI aims to develop and optimise the protocol (measurement, data flow, quality control, metadata), create pipelines for image processing, analysis, and visualisations, and investigate the scalability and sustainability of automated monitoring. We will use new, non-lethal technology to capture images of pollinators on flowers in the field using time-lapse cameras and deep learning to identify pollinators. Local stakeholders, such as eLTER research site managers, will only adopt new protocols if they provide an added benefit, are not too labour-intensive, and are affordable. SEPPI aims to demonstrate the scalability and sustainability of automated methods. We envision a future in which plants, pollinators and their interactions are monitored every year with minimal costs and high automation.

Main activities

Scientific outputs include quantification of the abundance and diversity of four orders of pollinating insects across space and time and European maps of pollinator trends, as well as quantification of changes in plant-pollinator interactions, and the degree to which environmental change alters pollinators through changes in plant communities. Protocols and pipelines will be co-created with the pre-identified stakeholders that will use them: scientists, research site managers, eLTER, EuropaBON and EEA. The developed protocol will be tested in the field sites of the PIs for performance at detecting plant-pollinator interaction change across a variety of ecological gradients, such as land-use, restoration, altitude, fragmentation, and ecological succession. As pollination ecologists are only recently investigating network responses to each of these gradients, each case study represents a novel contribution to science. Together, these case studies will allow us to test hypotheses about how well automated methods detect changes in interactions across a wide range of biogeographical settings and types of gradients. SEPPI will quantify the implementation costs for equipment and, labour and in each revision of the protocol will seek ways to reduce these costs.

SoilRise - Raising awareness for soil biodiversity and multiplying monitoring by student-based Citizen Science

Context

Soil organisms are neglected by conservation policies compared to the biodiversity contained in most other habitats. Indeed, below-ground biodiversity is hard to monitor at scale due to its cryptic living and low recognition in public and science. Yet, stakeholders (e.g. farmers, gardeners, local authorities, urban planners, and natural area managers) show a growing interest in obtaining simple and reliable indicators to assess soil biodiversity, quality and functioning. Among soil organisms, earthworms are widely recognised as relevant bioindicators of soil quality. They are also considered as soil ecosystem engineers. In the context of decreasing biodiversity, conserving high abundance and diversity of earthworms is of major interest, since they represent an important below-ground node maintaining above-ground trophic networks.

SoilRise takes earthworms to exemplify an approach of combining cross-European sampling of earthworms through Citizen Science (CS) with barcode analyses to ensure high data quality to model earthworm distribution and communities at European scale. Barcoding will help to harmonise taxonomic dissent and improve and validate morphological identification keys. SoilRise will contribute to the specifications of Essential Biodiversity Variables (EBVs) and Essential Ecosystem Services Variables (EESVs) within EuropaBON efforts for below-ground biodiversity in terrestrial systems. SoilRise will develop an interactive network between academia and the public to enable extensive and accurate soil biodiversity monitoring.

Main objectives

- Boost data and its availability on earthworm communities across Europe;
- Raise soil biodiversity related awareness and enthusiasm among stakeholders and the public;
- Identify species at risk and define tools and measures for protection;
- Harmonise the taxonomy of earthworms across Europe;
- Explore diversity patterns across Europe, including interspecific variability;
- Identify potential non-native species;
- Valuation of social-ecological impacts of CS in student-stakeholders collaboration chain.

Main activities

- SoilRise will create a student-based research network of Citizen Scientists (land managers, stakeholders and citizens), students, and researchers in each partner country;
- Analyses of earthworm diversity and abundance in relation to habitat and implications for earthworm conservation;
- DNA barcoding in the SoilRise-network for intraspecific variability and future identification of potential new records, cases of cryptic and complex species;
- Socio-ecological valuation of the student-based citizen science approach;
- SoilRise will raise public awareness of the importance of soils and communicate the crucial role of soil organisms in sustaining life on the planet.

Earthworms: Monitoring soil fauna and its impact on sustaining life!

