biodiversa+
European Biodiversity Partnership

Water JPI

2020-2021 Call for proposals

Conservation and restoration of degraded ecosystems and their biodiversity, including a focus on aquatic systems.

Biodiversa

Created in 2005, Biodiversa evolved into the European Biodiversity Partnership Biodiversa+ in 2021, now gathering 74 research programmers and funders and environmental policy actors from 36 countries.

Since 2008, Biodiversa has launched 11 calls and has funded 147 transnational research projects selected both for their scientific excellence and societal, policy relevance and quality of stakeholder engagement, for a total amount of 270 million euros (including ca. 179 million euros directly raised by the Biodiversa partners and the European Commission).

To further strengthen the European Research Area on biodiversity, Biodiversa has developed a great diversity of activities from planning and supporting research and innovation on biodiversity through a shared strategy, annual joint calls for research projects and capacity building activities, setting up a network of harmonised schemes to improve monitoring of biodiversity and ecosystem services across Europe, contributing to high-end knowledge for deploying Nature-Based Solutions and valuation of biodiversity in the private sector, ensuring efficient science-based support for policy-making and implementation in Europe and strengthening the relevance and impact of pan-European research on biodiversity in a global context.

For more information: www.biodiversa.org

Water JPI

The Joint Programming Initiative on "Water challenges for a changing world" is aiming to tackle the ambitious grand challenge of "Achieving sustainable water systems for a sustainable economy in Europe and abroad". The Water JPI was launched in December 2011 and has since then assembled a cohesive group of 20-member countries, five associated countries, three observers, plus the European Commission. The initiative has developed a high-level operational partnership for implementing joint activities to address water challenges, with a shared vision of "together for a water secure world" and a shared mission for jointly enabling 'smart' water solutions for a changing world.

The Water JPI developed a robust Strategic Research and Innovation Agenda that is updated in 5-year cycles, which sits under the Water JPI vision and constitutes the roadmap for future water-related RDI actions. Since 2013, the Water JPI has launched seven joint calls and has funded 110 transnational research projects selected both for their scientific excellence and impact, for a total grant of over 88 million euros (directly raised by Water JPI partners and the European Commission) and ca. 16 million euros directly raised by Water JPI partners without support from the European Commission. The Water JPI also implemented other joint activities including the implementation of two international knowledge hubs, two thematic annual programming actions and a transfer project in an effort to reinforce international cooperation in RDI to address global water challenges.

For more information: www.waterjpi.eu

BiodivRestore

In October 2020, Biodiversa and the Water JPI joined forces to launch a programme named BiodivRestore for supporting international research efforts for the conservation and restoration of degraded ecosystems and their biodiversity, including a focus on aquatic systems. Supported by the European Commission as an ERA-NET COFUND, this programme will run for five years, until September 2025.

BiodivRestore consists of a joint call for international research projects, co-funded by the European Commission 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 including in non-academic realms. Building on previous Biodiversa and Water JPI funded projects and on contributions from BiodivRestore, scientific foresight work will also be performed, aiming to identify new research frontiers, gaps and priorities for the conservation and restoration of degraded ecosystems and their biodiversity.

The ERA-NET Cofund BiodivRestore "Promoting and implementing joint programming to reinforce transnational research for the conservation and restoration of degraded ecosystems and their biodiversity, including a focus on aquatic systems" has received funding from the European Union's Horizon 2020 research and innovation programme under the grant agreement No 101003777.

