Belmont Forum – BiodivERsA 2017-2018 Call for proposals

Scenarios of Biodiversity and Ecosystem services

BiodivERsA

Created in 2005, and transformed into a long term partnership in June 2018, BiodivERsA is a network of 38 agencies and ministries from 24 countries programming and funding pan-European research on biodiversity, ecosystem services and Nature-based Solutions on a competitive basis.

Over 2008-2017, BiodivERsA launched 7 calls; it funded 75 transnational research projects selected for their scientific excellence, societal/policy relevance and quality of stakeholder engagement for a total amount of ca. 180 million euro (including 113 million euro of money directly raised by BiodivERsA partners and the European Commission).

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

For more information: www.biodiversa.org

The Belmont Forum

Established in 2009, the Belmont Forum is a partnership of funding organizations, international science councils, and regional consortia committed to the advancement of interdisciplinary and transdisciplinary science. Forum operations are guided by the Belmont Challenge, a vision document that encourages international transdisciplinary research for understanding, mitigating and adapting to global environmental changes.

Forum members and partner organizations work collaboratively to meet this Challenge by issuing international calls for proposals, committing to best practices for open data access, and providing transdisciplinary training. To that end, the Belmont Forum is also working to enhance the broader capacity to conduct transnational environmental change research through its e-Infrastructure and Data Management initiative.

For more information: www.belmontforum.org

BiodivScen

The Belmont Forum and BiodivERsA have joined forces to implement the joint programme "BiodivScen", for supporting international research efforts in the development of scenarios of biodiversity and ecosystem services. This programme runs from October 2017 to September 2022.

BiodivScen consists of a joint call for international research projects and a set of other activities addressed to researchers, non-academic stakeholders and research programmers of this domain. These activities include networking and capacity building events for researchers, as well as dedicated support and events for the engagement of stakeholders and for the uptake of research results in non-academic realms. Building on the contributions from the BiodivScen-funded projects, scientific foresight work will also be performed, aiming to identify new research frontiers, gaps and priorities related to the development of biodiversity and ecosystem services scenarios.

The European Commission participation in BiodivScen

This programme is co-funded by the European Commission under the Horizon 2020 programme as an ERA-NET COFUND.

ERA-NET COFUND are funding tools aiming at strengthening the coordination of national and regional research programmes. The core activity of such a tool is to implement one substantial call for research proposals, which is co-funded by the European Commission.

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From the BiodivScen Coordinator and Secretariat

Biodiversity and ecosystem services, and the vital benefits they bring to human societies, are our life insurance and underpin economic growth and human well-being (Mace et al., 2012). It is increasingly recognized that Nature's contributions to people (Diaz et al., 2018) are as much an environmental issue as an economic, food-security, energy-security and political one. In particular, biodiversity and ecosystems provide human populations with direct and indirect services, such as food, raw material, fresh water, medicinal resources, carbon sequestration, prevention of erosion, etc.

However, a 'Great Acceleration' in human activities has been observed since 1750 and the start of the industrial revolution, with subsequent changes in the Earth System characterized by raising greenhouse gas concentrations in the atmosphere, ocean acidification, pollution, deforestation, urbanization, and more generally increased intensity of land use and natural resource exploitation. Already in 1778, the Comte de Buffon noticed that '*the entire face of the Earth today bears the imprint of the power of man*', while in 1864, the ecologist George Perkins Marsh published '*Man and nature: Physical geography as modified by human action*'. The post-1950 acceleration of the human imprint on the Earth System has even led to call 'Anthropocene' the era in Earth history, in which we now live.

In the Anthropocene, multiple drivers, direct or indirect, cause a substantial loss of biodiversity. Be it habitat loss and degradation, climate change, excessive nutrient load and other forms of pollution, over-exploitation and unsustainable use of resources, invasive alien species… (Global Biodiversity Outlook 3). Threats to biodiversity in all environments call for protection and a durable management of biodiversity, which will allow safeguarding our natural heritage and securing sustainable delivery of a broad range of ecosystem services.

The conservation of biodiversity and ecosystem services is a challenge that has been addressed at the European level as well as internationally. The signatories of the Convention on Biological Diversity committed in 2010 to achieve the Aichi biodiversity targets and to take action to halt the loss of biodiversity in order to ensure the resilience of ecosystems and the continuous provision of essential services. The European Union's 7th Environment Action Programme has a priority objective to protect, conserve and enhance the Union's natural capital, while the European Union's Biodiversity Strategy sets out the targets and actions needed to reverse those negative trends, to halt the loss of biodiversity and the degradation of ecosystem services by 2020 and restore them as far as feasible. Good status of biodiversity and ecosystems are also the backbone of many of the Sustainable Development Goals defined within the 2030 Agenda for Sustainable Development.

In order to foresee plausible trajectories of biodiversity in the coming decades taking into account identified threats and trends, and to support 'no regrets' approach to decision-making, research has developed scenarios (Sala et al., 2000; Pereira et al., 2010; Thuiller et al., 2019).

> Scenarios can deliver estimations of the outcomes of given political and societal pathways, as much as they can bring visions of desirable futures or dreaded ones, thus contributing to shaping plans for action designed to achieve them – or prevent them.

However, several barriers still hinder the development and effective use of scenarios of biodiversity and ecosystem services. IPBES - the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services - has notably identified in its Methodological Assessment on Scenarios and Models of Biodiversity and Ecosystem Services the main gaps in methods for modelling impacts of drivers and policy interventions on biodiversity and ecosystem services (Ferrier et al., 2016). First, this includes the need to develop scenarios relevant to multiple spatial scales and types of decision-making, while considering multiple dimensions of biodiversity and ecosystem services. Second, it is needed to provide end users with guidance and tools that can facilitate their understanding of scenarios, increasing the use of biodiversity scenarios by stakeholders in particular for decision-making. Overall, and in contrast to climate change, biodiversity modelling and scenario development have so far not achieved the level of maturity necessary to effectively inform policy-making, which creates a barrier to mainstreaming biodiversity in other areas of global concern.

The BiodivScen program, jointly implemented by the Belmont Forum and BiodivERsA, and supported by the European Commission, tackled these challenges. In particular, this program includes a joint call on 'Scenarios of Biodiversity and Ecosystem Services' which accounted for the recommendations made by the IPBES methodological assessment. It is expected that the selected projects will contribute to address the knowledge gaps identified and develop scenarios of high relevance for decision-making. The outcomes and results of research funded through BiodivScen are likely to, in turn, feed future IPBES' assessments.

As a collaboration between the Belmont Forum – the international network of funding organizations on environmental research – and BiodivERsA – the European network of organizations funding transnational research on biodiversity, ecosystem services and Nature-based Solutions – BiodivScen brought together funding agencies from all around the world and allowed a vast research community to apply for funding. This proved to be fruitful as the call successfully reached the international research community: there were 135 full proposals submitted, carried by 940 research teams spread in more than 50 countries, for a total of around 2,800 individual applicants! The call allowed funding 21 research projects, selected for their scientific excellence and efficient implementation plan as well as for their high expected policy/societal relevance and efficient stakeholder engagement plan. The total amount of funding is 27.9 million Euros. 86% of the selected projects include teams from at least 2 continents. These projects build bridges across disciplines and address key issues in diverse types of ecosystems.

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 the funding of the highest possible number of top-ranked proposals despite the high number of applications.

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 21 projects selected for funding. This demonstrates how BiodivScen will contribute to the emergence of a new generation of biodiversity scenarios and will fill major gaps identified for this domain by the IPBES. Enjoy your reading!

Xavier Le Roux
BiodivScen Coordinator
Fondation pour la Recherche sur la Biodiversité (FRB)

&

Cécile Jacques
BiodivScen Secretariat
Fondation pour la Recherche sur la Biodiversité (FRB)

BELMONT FORUM

From the Belmont Forum Secretariat

"Scenarios of biodiversity and ecosystem services are the outputs of the combination of scenarios of indirect drivers and direct drivers — such as land use change, invasive alien species, overexploitation, climate change or pollution — and models of impacts of these drivers on biodiversity and ecosystem services."

The above definition of scenarios is driving the projects funded by the Scenarios of Biodiversity and Ecosystem Services II, the follow-up to the first Belmont Forum Scenarios of Biodiversity and Ecosystem Services Collaborative Research Action. The first call funded by Australia, Brazil, China, France, Germany, India, Japan, Norway, and South Africa in 2014 stimulated networking and capacity building for innovative research across social and natural science disciplines. The four funded projects addressed harmonizing and integrating the development and application of biodiversity scenarios across spatial scales of relevance to multiple types of decisions and considering several dimensions of biodiversity and ecosystem services.

The Belmont Forum builds on a legacy of international scientific collaboration that began decades ago. The new collaborative funding opportunity united funders from the Belmont Forum and BiodivERsA with the support of the European Commission. The number of funding agencies has more than doubled, which allowed expanding the funding opportunity by a great deal. The funders aimed at supporting innovative research proposals that explicitly addressed a scenario dimension, and would lead to more informed decision-making, considering complex interaction of socio-economic and global environmental trends. Not only are the twenty-one awarded projects academically excellent, but they also explicitly engage stakeholders which maximizes the societal benefits of this research.

The Belmont Forum welcomes the awardees to the growing community of transdisciplinary sustainability scientists and invites them to share learning and to highlight the cumulative impact of all the projects. The projects are also encouraged to engage with each

other and with other #BelmontFunded initiatives. A kick-off event is only the beginning! We are looking forward to learning from every project at each of the upcoming meetings, sharing the accomplishments and findings, promoting the visibility of the research teams, and help along the way on this collaborative effort. The strengths and expertise of the professionals participating in each of these projects equip each team with diverse skills and the knowledge necessary to address the complex problems that they set out to study.

We would like to thank all the partners and members of the funding organization, the reviewers of the expert panel who provided an essential service for selecting the projects that were most likely to excel, and we express our gratitude towards all who play a role in administering and coordinating this effort.

Thank you, all!

Belmont Forum Secretariat

![biodiversa — The network promoting European Research on biodiversity, ecosystem services and Nature-based Solutions]

From the BiodivERsA Coordinator and Secretariat

In its Strategic Research and Innovation Agenda, BiodivERsA identifies among one of its three Transversal Theme the need to reinforce research capacity for the development of scenarios. In this context, developing a collaboration with the Belmont Forum to implement an ambitious call for research proposals on scenarios of biodiversity and ecosystem services was a unique opportunity to contribute to generate new knowledge in this domain at the international scale.

Besides, this collaboration with the Belmont Forum was consistent with BiodivERsA efforts to reinforce its international dimension and to cooperate with other initiatives to better tackle trans-sectoral issues and promote the international dimension of research. Thanks to the BiodivScen Action, BiodivERsA partners were able to collaborate with funding agencies from Argentina, Brazil, Canada, Ivory Coast and USA. Given the strong link that exists between BiodivERsA ad the European Commission, this joint call was also co-funded by the European Commission.

The joint call built on both the first Belmont Forum Collaborative Research Action on Scenarios of Biodiversity launched in 2014 to support networks and the first BiodivERsA call on biodiversity dynamics, resilience and scenarios, launched in 2011.

The 2017 joint Belmont Forum and BiodivERsA call was of higher amplitude than these two past calls, both in terms of funding and geographical coverage. Attracting more than 130 pre-proposals and leading to the funding of 21 excellent research projects for a funding amount of around 28 million Euro, this joint call was a great success. It was a win-win collaboration between the Belmont Forum and BiodivERsA: through this call, both initiatives were able to mobilize a higher number of funding Partners and to cover a broader geographical scope; this collaboration also allowed the two initiatives to learn from each other and build capacity for the implementation of activities to reinforce research in the domain.

The collaboration between the Belmont Forum and BiodivERsA will continue part of the BiodivScen Action, notably in the context of the follow-up of the funded research projects. During their lifetime, the funded projects will indeed benefit from supporting capacity-building activities, whether for improving their data management plan or for involving new stakeholders, improving the uptake of their research results by policy makers, etc. BiodivERsA looks forward to supporting the funded projects during their lifetime and making them benefit from its long experience in terms of stakeholder engagement, knowledge brokerage and transfer, etc. In addition, the funded projects' outputs will contribute to identify new knowledge gaps, which will be taken into account when updating the BiodivERsA Strategic Research and Innovation Agenda.

In a nutshell, BiodivERsA was thrilled by this collaboration, and what it led to. BiodivERsA would like to thanks all those who made this adventure possible, including all funders, evaluators and applicants, and wishes all the best to the funded projects.

Xavier Le Roux
BiodivERsA Coordinator & CEO
Fondation pour la Recherche sur la Biodiversité (FRB)

&

Claire Blery
BiodivERsA Secretariat Executive Manager
Fondation pour la Recherche sur la Biodiversité (FRB)

Overview of the BiodivScen call

Summary of the 2017-2018 Belmont Forum - BiodivERsA call

The aim of this call was to promote innovative research for more informed decision-making by developing scenarios of biodiversity and ecosystem services, accounting for the complex interactions between socio-economic and global environmental trends. It focused on foresight views up to the next 50 years, which could help the management of biodiversity, ecosystem services and their contributions to human well-being.

Two major (non-exclusive) priorities addressed:

- **Development and application of scenarios of biodiversity and ecosystem services across spatial scales of relevance to multiple types of decisions** - Previous biodiversity scenarios developed by the research community have often been highly scale-specific. However, scenarios at global scales are difficult to translate into actions at regional/local scales, where many biodiversity relevant decisions are made. Conversely, scenarios at local/regional scales often do not include global scale constraints and feedbacks (e.g. international trade, teleconnections, etc.) restricting their capacity to inform international policy-making. Integrating several spatial scales while developing biodiversity scenarios is thus one of the key barriers to greater integration of these scenarios into decision-making.

- **Consideration of multiple dimensions of biodiversity and ecosystem services in biodiversity scenarios** – Previous biodiversity scenarios have typically focused on a very limited number of dimensions of biodiversity and ecosystem services (e.g. scenarios of loss of species). However, decision-making processes often require information on a much broader range of dimensions – both because different decision-making processes may focus on different dimensions, and because some processes are purposely designed to address multiple dimensions (e.g. through multi-criteria trade-off analysis).

Type of research aimed at

This call targeted **transdisciplinary projects** of 3 years, involving partners from at least three different countries participating in the call to develop science-based projections of the dynamics of biodiversity and ecosystem services and reinforce the research capacity to develop such projections.