Partners of the project

Center of Biodiversity and sustainable Land Use, University of Göttingen, Göttingen, Germany

Department of Crop Sciences/ Experimental Farm Gross-Enzersdorf, University of Natural Resources and Life Science (BOKU), Vienna, Austria

Department of Soil Science and Agrophysics, Krakow, University of Agriculture in Krakow, Krakow, Poland

UCD School of Agriculture and Food Science, University College Dublin, Dublin, Ireland

UMR ECOBIO 6553, University of Rennes 1, Rennes, France

Living Lab Clef, Plelan-le-Grand, France

Duration

01/03/2024 - 28/02/2027

Total grant

Approx. 1,2 mil. €

More information

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Subterranean amphipod species Niphargus pachytelson inhabits ground-waters in karst of Northwestern Dinarides in the Balkans. It is one of more than 500 species of the megadiverse genus Niphargus, that live in groundwaters of Western Palaearctic.

Partners of the project

Biotechnical Faculty, Department of Biology, SubBioLab, University of Ljubljana, Ljubljana, Slovenia

Faculty of Sciences, Department for Biology of Organisms, Free University of Brussels (ULB), Brussels, Belgium

Department of Life, Health and Environmental Sciences (MESVA), University of L'Aquila, L'Aquila, Italy

Department of Systematic Zoology and Ecology, Eötvös Loránd University, Budapest, Hungary

"Emil Racovita" Institute of Speleology; Cluj Napoca, Romania

National Museum of Natural History Luxembourg, Zoology Department; Luxembourg

Duration

01/04/2024 - 31/03/2027

Total grant

Approx. 871 thsd. €

More information

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Sub-BioMon - Developing and testing approaches to monitor subterranean biodiversity in karst

Context

The subterranean species of karst regions in Europe represent a unique and indispensable part of European biodiversity. Numerous specialised species are rare and highly endemic, bound to narrow geographical areas. At the same time, subterranean habitats are among the most challenging for biodiversity monitoring, due to difficult accessibility and the complexity of its exploration, which requires expertise and specialised equipment. Caves are rare points where humans can enter the subterranean domain and are often considered to be the main habitat for the subterranean species. They are protected as a special habitat type (8310 "Caves not open to the public") in the EU Habitats Directive, which demands their monitoring at national and international level. However, up to now, there is no standardised sampling method for monitoring subterranean species and habitats. The Sub-BioMon will reconsider the role of caves as either habitats or simply windows into an extensive subterranean habitat in a fractured rock, consisting of cavities and crevices inaccessible to humans. The project will provide a scientific basis for monitoring, which is relevant to a variety of stakeholders, such as governmental and conservation institutions, management authorities of natural parks and show caves, as well as the general public, all of which will be involved in the project.

Main objectives

The Sub-BioMon project will provide standardised methods and protocols for monitoring subterranean biodiversity in European karst areas, with a focus on developing and testing novel approaches.

Main activities

The project will tackle several interrelated challenges, starting from the problem of selecting monitoring sites, sampling using standardised methods, and identifying the selected taxa down to the species level. The selection of monitoring sites and microhabitat locations will be based on defining bioregions at different spatial scales, using both large and accessible datasets on selected groups of subterranean animals and national databases. The second major challenge is to standardise field sampling methods. Subterranean animals are rare and repeated visits are necessary to detect them. We will build upon practices implemented in participating countries and test a feasible protocol for monitoring subterranean fauna in the field. The final challenge addresses the problem of identifying sampled specimens, which is especially difficult in subterranean habitats with numerous cryptic species. We will implement DNA-based molecular approaches, including DNA barcoding and environmental DNA (eDNA) for both identification and detection of species. The results of Sub-BioMon will provide scientifically supported approaches to assess subterranean biodiversity. The outcomes will directly support policy makers and authorities who are obliged to monitor and report on subterranean biodiversity to the international community. A framework for the development of Citizen Science approaches will be established to involve the public and cavers in an early warning system about the status and potential threats to subterranean karst areas and, where possible, to collect data on selected, easily recognizable species. The developed guidelines will lay the foundation of an international network for long-term monitoring of subterranean biodiversity.

TABMON - Towards a Transnational Acoustic Biodiversity Monitoring Network

Context

TABMON is a research project that aims to advance biodiversity monitoring across Europe through a novel approach using autonomous acoustic sensing. This project is designed to fill gaps in current biodiversity reporting and contribute to achieving the targets set in the EU Biodiversity Strategy for 2030. It involves harmonising the collection, analysis, and integration of acoustic biodiversity observations, leveraging advancements in technology and Artificial Intelligence (AI). At its core, TABMON seeks to demonstrate the effectiveness of acoustic observation in transnational biodiversity monitoring. It focuses on deploying an acoustic monitoring network that captures and analyses sounds across different European landscapes, using these audio data to gain insights into species distribution, abundance, and migration patterns. Through its innovative approach and transdisciplinary collaboration, TABMON sets out to enhance the effectiveness of biodiversity monitoring and contribute significantly to the conservation and management of European biodiversity.

