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The network promoting European research on biodiversity, ecosystem services and Nature-based Solutions

BiodivERsA 2018-2019 Call for proposals

Biodiversity and its influence on animal, human and plant health

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The network promoting European Research on biodiversity, ecosystem services and Nature-based Solutions

BiodivERsA

BiodivERsA is the European network of programmers and funders of research on biodiversity, ecosystem services and Nature-based Solutions.

Created in 2005, and transformed into a long-term partnership in June 2018, BiodivERsA is a network of 39 agencies and ministries from 25 countries.

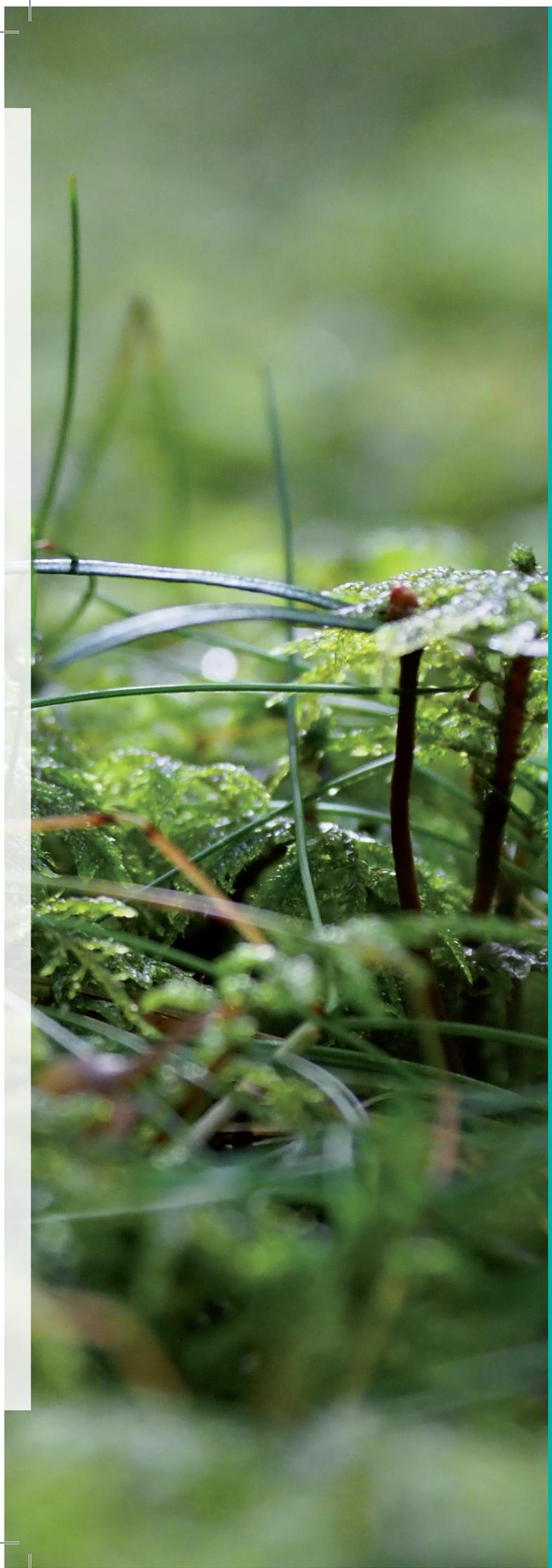
Since 2008, BiodivERsA has launched 9 calls and has funded 104 transnational research projects selected for their scientific excellence, societal and policy relevance and the quality of stakeholder engagement for a total amount of over 239 million euro (including ca. 151 million euro of money directly raised by the BiodivERsA partners and the European Commission).

To further strengthen the European Research Area on biodiversity, BiodivERsA has further developed a great diversity of activities ranging from research mapping, programming and funding, to stakeholder engagement, capacity building, dissemination of projects' outputs and knowledge brokerage.

For more information: www.biodiversa.org

The BiodivERsA members

1. French Foundation for Research on Biodiversity, FRANCE - coordinator
2. Austrian Science Fund, AUSTRIA
3. Belgian Science Policy Office, BELGIUM
4. The Fund for Scientific Research – Wallonia, BELGIUM
5. The Research Foundation - Flanders, BELGIUM
6. National Science Fund Bulgaria, BULGARIA
7. Ministry of the Environment, CZECH REPUBLIC
8. Innovation Fund, DENMARK
9. Ministry of Environment and Food, DENMARK
10. Estonian Research Council, ESTONIA
11. Academy of Finland, FINLAND
12. National Research Agency, FRANCE
13. Ministry of Ecology, Sustainable Development and Energy, FRANCE
14. Ministry of Higher Education, Research and Innovation, FRANCE
15. The Technopole of New Caledonia, FRANCE
16. Guadeloupe Region, FRANCE
17. French Guyana Region, FRANCE
18. Reunion Region, FRANCE
19. German aeronautics and space research centre, on behalf the German Ministry of Education and Research, GERMANY
20. German Research Foundation, GERMANY
21. Ministry of Agriculture, HUNGARY
22. The Irish Environmental Protection Agency, IRELAND
23. Ministry of Environmental Protection, ISRAEL
24. Ministry of Environmental Protection and Regional Development, LATVIA
25. Research Council of Lithuania, LITHUANIA
26. The Netherlands Organisation for Scientific Research, THE NETHERLANDS
27. Research Council of Norway, NORWAY
28. National Science Centre, POLAND
29. Portuguese national funding agency for science, research and technology, PORTUGAL
30. Regional Fund for Science and Technology, Azores, PORTUGAL
31. The Executive Agency for Higher Education, Research, Development and Innovation Funding, ROMANIA
32. Slovak Academy of Sciences, SLOVAKIA
33. Spanish State Research Agency, SPAIN
34. Regional Government of the Canary Islands, SPAIN
35. Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning, SWEDEN
36. Swedish Environmental Protection Agency, SWEDEN
37. Swiss National Science Foundation, SWITZERLAND
38. Ministry of Agriculture and Forestry, TURKEY
39. Joint Nature Conservation Committee, UNITED KINGDOM



Contents

From the BiodivERsA Chair & Coordinator and Secretariat

Biodiversity provides many nature's contributions to people such as provision of food and energy, water purification, regulation of climate, and inspiration. Biodiversity also underpins human's physical, mental and emotional health and provides medical resources. It is thus essential to preserve biodiversity and healthy ecosystems to ensure that they can continue to deliver their services and that the livelihoods of people depending on these ecosystems can be sustained.

More specifically, and as it seems to be the case for the 2020 CoVid-19 crisis, most pandemics like HIV/AIDS, pandemic influenza or severe acute respiratory syndrome, originate in animals and are driven to emerge by ecological, socio-economic or behavioural changes. The ecological crisis we experience thus should also be taken into account very seriously by health authorities. Yet, over the last decades, many ecosystems underwent major degradation and biodiversity loss accelerated at unprecedented rates, while contacts between humans and unrecognized reservoirs of pathogens were deeply altered, leading to the emergence of zoonoses.

> Biodiversity also underpins human's physical, mental and emotional health and provides medical resources.

At the European and international levels, interactions between biodiversity and health are more and more considered. For instance, the Convention on Biological Diversity considers that all the Aichi Targets – which aim at preserving biodiversity – potentially have a link to health and human well-being and considers that actions in favour of meeting Aichi Targets would contribute to improve both global human health and ecosystem health. The European Green Deal and the post 2020 Global Biodiversity Framework would further address that issue. It is thus important to obtain more knowledge on the inter-linkages between biodiversity and health and to further involve stakeholders to contribute to the development of innovative opportunities and science-driven policies in the field.

> The ecological crisis we experience thus should also be taken into account very seriously by health authorities.

The BiodivERsA 2018-2019 call for proposals aimed at supporting transnational research projects addressing issues at the nexus of biodiversity and health. The research funded under this call will also feed the upcoming IPBES 'nexus' assessment on biodiversity, water, food and health.

The call supported two actions:

- the first action (Action A) consisted in supporting transnational collaborative research projects gathering different research teams that generate new knowledge to tackle research questions – similar to previous BiodivERsA calls.

- the second - Pilot - Action (Action B) consisted in promoting another type of research project, namely synthesis research projects. These projects consist in consortia of individual researchers -and possibly stakeholders- developing synthesis activities based on the reuse of existing data and datasets of various nature (i.e. without generating new primary data) also to tackle research questions. The intention was to develop this Action with the support from biodiversity synthesis centres that exist in Europe.

Studying the nexus between biodiversity and health is fundamental but remains challenging as the topic is still fairly new. Our call announcement was also clear on the fact that only proposals seriously addressing both biodiversity and health issues, i.e. the interface between these two fields, could be considered, and that research questions, expected impacts and composition of consortia should reflect this. Still, the call was a success and 49 full proposals gathering a range of scientific disciplines were submitted. In the end, 10 projects were funded of which 9 for Action A and 1 for Action B for a total amount of funding of 11.8 million euro. These projects will contribute to build bridges across disciplines that are too often separated, like ecology, genetics or evolutionary sciences on the one end, and epidemiology and health sciences on the other end, allowing to tackle key issues at the crossroad between biodiversity and health.

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

This brochure gives insight on the call process, from

the call development 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 10 projects selected for funding. Very timely, one of the projects (Biodiv-AFREID) will investigate how biodiversity status and alterations might (dis) favour emerging infectious diseases derived from small mammals in African forests, including coronaviruses ! Another project (BioRodDis) will assess the importance of rodents as potential reservoirs of zoonotic agents, potentially including coronaviruses, in temperate forests and urban areas.

> Biodiv-AFREID will investigate how biodiversity status and alterations might (dis)favour emerging infectious diseases derived from small mammals in African forests, including coronaviruses

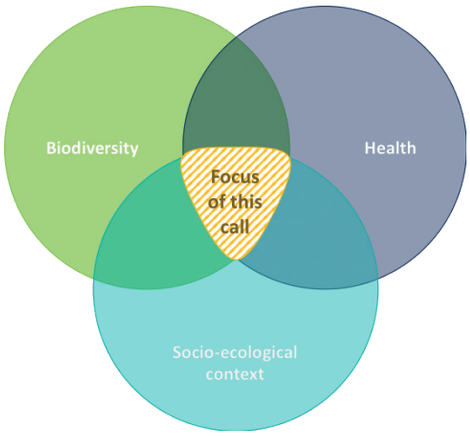
All these projects will deepen our understanding of the relationships that exist between biodiversity and health, including the factors that drive pathogen emergence. This could help us to move health strategies from reaction to more anticipation. For instance, emerging diseases and pandemics are on the increase and we must not only contain the diseases one after the other, but we also need to understand and tackle the processes allowing their emergence, including the importance of the interlinkages between biodiversity and health. This BiodivERsA call clearly demonstrates that our network has a key role in this context. We wish you a pleasant reading!

Xavier Le Roux
BiodivERsA Chair
& Coordinator French Foundation for Research on Biodiversity (FRB)

Claire Blery
BiodivERsA Chief Executive Officer
French Foundation for Research on Biodiversity (FRB)

Cécile Mandon
BiodivERsA Secretariat Officer
French Foundation for Research on Biodiversity (FRB)

Summary of the 2018-2019 BiodivERsA Call



The aim of this call was to support transnational research projects jointly addressing issues at the nexus between biodiversity and health, properly taking into account socio-ecological contexts, and promoting innovative research for more informed decision-making.

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

Projects could address one or several themes. Besides, the research projects (funded under the Action A) that were addressing theme 1 also had to address theme 2 and/or theme 3.

Theme 1: Relationships between biological diversity and animal, human and/or plant health: effects and underlying mechanisms.