Given the nature of the research supported through this call, proposals had to include as needed collaboration and integration across several disciplines from natural sciences and/or 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, including for upscaling knowledge at the (sub-)regional level or for comparative approaches of different local contexts. Contributions to global research programs, assessment bodies, and multi-lateral environmental agreements, including but not limited to IPBES and SDGs, were encouraged.

Call process

The topic of this call for research proposals was a common priority of the Belmont Forum and BiodivERsA and was a follow-up of two calls launched on a similar topic by the two initiatives in 2014 and 2011, respectively. BiodivERsA indeed made a pioneering call in late 2011 that included a sub-theme on scenarios of biodiversity and ecosystem services, allowing to fund 9 projects; and the Belmont Forum launched a first CRA - Collaborative Research Action - on «Scenarios of Biodiversity and Ecosystem Services» in 2014, through which it funded 4 international networks of scientists in order to reinforce the capacity of the research community on this domain.

The Belmont Forum and BiodivERsA decided to join forces for the 2017-2018 call to launch a more ambitious call on scenarios of biodiversity, mobilizing more funders than the previously mentioned calls and reaching a higher critical mass both in terms of funding and coverage of the research community. This allowed these two initiatives to jointly address the pressing issues of the call at a larger scale and allowing the development of international collaboration.

The content and procedures for this joint call were defined in common between the Belmont Forum and BiodivERsA partners. 26 national and regional funding organisations from 23 countries participated in the call, with a financial support from the European Commission through an ERA-NET COFUND Action. ANR – The French National Research Funding Agency – hosted the Call Secretariat, with a support from FAPESP – the Engineering and Physical Sciences Research Council of Sao Paulo State – and played an important part in the swift implementation and success of the call.

The call was launched on October 2, 2017, with a deadline to submit pre-registrations on December 1, 2017. Eligible pre-registrations were invited to submit full proposals by March 9, 2018. The full proposals were evaluated by an independent evaluation panel as well as by external reviewers between March and June 2018.

Based on the results of the evaluation process and without modifying the ranking of projects established by the independent evaluation panel, BiodivScen partners agreed on the number of projects to be recommended for funding in June 2018, allowing for a start of the funded projects between November 2018 and March 2019.

All the projects have a 3-year 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 agencies that participated in the call.

Evaluation process

The submitted proposals were evaluated by an independent evaluation panel, as well as by external reviewers. Both the evaluation panel and group of external reviewers were comprised of scientific experts, as well as policy-makers and practitioners.

The proposals were evaluated following specific, pre-defined guidelines and according to the following, pre-announced three criteria: scientific excellence; quality and efficiency of the implementation; and (expected societal and/or policy) impact. These three criteria were further divided into sub-criteria. Three grades corresponding to these three criteria were given to each proposal, with a predefined emphasis on scientific excellence. For each criterion, threshold scores were used. Proposals with scores below the threshold were not ranked nor considered for funding.

The final evaluation meeting was organised on 6-8 June 2018 with all the evaluation panel members. This meeting was the chance for the panel members to discuss the proposals and agree on the final grades to be attributed to the proposals. This led to the establishment of the ranking list of the best proposals, which was provided to the Group of Program Coordinators (GPC), i.e. the Funding Organisations participating in this call. The GPC decided on which proposals should be recommended for funding strictly following this ranking list.

As this call was co-funded by the European Commission, an independent observer was in charge of assessing the quality of the evaluation process and its compliance with EU co-funding rules.

Agencies participating to the call

SGCTEIP – Argentina

FWF – Austria

BelSPO – Belgium

F.R.S-FNRS – Belgium

FAPESP – Brazil

BNSF – Bulgaria

FRQ – Canada

NSERC – Canada

ETAg – Estonia

AKA – Finland

ANR – France

DFG – Germany

DLR-PT – Germany

EPA – Ireland

PASRES – Ivory Coast

RCL – Lithuania

RCN – Norway

NCN – Poland

UEFISCDI – Romania

SAS – Slovakia

AEI – Spain

Formas – Sweden

SNSF – Switzerland

NWO – The Netherlands

TÜBITAK – Turkey

NSF – United States of America

Analysis of the submitted research projects

Overall figures of the call

	Number of full proposals	Number of research teams	Requested budget
Submitted proposals	135	939	168 M€
Selected proposals	21	169	28 M€

With 135 full proposals submitted, 939 participating teams and 2,831 individual applicants, the BiodivScen call was a great success. By attracting so many proposals, the call demonstrated a major interest from the international scientific community for the topic 'scenarios of biodiversity and ecosystem services'. More generally, this demonstrates the large size and mobilization capacity of the biodiversity research community.

Out of the 135 full proposals, the Group of Programme Coordinators agreed to fund the 21 highest ranked proposals for a total amount of 28 Million Euros, which represents a success rate of 16.6%.

Geographical origin of the applicants

The large majority (92%) of research teams who submitted a proposal came from the 23 partner countries participating in the funding of the call, i.e. Argentina, Austria, Belgium, Brazil - Sao Paulo State, Bulgaria, Canada, Estonia, Finland, France, Germany, Ireland, Ivory Coast, Lithuania, The Netherlands, Norway, Poland, Romania, Slovakia, Spain, Sweden, Switzerland, Turkey and the United States of America.
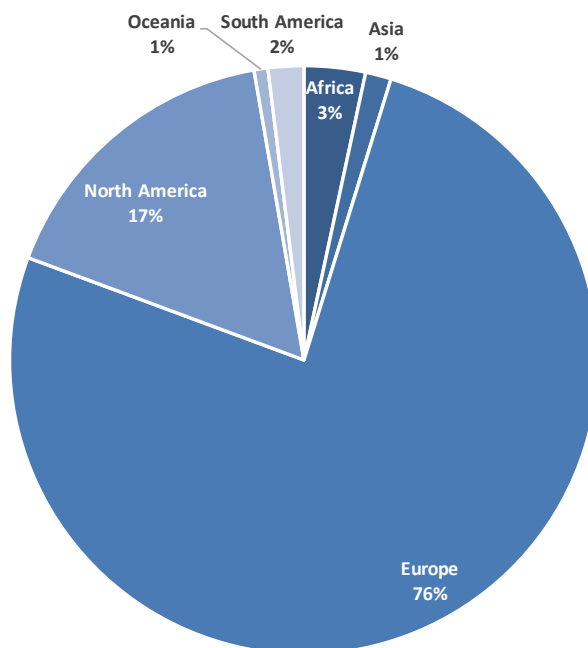

Figure 1: Distribution of the number of research teams that applied to the BiodivScen call according to their continent

From a geographical perspective, the applicants came from 6 different continents, i.e. Europe (76%), North America (17%), Africa (3%), South America (2%%), Asia (1%) and Oceania (1%). This repartition was influenced by the origins of the countries participating in the BiodivScen call and the resources reserved by the latter for the call (Figure 2, left).

Reserved budgets

The highest values of both reserved and requested budgets were observed for Germany and to a lesser extent France, Norway, Sweden, and the United States of America (which were the 5 out of 6 countries with the highest reserved budgets). On the reverse, even if the reserved budget of Brazil - Sao Paulo State was quite high (6.3% of total reserved budget), the requested budget remained low (1% of total requested budget) (Figure 2).
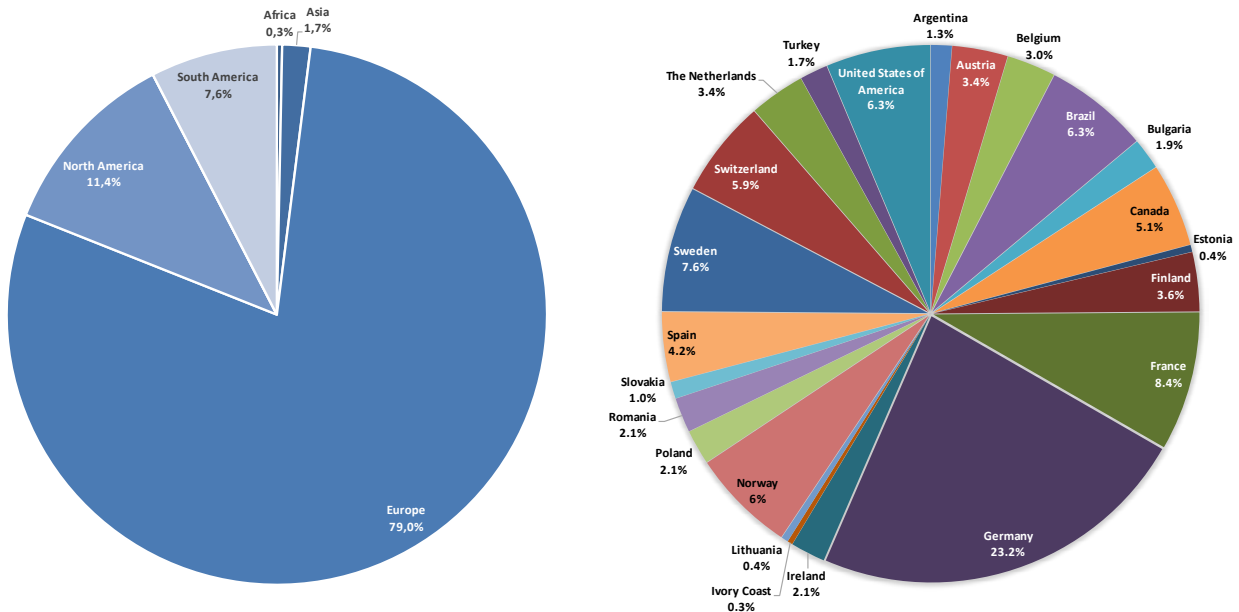
Figure 2: Distribution of the reserved budget among (left) continents and (right) participating countries

For some countries, such as Finland and Sweden, and to a lesser extent Norway and The Netherlands, the requested budget was much higher than their reserved budget. In the end, in some cases, such as for Canada, Finland, The Netherlands, Norway, Sweden, and the United States of America, the reserved budget proved to be insufficient compared to the financial demand from the successful applicants. This did not however lead to blocking situations thanks to the flexibility of these partners and to other partners who showed flexibility to manage financial shortages.

Ultimately, the 21 top ranked projects could be funded, strictly following the ranking list established by the independent evaluation panel.

Number of applicants and awardees per country

 # teams per country in submitted proposals

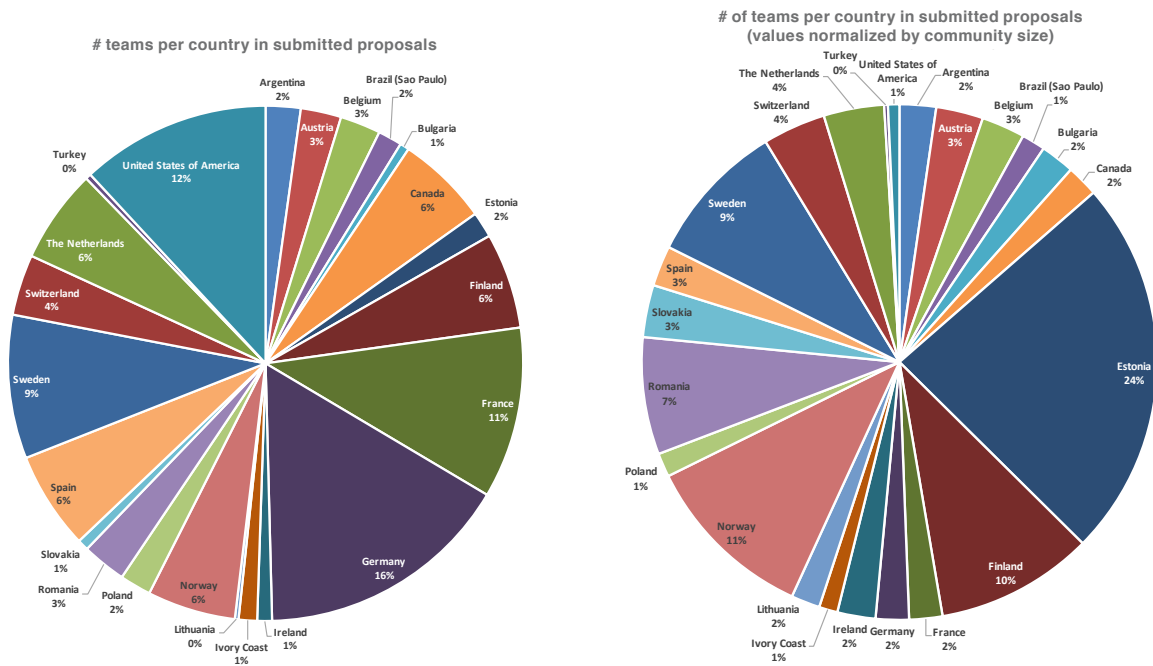**# of teams per country in submitted proposals (values normalized by community size)**

Figure 3: Number of teams among countries (left) in absolute values, and (right) considering the values normalised according to the size of the national scientific community [source: Eurostat & OECD 2015, all sectors, Full Time Equivalent unit].

In absolute value, France, Germany, the USA and to a lesser extent Sweden were the countries best represented in terms of number of teams (Figure 3, left). Yet, despite a relatively low participation in terms of number of teams (Figure 3, left), the biodiversity scientific communities from Estonia, Norway, and to a lesser extent Finland and Romania have responded well to this call once the number of teams are normalised according to the estimated number of researchers from all scientific areas in each country (Figure 3, right). There is however no available data to know precisely the size of the biodiversity research community within the overall research community of each country, which would have improved the normalization.