Main objectives

The central objective of TABMON is to develop a transnational biodiversity monitoring with autonomous acoustic sensors across a large latitudinal range in Europe, demonstrating how acoustic sensing can complement existing monitoring efforts to fill current gaps in reporting to EU directives, and assessing the targets outlined in the EU Biodiversity Strategy.

Main activities

The TABMON project is characterised by a series of specific, targeted activities that collectively aim to advance the field of biodiversity monitoring through acoustic techniques:

- Acoustic Sensor Deployment: Installation of advanced acoustic sensors across various European biodiversity ecosystems to record natural soundscapes. These sensors are designed to continuously record the natural soundscapes of various ecosystems, capturing a wide array of biological sounds that indicate the presence and activities of different species.
- Data Collection and Analysis: The recorded audio data, rich in ecological information, will be systematically collected and analysed using sophisticated artificial intelligence algorithms. This process involves identifying species-specific calls and sounds, which can provide insights into species diversity, population density, and behavioural patterns.
- Biodiversity Indicators Development: Based on the analysis, the project will develop key biodiversity indicators that can be used to assess the state of ecosystems and track changes over time. These indicators will be crucial for informing conservation strategies and policy decisions.

Acoustic recorder device connected to a solar panel in a forest.

Partners of the project

Department of Environmental Data, Norwegian Institute for Nature Research, Norway

Institute for Biodiversity and Ecosystem Dynamics (IBED), University of Amsterdam, Netherlands

LIS (Computer Science and Systems Laboratory), University of Toulon, France

Department of Landscape Dynamics and Biodiversity, Forest Science and Technology Centre of Catalonia, Spain

Department of Cognitive Science and AI, Tilburg University, Netherlands

Evolutionary Ecology Research Group, Naturalis Biodiversity Center, Netherlands

Department of Socio-economic and spatial statistics (SER), Statistics Netherlands, Netherlands

Sovon Dutch Centre for Field Ornithology, Nijmegen, Netherlands

Duration

08/01/2024-08/01/2027

Total grant

Approx. 1,2 mil. €

More information

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Ponds provide key habitats for a range of aquatic biodiversity including amphibians.

Partners of the project

Department of Ecoscience, Aarhus University, Aarhus Denmark

Institute of Aquatic Ecology, Centre for Ecological Research, Budapest, Hungary

Department of Biology, KU Leuven, Leuven, Belgium

Life Science Department / Institute Land-Nature-Environment, HES_SO, Jussy, Switzerland

PhyloLab, University of Geneva, Geneva, Switzerland

Aquatic ecology group, Biosciences, FUB, University of Vic, Vic, Spain

Biological Sciences Department, Limnology Laboratory and Ecosystem Research and Implementation Centre, METU, Ankara, Turkey

Nature Conservation, WWF Deutschland, Berlin, Germany

Department of Fish Biology, Fisheries and Aquaculture, Leibniz Institute of Freshwater Ecology and Inland Fisheries in Forschungsverbund Berlin e.V. (IGB) Berlin, Germany

Duration

01/02/2024 - 31/01/2027

Total grant

Approx. 1,5 mil. €

More information

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TRANSPONDER - Transnational biodiversity and ecosystem assessment approaches for pondscapes in Europe

Context

Permanent and temporary ponds are increasingly recognised as key habitats for the provision and protection of freshwater biodiversity. Despite this, they are largely neglected in water- and nature-related national and EU policies and strategies, and not included in many freshwater monitoring programs. Our ability to assess the biodiversity status and dynamics of ponds is hampered by the lack of a standardised protocol for monitoring pond biodiversity. This paucity of monitoring data is at odds with the fact that ponds lend themselves to effective monitoring as sampling requires less logistical investment compared with larger water bodies. There is, therefore, potential for cost-efficient assessment and monitoring of pond and pondscape biodiversity that captures broader scale patterns of biodiversity (taxonomic, functional, and genetic diversity) and ecosystem quality than is currently achieved.