Emphasising studies on interactions between biodiversity and animal, human and/or plant health is essential to better connect health and biodiversity. To that regard the first theme was divided into two subthemes, the first dealing with the positive and negative relationships between biodiversity and animal, human and/or plant diseases ; and the second with the linkage between contact of people with biodiversity and Human health. Understanding the underlying mechanisms were key in this context.

Theme 2: Understanding and predicting the integrated effects of global change factors on biodiversity-related health issues.

The consequences of global change factors continue to be poorly understood. Using different models would help to better demonstrate the role of biodiversity, at all relevant levels, on disease risks. Thus, three subthemes were created: (1) one on the impacts of global change factors on biodiversity-related issues, (2) another on the understanding of the transition steps from biological hazards to infectious disease risk and pandemic risk in a global change world; and (3) developing scenarios of the coupling between biodiversity and health issues over the next decades.

Theme 3: Valuing/qualifying biodiversity benefits to animal, human and plant health, and promoting health-friendly biodiversity status as well as biodiversity-based health status.

The objective here was to assess benefit-cost ratio to maintain health-friendly biodiversity status. This is crucial to bring new knowledge on health-friendly biodiversity status and thus facilitate its uptake by policy makers.

Theme 4: Focus on biodiversity-health relations in European overseas.

This transversal theme focused on overseas. Its purpose was to reinforce engagement of researchers and stakeholders in the European outermost regions (ORs) and overseas countries and territories (OCTs). Projects corresponding to theme 4 had to address one or several of the first three themes, but always with a focus on overseas.

Type of research funded

This call targeted transdisciplinary projects of 3 years, involving partners from at least three and five different countries participating in the call for Action A and B, respectively.

Given the nature of the research supported through this call, proposals had to engage different disciplines including natural sciences, medical sciences and social sciences and humanities.

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

Call process

The topic of this call for research proposals was a priority for the BiodivERsA network and its members, as defined in the BiodivERsA 2017-2019 Implementation plan. The nexus between biodiversity and health was not the focus of previous projects funded through BiodivERsA –with a few exceptions– and connecting animal, human and plant health with biodiversity appeared to be an emerging and important topic. That is why BiodivERsA decided to launch that ambitious joint call in 2018-2019 on that issue.

The content and procedures for this joint call were defined by the participating organisations. A total of 16 national and regional funding organisations from 11 countries participated in the call. NCN, the Polish National Science Centre and ANR, the French National Research Funding Agency, co-hosted the Call Secretariat for Action A. FRB, the French Foundation for Research on Biodiversity, and TAGEM, the Turkish Ministry of Agriculture and Forestry co-hosted the Call Secretariat for Action B. These four agencies played an important role in the implementation and success of the call.

The call was launched on October 1, 2018, with a deadline to submit pre-proposals on November 16, 2018. Eligible pre-registrations were invited to submit full proposals by February 8, 2019. The full proposals were evaluated by an independent Evaluation Committee as well as by external reviewers between February and May 2019.

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 June 2019, allowing for a start of the funded projects between October 2019 and March 2020.

All the projects have a 3-years duration. During their lifetime, they will be requested to submit two reports: one mid-term report and one final report, which will be assessed by the funding organisations that participated in the call.

Agencies and organisations participating to the call

FWF - AUSTRA

BELSPO - BELGIUM

F.R.S.-FNRS - BELGIUM

FWO - BELGIUM

BNSF - BULGARIA

ETAG - ESTONIA

ANR - FRANCE

GUA-REG - FRANCE

DFG - GERMANY

PT - DLR - GERMANY

EPA - IRELAND

RCL - LITHUANIA

NCN - POLAND

UEFISCDI - ROMANIA

SAS - SLOVAKIA

SNSF - SWITZERLAND

Composition of the Evaluation Committee

Scientific experts

Richard Kock (Chair of the Evaluation Committee) – Royal Veterinary College University of London, UNITED KINGDOM
Eric Allan – University of Bern, SWITZERLAND
Sarah Bell – London Global University, UNITED KINGDOM
Dominik Bergerow – Ruhr–University Bochum, GERMANY
Don Cowan – University of Pretoria, SOUTH AFRICA
Clare Heaviside – University of Oxford, UNITED KINGDOM
Thomas Hefin Jones – Cardiff University, UNITED KINGDOM
Michael Jeger – Imperial College, UNITED KINGDOM
Felicia Keesing – Bard College, UNITED STATES
Gabor Lovei – Aarhus University, DENMARK
Kris Murray – Imperial College, UNITED KINGDOM
Olivier Sparagano – City University of Hong Kong, HONG–KONG
Thierry Work – U.S. Geological Survey, UNITED STATES

Policy/management experts

Simon Gardner (Vice–Chair of the Evaluation Committee) – Natural Environment Research Council, UNITED KINGDOM
Peter Bridgewater – University of Canberra/ University of Wollongong, AUSTRALIA and DUBAI
Katia Hueso – Universidad Pontificia de Comillas, SPAIN
Melanie Josefsson – Swedish Environmental Protection Agency, SWEDEN
Andreas Kruess – Federal Agency for Nature Conservation, GERMANY
Daniel Reynders – Retired from the Belgium Ministry of Health, BELGIUM

Evaluation process

The submitted proposals were evaluated by an independent Evaluation Committee, as well as by external reviewers. Both the Evaluation Committee and the external reviewers consisted of scientific experts, as well as policy/management experts and practitioners.

The proposals were evaluated following specific guidelines and according to the following three criteria (pre-defined and communicated in advance to applicants): (1) scientific excellence; (2) quality / efficiency of the implementation; and (3) expected societal / policy impact (including approach to stakeholder engagement). Three scores corresponding to these three criteria were given to each proposal, with a slightly higher weight on scientific excellence over societal / policy relevance. Proposals with scores below the pre-defined threshold values were not ranked nor considered for funding.

The final evaluation meeting was organised in Krakow on 28-29 May 2019. This meeting was the opportunity for the Evaluation Committee members to discuss about the proposals and agree on final scores to be attributed to the proposals. This 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 to the call. The funders then decided on the maximum number of top-ranked projects that would be funded, strictly following the ranking list.

From the Evaluation Committee Chairs

It was a pleasure to be invited to be Chair and Vice-Chair of the 2018-2019 Evaluation Committee, and to chair discussions between a large and diverse international evaluation panel involving both scientific experts and policy-experts. The call focussed on biodiversity and its influence on animal, human and plant health, with the aim to support research projects at the nexus of biodiversity and health issues. This reflects a growing interest in the health and biodiversity sciences, amongst health practitioners and from society whilst recognising the need for a strong science evidence base.

Health is a challenging concept in the context of ecology and biodiversity. The health of one species can often be at the cost of another and this is particularly true in relation to the human species, which has benefited from natural resources at great cost to ecosystems. Overexploitation may reverse the apparent healthiness of humanity and this is forcing closer consideration of biodiversity and health. The knowledge gained from an interdisciplinary and transnational call process can be applied at appropriate scales to deliver conservation and management of biodiversity and ecosystem services via international agreements such as the Convention on Biological Diversity, European Directives, National and Regional policy and practice. And above all, through local awareness, participation and action by the general public and stakeholders. To this end, the guidance issued by BiodivERsA regarding the translation into policy, practice and public engagement was excellent.

The call welcomed two forms of proposals: firstly, those aimed at supporting collaborative research projects, gathering different research teams generating new knowledge in particular based on the production of new primary data; secondly, those aimed at supporting research synthesis projects, gathering individuals forming a working group which perform research and answer research questions using existing data sets.

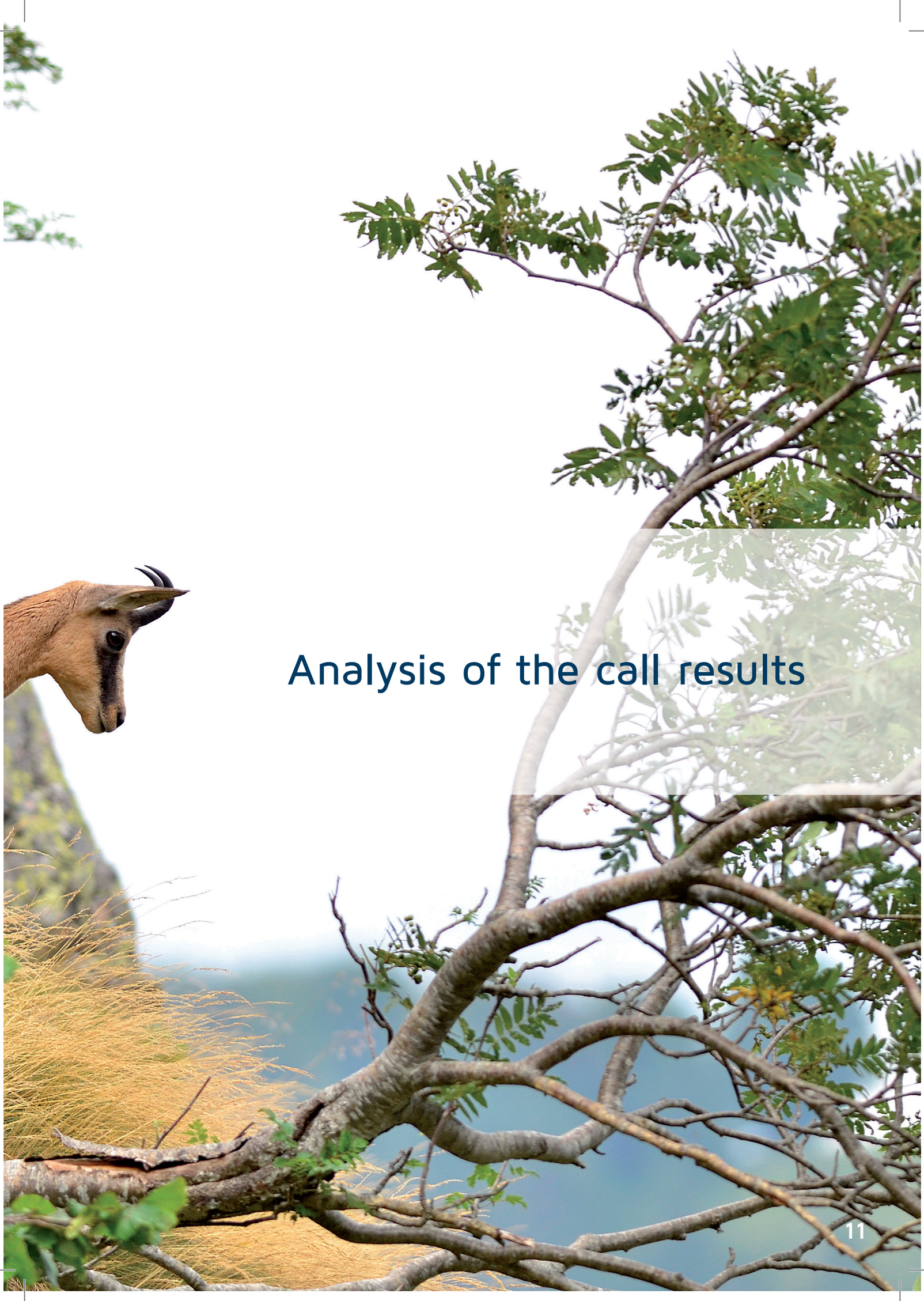
The members of the evaluation panel represented a diverse but complementary range of expertise and perspectives, whilst ensuring that any potential conflicts of interest would be minimised. In order to be successful, proposals had to both represent the best science, together with excellent prospects for translation into tangible action via policy, public engagement and practice. This inevitably meant that there was some excellent science that was not funded due to inadequate proposals for translation into policy, practice and outreach, and vice-versa.