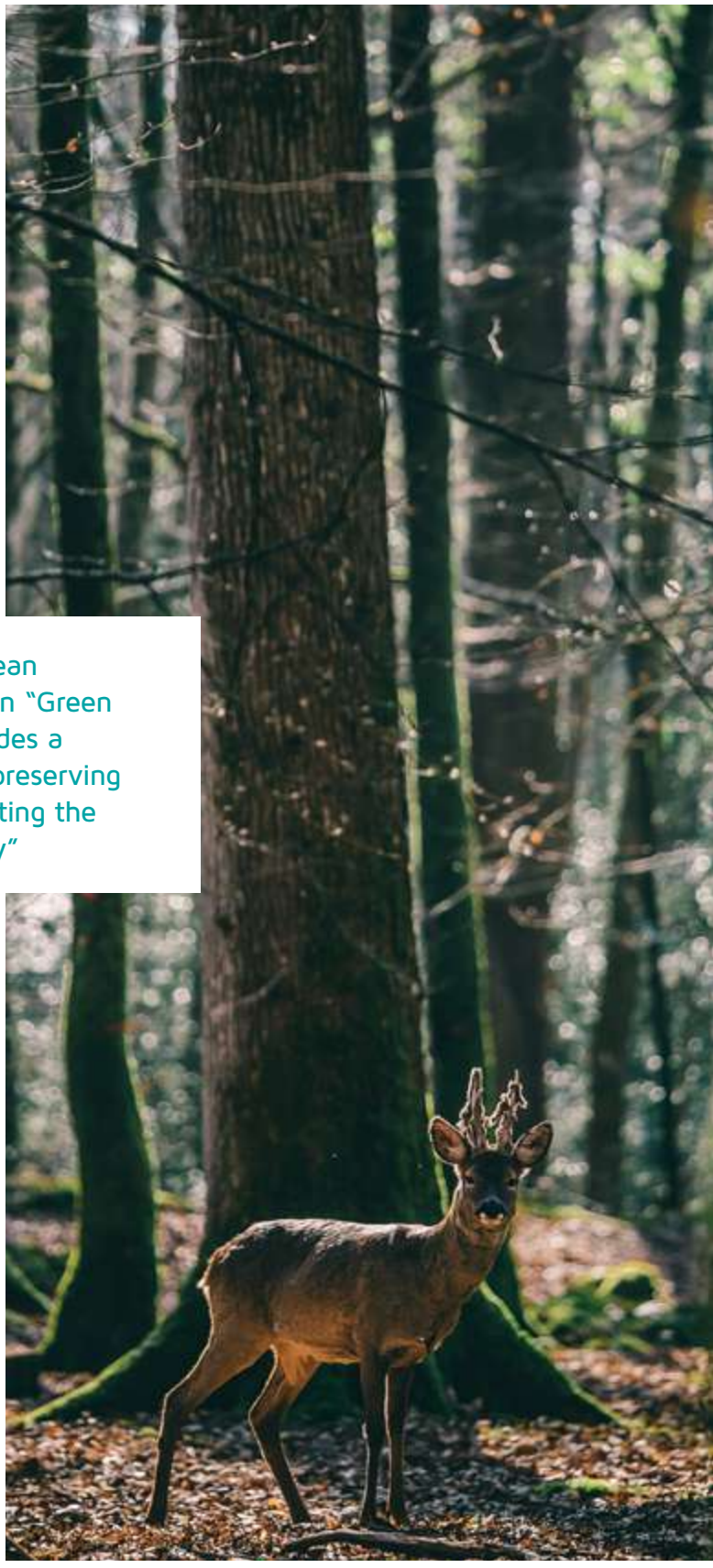
The BiodivRestore partners

1. Foundation for Biodiversity Research, FRANCE - Coordinator
2. Austrian Science Fund, AUSTRIA
3. Belgian Science Policy Office, BELGIUM
4. The Fund for Scientific Research- Wallonia, BELGIUM
5. The Research Foundation Flanders - Flanders, BELGIUM
6. Brazilian National Council for the State Funding Agencies (CONFAP), BRAZIL
7. National Science Fund Bulgaria, BULGARIA
8. Technology Agency of the Czech Republic, CZECH REPUBLIC
9. Innovation Fund Denmark, DENMARK
10. Estonian Research Council, ESTONIA
11. The Academy of Finland, FINLAND
12. French National Research Agency, FRANCE
13. German Research Foundation, GERMANY
14. German Aerospace Centre, GERMANY
15. VDI/VDE Innovation + Technology GmbH, on behalf the German Federal Ministry of Education and Research, GERMANY
16. Environmental Protection Agency of Ireland, IRELAND
17. State Education Development Agency, LATVIA
18. Research Council of Lithuania, LITHUANIA
19. National Agency for Research and Development, MOLDOVA
20. Ministry of National Education, Professional Training, Higher Education and Scientific Research, MOROCCO
21. Ministry of Agriculture, Nature and Food Quality, NETHERLANDS
22. Research Council of Norway, NORWAY
23. National Science Centre, POLAND
24. Portuguese National Funding Agency for Science, Research and Technology, PORTUGAL
25. Regional Fund for Science and Technology, Azores, PORTUGAL
26. The Executive Agency for Higher Education, Research, Development and Innovation Funding, ROMANIA
27. The Slovak Academy of Sciences, SLOVAKIA
28. Water Research Commission, SOUTH AFRICA
29. Spanish State Research Agency, SPAIN
30. Regional Government of the Canary Islands, SPAIN
31. Swedish Environmental Protection Agency, SWEDEN
32. Swiss National Science Foundation, SWITZERLAND
33. Ministry of Science and Technology, TAIWAN
34. Ministry of Higher Education and Scientific Research, TUNISIA
35. Ministry of Agriculture and Forestry, TURKEY

Contents

From Biodiversa, the Water JPI, and the European Commission

Biodiversity is a common heritage to preserve, and Human societies rely on the functions and services it provides, although the role played by terrestrial and aquatic ecosystems is not limited to the livelihood of human societies. Healthy ecosystems also play a critical role in climate mitigation, while shielding animal and human populations against a variety of natural disasters. The latest IPCC and IPBES reports highlighted that in spite of their value, biodiversity and ecosystems are highly vulnerable and directly affected by climate change and the current human consumption and production patterns. Biodiversity loss is caused by land use and management changes, the unsustainable extraction of resources, climate change, the continuous emergence of new contaminants, biological invasions, and keeps on worsening. The incidence of degrading biodiversity and ecosystems is affecting societies at local and global scales. Unless urgent and concerted action is taken, this will only worsen over time, and measures to combat it will become more difficult and costlier.