 # awarded teams per country

Argentina 1%
Belgium 1%
Brazil (Sao Paulo) 1%
Austria 3%
Canada 8%
Estonia 1%
Turkey 1%
United States of America 15%
Finland 7%
Netherlands 4%
Switzerland 4%
France 10%
Sweden 11%
Spain 7%
Germany 17%
Romania 1%
Poland 1%
Norway 7%
Ireland 1%

# of awarded teams per country (values normalized by community size)

The Netherlands 3%
Turkey 1%
United States of America 1%
Argentina 1%
Switzerland 6%
Belgium 1%
Brazil (Sao Paulo) 1%
Austria 5%
Canada 4%
Sweden 15%
Estonia 13%
Spain 4%
Romania 2%
Poland 1%
Finland 15%
Norway 17%
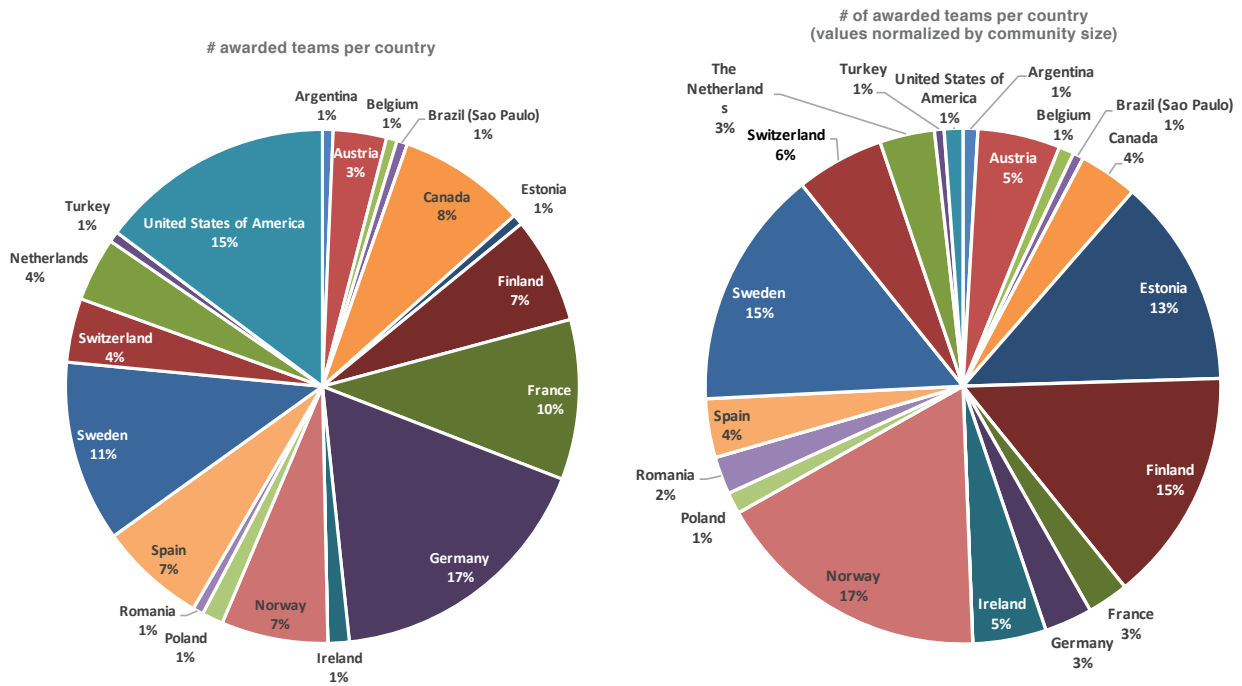Ireland 5%
France 3%
Germany 3%

Figure 4: Number of successful teams among countries (left) in absolute values and (right) considering the values normalized according to the size of the national scientific community [source: Eurostat and OECD 2015, all sectors, Full Time Equivalent unit]

The teams funded through the BiodivScen call came from 19 different countries (Figure 4). The largest number of funded teams came from the four countries with the highest amount of funding reserved, namely Germany, France, Norway, Sweden and the United States of America.

Again, it is worth comparing the number of awarded teams between countries in terms of both absolute values and number normalised according to the estimated number of researchers (both pie charts of Figure 4). This better highlights the success observed for countries like Estonia, Finland, Sweden and Norway.

Success rate per country

The Austrian, Canadian, Irish, Norwegian, Swedish, Turkish and US research teams applying to this call had a particularly good success rate, i.e. ratio of awarded-to-requested budget amounts (Figure 5). The figures should be viewed with caution for some countries, given their low number of submitted proposals.

Despite the participation of Bulgaria, Ivory Coast, Lithuania and Slovakia to the call, none of the 21 funded projects involved a research team from these countries, likely due to the low number of proposals including national research teams for these countries (Figure 5).
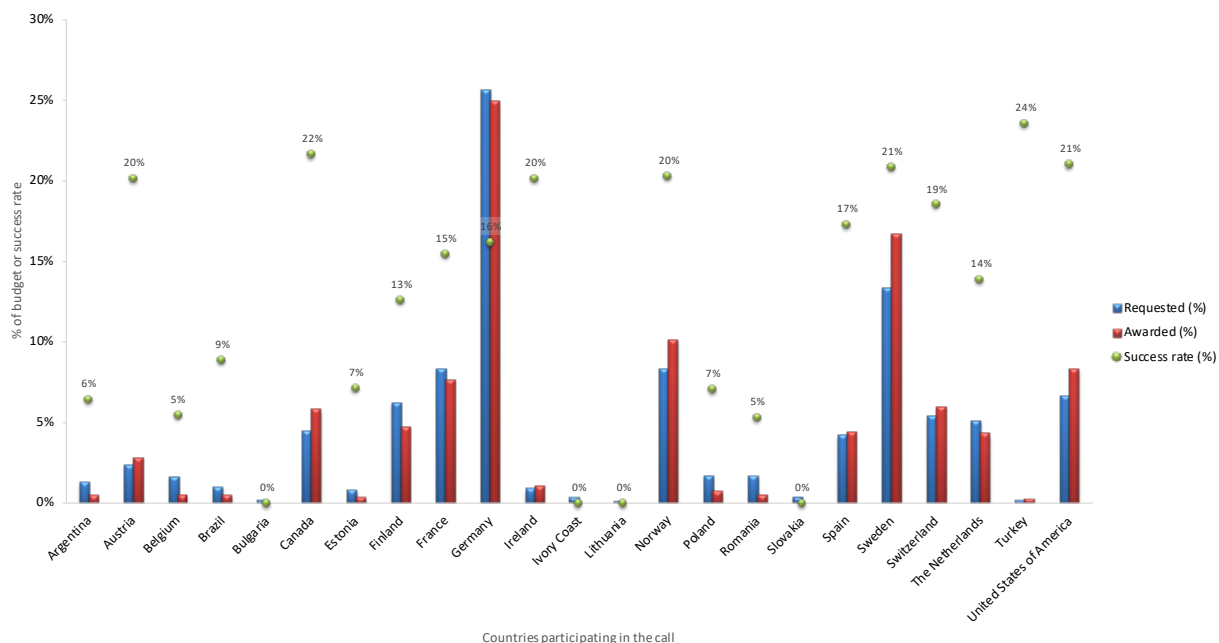

Figure 5: Comparison of the percentage of budget in the proposals between countries participating to the call at the submission phase (requested – blue bars) and after selection (awarded – red bars). The financial success rate, i.e. the ratio of awarded-to-requested budget amounts is indicated as green dots

Proposal coordination

Coordination of submitted proposals
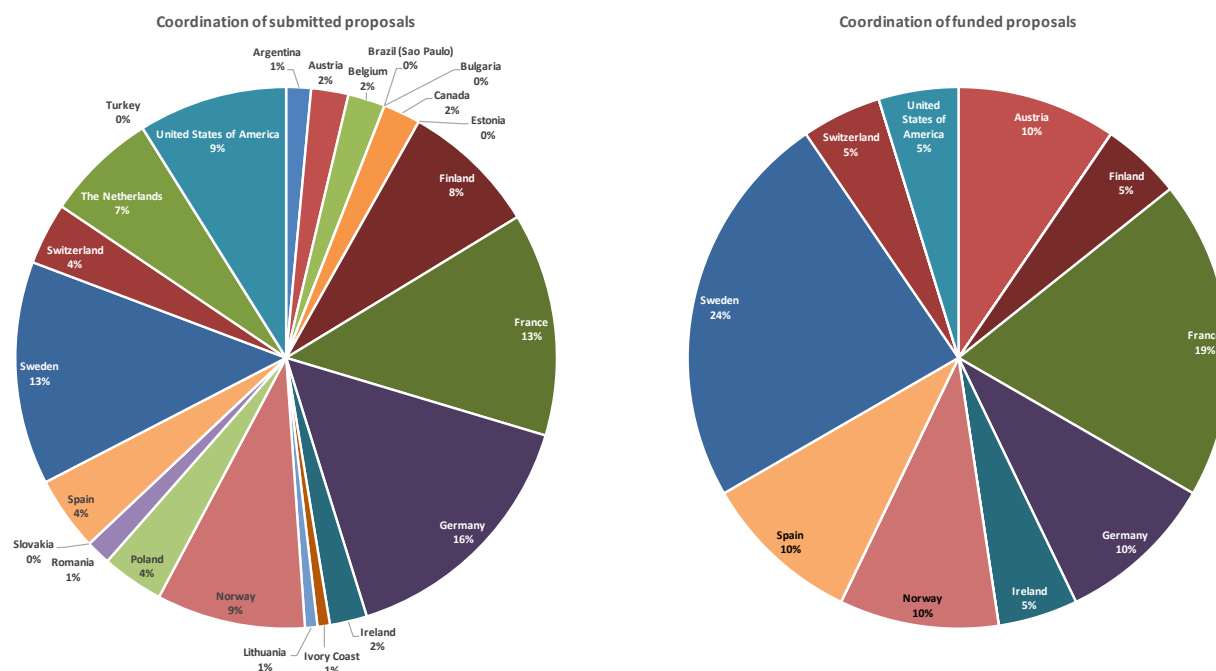
Coordination of funded proposals

Figure 6: Geographical distribution of the coordinators for the (left) submitted and (right) funded proposals.

At the submission stage, the project coordinators originated from 19 countries out of the 23 participating in the call (Figure 6, left). At the end, the coordinators of the funded proposals originated from 10 countries participating in the call. In absolute values, the coordinators of the funded projects were mainly from Sweden and France (with 5 and 4 coordinations, respectively) and to a lesser extent from Austria, Germany, Norway and Spain (with 2 coordinations per country) (Figure 6, right).

The success rate for coordination, i.e. the number of coordinators in the funded project compared to the submitted proposals, was particularly high for Austria (67%), Ireland (33%) and Spain (33%), and to a lesser extent for Sweden (28%) and France (22%).

Call themes addressed by the proposals

This BiodivScen call was composed of two major (non-exclusive) themes:

• Theme 1: "Development and application of scenarios of biodiversity and ecosystem services across spatial scales of relevance to multiple types of decisions"

• Theme 2: "Consideration of multiple dimensions of biodiversity and ecosystem services in biodiversity scenarios"

During the submission phase, project coordinators had to indicate to which theme their proposal applied. As the two themes were not exclusive, they could indicate the relative importance of each theme for their proposal, allowing to assess the interest in each of the themes. The numbers revealed that most projects were submitted under both themes; out of 135 proposals, 93% (i.e. 125) proposals addressed theme 1 and 93% (i.e. 126) proposals addressed theme 2. Besides, 20 out of 21 funded proposals addressed both themes, while one addressed theme 2 only. On average, proposals interest for theme 1 was 56% and 44% for theme 2.
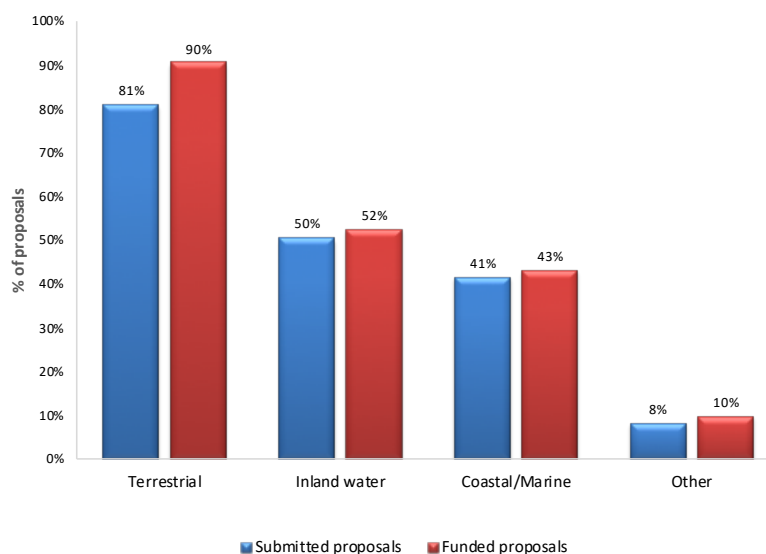
Types of studied environments

Figure 7: Percentage of the submitted and funded proposals according to the environments studied. One proposal can address several environments.

The majority of the submitted and funded proposals focused on terrestrial ecosystems (81% and 90% of the submitted and funded proposals, respectively)(Figure 7).

However, half of the proposals also focused on inland water (50% and 52% of the submitted and funded proposals, respectively) and more than 40% focused on coastal and/or marine environments (Figure 7).
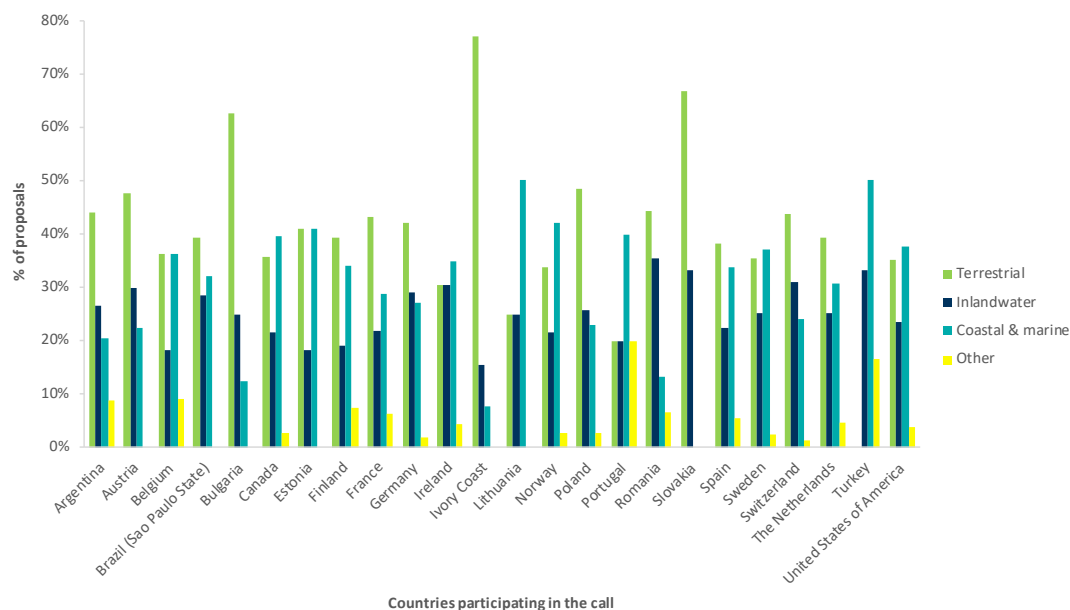

Figure 8: Percentage of the submitted proposals by country according to the environments studied. One proposal can address several environments.