The outcome was consensus on 10 outstanding proposals to be funded to the tune of 11.8 million euro. These projects are actively addressing a variety of important and very timely topics extending from the role of biodiversity in limiting the spread of emerging infectious diseases and antibiotic microbial resistance, to impacts on the health of pollinator populations. The funded projects cover both the terrestrial and marine environment at a range of different spatial scales. This is a strong portfolio of projects that will allow excellent scientific research to be undertaken that is firmly anchored within the policy landscape. As such, they are more likely to be impactful and to lead to tangible action on improving conservation of ecosystems to support resilience and stability, ensuring healthy population of animals, humans and plants.

The panel members were very pleased to contribute to what they considered to be a very timely and pertinent call showing the strength and diversity of the European scientific community and the trend towards societally relevant research – bringing a vital aspect of biodiversity, its contribution to health, to improve both science and policy.

Richard Kock
Chair of the Evaluation Committee

Simon Gardner
Vice-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 proposals	49	295	46.1 M€
Selected proposals	10	75	11.8 M€

With a total of 49 full proposals submitted and 295 participating teams, the 2018-2019 BiodivERsA call was a success, and the interest from the scientific community regarding the different topics and themes proposed within the call was clear.

Out of the 49 full proposals, the Call Steering Committee agreed to fund the 10 highest ranked proposals for a total amount of 11.8 Million euro, which represents a success rate of 20%. Out of these 10 projects, nine are research projects selected under action A and one is a synthesis research project under action B.

Thanks to good anticipation of the required budget for each participating country and to the flexibility of several funding organisations who agreed -when necessary- to increase their budget, the funding organisations ensured a good success rate (slightly above the average for BiodivERsA which is 18%).

Geographical origin of the applicants

The large majority (94.6%) of the teams who submitted a full proposal were from the 12 funding organisations' countries participating in the funding of the call, i.e. Austria, Belgium, Bulgaria, Estonia, France (including the Guadeloupe Region), Germany, Ireland, Lithuania, Poland, Romania, Slovakia and Switzerland.

The remaining 5.4% came mostly from European countries not participating in the call (3.1%), i.e. Hungary, the Netherlands, Spain, Sweden, the United-Kingdom; and from Africa (1%), North America (0.7%), the Caribbean (0.3%) and South America (0.3%).

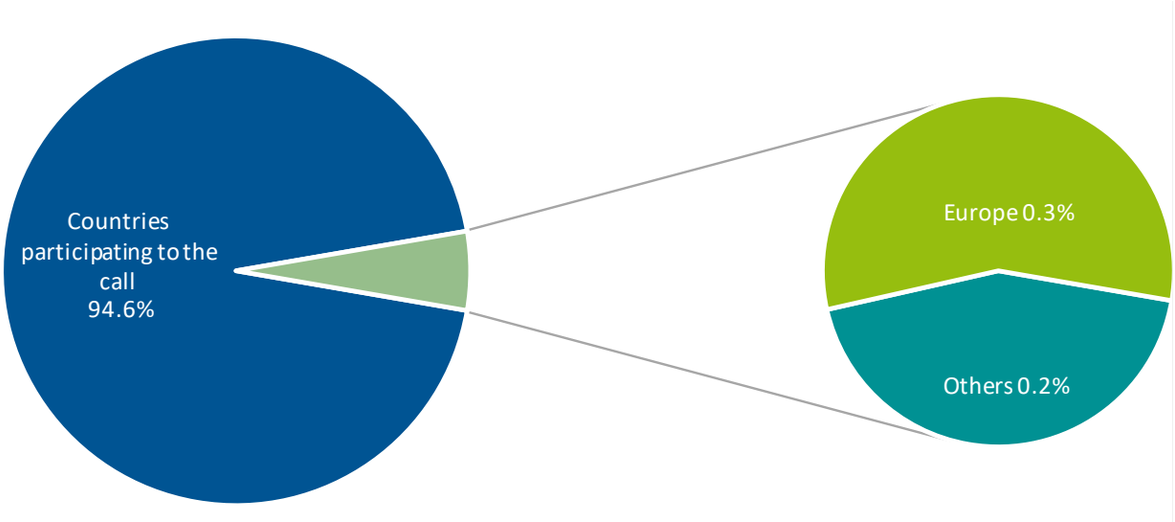


Fig. 1: Geographical origin of the applicants participating in the BiodivERsA 2018-2019 call

Reserved and requested budgets

The reserved budgets for the participating countries were published during the announcement of the call, which might have influenced the budget requests made by applicants. The highest values of both reserved and requested budgets were observed for Germany and France which were indeed the countries with the highest reserved budgets.

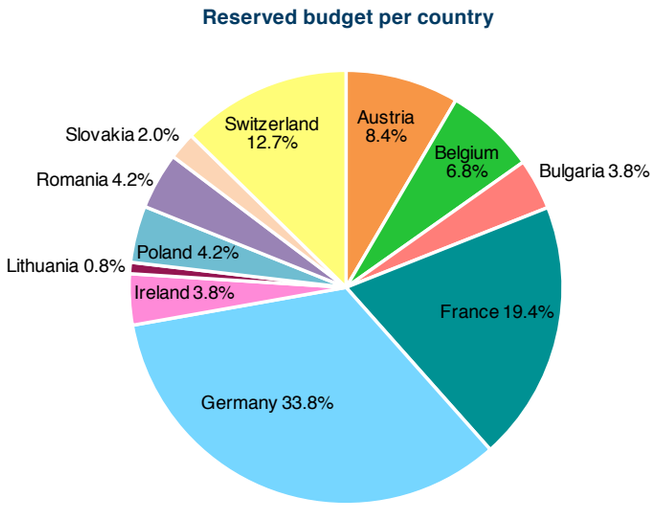


Fig. 2: Distribution of the reserved budget among participating countries

In some cases, such as for Belgium (Flanders), Germany and Poland, the reserved budget proved to be insufficient compared to the financial demand from the successful applicants. Yet, thanks to the flexibility of these funding organisations, this did not jeopardize the call outcome.

Ultimately, the 10 top ranked projects could be funded, strictly following the ranking list established by the evaluation committee.

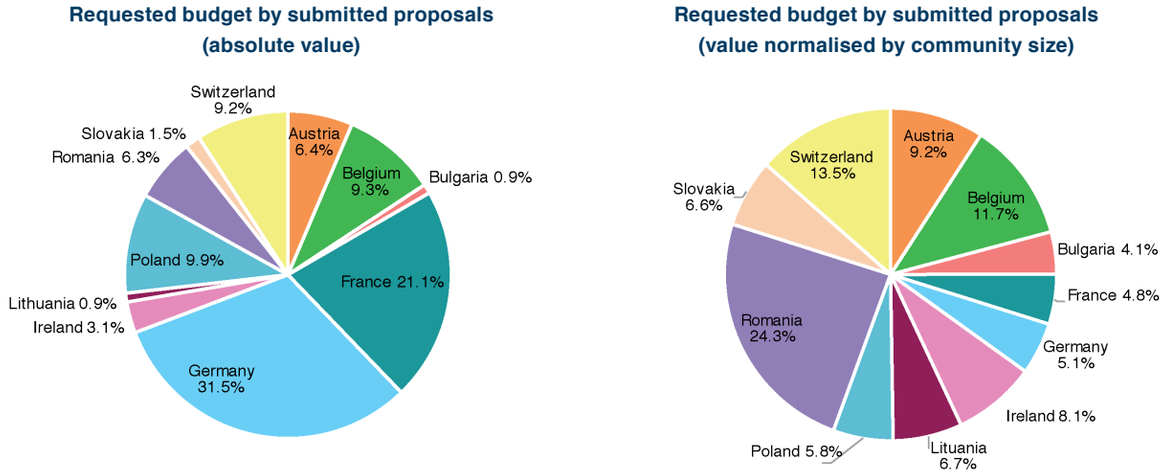


Fig. 3: Budget requested to participating countries by the applicants in the submitted proposals, in absolute values (left) and values normalised according by the size of the national scientific community (right) [source Eurostat 2017, all sectors, Full Time Equivalent unit]. Note that depending on the countries, requested budget may, or may not, include salaries for permanent positions.

Despite a relatively low participation in terms of requested budget (Fig. 3), the scientific communities from Bulgaria, Ireland, Lithuania and Slovakia seem to have responded well to this call once the budget requests are normalised according to the estimated number of researchers from all scientific areas in each country (Fig. 3). This observation also applies to Romania, for which participation is very high considering the size of the overall research community. Unfortunately, we do not have numbers of the size of the biodiversity research communities per se, which would have improved the normalisation.

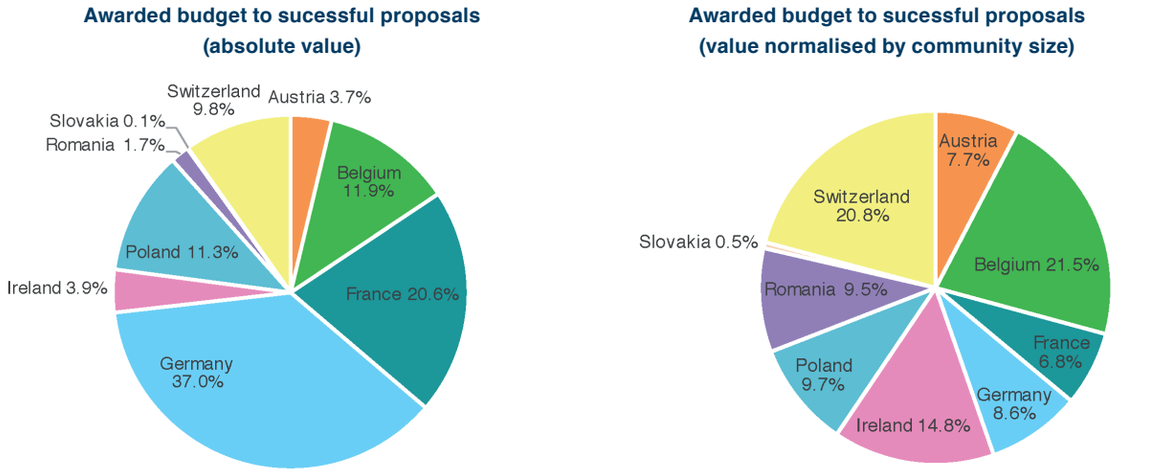


Fig. 4: Distribution of awarded budget to the successful applicants among participating countries in absolute value (left) and in values normalised according to the size of the national scientific community (right) [source: Eurostat 2017, all sectors, Full Time Equivalent unit]

The teams funded through the 2018-2019 Call came from 9 different countries (Fig. 4). The largest number of funded teams came from the countries with the highest amount of reserved funding, namely France and Germany. Again, it is worth comparing the funding amounts between countries both in terms of absolute values and in terms of amounts normalised according to the estimated number of researchers from all scientific disciplines in each country (Fig. 4). These normalised numbers are more representative in highlighting the high success rate observed for countries such as Belgium, Ireland, Romania and Switzerland.

Success rate per country

The Belgian, French, German, Irish, Polish and Swiss research teams applying to this call had a particularly good success rate (ratio of granted to requested funded amounts), i.e. above the average of 20% (Fig. 5). The figures should be viewed with caution for some countries, given their low number of submitted proposals.

Despite the participation of Bulgaria and Lithuania to the call, none of the 10 funded projects involved a research team from these countries, likely due to the low number of submitted proposals including teams from these countries. The same situation occurs for the overseas, as none of the 10 funded projects included teams from their territories (particularly for Guadeloupe who participated in this call). Again, this is largely due to the low number of proposals submitted by their teams. Only 4.1% of the teams in submitted proposals were from Outermost Regions (ORs) or Overseas Countries and Territories (OCTs).