Main objectives

TRANSPONDER will combine existing data across a range of countries with new data collection to develop methods and protocols for biodiversity and ecosystem monitoring of ponds and pondscapes that: (i) are applicable to different types of ponds and different climatic zones and land-use contexts; (ii) cover different key taxonomic groups that capture different aspects of pond biota; (iii) cover both taxonomic, functional (providing a synthetic summary linked to ecosystem functioning) and genetic diversity (reflecting evolutionary potential, in both zooplankton and macrophytes); and (iv) allow time- and resource effective sampling through a high degree of automation (sensors, eDNA, artificial intelligence aided identification of zooplankton and macroinvertebrates, remote sensing), enabling a broader coverage.

Main activities

TRANSPONDER will develop and assess methods allowing efficient biodiversity assessment of ponds. The project will combine existing data with new data to assess the representativeness of a few ponds of the wider pondscape in terms of how they reflect the broader biodiversity. Optimisation methods and sampling protocols to assess taxonomic, genetic and functional diversity will be developed and applied. These will include automated identification systems using artificial intelligence, eDNA, and community metabarcoding. The project will also explore methods for upscaling biodiversity assessment proxies to the landscape level and the use of remote sensing approaches to track changes in pond hydrology and essential biodiversity variables (EBVs) at a large scale. Finally, we will engage with different stakeholder groups to (a) explore the interest in applying pond monitoring and incorporating ponds and pondscapes in policies and monitoring activities; (b) co-develop the monitoring protocols to facilitate uptake and implementation by different actors; and (c) simplify the monitoring protocols so that they become amenable for citizen-mediated monitoring, allowing further expansion of the scope of monitoring.

WildINTEL – Building a scalable WILDlife monitoring system by integrating remote camera sampling and artificial INTELligence with Essential Biodiversity Variables

Context

Wildlife monitoring is critical to understanding, responding to and halting the current biodiversity crisis. Recent advances in biodiversity sensing, such as camera trapping, image classification technologies, citizen-science platforms, and machine learning, provide cost-effective wildlife monitoring. However, there are still some bottlenecks, such as the high cost of manual image review and the lack of automated workflows. These constraints have hampered our ability to innovate and harmonise methods and tools for collecting and managing biodiversity monitoring data, and to take timely conservation and management actions.

Main objectives

The objective is to develop a cutting-edge coordinated wildlife monitoring system based on the Essential Biodiversity Variables (EBVs) framework. We will combine camera trapping, citizen science, artificial intelligence, and hierarchical models for the automated production of species population and community structure EBVs, with a precision that conventional monitoring schemes cannot match. This will enable stakeholders to obtain reliable and timely assessments of species conservation status and conservation actions to halt biodiversity loss. The WildINTEL system will help mobilise and optimise the use of existing data and integrate camera-trap projects from other areas while supporting the analysis of the drivers of global change and biodiversity loss at spatio-temporal scales. We will focus on mammals, as they are condition sentinels as well as crucial indicators of ecosystem trophic integrity and global change.

Main activities

European biogeographical regions: Mediterranean, Continental, Alpine and Boreal. A protocol and application for the harmonisation of standardised image data collation will be developed. These data will be later uploaded to a global dataset infrastructure. We will develop a transnational citizen science project in Zooniverse to enhance the general public's involvement and knowledge of wildlife and to assist in image classification. These images will support the development of an automated artificial intelligence system for species identification and individual counts in biogeographical regions of Europe. WildINTEL will produce automated spatio-temporal species and community EBVs data cubes in near real-time, corrected for imperfect species detectability and identification, thereby supporting efficient management decisions. EBV data will be periodically shared through the Global Biodiversity Information Facility. Through several dissemination channels, including a website interface and several workshops, we will encourage new stakeholders to adopt the automated monitoring system and get involved in its upscaling. WildINTEL will implement a European stakeholder-led biodiversity monitoring, which will be maintained in the long-term.

Brown bear family in the Tatra National Park (Poland), one of the study areas. The brown bear is the most abundant large carnivore in Europe. The WildINTEL monitoring system will provide related Essential Biodiversity Variables in near-real time to assist managers in the effective management of mammal populations.