This figure shows that the terrestrial environment was the main environment studied in the majority of participating countries. Only Canada, Ireland, Lithuania, Norway, Portugal, Sweden and Turkey had higher number of proposals submitted studying one of the other environments (generally coastal and marine).

Romania, Slovakia and Turkey had the highest proportion of inlandwater focused submitted proposals; while Lithuania and Turkey had the highest proportion of submitted proposals focusing on the coastal and marine environments.

Conclusions

The above analysis provides a good insight into the results of the BiodivScen COFUND call. The following aspects were found useful for future calls:

• The topic of this call has proven to be of great interest to the research community: it mobilised a large number of local and national agencies as well as the European Commission who allocated substantial funds to the call; and it mobilized a very high number of international consortia.

• Unfortunately, some countries participating to the call did not have any teams in the 21 proposals selected for funding. This was the case for Bulgaria, Ivory Coast, Lithuania and Slovakia. This situation is mainly explained by the fact that these teams were not well represented in the submitted proposals. Efforts to organise capacity building activities will be implemented in the future (BiodivERsA is notably developing activities to try to remediate this situation in its future calls). In addition, it is possible that the topic of this call was not mostly suitable for the research community of these countries.

• Thanks to the initial balance in the amounts of funding reserved by countries and to the flexibility of agencies to increase their budget when needed or seek other ways of flexibility, the Belmont Forum and BiodivERsA partners were able to fund a high number of proposals, strictly following the outputs of the selection procedure. The success rate obtained, i.e. over 16%, is deemed acceptable, although a success rate closer to 20% would have been preferred given the effort invested by both the agencies and applicants.

With regards to the content of the funded projects, they implement the recommendations made by the IPBES in its methodological assessment on scenarios and models of biodiversity and ecosystem services (notably by developing multiscale and multidriver scenarios, taking into account uncertainty in the developed scenarios, etc.). In this respect, it is expected that the funded projects will develop scenarios that could fill in the knowledge gaps identified by IPBES and feed future IPBES assessments and that are appropriate to support decision making, thus contributing to policy-interfacing.

Presentation of the 21 funded projects

Longyearbyen, Svalbard

Partners of the project:

The University Centre in Svalbard (UNIS), Longyearbyen, NORWAY

Norwegian Institute for water Research (NIVA), Oslo, NORWAY

NORCE Norwegian Research Centre AS, Bergen, NORWAY

University of Manitoba, Winnipeg, CANADA

Université du Québec, Rimouski, CANADA

Arctic Research Centre, University of Aarhus, DENMARK

Institute of Oceanology, Polish Academy of Sciences, Sopot, POLAND

University of Gdansk, Gdansk, POLAND

University of Alaska, Fairbanks, USA

University of Texas, Austin, USA

Duration:
12-2018 to 03-2022

Total grant:
€ 968,436

Further information:
Janne E. Søreide
janne.soreide@unis.no

ACCES – De-icing of Arctic Coasts: Critical or new opportunities for marine biodiversity and Ecosystem Services?

Context

Arctic coastal ecosystems are changing as climate changes and human activities increase, necessitating that government managers, industries, conservation organisations and communities have access to timely biodiversity and ecosystem status data, and if possible to plausible projections of status of biodiversity and ecosystem services over the next decades. The Arctic is characterised by an extensive coastline that constitutes 34% of the total global coasts. These nearshore waters are among the most productive regions and by far the most preferred ecotype for human settlements in the Arctic. Coastal waters are critical breeding and foraging grounds for many fishes, birds and marine mammals, and provide key ecosystem services that are vulnerable to climate induced stressors. Less sea ice, increased coastal erosion and sediment loads will physically change the nearshore bottom habitats and, thus, the biodiversity of these regions with cascading effects on food webs. Consequently, the coastal ecosystem goods and services (provisional, regulatory, socio-cultural) will also encounter changes. At present the extent of protected coastal marine ecosystems in the Arctic remains very small despite the fact that the Arctic coastal biodiversity is under growing pressure due to climate change and increased human activities.

Main objectives

To determine different de-icing scenarios to allow early warning of (socio-) ecological breakpoints and regime shifts and provide scientific and social science advice for sustainable ecosystem-based management of coastal regions in the high-Arctic.

Main activities

ACCES comprises a strong pan-Arctic and multidisciplinary team from Norway, Poland, Canada, US and Denmark. It will synthesize existing environmental and biodiversity data and generate new knowledge from sites spanning over a wide geographical scale from the Pacific to the Atlantic Arctic. The project's main objectives are to:

• Determine to what extent changes in hydrography, nutrient dynamics, underwater light and sediment load impact primary producers' biodiversity, distribution and bloom phenology;

• Identify consequences of sea ice decline on nearshore metazoan biodiversity, distribution and trophic structure;

• Start dialog with relevant stakeholders to document and analyse their development strategies and knowledge-needs in light of different de-icing scenarios.

ACCES plans for close engagement with the Arctic Council as they are developing monitoring and management plans for the region and would be primary users of the projects' outcomes. To build scenarios useful for decision-making, it is planned to involve local, regional and pan-Arctic knowledge alliances during the project and invite them to a larger stakeholder workshop in autumn 2019. Towards the end of the project a combined stakeholder and research session will be organized on the topic 'Sustainable Arctic Coasts' during the annual, international 'Arctic Frontiers' conference in Tromsø, Norway.

AlienScenarios - Developing and applying scenarios of biological invasions for the 21st century

Context

Human activity has modified virtually every facets of the biophysical environment on Earth, with profound implications for the status, distribution and resilience of biodiversity. Several major drivers of biodiversity loss have been identified, with climate change, land-use change and biological invasions being among the most important ones. Changes in climate and land use have received much attention during the last decades, which resulted in readily available scenarios. In contrast, approaches also accounting for biological invasions are still lacking despite the importance of this driver for biodiversity losses and cascading impacts on human livelihoods. Worryingly, recent research has shown that numbers of alien species are rising unabatedly in most taxonomic groups. Therefore, a thorough evaluation of plausible future trajectories of biological invasions is urgently needed to enable comprehensive assessments of biodiversity changes for the decades to come, to allow better-informed decisions of policy makers and stakeholders, and to examine the future implications of different societal responses for biological invasions.

Main objectives

AlienScenarios will, for the first time, evaluate the range of plausible futures of biological invasions for the 21st century at different spatial scales and for a range of taxonomic groups. It will combine the strategic forward-looking methodology of scenario planning with advanced modelling approaches to **construct plausible global mid-term (2050) and long-term (2100) futures of biological invasions and their impacts**.

Main activities

The project is divided into 7 interrelated working packages for:

1. Developing the **first global scenarios for biological invasions** for the 21st century;

2. Implementing **global quantitative models** of future alien species numbers under different biological invasion scenarios;

3. Evaluating the **future impacts of biological invasions** on the environment and human livelihoods under these different scenarios at a global scale;

4. Establishing **continental (Europe) scenarios and models** of biological invasions to assess the effectiveness of the EU regulation of invasive alien species;

5. Assessing the relationships between **alien species traits** and future impacts of biological invasions;

6. Expanding beyond temperate developed regions to understudied but highly biodiverse regions, and considering **invasions in the context of the Global South**, taking Panama as a study example;

7. Analysing the consequences of biological invasions in the 21st century under different **scenarios for policy and alien species management**.

In summary, in AlienScenarios we will quantitatively elucidate the plausible range of future invasion trajectories, provide crucially needed data for pro-active alien species management and policy, and explore options for arriving at preferred futures through the adaptation of existing policies.

The outcomes of the project will be disseminated through scientific publications in open-access journals and participation in international conferences, a book or a large review, a website, a Whiteboard Animation video (3 min), and a brochure and leaflets. Local stakeholders will be involved for the local socio-ecological study in Panama. Policy-makers will also be involved for assessing the effectiveness of EU regulations of invasive alien species.

Fraxinus pennsylvanicus, an alien plant species that causes substantial negative impacts on the environment and human livelihood

Partners of the project:

University of Vienna, Vienna, AUSTRIA

McGill University, Montreal, CANADA

Centre National de la Recherche Scientifique/University Paris Saclay, Orsay, FRANCE

IGB & FU Berlin, Berlin, GERMANY

Senckenberg Gesellschaft für Naturforschung, Frankfurt, GERMANY

Senckenberg Gesellschaft für Naturforschung, Leipzig, GERMANY

University of Girona, Girona, Catalonia, SPAIN

Duration:
03-2019 to 04-2022

Total grant:
€ 1,446,093

Further information:

Franz Essl
franz.essl@univie.ac.at

Lake Radujavri at 68°N in Sweden

Partners of the project:

Swedish University of Agricultural Sciences (SLU), Uppsala, SWEDEN

University of Alaska, Anchorage, USA

University of Copenhagen, GREENLAND, DENMARK

University of Oslo, NORWAY

Wilfrid Laurier University, Waterloo, CANADA

Insitut National de Recherche Scientifique (INRS), Québec, CANADA

Duration:
12-2018 to 03-2022

Total grant:
€ 1,314,391

Further information:

Willem Goedkoop
Willem.Goedkoop@slu.se

Joseph Culp
joseph.culp@canada.ca

ARCTIC-BIODIVER – Scenarios of freshwater biodiversity and ecosystem services in a changing Arctic

Context

ARCTIC-BIODIVER is an interdisciplinary, international research program focused on filling gaps in Arctic freshwater biodiversity knowledge, and developing biodiversity scenarios at national and circumpolar scales. The project considers both structural and functional biodiversity. Field testing of the projected climate change impacts on Arctic freshwater food web dynamics will allow estimating uncertainty in biodiversity scenarios. Moreover, the use of space-for-time analyses of shifts in biodiversity and basal resources will help propose indicators for early warning of the ecological impacts of climate change. ARCTIC-BIODIVER is further focused on the development of bio-economic models to integrate scenarios of biodiversity across trophic levels considering the socio-economics of ecosystem services provided by fish in the Arctic.

Main objectives

ARCTIC-BIODIVER will:

1. Evaluate biodiversity and functional trait patterns in relation to environmental drivers, including climate, nutrient enrichment, and terrestrial land use change;
2. Identify biodiversity hotspots and food web changes in lakes and rivers across latitudinal gradients in the Arctic;
3. Provide insight into how direct and indirect drivers related to climate change impact the biodiversity and trait composition of aquatic food webs, and ultimately fish production;
4. Use bio-economic models to evaluate socio-economic trade-offs and potential shifts in ecosystem services in Arctic lakes and rivers associated with climate change, nutrient enrichment, and resource exploitation;
5. Develop assessment criteria that better quantify the ecological change in Arctic freshwaters and provide strategies for the early detection of new and/or invasive species;
6. Inform policy makers, NGO's, people who live in the Arctic, and the global community about the ongoing change in Arctic freshwater ecosystems.

Main activities

ARCTIC-BIODIVER includes circumpolar lakes and rivers evaluation using an extensive monitoring database, and the collection of additional data along Arctic latitudinal gradients. Sample locations build upon prior monitoring activities and support stakeholders' interest in the assessment of biodiversity status and trends.

The project will evaluate multiple dimensions of biodiversity by using physical-chemical climate-change models to develop biodiversity scenarios, by quantifying changes to basal food resources that affect food webs, and by predicting consequences to ecosystem services at regional and circumpolar scales. It will elucidate socio-economic trade-offs and potential shifts in freshwater ecosystem services associated with climate change.

ARCTIC-BIODIVER will work closely with and support the goals of the Circumpolar Biodiversity Monitoring Program (CBMP) of Conservation of Arctic Flora and Fauna (CAFF). In particular, the project will address several of the policy recommendations outlined in the Arctic Biodiversity Assessment Report for Policy Makers, which is currently a high priority for CAFF and the Arctic Council. Project findings will feed directly into the work by CAFF and the Arctic Council. Other activities include formation of a stakeholder reference group, and the organization of several stakeholder engagement workshops.

BioDiv-Support – Scenario-based decision support for policy planning and adaptation to future changes in biodiversity and ecosystem services

Context

Biodiversity includes variation between species, as within species and habitats on Earth. Among the greatest threats to biodiversity are climate change, destruction of habitats and other human activities. High-altitude mountain regions are one of our most pristine environments, often with historically small impacts from air pollution, but at risk of being disproportionately impacted by climate change. We focus on three mountainous regions: the Scandinavian Mountains, the Guadarrama Mountains in Spain, and the Pyrenees in France, Andorra and Spain. We will study the impact of drivers of change of biodiversity such as future climate change, increased incidences of wild fires, emissions from new shipping routes in the Arctic as ice sheets are melting, human impacts on land use and management practices (such as reindeer grazing) and air pollution.

Main objectives

The aim of this project is to develop future scenarios of biodiversity and ecosystem services for decision-makers and other end users to enable enlightened decisions for adaptation and policy on local and regional scales. The project will focus on changes to vegetation, including for example changes to the forest and tree line, and the impact on and of grazing and wild fires, as well as other indicators and services. The scenarios will represent possible trajectories until the 2050s.

Main activities

The following main activities will be implemented:

• Simulate the changes in climate, nitrogen deposition and exposure to ozone in mountain ecosystems as a consequence of greenhouse gas emission and air pollution scenarios;
• Model the effect of mountain ecosystems in the Scandinavian, French and Spanish study areas in response to the developed climate and air pollution (AP) scenarios.

BioDiv-Support will also develop a web-based planning tool where local stakeholders in each region can explore the project results to understand how scenarios of climate change, air pollution and policy development will affect these ecosystems. Local stakeholders will be involved through different workshops. On the Global and European scales we will participate in meetings by networks bridging between the scientific and the policy communities, e.g. Arctic Monitoring and Assessment Programme (AMAP), United Nations Economic Commission for Europe (UNECE), Convention on Long-Range Transboundary Air Pollution (CLRTAP) on the subject of Hemispheric Transport of Air Pollution (HTAP).