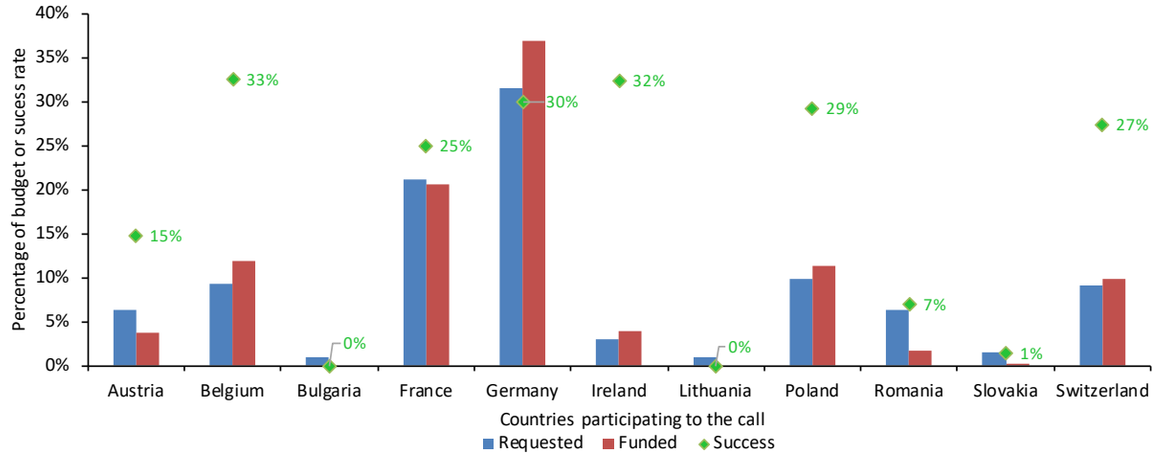


Fig. 5: Comparison of the percentage of budgets in the proposals between countries at the submission phase (requested – blue bars) and after selection (funded – red bars), along with the financial success rate (green diamonds)

Project coordinators

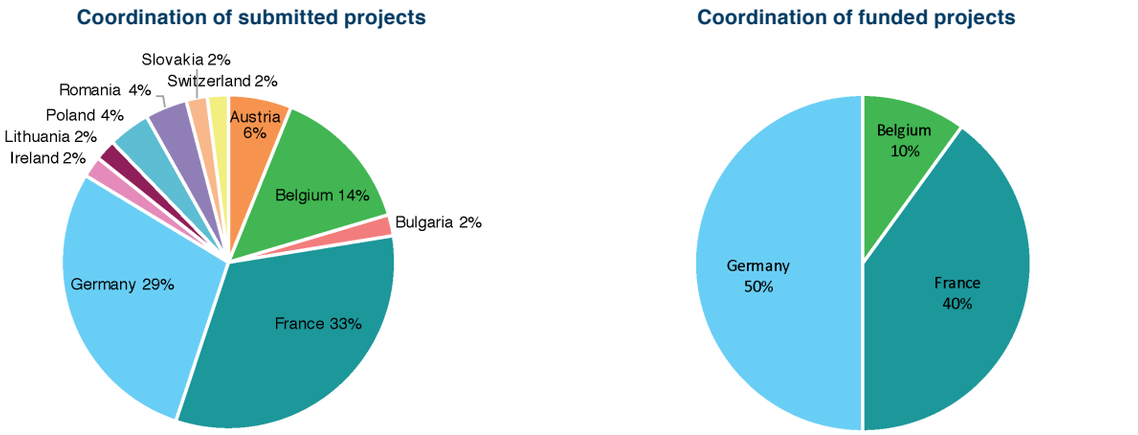


Fig. 6: Geographical origin of the coordinators in the submitted projects (left) and funded projects (right)

At the submission stage, the project coordinators represented the 11 countries participating in the call (Fig. 6), whereas the coordinators of the funded projects only come from 3 countries. Again, these figures should be viewed with caution since they represent the geographical spread of coordinators only, i.e. quite low numbers (49 and 10 for the submission and funding phases, respectively).

Call themes and sub-themes addressed by the proposals

This BiodivERsA call was composed of four main themes: “Relationships between biological diversity and animal, human and/or plant health: effects and underlying mechanisms” (theme 1), “Understanding and predicting the integrated effects of global change factors on biodiversity-related health issues” (theme 2), “Valuing/qualifying biodiversity benefits to animal, human and plant health, and promoting health-friendly biodiversity status as well as biodiversity-based health status” (theme 3) and “Focus on biodiversity-health relations in European overseas” (theme 4). One project could address several themes.

During the submission phase, the project’s coordinator had to indicate to which theme(s) they applied. Within action A, theme 1 had to be combined with theme 2 and / or theme 3. A similar rule applied to theme 4, which had to be addressed with theme 1 plus theme 2 and / or theme 3.

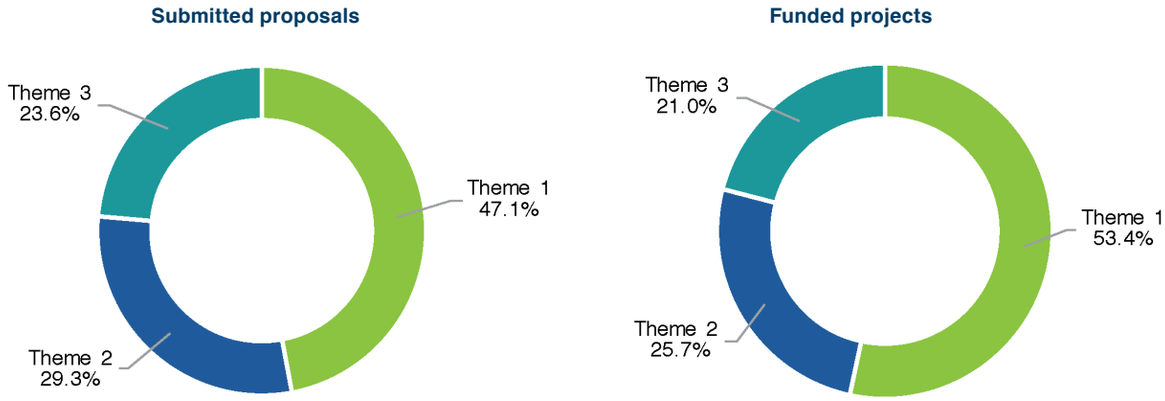


Fig. 7: Percentage of total requested budget for theme 1, 2 or 3 in the submitted proposals (left) and funded projects (right)

Theme 4 was specific, as it aimed at encouraging applicants to involve teams from ORs and OCTs and to address specific issues faced by the overseas.

Fig. 8: Percentage of projects addressing Theme 4

It is clear that only a low number of submitted proposals and funded projects addressed the theme 4 "Focus on biodiversity-health relations in European overseas", which is linked to a rather low participation of teams from ORs and OCTs (Fig. 8). However, figure 8 shows that projects addressing theme 4 were not really counter-selected during the evaluation.

Studied environments

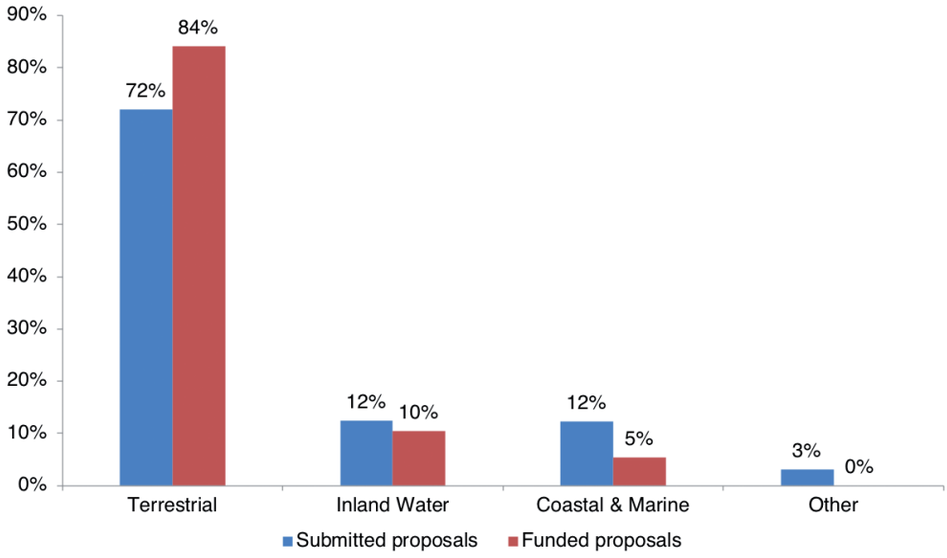


Fig. 9: Distribution of budgets of submitted and funded proposals according to the studied environments. One proposal can address several environments

The majority of submitted and funded proposals focused on terrestrial ecosystems (Fig. 9), whereas those focusing on inland water and marine/coastal environments were fewer.

It is clear that few researchers in marine fields applied to this call. It is probably due to the fact that there are other well-known funding resources available for marine biodiversity research at the European level, and that the 'biodiversity and health' topic of this call did not generate sufficient interest from freshwater and marine research communities.

The proposals addressing other environments were planning studies on the relationship between biodiversity in air/atmosphere and human beings.

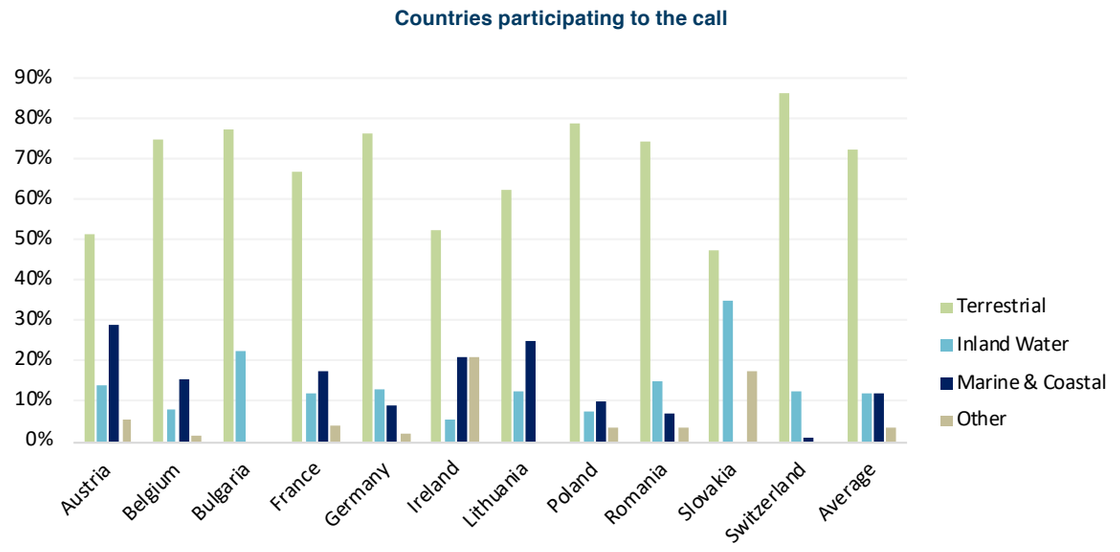


Fig. 10: Percentage of the requested budget in the submitted proposals by country according to the studied environment

Figure 10 shows that Bulgaria and Slovakia had the highest portion of inland water-focused submitted proposals. Lithuania was also among the countries with the highest proportion of proposals focusing on marine and coastal environments, with Austria, France and Ireland. However, given the small number of teams originating from some countries (including Bulgaria, Lithuania and Slovakia), these figures should be taken with caution.