Partners of the project

Institute of Nature Conservation Polish Academy of Sciences, Kraków, Poland

Electrical Engineering and Computer Science/ Computer Science and AI Laboratory, Massachusetts Institute of Technology, Cambridge, USA

Faculty of Experimental Sciences, Department of Integrated Sciences, University of Huelva, Huelva, Spain

Department of Natural Resources and Environmental Health, University of South-Eastern Norway, Bø, Norway

German Centre for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig, Martin Luther University Halle-Wittenberg, Leipzig, Germany

GBIF Spain, Coordination Unit, Spanish National Research Council (CSIC), Madrid, Spain

Duration

01/02/2024 - 31/01/2027

Total grant

approx. 1,6 mil. €

More information

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Hard-bottom sponge habitat with Axinella spp. and Aplysina aerophoba at 25 m depth, Mediterranean Sea.

Partners of the project

Section Polar Biological Oceanography, Alfred-Wegener-Institute Helmholtz Center for Polar and Marine Research, Bremerhaven, Germany

Department of Marine Systems, University of Rostock, Rostock, Germany

Stockholm Resilience Centre, Stockholm University, Stockholm, Sweden

Department of Biology, University of Padova, Padova, Italy

Research Department, Norwegian Polar Institute, Tromso, Norway

Groningen Institute for Evolutionary Life Sciences, University of Groningen, Groningen, Netherlands

Biodiversity & Ecosystems Data & Information Centre, Royal Belgian Institute of Natural Sciences, Brussels, Belgium

Department of Arctic and Marine Biology, The Arctic University of Norway, Tromso, Norway

Department of Marine Ecology, Institute of Oceanology Polish Academy of Sciences, Sopot, Poland

Self-financed partners:

Wageningen Marine Research, Den Helder, Netherlands

Antarctic and Southern Ocean Coalition, Washington, D.C., USA

Duration

01/04/2024 - 31/03/2027

Total grant

Approx. 1,9 mil. €

More information

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WOBEC - Weddell Sea Observatory for Biodiversity and Ecosystem Change

Context

The Weddell Sea in Antarctica plays an important role in global climate regulation and constitutes a potential sanctuary for unique Antarctic species. Therefore, the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) is developing a Weddell Sea Marine Protected Area (WSMPA) to ensure the future protection of its biological treasures. In recent years, there has been increasing evidence of accelerating climate change all around Antarctica, prompting the need for sustained monitoring to assess how ecosystems will change under progressing sea-ice decline, ocean warming, and ocean acidification. Since no systematic ecosystem monitoring exists in the eastern Weddell Sea, scientists of 11 institutes from 8 countries join forces together with stakeholders from business, conservation, and society to design and apply a monitoring framework for a *Weddell Sea Observatory of Biodiversity and Ecosystem Change* (WOBEC).

Main objectives

WOBEC aims to establish the "DNA" for a systematic ecosystem monitoring framework in the Eastern Weddell Sea, and a baseline of the current state of the ecosystem against which change can be measured, by achieving the following objectives:

1. Making the baseline biodiversity and ecosystem knowledge of the Eastern Weddell Sea globally accessible to the public;
2. Engaging stakeholders in a participatory process to develop a scientific monitoring framework with potential application in the WSMPA process;
3. Crafting and implementing an innovative multiscale monitoring strategy that integrates traditional methods with cutting-edge technology.

Main activities

WOBEC builds on a comprehensive co-design process with stakeholders to develop a monitoring framework that takes into account the latest state of scientific knowledge and societal demands, and which will unfold in a series of stakeholder-science workshops. To provide the necessary knowledge base, we will inventory historic, recent, and new ecosystem data and make them available through publicly accessible data portals, e.g. OBIS and EMODnet. Furthermore, we will assess and apply available technologies for their suitability for long-term monitoring across spatial and temporal scales, including autonomous observatories, Earth Observation and traditional ship-bases methods. Finally, we will analyse ecological data to generate scientific products such as statistical models and maps, facilitating an iterative process to inform and refine the co-design process of the WOBEC monitoring framework. WOBEC will yield publicly available scientific data from the past 5 decades to the present, a socially relevant monitoring framework for future continuation, including a data management plan and standard operating procedures for the sampling of Essential Variables (EVs). The results will be presented in scientific publications and outreach products, including fact sheets, a website, and various media formats. WOBEC will be developed in close collaboration with CCAMLR, other industry and conservation stakeholders, and other monitoring initiatives in the Southern Ocean and beyond, ensuring a wide dissemination of results to stakeholders and policy makers.