Meadow in the Scandes moutains

Partners of the project:

Swedish Meteorological and Hydrological Institute (SMHI), Norrköping, SWEDEN

Lund University, SWEDEN

Stockholm University, SWEDEN

University of Gothenburg, SWEDEN

Finnish Meteorological Institute, Helsinki, FINLAND

INERIS, Verneuil-en-Halatte, FRANCE

Senckenberggesellschaft für Naturforschung, Frankfurtm am Main, GERMANY

Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (CIEMAT), Madrid, SPAIN

Duration:
12-2018 to 03-2022

Total grant:
€ 1,277,311

Further information:
Camilla Andersson
camilla.andersson@smhi.se

Website:
www.smhi.se/research/biodivsupport

Saperda scalaris is a species of beetle in the family Cerambycidae. It feeds predominantly on broadleaf trees. Changing conifers to broadleafs will increase its host availability.

www.biodiversa.org

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BIOESSHEALTH – Scenarios for biodiversity and ecosystem services acknowledging health

Context

Wood production is a pivotal provisioning ecosystem service of major economic importance and a key component of the transition from a fossil- to a bio-based economy. However, intensive utilization of forests also affects the viability of forest species and other ecosystem services, such as sustaining human wellbeing in the form of stress reduction or recovery. It is therefore needed to modify forest management to secure high yield of wood products, the stability of biological communities and the use of forest to promote public health.

Main objectives

The overall objective is to identify national forest management strategies that produce wood in a sustainable way while also promoting public health. The strategies will balance the global demand for wood, the profitability of forestry, the preservation of forest species communities, and promotion of human wellbeing. The project will estimate the future global demand for wood and the supply of wood in EU countries during the coming 100 years, using the scenarios in the UN Emissions Gap Report. Based on the estimated global demand for wood from the study countries, the project will identify landscape-level scenarios with profitable forestry, stable communities of forest beetles and enhanced human wellbeing. To identify these scenarios, the project will first further develop the global land-use model GLOBIOM, develop models for the structure of beetle communities and an index for human wellbeing reflecting stress reduction or recovery in relation with the diversity of different organism groups.

Main activities

Core work include formulating and simulating scenarios for land-use, forestry and conservation, from the global to the landscape scale. The global scale simulations will account for factors such as consumer demand, production capacity, and competition between geographical regions and land use sectors. The landscape scale simulations will differ concerning forestry parameters, such as stand rotation length and tree species composition. They will also differ concerning strategies to promote conservation and human wellbeing. We will both compile available empirical data and collect new data in the field. These data will be used to build the models for beetle community structure and interactions between forest trees. We will also develop an index for human wellbeing for continental forest depending on forest conditions, based on the experiences from doing this in the Nordic countries. These models and indices will be used in the scenario simulations.

Two-way interactions with stakeholders will be implemented throughout the project. Initially, stakeholders will provide input on the scenario formulation. When the results from the scenario simulations are available, discussions with stakeholders on how to translate the findings into management guidelines will be carried out. Finally, the dissemination of the project's results will be made in close link with key stakeholders representing the forest industry, NGOs and governmental officers.

Partners of the project:

Swedish University of Agricultural Sciences (SLU), Uppsala, SWEDEN

Swedish University of Agricultural Sciences (SLU), Alnarp, SWEDEN

University of Jyväskylä, FINLAND

Technische Universität München, Freising, GERMANY

Julius-Maximilians-Universität Würzburg, Rauhenebrach, GERMANY

International Institute for Applied Systems Analysis, Laxenburg, AUSTRIA

Norwegian University of Life Sciences, Aas, NORWAY

Duration:
11-2018 to 03-2022

Total grant:
€ 2,051,937

Further information:
Tord Snäll
tord.snall@slu.se

www.biodiversa.org

www.belmontforum.org

BONDS – Balancing biOdiversity coNservation with Development in Amazonian wetlandS

Context

Amazonian "whitewater" river floodplains have long been centers for human settlements. Over the past several decades, unprecedented demographic and economic growths have influenced resource use and challenged capacity to sustain both humans and biodiversity on the floodplain and bordering upland. Threats to the integrity of Amazon floodplain habitats from dams, river navigation networks, extension of the agricultural frontier, and climate change are increasingly severe. However, to date, biodiversity scenarios for the Amazon wetlands have not considered all these critical drivers.

Main objectives

The overall objective is to work with stakeholders to find solutions enabling preservation of biodiversity and ecosystem services in Amazon floodplain environments under a variety of development scenarios, and to provide support for decision-making at local and regional scales. To explore potential scenarios of Amazonian floodplain biodiversity and services in a rapidly changing socio-environment, BONDS will:

1. Improve methods for capturing the spatio-temporal variability of floodplain habitats, allowing us to scale up existing biodiversity data sets and to evaluate the potential impacts of drivers such as climate, land use intensification, and dams upon wetlands habitats;

2. Improve knowledge on the interactions between local populations and their environment and how they may adapt to changes in regional drivers, including socio-demographic and socio-economic drivers;

3. Understand how public policies and governance have contributed and may better contribute to wetland habitat protection and freshwater biodiversity conservation by comparing several scenarios.

Main activities

Wetland habitats will be mapped combining multiple remote sensing products at medium to high resolution. The interactions between biodiversity, habitats, hydrology and fisheries management will be studied. Exploratory scenarios will be built with different types of stakeholders (e.g. local population, commercial fisheries representatives) and decision-makers.

Specific activities for dissemination of the project's outputs will be implemented, including contribution to GEO BON, GEO Wetlands and GBIF databases. Knowledge transfer and involvement of stakeholders / policy-makers into the research will be promoted through their participation into the construction of the conceptual floodplain socio-ecosystem model that will be implemented as a multi-agent-based communication platform. The latter will be further used to explore scenarios with them to look at solutions to improve management.

Local fishermen at work in Janauacá floodplain

Partners of the project:

Institut de Recherche pour le Développement (IRD), Montpellier, FRANCE

Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD), Montpellier, FRANCE

Institut de Recherche en Sciences et Technologies pour l'Environnement et l'Agriculture (IRSTEA), Montpellier, FRANCE

Instituto Nacional de Pesquisas Espaciais, Sao José dos Campos, BRAZIL

Universidade de Brasília, Brasilia, BRAZIL

Universidad Nacional de Colombia, Palmira, COLOMBIA

Friedrich-Schiller-University, Jena, GERMANY

Norwegian University of Life Sciences, Aas, NORWAY

Université de Lausanne, SWITZERLAND

University of East Anglia, Norwich, UNITED KINGDOM

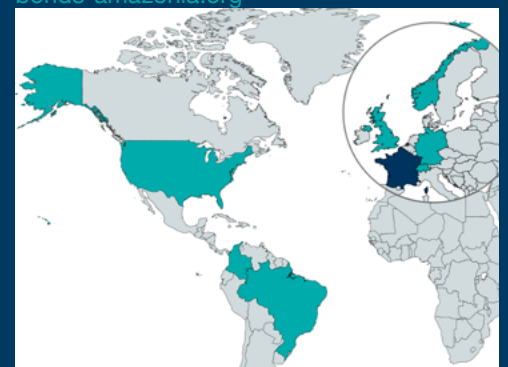University of California, Santa Barbara, USA

Virginia Polytechnic Institute and State University, Blacksburg, USA

Duration:
02-2019 to 03-2022

Total grant:
€ 1,229,205

Further information:
Marie-Paule Bonnet
marie-paule.bonnet@ird.fr

Website:
bonds-amazonia.org

View of the Alaska Range from Wonder Lake in Denali National Park

Partners of the project:

Swedish University of Agricultural Sciences (SLU), Alnarp, SWEDEN

Stockholm Resilience Centre, SWEDEN

International Union for Conservation of Nature, Brussels, BELGIUM

University of Göttingen, GERMANY

Fundació per a la Universitat Oberta de Catalunya, Barcelona, SPAIN

Scienseed, Madrid, SPAIN

The University of Edinburgh, UNITED KINGDOM

Vrije Universiteit, Amsterdam, THE NETHERLANDS

University of Illinois, Urbana, USA

Duration:
12-2018 to 03-2022

Total grant:
€ 1,573,492

Further information:

Christopher Raymond
Christopher.Raymond@slu.se

www.biodiversa.org

www.belmontforum.org

ENVISION – An inclusive approach to assessing integrative scenarios and visions for protected area management

Context

Developing protected area (PA) management strategies that enhance biodiversity conservation while also supporting the needs of stakeholders is a major global challenge. Assessing the consequences of diverse visions on biodiversity, ecosystem services, and well-being across stakeholder groups remains a critical research gap which restricts guidance to decision making.

Main objectives

In partnership with local residents, protected area managers and diverse industry groups, we will examine the consequences of multiple visions for PA management, using mixed-method, participatory scenario planning tools, in four case study areas: Västra Harg (Sweden), Utrechtse Heuvelrug & Kromme Rijn region (The Netherlands), Sierra de Guadarrama National Park (Spain) and Denali National Park and Preserve (United States).

Main activities

- Establish an integrative social-ecological approach for inclusive conservation that considers multiple visions and scenarios for PA management;
- Quantitatively assess the consequences of different scenarios and associated visions (related e.g., to tourism, agriculture, mining, recreation) on agro-biodiversity and biodiversity associated with semi-natural (protected) areas and cultural landscapes, and human well-being;
- Test how social learning about the consequences of each vision changes values and enables the development of collectively defined visions for PA management;
- Better understand how uncertainties can be dealt with and translated into more resilient PA management strategies;
- Propose inclusive governance models capable of informing PA decision-making at multiple scales;
- Communicate and disseminate project findings to diverse stakeholders within and across study areas.

The ENVISION project will result in the development of several communications and policy tools:

- A set of mixed methods that enable a more inclusive approach to the conservation of protected areas (termed: inclusive conservation);
- Development of local and regional knowledge alliances composed of key stakeholders for ongoing engagement in the different stages of research;
- Targeted outreach events to policy-makers and practitioners, including a business breakfast and side events at EU Green Week and IUCN World Conservation Congress;
- Timely policy and planning recommendations, in the form of fact sheets, presentations and brochures, to protected area managers to inform post-2020 debates on the conservation of biodiversity and ecosystems;
- A unique set of scenario planning techniques for identifying different community and industry visions for protected area management, and for understanding their consequences on biodiversity, ecosystem services and human well-being.

FARMS4Biodiversity – Farmer-led Agroecological Research in Malawi using Scenarios for Biodiversity and Ecosystem Services

Context

Malawi mirrors many socioeconomic and ecological systems across Africa in that complex factors drive high food insecurity, deforestation, soil degradation, and urbanization. Agricultural interventions relying on store-bought fertilizers and synthetic pesticides have not delivered anticipated benefits, and demand for fuelwood and agricultural land is driving significant changes in land use. These challenges threaten human well-being, biodiversity, and ecosystem services such as pollination and pest control. A growing body of research suggests that agroecological practices, such as the use of pesticidal plants as botanical sprays and crop diversification, may buffer a farm against biodiversity loss resulting from land use change. Yet little of this research explores biodiversity scenarios for African agroecosystems that account for the link between biodiversity and ecosystem services (including crop productivity) and for how local-level practices scale to landscape-level benefits.

Main objectives

FARMS4Biodiversity engages farmers in Malawi in collaboration with scientists (including from Malawi) from diverse fields, in order to examine five questions:

1. Can agroecological practices at different scales buffer against the loss of biodiversity and ecosystem services?

2. Are there breakpoints of adoption above which biodiversity and ecosystem services are best retained?

3. Do social roles and/or forces influence agroecological practice adoption and community resilience?

4. Can participatory scenario planning enhance resilience and biodiversity in light of climate and land use changes?

5. Do new institutional/policy frameworks facilitate the use of agroecological practices?

Main activities

The project has four interrelated work packages involving the following tasks:

1. Researchers collect ecological, agricultural and land cover data. Analysis will lead to the creation of models of land use change over the next 25 years and their likely impacts.

2. Surveys assess how community-level social factors shape agroecological practices, perceptions and use of wild biodiversity and ecosystem services.

3. Farmers and researchers use satellite imagery, GPS, and other participatory methods to create maps of their communities, drawing on local knowledge to address environmental and social change.

4. Multi-actor platforms bring together diverse stakeholders to identify policies, tools, and technologies to support agricultural systems that promote biodiversity, food security, and resilience.

Each element of the project is designed to build knowledge and facilitate knowledge transfer between farming communities, policy makers and scientists. Farmers have critical roles in each part of the project, including but not limited to ecological data collection, participatory land use change scenario planning, and policy discussion. Results will be actively shared and disseminated through community meetings, publications and social media.

The SFHC Farmer Training Center provides a place to experiment with intercropping and other agroecological techniques.

Partners of the project:

Cornell University, Ithaca, UNITED STATES

University of Denver, UNITED STATES

Western University, London, CANADA

University of Würzburg, GERMANY

Lilongwe University of Agricultural and Natural Resources (LUANAR), Lilongwe, MALAWI

Soils, Food and Healthy Communities (SFHC), Ekwendeni, MALAWI

Norwegian Institute of Bioeconomy Research (NIBIO), Aas, NORWAY

Duration:
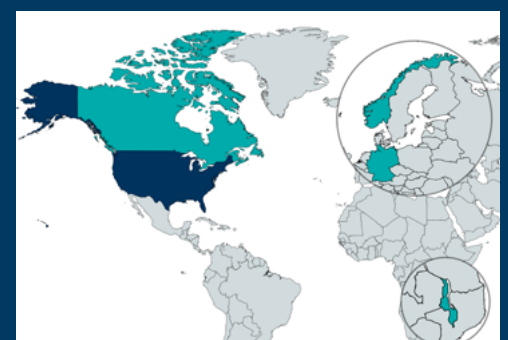11-2018 to 03-2022

Total grant:
€ 996,350

Further information:
Rachel Bezner Kerr
rbeznerkerr@cornell.edu

Website:
https://soilandfood.org/projects/farms4biodiversity

Eveny reindeer herder Vasilii Popov passing on his traditional knowledge of reindeer management to the next generation. Yakutia.

biodiversa
www.biodiversa.org

BELMONT FORUM
www.belmontforum.org

FATE – Future ArcTic Ecosystems: drivers of diversity and future scenarios from ethno-ecology, contemporary ecology and ancient DNA

Context

The Arctic is currently experiencing dramatic ecosystem changes due to climate warming and increased anthropogenic pressure, influencing biodiversity and ecosystem services. Understanding the relative impacts of climate, herbivory and human management on ecosystems, is of paramount importance for their long-term sustainability as well as for the well-being of communities across the circumpolar North. Well-informed ecosystem management and species conservation are however precluded by the scarcity of long-term (millennia) data sets spanning ancient and contemporary climatic and land use events. FATE will therefore conduct a comprehensive inter- and trans-disciplinary study using sedimentary ancient DNA, current ecological observations and anthropological investigations of indigenous peoples' knowledge and interpretations.