Conclusion

The analysis presented above provides a good insight into the implementation and results of the BiodivERsA 2018-2019 Call. The following aspects were found useful for future calls:

- Overall, the topics of this call have proven to be of great interest to the European research community. Yet, most of the submitted proposals were collaborative research projects; and only three synthesis research projects were submitted. This resulted in only one synthesis research project being funded. BiodivERsA will explore how to better promote synthesis research projects in the future.

- Although the first three themes covered by this call have been well addressed, theme 4 focusing on biodiversity-health relationships in European overseas did not attract many proposals. Consequently, and despite a similar success rate for theme 4 than other themes, only one funded project addressed theme 4. To overcome this situation, the participation of research teams from ORs and OCTs should be increased in future calls.

- Unfortunately, some countries and regions participating to the call did not have any teams in the 10 proposals selected for funding. This was the case of Bulgaria and Lithuania. This situation can be largely explained by the fact that these teams were not well represented in the submitted proposals.

- Thanks to the initial balance in the amounts of funding reserved by countries and to the flexibility of funding organisations to increase their budget when needed, BiodivERsA partners were able to ensure a good success rate in the call, strictly following the outputs of the selection procedure.

- BiodivERsA will now implement a range of activities and a continuous dialogue with the funded projects to increase the outcomes of the individual projects and the program as a whole.

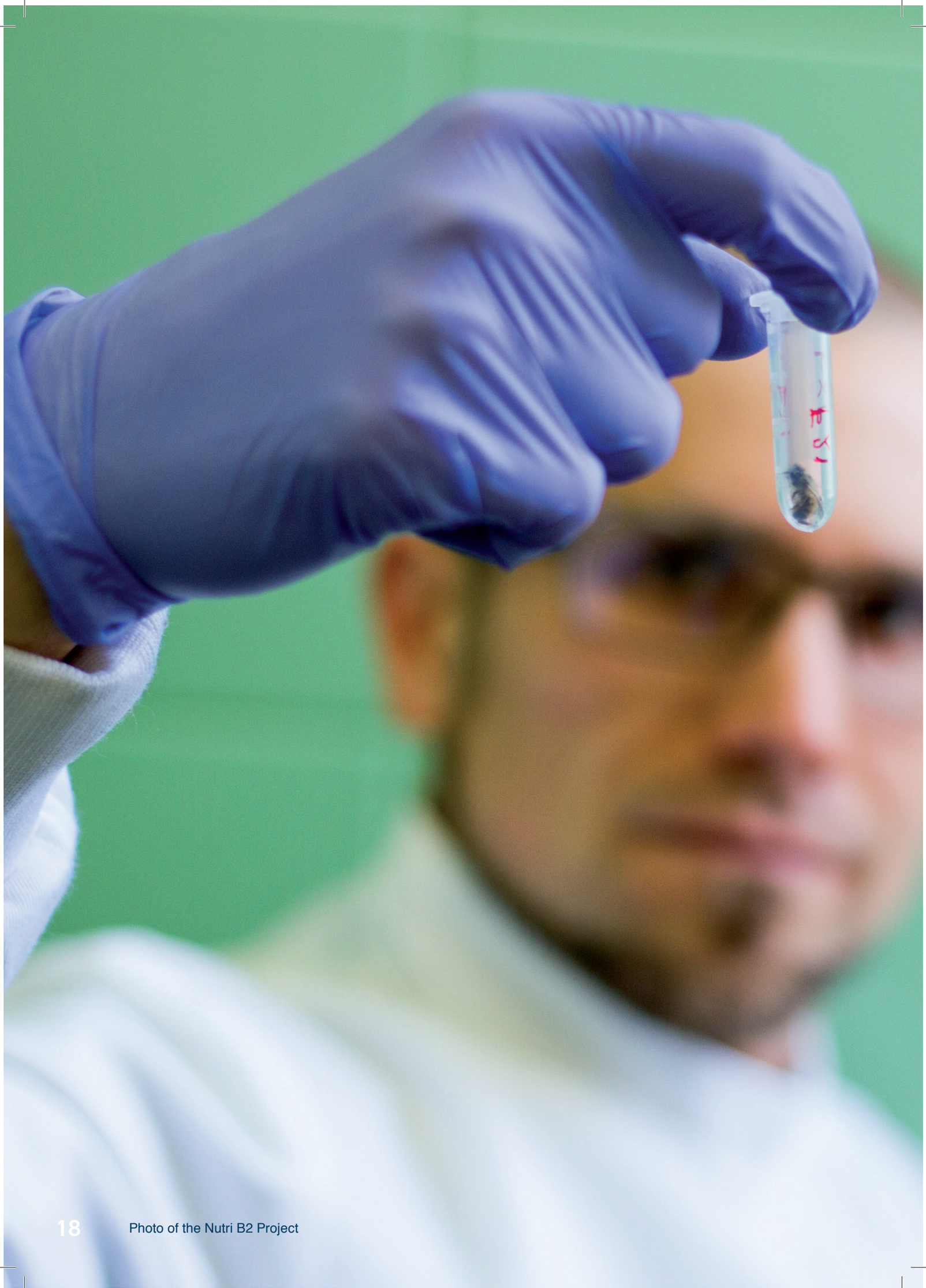


Photo of the Nutri B2 Project

Presentation of the 10 funded projects

ACTION A

Collaborative research projects

The collaborative research projects funded through Action A are gathering different research teams that implement research activities with the objective to answer important research questions largely based on the production of new primary data. This corresponds to the classic type of projects supported by BiodivERsA in its previous calls.

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ANTIVERSA - Biodiversity as an ecological barrier for the spread of clinically relevant antibiotic resistance in the environment

Context

Antimicrobial resistance (AMR) is one of the largest health-related issues worldwide. Reducing antibiotic consumption and other such measures at the source are important to lower antimicrobial resistance in medical contexts. However, they cannot reverse its evolution and they do not prevent antimicrobial resistance from disseminating through the environment, which causes cascading health issues, including in medical contexts.

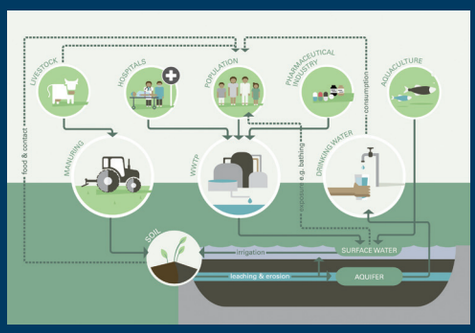
Main objectives

The main objective is to test the hypothesis that the persistence, and the abundance and diversity, of clinically relevant antibiotic resistance genes (ARGs) and antibiotic resistant bacteria (ARB) in sediments and soil is inversely correlated to the biological diversity of invaded communities. ANTIVERSA will thus evaluate whether high biological diversity may act as an ecological barrier to the spread and persistence of ARB and ARGs from various anthropogenic contamination sources.

Main activities

Experiments will include the natural microbial diversity across seven nations in Central Europe. With these experiments we will be able to answer the question if the spread of antibiotic resistant bacteria originating from wastewater will be hindered by a microbial community with a high diversity. We will test this also for bacteria occurring in freshwater and soil. Here we will focus on streams which are behind the effluent of wastewater treatment plants and soil that is fertilized with manure. The results of these experiments will aid the development of regulations on maintaining water and soil quality.

Besides, specific activities to engage stakeholders (national and local authorities, management actors, civil society actors land local communities) will be implemented. Priorities of residents close to water ways and agricultural fields will be assessed. These assessments will include questions with respect to the importance of biodiversity, the concerns regarding contamination with pathogens and ARB. We endeavour an across generation stakeholder engagement. This will be facilitated with an involvement of selected schools located next to a large river (e.g. Elbe) and surrounded by intensive agriculture. Also, we will endeavour to involve the Model United Nations (MUN) which organizes conferences by and for students from all over the world in order to simulate the work of the United Nations.



Antibiotic resistance in the environment

Partners of the project:

Coordinator: Environmental Science – Chair of Limnology – Technische Universität Dresden – Dresden – Germany

Division for Integrative Risk Assessment – Austrian Agency for Health and Food Safety – Vienna – Austria

Microbiology of materials and the environment (LCPME) – CNRS/Université de Lorraine – Villers–les–Nancy – France

Strategy and Consulting – Stadtentwaesserung Dresden GmbH – Dresden – Germany

Dep. of Biology – Maynooth University – Maynooth – Ireland

Institute of Microbiology – University of Warsaw – Warsaw – Poland

Dep. of Taxonomy and Ecology – Institute of Biological Research Cluj – Cluj–Napoca – Romania

Surface Waters – Eawag: Swiss Federal Institute of Aquatic Science and Technology – Kastanienbaum – Switzerland

Duration:
01/02/2020 – 31/03/2023

Total grant:
€ 2,121,268

Further information:

Thomas Berendonk
thomas.berendonk@tu–dresden.de

Congolese researchers removing a bat from a mist net, in order to take blood sample for detection of Ebola virus.

Partners of the project:

Coordinator: Biology – University Antwerp – Antwerp – Belgium

Operational Directorate Taxonomy and Phylogeny – Royal Belgian Institute of Natural Sciences – Brussels – Belgium

Biodiversity Monitoring Centre – University of Kisangani – Kisangani – DR Congo

National Biomedical Research Institute – Kinshasa – DR Congo

Translational researches on VIH and infectious diseases (TransVIHMI) – IRD/ University of Montpellier/Inserm– Montpellier – France

Epidemiology of highly pathogenic microorgansims – Robert Koch Institute – Berlin – Germany

OneHealth for all – Bingerville – Ivory Coast

Duration:
01/03/2020 – 28/02/2023

Total grant:
€ 950,820

Further information:

Prof. Dr. Herwig Leirs
herwig.leirs@uantwerpen.be

Provisonal Website:
https://www.uantwerpen.be/en/research-groups/eveco/research/main-ongoing-project/new--biodiv-afreid--/

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BIODIV-AFREID - Biodiversity changes in African Forests and Emerging Infectious Diseases: should we worry?

Context

Biodiversity loss has increased significantly on the African continent, due to deforestation, bushmeat consumption, pesticide use, etc., and is predicted to continue doing so in the forthcoming decades. Yet, as recognized by the "One Health" concept, changes in biodiversity can impact human health and wellbeing. In particular, the dilution effect hypothesis suggests that higher biodiversity mitigates the risk of transmission of infectious agents; but in reverse, biodiversity loss may have a huge impact on the incidence and transmission of zoonotic diseases. However, high biodiversity can also result in more transmission events, e.g. since more potential reservoir species are available. Yet both convincing evidence and a thorough understanding of the underlying mechanisms are lacking to respond to these questions.

Main objectives

BIODIV-AFREID will investigate how biodiversity conditions (dis)favour transmissions of infectious agents from small mammals into human populations in African forests. It will:

- link changes in biodiversity to changes in communities of reservoirs and the pathogens they carry;
- link differences in these reservoir communities to human health. The study will include a variety of viruses (Arenaviruses, Coronaviruses and Hantaviruses) but will have a specific focus on two pathogens with an increasing frequency: Ebola and Monkeypox virus. Both are emerging from the African rainforest and cause major concerns for public health.

Main activities

To achieve these objectives, BIODIV-AFREID will:

- Determine the diversity and abundance of potential small mammal reservoirs for sites in Democratic Republic of the Congo and Ivory Coast, based on already available as well as newly collected small mammal specimens, bushmeat samples and blood-fed arthropods;
- Screen samples for the presence of different pathogens. Diversity and evolutionary history of the pathogens will be investigated with whole genome sequencing.
- Correlate levels of disturbance (distance to human settlement, degree of deforestation, intensity of bushmeat hunting) to biodiversity and abundance of potential reservoirs, and to changes in the transmission and persistence of pathogens;
- Characterise pathogen strains in humans will be characterised with whole genome sequencing and compared to those in wild animals. Reservoir and pathogen diversity and frequency of human-wildlife interactions will be linked to the level of infection on humans. The risk for spillover of wildlife infections to humans will be modelled.