NOTES

NOTES

Contributors

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Layout

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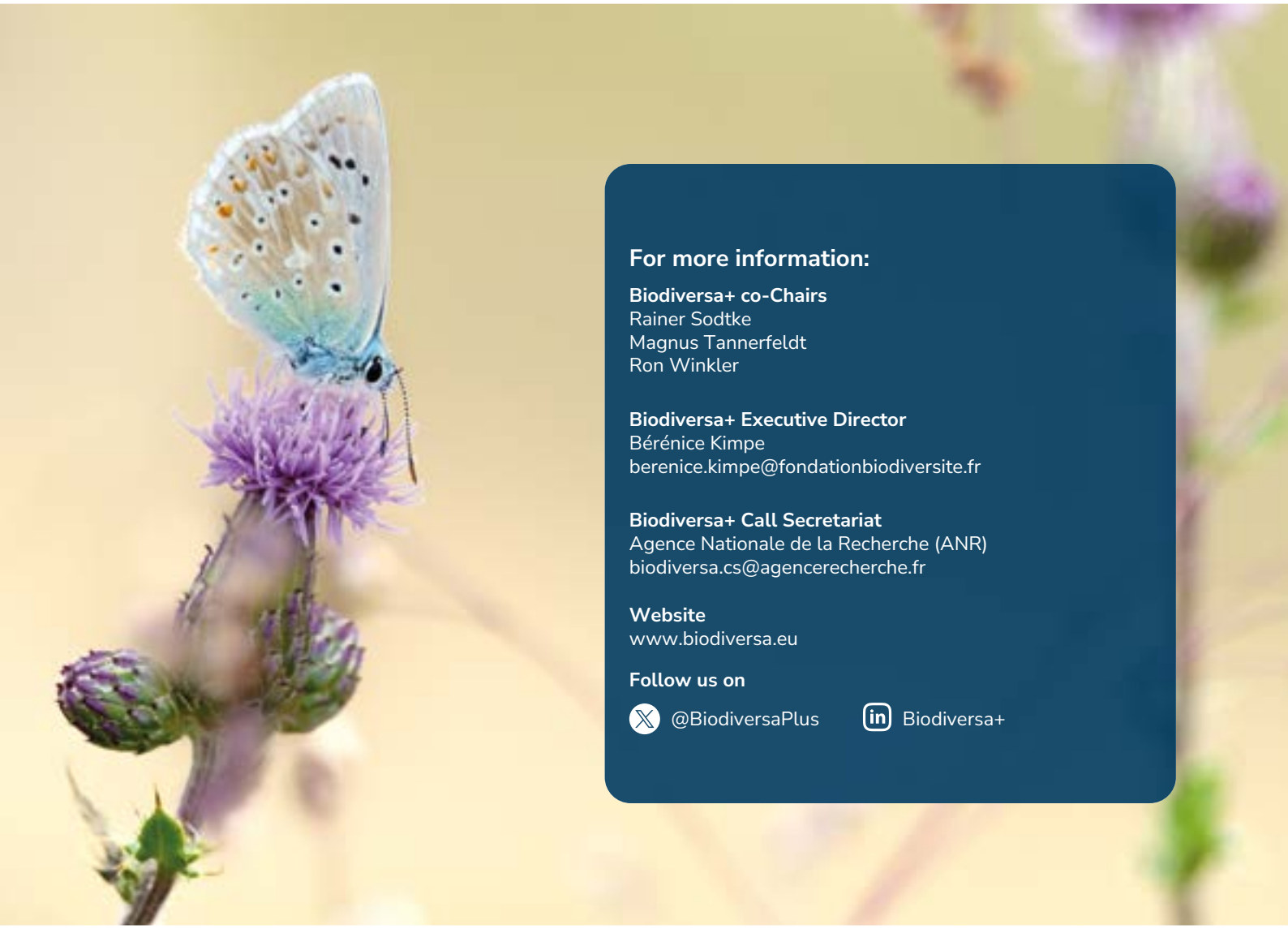

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