Main objectives

1. Determine local biodiversity changes and vegetation shifts over large spatial (circumarctic) and temporal (Last Glacial Maximum until today) scale;

2. Identify drivers of recent and historic biodiversity changes and integrate them in climatic niche models to forecast future biodiversity changes;

3. Chronicle indigenous and local knowledge (ILK) of biodiversity changes and their drivers;

4. Build exploratory and predictive scenarios to link potential ecosystem shifts to changes in biodiversity and ecosystem services relevant for local communities in the Arctic.

Main activities

1. Retrieve and identify ancient DNA of plants, mammals and fungi at a high temporal resolution from sediment cores from across the Arctic;

2. Integrate data from local long-term ecological experiments that have been running for the last decades with the molecular genetic paleo-data;

3. Carry out anthropological field studies in four different communities in Northern Siberia and Northern Europe;

4. Build scenarios based on the outcomes of 1-3 in an iterative process with local stakeholders.

The project integrates the knowledge and needs of local communities and stakeholders from the start, as it will generate the outcomes and build the scenarios in an iterative and collaborative manner. Results will be communicated directly to participating communities, both through the work and through popular publications in the local languages, as well as to local decision-making bodies in the Arctic. A wider audience will be addressed in a series of workshops and public conferences, with the final project conference organized around the Jokkmokk Winter Market in 2022 as a public event.

Partners of the project:

University of Konstanz, GERMANY & Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, Potsdam, GERMANY

Tromsø Museum, UiT - The Arctic University of Norway, NORWAY

Umeå University, SWEDEN

UNESCO, Paris, FRANCE

Université Paris Sud, Orsay, FRANCE

University of Lapland, Rovaniemi, FINLAND

University of Alberta, Edmonton, CANADA

University of California, Santa Cruz, USA

Duration:
12-2018 to 04-2022

Total grant:
€ 1,737,830

Further information:

Laura Epp
laura.epp@uni-konstanz.de

www.biodiversa.org

www.belmontforum.org

Future BirdScenarios – Integrating citizen science data from national monitoring schemes to model impacts of global change scenarios

Eurasian Dotterel (Charadrius morinellus) are a declining species of mountain bird in Fennoscandia.

Context

Bird communities play an important ecological role in northern ecosystems. The economic benefits of birds are linked to dispersal of seeds in native forests, control of insect pests in agricultural systems, and provision of important game species for harvest. However, potential conflict may arise due to crop damage or impacts on fish production. The goal of this project is to understand how environmental change will affect the future distributions of birds and their ecological benefits and conflicts with human society. It will integrate information on bird numbers and distributions in northern Europe that has been collected under different national survey programs, and with opportunistic records reported to citizen science programs. New statistical models will be used to combine bird records with geographic information for predicting future distributions of birds under different scenarios of environmental change.

Main objectives

The objectives of the Future Bird Scenarios project are to:

- Examine the role of climate, food, and habitat in determining distributions of the breeding and non-breeding birds in terrestrial, freshwater, and coastal marine environments;
- Determine the effects that long-term changes in climate, land use and other environmental factors would have on the future distributions of bird species;
- Forecast the potential effects that future changes in bird distributions would have upon networks of protected areas and the ecosystem services provided by bird populations.

Main activities

To assess the plausible future changes in bird distributions in Fennoscandia and their implications, activities will include:

- Analysis of the life-history traits that make bird species more likely to respond to future ecological change. For instance, are risks greater for migratory species, large-bodied birds, or species with habitat specialization?
- Identification of the key bottlenecks in the annual cycles of migratory birds. Are limiting factors acting in the breeding or nonbreeding range, and do different factors act at different stages of the annual cycle?
- Investigation of risk factors for birds that inhabit alpine habitats at high elevations. What are the relative effects of climate change, abandonment of traditional grazing practices, fall harvest, or changes in predator numbers?
- Determination of whether current networks of protected areas will be in the future. Will new protected areas need to be established if bird distributions are changing?
- Evaluation of potential impacts on ecosystem services. Will changing avian distributions reduce benefits from seed dispersal and pest management, or increase conflicts with crop damage and depredation?

The research team will engage stakeholders involved with management of natural resources. Stakeholders for the Future Bird Scenarios project include government agencies responsible for management of public lands in national forests, local communities involved in wetland restoration, and partners in the agricultural, forestry, and fisheries sectors. Project results will be disseminated at a national level through workshops, press releases, and open access project publications. At an international level, we will work with the European Bird Census Council and Wetlands International to develop new plans and recommendations for conservation of critical habitats for birds and other wildlife species.

Partners of the project:

Norwegian Institute for Nature Research, Trondheim, NORWAY

Lund University, SWEDEN

Swedish University of Agricultural Sciences (SLU), Uppsala, SWEDEN

University of Helsinki, FINLAND

University of Turku, FINLAND

Cornell University, Ithaca, USA

Duration:
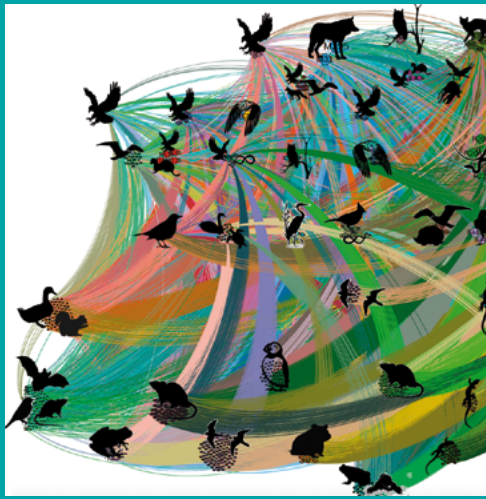12-2018 to 03-2022

Total grant:
€1,026,560

Further information:

Brett K. Sandercock
brett.sandercock@nina.no

Metaweb of interactions between species.

Partners of the project:

Université Grenoble Alpes/Centre National de la Recherche Scientifique (CNRS), FRANCE

University of Helsinki, FINLAND

German Centre for Integrative Biodiversity Research (iDiv), Halle-Jena-Leipzig, GERMANY

University of Rome "La Sapienza", ITALY

Vrije Universiteit Amsterdam, THE NETHERLANDS

Swiss Federal Research Institute, Birmensdorf, SWITZERLAND

Duke University, Durham, USA

UNEP World Conservation Monitoring Centre, Cambridge, UNITED KINGDOM

Duration:
03-2019 to 03-2022

Total grant:
€ 1,269,532

Further information:
Wilfried Thuiller
wilfried.thuiller@univ-grenoble-alpes.fr

FutureWeb – Climate and land use change threat to the vertebrate European food web structure and functioning

Context

Abrupt climate change and drastic land-use change, along with other human-made disturbances, have already triggered species extinctions, range shifts, and phenological changes. However, up to now research has mostly provided simplified predictions and scenarios that overlook many of the most relevant biological processes in ecological systems and do not report or assess uncertainties. First, most biodiversity models have been heavily criticized because they ignore basic mechanisms, such as biotic interactions and links between trophic levels (e.g. predator-prey). A second, strongly related limitation is that the relationship between multi-trophic assemblages, ecosystem functioning and ecosystem services is poorly understood and modelled. Third, most current studies of biodiversity and ecosystem services focus on a single biodiversity model or one or a few climate scenarios. Finally, the conservation agenda needs a paradigm shift from focusing on species rarity and threat alone to also securing the structure and functioning of food-webs.

Main objectives

FutureWeb will integrate predictive biogeography, geography, biostatistics and trophic web ecology to derive an ensemble of scenarios of the impact of global change on multi-trophic vertebrate biodiversity, ecosystem functioning and the provision of ecosystem services in Europe. Through an effective involvement of relevant stakeholders, the project will adapt methodological choices, scenarios and indicators in such a way that the results are useful for conservation planning and decision-making support.

Main activities

A set of harmonized ecological and environmental data across Europe will be developed, including species distribution data, species trait data and a fully resolved species interaction matrix for all European vertebrates, as well as high resolution climatic and land use layers for both current and future conditions. In parallel, FutureWeb will develop, benchmark and extend novel multi-trophic biodiversity models to larger spatial scales and multi-trophic diversity data. These will be applied to all vertebrate species to project their potential distributions under ensembles of climate and land use scenarios while accounting for their trophic interactions. Using metabolic theory, the project will then integrate measures of multi-trophic ecosystem functioning and services in the ensemble predictions. Finally, it will identify areas that should be conservation priorities by combining the principles of systematic conservation planning with the ensembles of projections of biodiversity projections, multi-trophic functioning and ecosystem services.

FutureWeb will ensure an effective application and uptake of scenarios and models in policy- and decision-making by involving policy makers, practitioners and other relevant stakeholders throughout the entire process of scenario development, selection of relevant biodiversity/ecosystem functioning and services variables, and evaluation of conservation options.

GloBAM – Towards monitoring, understanding and forecasting Global Biomass flows of Aerial Migrants

Context

Trillions of migratory insects and birds, encompassing thousands of tons of animal biomass, move through the air within and across continents. Migrants are an important component of biodiversity and provide a multitude of services and disservices to human economy, agriculture and health. Over the past years, many of these migrant populations have alarmingly declined. The terrestrial and aerial habitats of these migrants have changed dramatically, particularly from human-driven land use alterations, increased urbanization, massive extensions of artificial light and rapid climate change.

Main objectives

GloBAM aims at quantifying the magnitude, spatial extent and timing of aerial migrations, understanding their (functional) relations with environmental and socio-economic variables, and projecting the consequences of future socio-economic changes on migratory populations.

Main activities

To achieve its aims, the project will:

• Retrieve biological information from (weather) radar networks;

• Quantify biomass flows of aerial migrants (birds and insects) in Europe and North America, and estimate the role of migrants in ecosystem functioning;

• Identify how these biomass flows are related to external variables, particularly weather and climate, along with habitat and land use characteristics including artificial light and wind energy installations;

• Develop scenarios for future changes in these variables and assess their consequences on the movements and population dynamics of aerial migrants.

This research addresses challenging and pressing biodiversity issues. Migratory animals are an integral component of biodiversity and have been declining at an alarming rate and international legislation often requires the conservation of migratory species. Identifying the response of migrants to climatic and land-use changes is fundamental for efficient conservation and mitigation of human-wildlife conflicts.

Therefore, the project will link to various stakeholders, from conservation practitioners and policy makers, to the wind energy sector and aviation safety, to assist in developing a) standard **long-term and large-scale monitoring of aerial migrations**; b) **policies** regarding artificial light; c) forecast models to **support mitigation procedures for wind energy installations**; and d) **policies for conservation** of crucial (aerial) habitat, core locations and time-periods that are essential for sustaining migratory populations.

Arctic waterfowl migration along the Gulf of Finland

Partners of the project:

Swiss Ornithological Institute, Sempach, SWITZERLAND

Finish Meteorological Institute, Helsinki, FINLAND

Research Institute for Nature and Forest, Brussels, BELGIUM

University of Amsterdam, THE NETHERLANDS

University of Exeter, UNITED KINGDOM

Cornell Lab of Ornithology, Ithaca, USA

Duration:
12-2018 to 03-2022

Total grant:
€ 1,391,047

Further information:
Silke Bauer
Silke.s.bauer@gmail.com

Website:
www.enram.eu/globam

Prickly pear (Opuntia) invasion in Southern Spain

InvasiBES – Understanding and managing the impacts of Invasive alien species on Biodiversity and Ecosystem Services

Context

Invasive Alien Species (IAS) are a direct driver of biodiversity loss and have major impacts on supporting, provisioning, regulating and cultural services. Both the numbers and distributions of IAS are increasing in many parts of the world. This is fostered by international trade and travel, with multimillion costs arising from economic loss in the agriculture, forestry, energy and health sectors, and cost of controlling and eradicating invasions. Climate change introduces an additional challenge for IAS management because species' ranges are shifting in response to warming. Researchers and managers are under growing pressure to evaluate the costs and benefits of plausible intervention scenarios to control invasions and maintain ecosystem services. However, past research has mainly focused on the ecological factors determining the success of IAS and changes in biodiversity after invasion, treating ecosystem services only marginally. To support policy and management, there is an urgent need to synthesize knowledge across habitats and scales, thereby providing a comprehensive understanding of the multi-faceted impacts of IAS.

Main objectives

Using data derived from surveys and experiments and models across habitats (terrestrial, freshwater and marine) and scales (continental and local), InvasiBES aims to better understand and anticipate the impacts of IAS on biodiversity and ecosystem services and to provide tools for their management.

Main activities

InvasiBES will design three future intervention scenarios focused on prevention, control and eradication of IAS in Europe and the US, through a participatory process bringing together the expertise of scientists and stakeholders. We will also adapt current impact assessment protocols (EICAT and SEICAT) to consider both the detrimental and beneficial impacts of IAS on biodiversity and ecosystem services. This information will be combined with maps of the potential distribution of some of the worst IAS in Europe and the US under current and future climate change scenarios. Models and maps will serve to evaluate the costs and benefits in terms of ecosystem services of alternative IAS intervention scenarios. Moreover, focusing on three local scale studies that cover a range of habitats (freshwater, terrestrial and marine), invasive species (plants and animals) and ecosystem services (supporting, provisioning, regulating and cultural), we will quantify the impacts of IAS and explore the recovery of ecosystems after the invader is removed. Spatial planning tools (InVEST) will be used to evaluate the costs and benefits of intervention scenarios at the local scale.

The results of InvasiBES are of high interest for policy stakeholders and practitioners who aim to invest IAS management resources efficiently and solve potential conflicts using science-based analyses of costs and benefits for ecosystems and society. Because InvasiBES will prioritize IAS listed under EU regulation for analysis, European and member state policy-makers and practitioners will be especially interested in the project and invited to engage from the beginning. In the US, we will collaborate with the Northeast Regional Invasive Species and Climate Change (RISCC) Management Network to support the regulatory listing of high-priority species identified in this project.