Through these insights, BIODIV-AFREID will seek to inform the development of more targeted conservation and public health strategies for the control or response to zoonotic disease transmissions. The expected outcome will strengthen international and national authorities dealing with the management of health risks resulting from wild species hunting, bushmeat consumption, and zoonotic agents causing emerging diseases in African tropical lowland forests. Results are expected to significantly help the IUCN in taking a leading role in clearly explaining the close links between biodiversity (deforestation, bushmeat) and epidemic diseases, while emphasising the need for an integrated approach in the protection of biodiversity and human health in the context of the Convention of Biological Diversity. To achieve this, BIODIV-AFREID will organise stakeholder workshops at the start and end of the project, some targeting key organisations and processes at the international level and others focused on collaborating at the local level, while field trips and participation to international OneHealth events are also planned in the course of the projects. In addition, project results will be summarised in a series of policy briefs co-developed with local authorities, management and civil society actors to inform government agents responsible for public health in both the Democratic Republic of Congo and Ivory Coast.

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BioRodDis - Managing BIOdiversity in forests and urban green spaces: Dilution and amplification effects on RODent microbiomes and rodent-borne DISeases

Context

Major advances in the understanding of infectious diseases have been achieved these last decades. However, the persistence and re-emergence of pathogens continue to raise public and veterinary health concerns, of which the recent COVID-19 pandemic may be one of the most dramatic recent examples. The role of biological diversity alteration in such cases has received a lot of attention, primarily because of the concomitant occurrence of habitat alteration and biodiversity loss with pathogen transmission and emergence from wildlife. Yet, scientists do not exactly understand how biodiversity changes disease dynamics and emergence. Understanding the relationships between wildlife biodiversity and zoonotic infectious diseases in a changing climate is a challenging and major issue of worldwide concern that scientists must address to help guide policy actions and response.

Main objectives

BioRodDis aims at tackling this challenge by looking at rodent-borne diseases in European temperate forests and large urban green spaces. Rodents are important reservoirs of zoonotic agents; forests and green spaces are environments where rodents are abundant, and where human/domestic-wildlife interactions are likely to occur. The main objectives will be to develop four promising and original research streams to understand the relationship between biodiversity and zoonotic infectious diseases:

- the impact of co-infections on epidemiology;
- the interactions between gut microbiome and host susceptibility to infectious agents;
- the influence of socio-economic contexts on human exposure to wildlife;
- the temporal variability of biodiversity/health relationships.

Overall, BioRodDis will provide proof-of-concept that joint strategies between public health and conservation biology programs can help to prevent emergence of zoonotic pathogens from wildlife including coronaviruses as needed.

Main activities

BioRodDis will use rodent sampling and large survey of zoonotic agents and microbiome to establish an up-to-date, open database and maps of rodent-borne pathogens circulating in western-central European countries. Eco-epidemiological approaches will be applied to enhance our understanding of the processes that influence zoonotic pathogen transmission in rodent populations. Mathematical models will be developed to analyse the influence of spatiotemporal scales and within-host interactions on the relationships between biodiversity (rodents and microbiome) and zoonotic diseases. The impact of climate change scenarios on zoonotic disease risk and rodent-microbiome biodiversity will be evaluated. Lastly, zoonose prevention policies will be improved through (i) the dissemination of surveillance protocols that will be adapted to the different specific user groups (clinicians, identified risk groups, biodiversity conservation organisations); (ii) the training of the main stakeholders identified and (iii) awareness campaigns towards people at risks such as clinicians, biodiversity conservation organisations, ecology and environment departments of cities and national forestry offices.

In addition to advancing scientific knowledge, the project will rely on participation in conferences and an active use of social media. The project also involves sociologists to help partners develop effective knowledge exchanges and collaborations between scientists and stakeholders. A first circle will integrate collaborators from public health, biodiversity management and NGOs representing public at risk (e.g. Scouts) of rodent-borne zoonoses. These stakeholders will be strongly engaged throughout the project, as they will be informed, consulted and involved in project activities and dissemination (e.g. ecology departments of cities, national forestry office). A second, larger, circle will be engaged through knowledge exchanges, to guarantee that all organisations and public interested in, affected by rodent-borne diseases or involved in nature management can be informed.

The bank vole (Myodes glareolus) is one of the main rodent species living in deciduous and mixed European forests. It can transmit zoonotic agents, including Puumala hantavirus, the agent of nephropathia epidemica.

Partners of the project:

Coordinator: Biology Center for Population Management (CBGP) – INRAE/IRD/CIRAD/Montpellier SupAgro – Montferrier sur Lez – France

Department of Biology – University of Antwerpen – Antwerpen – Belgium

Infectious Diseases and Vectors (MIVEGEC) – IRD /Université de Montpellier/CNRS – Montpellier – France

Mountain Ecosystems and Societies (LESSEM), INRAE– Grenoble – France

Animal Ecology – University of Potsdam – Potsdam – Germany

Zoology building, School of Natural Sciences – Trinity College Dublin – Dublin – Ireland

Tropical Parasitology –Medical University of Gdansk – Gdynia – Poland

Duration:
01/03/2020 – 28/02/2023

Total grant:
€ 1,123,930

Further information:

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There are over 3,000 species of mosquitoes, and some have the ability to carry many different diseases.

Partners of the project:

Coordinator: Department of Biogeography – University of Bayreuth – Bayreuth – Germany

Unit of Medical Entomology – Institute of Tropical Medicine – Antwerp – Belgium

Infectious Diseases and Vectors (MIVEGEC) – IRD/CNRS/University of Montpellier – Montpellier – France

Arbovirology – Bernhard Nocht Institute for Tropical Medicine – Hamburg – Germany

Disease ecology and One Health Unit – National Autonomous University of Mexico – Mexico City – Mexico

Duration:
01/03/2020 – 31/02/2023

Total grant:
€ 947,628

Further information:

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www.biodiversa.org

DiMoC - Diversity components in Mosquito-borne diseases in face of Climate change

Context

Mosquito-borne pathogens such as chikungunya virus and West Nile virus are an increasing threat of veterinary and public health in Europe. Emerging and re-emerging transmission patterns are influenced by global transport, long-distance travel, and environmental and climatic changes, while vaccination and pharmaceutical treatment is either not available or very limited. The role of biodiversity on disease transmission is becoming evident as far as introduced invasive species and habitat degradation are concerned, but on the other hand, attenuating or promoting effects on the chain of infection remain poorly understood. At the same time, a better understanding has a high potential to advance policy actions and response on the transmission of zoonotic diseases and avoid local or regional outbreaks.

Main objectives

DiMoC will contribute to better understand the effects of biodiversity in mosquito-borne pathogen transmission. Through the analysis of different organisational (hosts, insects, viruses, human population), spatial (continental, regional, local, organism) and temporal scales (current conditions / future projections), DiMoC will test whether:

- Greater diversity in insect-specific virus hosted by mosquitoes results in a reduced relative risk of transmission of a virus through interactions within these populations;
- Mosquito diversity is influenced by interspecific interactions (e.g. competition) between species, which translates into different relative transmission risk;
- Greater host species diversity reduces the transmission risk due to the dilution effect;
- Changes in climatic conditions explain current large-scale patterns of pathogen, vector, and host diversity more than socio-economic conditions.

These results will allow to evaluate whether scenarios and models including climate, landscape diversity, and societal diversity can be used to quantify uncertainty in future trends of risks in pathogen transmission.

Main activities

DiMoC will focus on the European continent and on one overseas region and assess relative transmission risk of pathogens. Mosquitoes that can transmit pathogens (called vectors) will be caught in Belgium, Germany and Italy. The species will be studied to understand the effects of local microhabitat diversity and its influence on interspecific interactions of invasive versus native mosquitoes, which in the end translates to varying vector diversity and abundance. Cutting-edge approaches such as salivation assays of mosquitoes will help determine the differences in the vector competence for West Nile, chikungunya and Japanese encephalitis viruses. Vector impact will be assessed at regional scale: mosquito captures will allow to determine mosquito abundance, richness and diversity. Using molecular methods, DiMoC will identify vertebrate blood-meals in mosquitoes to reveal differences in host assemblages within and between studied sites.

DiMoC relates continental-scale patterns of vector diversity to current climate data and also to global scenarios and models on climate change. It will also identify the contribution of socio-economic drivers for explaining the detected patterns of vector diversity and pathogen transmission by integrating spatial information on human infrastructure, population density, land use and land cover.

DiMoC will proactively work with policy and practice. It identified key local to supra-national target organisations and policies to engage with, ranging from local authorities competent for the management of mosquito-borne diseases in Belgium, France (including overseas regions), Germany and Mexico to European institutions, authorities and associations. They will be involved in assessing the relative disease risks in local to continental settings. In particular, policy briefs will allow condensing the project results into practice-oriented conclusions for the management of biodiversity and risk mitigation in the context of mosquito-borne diseases.

Dr. FOREST - Diversity of forests affecting human health and well-being

Context

Forest ecosystems are an important reservoir for biodiversity in human-dominated landscapes within Europe, and deliver many ecosystem services. They are also a popular location for recreational activities, especially near urban areas. However, forests can also harbour threats and diseases, e.g. ticks that transmit pathogens to humans. Thus, there is a need to quantify the impacts of forest biodiversity on multiple human health risks and benefits to combine biodiversity conservation with ecosystem management that supports human health and well-being.

Main objectives

Dr. FOREST aims to:

- Study the effects and underlying mechanisms of tree diversity in temperate forests on human health and well-being;
- Understand and predict the integrated effects of global change factors (climate change, air pollution) on biodiversity-related health issues;
- Value/qualify tree diversity benefits to human health and well-being, and communicate these findings to local and high-level international stakeholders.

Main activities

Empirical research in existing tree diversity research sites will be performed across five main study topics: psychological restoration; microclimate, medicinal and edible plants and fungi; disease vectors; clean air; and health impact modelling and assessment. The work will be done in contrasting climatic regions of Central Europe (Austria, Belgium, France, Germany, Poland). Three case studies in urban forests will be developed and paired with three stakeholder workshops, in Belgium, France and Germany.

Dr. FOREST will work with stakeholders from local to national to European scales, and will seek to co-develop useful decision tools, such as policy briefs and guidelines for “Evidence-based Health Assessments of Forest Interventions”. A touring video and photo exhibition on “Forest Diversity and Human Health” will support the promotion of these outputs. At local level, the project will organise site-specific workshops with local forest managers, city council planners, NGOs, public health officials and representatives of the private health sector, to refine research questions, promote the human health impacts of biodiversity in forests and support the formulation of management guidelines. At national scale, networks of practitioners will in addition help to disseminate the projects’ outputs. At European level, a concluding seminar will focus on opportunities and limitations of integrating forest diversity-related risks and benefits into health and biodiversity policies; high-level international stakeholders from E.U. institutions and international organisations will be invited to participate, for which several have already expressed an interest.