Partners of the project:

Estación Biológica de Doñana, CSIC, Seville, SPAIN

Instituto Pirenaico de Ecología, CSIC, Zaragoza, SPAIN

University of Fribourg, SWITZERLAND

Laboratoire d'Ecologie Alpine, Université Grenoble Alpes, FRANCE

Institute of Biology, Freie Universität Berlin, GERMANY

University of Massachusetts, Amherst, USA

University of California, Irvine, USA

Duration:
01-2019 to 03-2022

Total grant:
€ 967,046

Further information:
Montserrat Vilà
montse.vila@ebd.csic.es

Belinda Gallardo
belinda@ipe.csic.es

Website:
http://elabs.ebd.csic.es/web/invasibes

www.biodiversa.org

www.belmontforum.org

Land2Sea – integrated modelling of consequences of terrestrial activities and climate change for freshwater and coastal marine biodiversity and ecosystem services

Context

Environmental policy and management to regulate multiple human activities require detailed understanding of how activities act individually and in combination to affect ecosystems and the range of services they provide. Progress has been made in characterising effects of many anthropogenic pressures on biodiversity, consequences for ecosystems and links to services. However research must be extended to capture effects in multiple dimensions of biodiversity and determine how changes in one ecosystem affect others.

Main objectives

Land2Sea aims to:

- develop an integrative framework of coupled models for predicting the immediate and long term consequences of land-use and climate change for the delivery of ecosystem services and the underlying biodiversity and ecosystem processes in freshwater and marine ecosystems;
- co-design a mechanism for the application of the framework to environmental policy & practice.

Main activities

The project will focus on combined impacts on freshwater and marine systems of selected human inputs to terrestrial systems (nutrients, biocides) and future climate-induced changes to hydromorphology. Empirical research will characterise combined effects of these stressors on multiple dimensions of biodiversity and on ecosystem processes, services and benefits. Findings will fill gaps in existing knowledge, which will be reviewed and complemented by expert opinion as a basis for a framework of coupled models (physical, biological and socio-economic) to predict impacts on aquatic ecosystems and ecosystem services. The framework and its application to policy and management will be developed and trialed for four case study catchments: Dublin Bay (Ireland), the St Lawrence Estuary (Canada), Bohuslän (Sweden) and the German part of the Wadden Sea.

Land2Sea will use online communication to inform, solicit participation of and engage stakeholders. Data and outputs will be accessible via platforms such as OPPLA, BISE and the OGSL. Land2Sea will engage differentially with its specific target groups. Workshops and other face to face interactions with stakeholders will be a key to engaging local stakeholders and communities. There will also be workshops with environmental decision-makers and planners. A Stakeholder Advisory Group will fine tune the work programme, ensure that the results will meet the needs of end-users and help with dissemination.

Bray, Ireland: a coastal community deriving benefits from terrestrial, freshwater and marine ecosystems

Partners of the project:

University College Dublin, IRELAND

Trinity College Dublin, IRELAND

Université Laval, Quebec, CANADA

Helmholz Zentrum, Geesthacht, GERMANY

University of Duisberg-Essen, Essen, GERMANY

University of Gothenburg, SWEDEN

Colorado State University, Fort Collins, USA

Duration:
11-2018 to 04-2022

Total grant:
€ 1,390,602

Further information:

Tasman Crowe
tasman.crowe@ucd.ie

Inlet into Lake Ringsjön with the highest nutrient inflow, Hörby 2015

biodiversa
www.biodiversa.org

BELMONT FORUM
www.belmontforum.org

LimnoScenES – Developing social-ecological scenarios for biodiversity and ecosystem service changes in north temperate freshwater ecosystems over the next half century

Context

Human life depends on the quality and quantity of freshwater, which is why many stakeholders organize themselves for collaborative management regarding this issue. However, successful collaboration is challenged by high uncertainty about impacts of climate change, the interaction between global and local disturbances affecting freshwater biodiversity, and multiple human activities like farming that appear only indirectly related to freshwater. A prominent example from the past is the accumulation of nutrients in freshwaters from overfertilization in agriculture and point pollution - leading to dangerous algae blooms and affecting biodiversity. The challenge for managing freshwaters in the future is to develop adaptive strategies that take into account ecological and social changes and visions, as well as their interaction. Processes of learning and anticipation are of utmost importance to inform actors to guide the resilience of ecosystem service provision.

Main objectives

LimnoScenES aims to support freshwater managers in decision-making through the development of future scenarios of biodiversity and ecosystem services useful to manage freshwaters for improved resilience. It will:

1. Estimate freshwater biodiversity and ecosystem services linked to water quality and develop/analyse modelled scenarios;

2. Create participatory scenarios to enable the visioning of maintenance and improvement of biodiversity and ecosystem services under different climate, societal and socio-economic trajectories focusing on transformative learning;

3. Improve the understanding of long-term dynamics which emerge from complex social-ecological feedbacks through management, use and pollution of freshwater systems.

Main activities

Based on three case studies in Sweden, Germany and Canada, the project will develop a new generation of social-ecological scenarios by:

1. Improving impact models with integrated global and local stressors, focusing on resilience,

2. Developing stakeholder visions for life close to water, and

3. Model the coupled dynamics of human-freshwater systems.

LimnoScenES will support water managers in developing adaptive measures against stressors from climate change, as well as for managing trade-offs among freshwater-based ES and biodiversity. The consortium will disseminate project results to scientists, stakeholders in the case studies (practitioners, policy makers, and administrators), and the general public through the following activities:

• Blog reports informing about the activities, the case study process, and project results

• An animated video to illustrate long-term dynamics such as eutrophication and restoration formed by social-ecological feedbacks, how they are shaped by climate and institutional change, and play a role in ecological and participatory scenarios in the three case studies such as eutrophication and restoration formed by social-ecological feedbacks, how they are shaped by climate and institutional change, and play a role in ecological and participatory scenarios in the three case studies

• A final project workshop to report back results to the stakeholders from each location, to policy makers from regions facing similar issues, and to stakeholders from the IPBES process.

Partners of the project:

Stockholm Resilience Centre, Stockholm University, SWEDEN

Lund University, SWEDEN

Université du Québec, Montreal, CANADA

University of Osnabrück, GERMANY

Leibniz Institute of Freshwater Ecology and Inland Fisheries, Berlin, GERMANY

Duration:
12-2018 to 03-2022

Total grant:
€ 1,589,396

Further information:

Maja Schlüter
maja.schlueter@su.se

Romina Martin
romina.martin@su.se

OBServ – Open Library of Pollinator Biodiversity and Ecosystem Services

Context

Biodiversity is now recognized as pivotal in maintaining ecosystem functions and providing ecosystem services with positive impacts for human well-being. Paradoxically, biodiversity is also being lost at unprecedented rates due to rapid human-induced environmental changes. OBServ focuses on pollinators and the pollination service they provide given their key contributions to biodiversity maintenance and food security and their threatened status globally.

Main objectives

OBServ aims to provide guidance and a formal cost-benefit analysis on the use of different modelling approaches to develop scenarios of pollinator biodiversity and ecosystem services provision. Rather than aiming at finding one model that can be applied universally, we need tools that allow us to select the right models for each situation while taking into account model complexity and data requirements.

Main activities

OBServ will use the open source environment k.LAB to develop a user-friendly open library of modelled scenarios in collaboration with stakeholders. By using a participatory approach with relevant stakeholders from four different countries, the project will assess the utility of the developed models and scenarios for the end users, including performance across scales and proper communication of uncertainty. The best models will be used for map pollination services under different environmental scenarios ranging from global trends extracted from IPCC and land use cover predictions, to local potential implementations of better management practices.

Specific activities for dissemination of the project's outputs, knowledge transfer and involvement of stakeholders / policy-makers will include stakeholders workshops, demonstration events, and webpage tutorials on how to use the developed tools.

A wild bee, Amegilla albigena, approaching a rosemary bush. Bees are key pollinators ensuring the functioning of ecosystems.

Partners of the project:

Estación Biológica de Doñana, CSIC, Seville, SPAIN

Basque Centre for Climate Change, Leioa, SPAIN

Instituto de Investigaciones en Recursos Naturales, Agroecología y Desarrollo Rural, San Carlos de Bariloche, ARGENTINA

Wageningen University, THE NETHERLANDS

Rutgers University, New Brunswick, USA
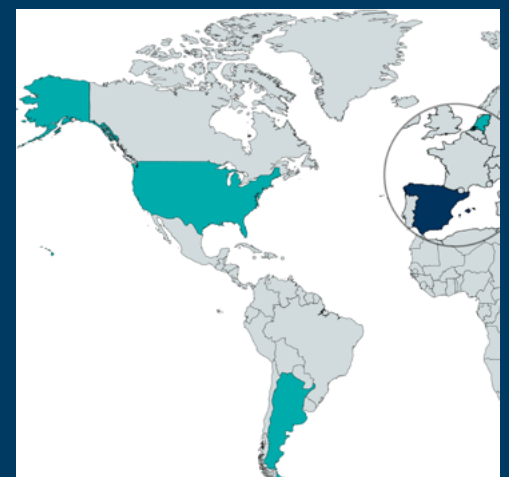
Duration:
01-2019 to 03-2022

Total grant:
€ 769,449

Further information:

Ignasi Bartomeus
nacho.bartomeus@gmail.com

A school of captain parrotfish (Chlorurus enneacanthus) swim over a reef in the remote Chagos Archipelago.

Partners of the project:

University of Montpellier, FRANCE

Ecole Pratique des Hautes Études, Perpignan, FRANCE

James Cook University, Townsville, AUSTRALIA

Dalhousie University, Halifax, CANADA

University of British Columbia, Vancouver, CANADA

Institut de Recherche pour le Développement, Noumea, Nouvelle-Calédonie, FRANCE

Leibniz Centre for Tropical Marine Research, Bremen, GERMANY

Uni Research, Bjerkenes Centre for Climate Research, Bergen, NORWAY

Stockholm University, SWEDEN

ETH Zurich, SWITZERLAND

Vrije Universiteit Amsterdam, THE NETHERLANDS

Lancaster University, UNITED KINGDOM

Julie Ann Wrigley Global Institute of Sustainability, Honolulu, USA

University of Hawai, Honolulu, USA

University of California, Santa Barbara, USA

University of Tasmania, Hobart, AUSTRALIA

Wildlife Conservation Society, Bronx, USA

UN Environment World Conservation Monitoring Centre, Cambridge, UNITED KINGDOM

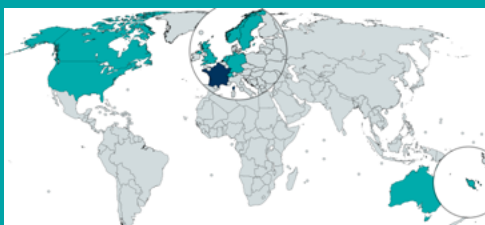**Duration:**
12-2018 to 04-2022

Total grant:
€ 1,856,569

Further information:
David Mouillot
david.mouillot@umontpellier.fr

Website:
https://reefish.umontpellier.fr

 biodiversa
www.biodiversa.org

BELMONT FORUM
www.belmontforum.org

REEF-FUTURES – The future of reef services in the Anthropocene

Context

On tropical and temperate shallow reefs (< 50 m deep), perhaps more than anywhere in the world, natural and human systems share a history of strong interconnection that must be considered in any attempt to secure, on one side, the long-term human development and well-being, and, on the other side, marine biodiversity. Surprisingly, we still lack integrated scenarios for simulating the dynamics of shallow reefs social-ecological systems on a long-term basis to better anticipate their futures within a context of global changes (climate and human demography).

Main objectives

The project will to follow a data-to-model-to-decision-making process and will meet two main objectives:

- Based on a global database of fish surveys over more than 5,000 reefs, determine the conditions (governance, social, economic, and environmental) under which five key ecosystem services provided by reef fishes are currently maintained or threatened: (i) biomass production providing livelihoods, (ii) nutrient cycling that affects productivity, (iii) regulation of the carbon cycle that affects atmospheric CO_2 concentration, (iv) cultural value that sustains tourism activities, and (v) nutritional value insuring food security. the project will estimate, through multivariate and non-linear models, the boundaries or thresholds beyond which these ecosystem services may collapse.

- Predict the potential futures of these services and more generally of the social-ecological systems under various global change scenarios. Using multiple integrated scenarios (human demography, economic development and climate change) and predictive models, the project will simulate the dynamics of shallow reef ecosystems and their ability to deliver these services during the next century.

Main activities

The kick-off meeting will be organized in Montpellier the 17th-21st of June 2019. The first task is to determine the value of five services on 5,000 reefs around the world. In parallel the project will collect the environmental (e.g. temperature), habitat (e.g. coral cover), socioeconomic (e.g. human density) and institutional (e.g. management) conditions on the same reefs to build various predictive models (Bayesian, Structural Equations) for the 5 services. The various futures of reef services will be then projected according to many scenarios to provide a range of potential trajectories and appropriate management options able to modify these trajectories.

The dissemination strategy will use 5 main channels:

- Make end-users accessing the results in an interactive and intuitive way using web-based tools;
- Inform, but also consult, a broader audience of stakeholders through meetings;
- Write biannual e-newsletters to disseminate our progresses and results;
- Produce a film on reef services;
- Organize a final conference and summer schools to share our findings and our tools.

SALBES - Scenarios for Agricultural Landscapes' Biodiversity and Ecosystem Services

Context

European agricultural landscapes are undergoing profound changes, but no schemes exist to identify landscape specific ecological infrastructures and adapted crop management which are needed to safeguard biodiversity and ESS, and the respective adaptability to changes.

Main objectives

The aim of the project is to develop a comprehensive protocol, with a focus on the agricultural systems, to develop and characterise the potential and impact of conservation strategies. The guiding principle is the "safe operating space" for development, here specified and advanced for agricultural landscapes. This includes an expanded definition of green infrastructure, adaptive land management, and stakeholder involvements. A coherent set of economic and ecological models will be combined to design scenarios, in close cooperation with stakeholders, integrating various spatial scales, e.g. from field to landscape. To support appropriate policies fostering an integrated landscape development, the project will develop guidelines and platforms to include regional biodiversity and ESS objectives into policy support schemes at national and international levels.

Case study areas in four European countries will be used. The primary focus is on stakeholder initiatives which have begun implementing biodiversity and ESS conservation schemes into the agricultural production processes.

Main activities

Research activities, including stakeholder input, will analyse the current agricultural production systems and future options, including adaptations to climatic changes and other driving forces. The results will reveal potentials and limitations on what agriculture can do to maintain the ecological infrastructure within a landscape. This includes various levels, from farms to policy, offering paths to the most efficient implementation of resilient ecological infrastructures.

This approach will lead to scientific advancement and will raise political interest by identifying goals and actions on the scale of various fields of action to safeguard sustainable development of agricultural landscapes. Through a number of workshops, local and EU policy-makers and administrators will be involved in the development of scenarios for an improved biodiversity based on adapted agricultural practices taking into account the region specific green infrastructure, value chains, national agro-environmental schemes and EU-policy goals.

Muensterland, Germany, an intensive used agricultural area. Most of the maize is converted to biogas.

Partners of the project:

Leibniz Centre for Agricultural Landscape Research, Müncheberg, GERMANY

Potsdam Institute for Climate Impact Research, GERMANY

Stiftung Westfälische Kulturlandschaft, Münster, GERMANY

University of Natural Resources and Applied Life Sciences, Vienna, AUSTRIA

University Vienna, AUSTRIA

Agroscope, Zurich, SWITZERLAND

Estonian University of Life Sciences, Tartu, ESTONIA

Duration:
04-2019 to 04-2022

Total grant:
€ 1,535,491

Further information:

Peter Zander
peter.zander@zalf.de

Sheep grazing is an alternative form of inter-row management in vineyards.

Partners of the project:

University of Natural Resources and Life Sciences, Vienna, AUSTRIA

Institut National de la Recherche Agronomique (INRA), Villenave-d'Ornon, FRANCE

Julius Kühn-Institute, Federal Research Centre for Cultivated Plants, Siebeldingen, GERMANY

Institute for Environmental Sciences, University of Koblenz-Landau, GERMANY

Department of Agricultural Economics and Rural Development, University of Göttingen, GERMANY

Faculty of Geo-Information Science and Earth Observation, University of Twente, Enschede, THE NETHERLANDS

University of Agricultural Science and Veterinary Medicine, Cluj-Napoca, ROMANIA

Agencia Estatal Consejo Superior de Investigaciones Científicas, Granada, SPAIN

Department of Wildlife, Fish, and Conservation Biology, University of California, Davis, USA

Duration:
01-2019 to 03-2022

Total grant:
€ 1,510,834

Further information:
Silvia Winter
Silvia.winter@boku.ac.at

Website:
www.secbivit.boku.ac.at

SECBIVIT – Scenarios for providing multiple ecosystem services and biodiversity in viticultural landscapes

Context

In agroecosystems, multiple ecosystem services such as crop production, soil fertility conservation and pest regulation need to be balanced to achieve both sustainable development and biodiversity targets. The main global change drivers of biodiversity and ecosystem services in viticultural landscapes are climate change, the invasion of alien (pest) species and land management changes. These drivers influence agricultural policies and land use decisions at the local and regional level which affects multiple dimensions of biodiversity and the delivery of ecosystem services.

Main objectives

SECBIVIT will develop locally adapted agent-based models based on existing data, surveys in commercial vineyards and stakeholder-driven scenarios for viticultural regions from Spain, France, Germany, Austria and Romania. The scenarios will integrate winegrowers as agents who take land use decisions. The effects of those land use decisions on multiple ecosystem services and biodiversity will be quantified for identifying potential trade-offs and synergies between grape production and other ecosystem services.

Main activities

SECBIVIT will organise local workshops to develop stakeholder-driven scenarios which will be used as input for the agent-based models. Existing knowledge from different European countries will be used to build a predictive model for the delivery of ecosystem services by biodiversity in viticulture. This model will be validated using independent field measurements of above- and below-ground biodiversity as well as multiple ecosystem services along gradients of landscape complexity and local management options across five European regions.

The stakeholder-driven scenario development and modelling will link scientific knowledge with decision criteria by stakeholders. In meetings organised in the study regions, SECBIVIT will capture the opinions and societal points of view on different land use practices in vineyards and farmers' attitudes towards sustainable management considering biodiversity and ecosystem services under different scenarios. The results will contribute to the production of policy briefs enhancing knowledge transfer and identifying policy recommendations.

SOMBEE – Scenarios of Marine Biodiversity and Evolution under Exploitation and climate change

School of barracudas, NE Riou archipelago, Mediterranean sea

Context

Global changes, including climate change and the growing demand for seafood, are driving marine ecosystems towards unprecedented states that require devising adaptation and mitigation strategies. Scenarios and models are invaluable tools to guide long-term strategic policies. However, although the degree of scenarios' realism has greatly improved, the Darwinian evolution of fish populations is still neglected in future projections. Fish evolution and adaptation could mitigate the impacts of global change on fish populations and prevent their extirpation, an evolutionary rescue. But it could also push them towards evolutionary traps due to the erosion of their genetic diversity and thus reduce their evolutionary potential and resilience.

Main objectives

SOMBEE is designed to advance our capacity to forecast future changes in marine fish biodiversity. It addresses the role of eco-evolutionary dynamics and their consequences for the sustainable exploitation of fish resources in the future. The key open question addressed is whether exploited fish populations have the capacity of adapting swiftly enough to global change to ensure their persistence and their sustainable exploitation.

Main activities

SOMBEE will : (i) develop a cutting edge evolutionary ecosystem model with primary focus on fish, (ii) project future changes in biodiversity and related fishing production under combined climate and fishing scenarios, and (iii) quantify the synergistic and antagonistic ecological, evolutionary and economic impacts of these drivers of change. Current ecosystem models explore how fish communities respond to global change by focusing on some key ecological processes (production, migration, physiology and trophic interactions), either alone or in some limited combination. SOMBEE will pioneer a modelling tool that includes all of these ecological processes and their impacts on life-history trait composition, genetic diversity and evolutionary potential of marine fish, providing a step-change in our capacity to simulate changes in biodiversity in response to scenarios of fishing and climate change. In addition, the coupling with a bio-economic model of fisheries will allow to project how eco-evolutionary changes impact fisheries economic profitability and sustainability.

SOMBEE will conduct its work in six regional marine ecosystems, with important contrasts in oceanography and ecology, history of fisheries, socio-economics, and management and policy frameworks: Pacific coast of Canada, Northern Humboldt, North Sea, Mediterranean Sea, Black Sea, Yellow Sea.

To be policy-relevant, the global change scenarios will be co-built with various regional stakeholders and then up-scaled to define generic marine socio-economic pathways across ecosystems. SOMBEE will actively engage four key stakeholder groups representing i) the primary recipients of the economic consequences of changes in biodiversity (fishing communities), ii) the most important actors implementing decisions that will impact on marine biodiversity (policy makers), iii) key players charged with providing advice appropriate for ecosystem-based management (fisheries science advisors), and iv) the standard-bearers for environmental concern and conservation (NGOs).

Partners of the project:

Institut de Recherche pour le Développement (IRD), Sète, FRANCE

Institut Français de Recherche pour l'Exploitation de la Mer (IFREMER), Boulogne-sur-Mer, FRANCE

University of British Columbia, Vancouver, CANADA

Ocean University of China, Qingdao, CHINA

University of Hamburg, GERMANY

University of Kiel, GERMANY

Peruvian Marine Research Institute, Lima, PERU

AZTI, San Sebastian, SPAIN

Middle East Technical University, Erdemli, TURKEY

UNEP-WCMC, Cambridge, UNITED KINGDOM

Duration:
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€ 1,281,536

Further information:

Dr Yunne Shin
yunne-jai.shin@ird.fr

Dr Bruno Ernande
bruno.ernande@ifremer.fr

Website:
www.sombee.org

The bank vole Myodes glareolus is a common rodent in north European forests and represents a model of wildlife health.

Partners of the project:

University of Oulu, FINLAND

University of Jyväskylä, FINLAND

Natural Resources Institute, Tampere, FINLAND

Swedish University of Agricultural Sciences, Umeå, SWEDEN

University of Alaska, Anchorage, USA
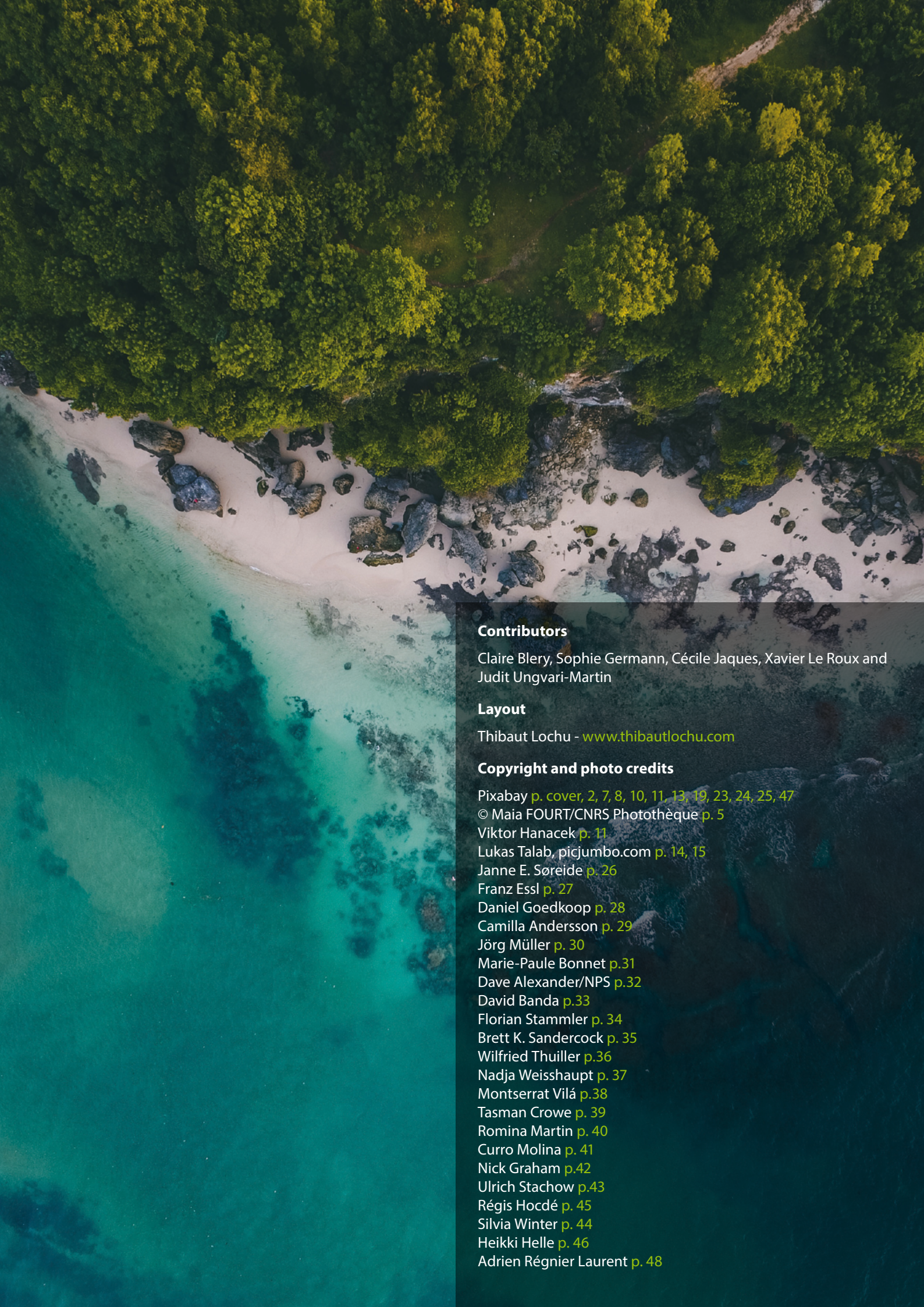
Duration:
12-2018 to 03-2022

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€ 746,013

Further information:
Phillip Watts
pcwatts@jyu.fi

WILD HEALTH – How does environmental biodiversity affect wildlife health?

Context

We are experiencing a biodiversity crisis through the effects of human actions, such as habitat destruction, land conversion for agriculture and development, climate change, pollution and the spread of invasive species. This is a cause for concern as biodiversity has an essential role in maintaining a healthy ecosystem. Biodiversity is hypothesised to positively impact human health, for example via a co-association with the host's microbiota - the associated community of microscopic organisms. However, it is unknown whether biodiversity confers a comparable benefit to wildlife.

Main objectives

WILD HEALTH will test the hypothesis that environmental biodiversity has positive effect on wildlife health. Through the consideration of different environmental scenarios in Alaska (US) and Scandinavia (Finland and Sweden), it examines whether:

- greater environmental biodiversity provides a more diverse microbial pool from which wildlife microbiota can develop,
- environmental biodiversity affects the diversity of diet and thus the composition of the host gut microbiota,
- microbiota diversity positively associates with improved health and fitness of wild mammals.

Main activities

WILD HEALTH will measure the health of mammals (bank voles, moose) inhabiting forests that experience contrasting human impacts. Using a combination of genomics methods, molecular biology, and community ecology, empirical data and field experiments, it aims to examine the relationships between environmental biodiversity, microbiota composition and wildlife health (*e.g.* parasite burden). The emphasis is on quantifying how forest management strategies impact these interactions. As the microbiota potentially forms part of an adaptive response by the host to a specific environment, the project will experimentally examine whether or not microbiota community composition affects mammal fitness and health in different forest environments.

WILD HEALTH will engage stakeholders in three steps:

- Co-design. The project will begin with a workshop for stakeholders where their expectations and potential conflict issues will be examined, setting the mutual objectives of the project and plan sampling.
- Co-doing. Samples will be collected as decided in the 1st step in collaboration with relevant stakeholders.
- Co-discussion and dissemination of results. The project culminates in a workshop that has two major themes. First, what do the results of the project mean from the point of view of each stakeholder? Second, how can the results be disseminated in public and how can possible management suggestions be implemented in forest management policy? A final report aimed for policy makers, addressing wildlife health issues as a function of biodiversity and use of natural resources, will be composed.

For more information:

BiodivScen Coordinator
Xavier Le Roux
xavierleroux@hotmail.fr
Ph.: +33 (0) 6 31 80 38 20

BiodivScen Secretariat
Cécile Jacques
cecile.jacques@fondationbiodiversite.fr
Ph.: +33 (0) 1 80 05 89 41

Fondation pour la Recherche sur la Biodiversité
195, rue Saint Jacques 75005 Paris, France

Websites
www.biodiversa.org
www.belmontforum.org