People hiking in a diverse forest

Partners of the project:

Coordinator: Geobotany – University of Freiburg – Freiburg – Germany
Institute of Forest Ecology – University of Natural Resources and Life Sciences – Vienna – Austria
Department of Environmental Health – Medical University of Vienna – Vienna – Austria
Environmental Sciences – Université Catholique de Louvain – Louvain–la–Neuve – Belgium
BOS+ Vlaanderen – Gontrode – Belgium
Forest & Nature – Ghent University – Melle–Gontrode – Belgium
Forest, Nature & Landscape – KU Leuven – Leuven – Belgium
Biodiversity, Genes and Communities (BIOGECO) – INRAE – Cestas – France
Institute of Psychology – Universität Leipzig – Leipzig – Germany
German Centre for Integrative Biodiversity Research: iDiv – Ecosystem Services – Leipzig – Germany
Forest Research Institute Baden–Wuerttemberg – Freiburg – Germany
Białowieża Geobotanical Station – University of Warsaw – Białowieża – Poland

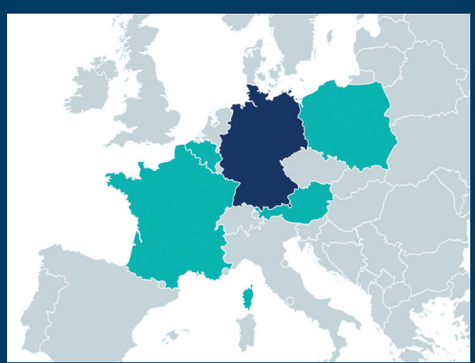
Duration:
01/02/2020 – 31/01/2023

Total grant:
€ 1,357,732

Further information:

Prof. Dr. Michael Scherer-Lorenzen
michael.scherer@biologie.uni-freiburg.de

Website:
www.dr-forest.eu



Buoy delimiting the fully protected zone within the Portofino Marine Protected Area, Italy

Partners of the project:

Coordinator: Island Research and Environmental Obervatory (CRIOBE) – CNRS/EPHE/University of Perpignan Via Domitia – Paris – France

Ecology of Aquatic Systems – Université Libre de Bruxelles – Brussels – Belgium

Marine and Freshwater Research Centre – Galway Mayo Institute of Technology – Galway – Ireland

Duration:
01/04/2020 – 31/05/2023

Total grant:
€ 647,874

Further information:

Prof. Dr. Joachim Claudet
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METRODIVER - Unraveling the effects of marine protected areas on ecosystem services linked to fish and human health through the lens of trophic diversity

Context

Preserving EU's marine ecosystem services is of utmost importance as they support the health and well-being of millions of citizens. These services are nowadays jeopardised due to important alterations of marine environments and species diversity. Functional diversity, defined as the diversity related to species characteristics and their role within ecosystems, experienced a dramatic decrease in the past decades. While extensive research has already been done to investigate the effects of existing conservation tools on species diversity, such as marine protected areas, the impacts of these tools on functional traits and especially those related to trophic processes (i.e., related to food chain), remain up to now unknown. Similarly, understanding how protection of these trophic traits affects ecosystem services, animal health, and ultimately human health, is another crucial question, which is yet completely unexplored.

Main objectives

The goal of METRODIVER is to combine a multi-level approach (ecosystem, population, microbiome) across 10 Mediterranean Marine Protected Areas (MPAs) located in France, Spain and Italy, to answer three pivotal questions:

- Do the marine protected areas allow for an efficient protection of the diversity at each level of the trophic web?
- How do these multi-level effects mediate ecosystem services and fish health?
- To what extent they contribute to provide healthier food for human societies?

Main activities

The following activities will be implemented during the project:

- Assess trophic diversity inside marine protected areas, through sampling in the 10 case studies across two transects, from the centre of the protected area (minimal human pressure) to its outskirts (maximal human pressure);
- Evaluate the main drivers of marine protected areas effectiveness on functional diversity;
- Identify if marine protected areas contribute to human health through increased fish condition.

METRODIVER will collaborate with local authorities and MPA managers around its case studies, from conducting sampling efforts to interpreting and disseminating results. Building on its research work, METRODIVER will help ecosystem managers and policy makers to:

- evaluate the ability of their MPAs, as they are currently designed, to protect foodwebs and the services they provide to human populations;
- highlight whether corrective actions are required in existing MPAs and provide guidance for adaptive management;
- design more efficient MPAs in the future.

The project will also work with key stakeholders at European and international scales (protected area networks, European Union institutions, science-policy fora and international organisations) to integrate METRODIVER results into the framework of Mediterranean MPA knowledge, and promote short term and longer-term corrective actions and legislation change.

NutriB² - Nutrition as critical link between Biodiversity and Bee health

Context

Bees are essential pollinators of most flowering plants and of many crop plant species. They also contribute to additional ecosystem services, such as biodiversity conservation and landscape aesthetics. Alarmingly, many wild bee populations are in decline and the multiple ecosystem functions and services they are associated with are currently put at risk, which is of large concern to scientists and many stakeholders and policy-makers alike. Improving bee health is one of the key levers of intervention to help preserve wild bee populations and associated ecosystem services.

Scientists assume that the loss of floral diversity is one major driver of the observed bee decline, while lab studies have shown that honeybees fed with diverse floral diets are healthier than honeybees fed with monotone floral diets. In fact, bees seem to thrive in biodiverse environments which typically provide a continuous supply of diverse food resources. However, equivalent field observations are still lacking, and the precise relationship between floral diversity, nutritional intake and bee health is still largely unknown. This is particularly true for wild bees, which have received much less research and attention than managed honeybees.

Main objectives

NutriB² will develop actionable knowledge for the management of wild bee health by:

- Studying how the composition and diversity of food resources collected across environments varying in floral diversity affects the nutritional composition and toxicity (e.g. due to toxic compounds typically found in flowers) of food for wild bees;
- Studying how food nutritional composition and toxicity relate to health of different wild bee species;
- Identifying whether key nutrients important for the health of bee populations can be linked with specific key plant species and habitats, which shall then be targeted by mitigation and conservation actions that support wild bee populations and associated ecosystem services.

Main activities

The ultimate aim of NutriB2 is to propose ways to increase the health of different wild bee species through conserving and restoring nutritionally diverse and appropriate floral resources, particularly in low diversity environments. NutriB2 will identify plant species visited by different wild bee species in grasslands of Germany, Austria and Belgium that differ in floral diversity using next-generation-sequencing. NutriB2 will also analyse the complete chemical composition –including nutrients and toxic compounds– of pollen from those plant species. In complement, NutriB2 will measure differences in the health status of bees within and between species in these grasslands, based on morphometric, physiological and stoichiometric analyses, and measure bee pathogen loads, e.g. viruses and protozoa. This will allow to identify interactions between nutrition, health and infections in relation to floral diversity and define species-specific nutritional niches and determine critical key nutrients and plant species and habitats beyond grasslands that cover the nutritional needs of a large fraction of bee species. In addition, NutriB2 will closely collaborate with farmers, seed companies, beekeepers and local and international NGOs, mutualising engagement efforts in collaboration with other projects (e.g. VOODOO, MacroBEEs). The aim is to reveal informational gaps on the importance of floral resources and nutrition for bees as well as how stakeholders have the means to support floral enhancement. They will be involved in understanding NutriB2 results in their specific contexts and help identify and implement viable solutions, e.g. composing nutritionally valuable seed mixes suitable in relation to habitat types (e.g. forest patches/hedgerows in agricultural fields) and on-site management regimes. To this end, NutriB2 will develop web resources, stakeholder workshops, policy-briefs, newspapers articles and booklets in close collaboration with other projects, creating synergies that benefit stakeholders.

Bombus pascuorum

Partners of the project:

Coordinator: Plant–Insects Interactions, Technical University of Munich – Freising – Germany

Free lance – Elixhausen – Austria

Plants and Crops – University of Ghent – Ghent – Belgium

Bees and Environment (BPA) – INRAE – Avignon – France

Evolution, Genomes, Behaviours and Ecology (EGCE) – University of Paris Sud/ CNRS/IRD – Gif sur Yvette – France

Nature Conservation and Landscape Ecology – Albert–Ludwigs–University – Freiburg – Germany

Zoological Museum of Kiel University – Kiel – Germany

Animal Ecology and Tropical Biology – University of Würzburg – Würzburg – Germany

Computational and Theoretical Biology – University of Würzburg – Würzburg – Germany

Intitute of Environmental Sciences– Jagiellonian University – Kraków – Poland

Natural Resources Institute – Kew Botanical Garden – Kew – United Kingdom

Entomology – University of Riversides – United–States

Duration:
01/03/2020 – 28/02/2023

Total grant:
€ 1,328,784

Further information:

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Twitter:
https://twitter.com/NutriB2
Website: https://nutrib2.project.uj.edu.pl/

Routine growth of tobacco in the Swiss soils

SuppressSOIL - Soil biodiversity and suppressiveness of soil against plant diseases and insect pests

Context

Soils can be disease-suppressive or disease-conductive, meaning that the level of disease development varies across soils when a virulent pathogen and susceptible host are present. This is especially relevant in regard to root diseases caused by phytopathogenic fungi on crop plants. The link between soil biodiversity, disease suppressiveness and the range of deleterious organisms that are controlled by this mechanism is poorly understood, especially in a context of global change directly affecting crops and pathogen/pest importance.

Main objectives

SuppressSOIL aims at developing integrated knowledge on the relation between soil biodiversity and crop protection in France, Germany and Switzerland. SuppressSOIL will compare soils of contrasting suppressiveness status and soils under different agricultural management regimes to identify novel indicators of soil biodiversity and define management strategies that improve crop health in soils with poor or no suppressiveness properties.

Main activities

SuppressSOIL will work towards this overall objective by:

- Filling current knowledge gaps on suppressiveness, based on analyses of soil, microbial (taxonomic and functional) biodiversity, and crop physiology;
- Assessing the significance of suppressiveness under global change scenario, by considering emerging crop species, diseases and insect pests;
- Determine the applicability of project findings to agronomic conditions, based on monitoring of phytopathogens & insect pests in fields, as well as crop protecting microbiota and crop plants.

The project will rely on chemical analyses of soil organic matter and crop physiological markers, molecular assessments of microbial biodiversity and field analyses of soil management effects on crop health, as well as experimental designs such as growth chamber pot trials of crop protection mechanisms.

In addition, SuppressSOIL will interact closely with agricultural stakeholders, so that project results and conclusions are deeply rooted in the socio-political context of the project. Specific activities are planned to engage a diverse range of stakeholders, including:

- Farmers and farmer organisations are engaged already, helping to identify suppressive soils and providing a recent history of pest and diseases in different sites. This will directly guide the selection of field sites and facilitate the monitoring of crop health status;
- Professional media, networks and federation will be mobilised to disseminate project results in replicable contexts, including through the involvement of farmers and agricultural advisors in technical workshops and visits of each case-study site; Policy-makers at regional and national levels will receive communications and concrete examples drawn from the project that could be used to guide the implementation of farming practices fostering soil biodiversity, ranging from individual-level decisions to regional- and national-level decision making that can materialize into farming policy, especially in a context of global change.

Partners of the project:

Coordinator: UMR 5557 Microbial Ecology – CNRS /INRAE/University Lyon1/VetAgro Sup – Villeurbanne – France

Soil Ecology – Helmholtz Centre for Environmental Research – Halle – Germany

Epidemiology and Pathogen Diagnostics – Julius Kühn Institut – Braunschweig – Germany

Fundamental Microbiology – University of Lausanne – Lausanne – Switzerland

Plant Protection / Entomology of Arable Crops and Viticulture – Agroscope Changins – Nyon – Switzerland

Swiss Association for the Development of Agriculture and Rural Areas – (AGRIDEA) – Lausanne – Switzerland

Duration:
01/03/2020 – 28/02/2023

Total grant:
€ 1,171,364

Further information:

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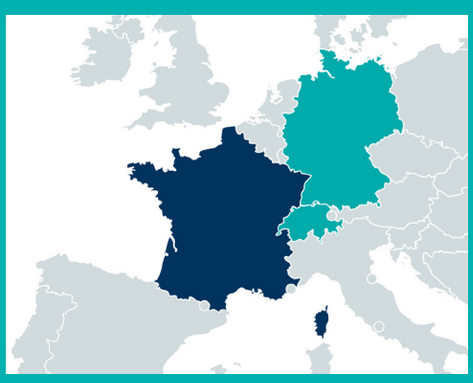

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VOODOO - Viral eco-evolutionary dynamics of wild and domestic pollinators under global change

Context

Pollinators provide sociocultural, biological and economic values for humankind by safeguarding biodiversity and crop yields through the pollination of wild plants and flowering crops. However, pollinators face multiple threats that are affecting their health, populations and diversity. A particular threat to pollinator health comes from a potential escalation of disease risk by environmental changes that alter pollinator nutrition, abundance, species interactions and communities. VOODOO aims to address this knowledge gap by discovering how land-use (conventional intensive agriculture, rural mosaic or urban land) and alien plant species drive modifications to the availability and quality of floral resources that in turn affect the structure and dynamics of plant-pollinator-virus communities.

Main objectives

VOODOO will address the following research questions:

- How do plant-pollinator-virus interaction networks vary between agricultural, habitat mosaic and urban landscapes?
- Does land-use driven variation in floral resources affect pollinator interactions and virus sharing?
- How does disease manifest in known and alternative pollinator hosts and what is the role of nutritional stress?

Do different societal groups apply knowledge of pollinator disease in decision-making?

Main activities

VOODOO integrates quantification of field-sampled plant-pollinator-virus communities with high-resolution molecular analysis, laboratory and field experiments, modelling, and active stakeholder engagement to generate new knowledge on the disease risk to pollinators arising from the effects of urban and agricultural land-use on floral resources (including pollen quality in collaboration with NutriB2) and pollinator foraging, in different landscapes.

VOODOO will establish a stakeholder advisory board comprising representatives from academia, policy, industry and associations. It will hold professionally facilitated multi-stakeholder workshops and dissemination events, create a web presence, and use pre-existing knowledge transfer e-tools and webinars. Interviews and workshops will be used to understand and map stakeholder perceptions of pollinator disease risk, other threats, and evaluate how perceptions change in response to new knowledge from VOODOO.

Networks of plant-pollinator-virus interactions in agricultural, urban and rural landscapes studied in four European countries.

Partners of the project:

Coordinator: Agroecology Unit – INRAE /AgroSupDijon/Bourgogne University – Dijon – France

Bees & Environment (BPA) – INRAE – Avignon – France

Community Ecology and Ecological Modelling – Helmholtz–Centre for Environmental – Research – Halle – Germany

General Zoology, Institute for Biology, University Halle–Wittenberg – Halle – Germany

Faculty of Veterinary Medicine – Warsaw University of Life Sciences – Warsaw – Poland

Faculty of Biotechnology and Horticulture – Jagiellonian University of Krakow – Kraków – Poland

Agroecology and Environment – Agroscope – Zurich – Switzerland

Institute of Bee Health – University of Bern – Switzerland

Duration:
15/01/2020 – 14/01/2023

Total grant:
€2,037,760

Further information:

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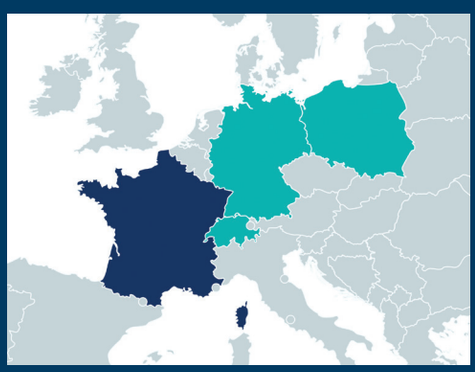

ACTION B

Synthesis research project

Synthesis research projects are gathering individuals forming a working group, which perform research and answer research questions using existing data sets. These projects do not collect or produce new primary data, but synthesize and/or analyse existing data sets (or concepts and ideas). These projects differ from other activities such as systematic reviews or knowledge synthesis which are based on a synthesis of publications and reports.

biodiversa
www.biodiversa.org

FunProd - Relationships between functional diversity and food production and quality under ecological intensification

Context

Agricultural intensification contributes to global food security and health by supplying the food demand of a growing human population, but also causes environmental problems. Ecological intensification has been proposed as viable alternative to achieve a balance between negative environmental issues, such as the ongoing loss of biodiversity, and sufficiently high and qualitative food production. The functional diversity of biotic communities is an understudied dimension of biodiversity which may be particularly relevant for the links between ecological intensification, biodiversity, pollination, pest control and human food and livestock fodder production.

Main objectives

Previous studies addressed the effects of ecological intensification on the functional diversity of single taxonomic groups in individual countries without considering links between functional diversity and plant, animal or human health across different landscapes and climatic regions. FunProd will undertake the joint synthesis of existing databases on these aspects in organic agriculture and permanent grasslands in Europe to provide a significant contribution to the evidence base for such links across different climatic regions and a range of landscapes. Closing this knowledge gap will contribute to the development of nature-based agricultural systems that provide simultaneously high levels of plant protection and health, together with sufficient productivity and quality to support the global human population, all while reducing environmental impact of agriculture. To this end, FunProd will address the following specific questions:

- Does ecological intensification enhance the functional diversity of biotic communities across taxonomic groups compared to conventional intensification and does the effect depend on climatic conditions, landscape structure and/or agricultural system?
- Does the effect of ecological intensification on the functional diversity of local communities explain the observed effect of ecological intensification on crop protection, pollination and health?

Can a high functional diversity reduce the yield gap between agricultural production systems that focus on ecological and conventional intensification in Europe, and thereby contribute to future food security and quality?

Main activities

Four workshops are planned and will allow:

- to link existing databases on species composition of animal communities with databases on functional traits (meeting 1);
- to analyse the effect of ecological intensification practices on functional diversity metrics (meeting 2 & synthesis paper 1);
- to develop models that link functional diversity to pollination and pest control services and crop plant health (meeting 3 & synthesis paper 2).

At the final meeting (meeting 4) these results will be linked to information on human health effects of organic agricultural products and yields (synthesis paper 3). These results will be used to develop a final set of dissemination products (e.g. policy brief and farmer magazine article) for the project's target audiences (e.g. regional policy-makers and farmer associations).

Organic fruit orchard in the Western Cape province South Africa

Partners of the project:

Coordinator: Ecology – Brandenburg University of Technology – Cottbus – Germany

Nutritional Epidemiology (EREN) – INRAE/INSERM/CNAM/Paris 13 University – Bobigny – France

Grassland Ecosystem (UREP) – INRAE/Vetagro Sup – Clermont–Ferrand – France

Vineyard Health and Agroecology (SAVE) – INRAE/Bordeaux Sciences Agro – Villenave d'Ornon– France

Ecology and Botany – Hungarian Academy of Sciences – Vácrátót – Hungary

School of Agriculture and Food Science – University College Dublin – Dublin – Ireland

Ecology and Biogeography – Nicolaus Copernicus University Toruń – Torún – Poland

Functional and Organic Food and Commodity – Warsaw University of Life Sciences – Warszawa – Poland

Environmental and Plant Parasitology – Institute of Parasitology – Košice – Slovakia

Environmental Studies – Vrije Universiteit Amsterdam – Amsterdam – The Netherlands

Duration:
01/04/2020 – 31/04/2022

Total grant:
€ 242,936

Further information:

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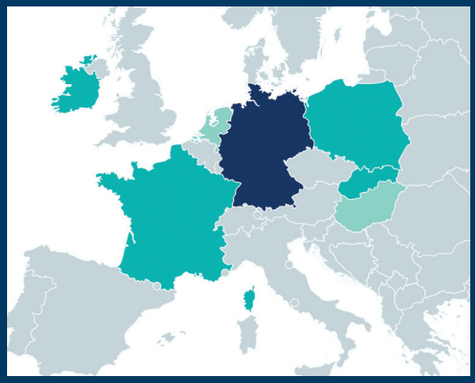

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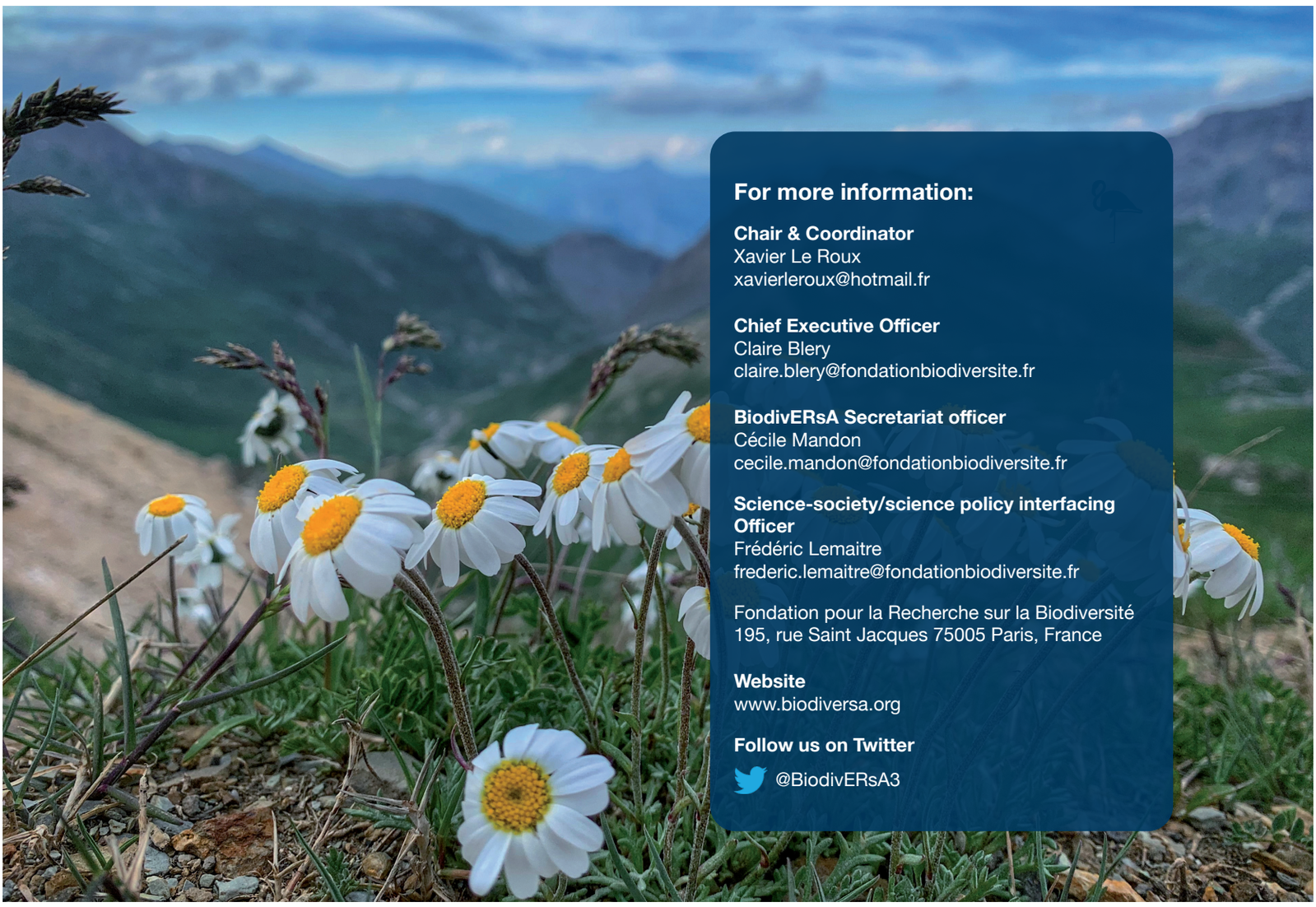
Layout

Thibaut Lochu - www.thibautlochu.com



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