> The European Commission "Green deal" includes a focus on "preserving and protecting the biodiversity"

Realizing the importance of conserving and protecting biodiversity and ecosystem services, the European Commission proposed in its « Green deal » a focus on « preserving and protecting the biodiversity ». Similarly, the UN launched the UN Decade on Ecosystem Restorations (2021 to 2030) initiative. These initiatives aim to promote research to inform sustainable pathways towards the recovery of biodiversity, which should include a transformative change that also meets the UN sustainable development goals.

With some highly sensitive terrestrial ecosystems, wetlands and freshwater ecosystems are currently amongst the most vulnerable and degraded, yet the pool of assets they represent is critical to human well-being and development. Ensuring the conservation and restoration of terrestrial and aquatic biodiversity and ecosystems is increasingly complex, due to the interaction between the multiple threats and diverse demands they are facing. This requires support from research, aiming at more integrative, inter- and transdisciplinary studies.

On this account, Biodiversa and the Water JPI launched in October 2020 a joint call to support research on the "Conservation and restoration of degraded ecosystems and their biodiversity, including a focus on aquatic systems", under their 'BiodivRestore' COFUND Action

(i.e. a joint call co-funded by Biodiversa and Water JPI members, and by the European Commission).

In addition to generating major academic breakthroughs, outcomes of this call should support the implementation of the EU Biodiversity Strategy; the Water Framework Directive; and the Marine Strategy Framework Directive, the EU Nature Directives and the EU Floods Directive.

> The Biodiversa-Water JPI joint call will help understand the mechanisms that make restoration actions successful

The aim of this joint call is to support research and projects that will help better understand the mechanisms that make conservation and restoration actions successful (or not), providing new knowledge relevant to guide practitioners and decision makers. Specifically, it is expected that this will help provide science-based guidance to conservation/ restoration policies and restoration practices on the ground which will not merely be effective, but efficient.

> With 172 initial proposals and 22 full proposals funded, the call was highly selective

The joint call included a focus on freshwater aquatic systems, but all environments were eligible. The call brought together 35 partners funding research activities from 28 countries and united most of the major European and European associated research funding associations, including 26 from European members' states, 5 from associated countries. The joint call was highly competitive, receiving 172 eligible pre-proposals that were evaluated by external experts and an independent committee. After a first evaluation step, 92 full proposals were received for the second step of evaluation. Finally, 22 projects were selected for funding based on their fit to the call topic, scientific excellence, and excellence in how they involved stakeholders and have a clear relevance to policy and society. These projects addressed the fundamental questions posed by the call, and through clustering and joint activities on cross-cutting issues and share of results with other relevant selected projects, creating the pathway for impact. The funding amount was 21.3 million euros from Biodiversa and Water JPI partners including the 5 million from the European Commission, while the total costs of the projects was 32.4 million euros.

Congratulations to the winning consortia for the excellent quality of their proposals and their commitment in improving the effectiveness and upscaling of conservation and restoration actions! We would also like to warmly thank the evaluation panel members as well as the external reviewers who ensured a high-quality evaluation process and a fair ranking of the pre- and full proposals. We also express our gratitude to the organisations that co-funded the joint call. Their efforts allowed a smooth call implementation and the funding of the highest possible number of top-ranked proposals.

This brochure gives insight on the call process, from the call development to the selection of proposals and the way their follow-up will be ensured. It gives an overview of the profile of the submitted proposals and a short description of each of the 22 projects selected for funding.

We wish you a pleasant reading!

Xavier Le Roux
BiodivRestore Coordinator and Biodiversa Chair & Coordinator

Miguel Angel Gilarranz
Water JPI Vice Chair

Marco Fritz
Biodiversity Team Leader, DG Research and Innovation, European Commission

Picture from the ReVersal project: Peat harvesting and parallel restoration experiments.

Overview of the BiodivRestore Call

Summary of the 2020-2021 BiodivRestore Call

The aim of this call was to support transnational research projects on conservation and restoration of degraded ecosystems and their biodiversity, including a focus on aquatic systems, properly taking into account socio-ecological contexts, and promoting innovative research for more informed decision-making.

This joint call included a focus on freshwater aquatic systems but all environments were eligible, i.e. marine, freshwater and terrestrial – including urban. While projects could focus on only one environment; proposals comparing different environments or studying links between environments (e.g., aquatic-terrestrial) were particularly welcomed.

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

Projects could address one or several themes. Projects combining aspects from two or more themes were encouraged.

Theme 1: Studying the biological and biophysical processes at stake for conservation/restoration, and their interactions.

This research theme focussed on the role of different biodiversity dimensions for conservation and restoration, the relationship between ecosystem functioning and biodiversity during conservation and restoration processes of degraded ecosystems and on the importance of time scales for assessing and understanding post- versus pre-conservation/ restoration trajectories.

Theme 2: Assessing trade-offs and synergies between targets, benefits and policies for conservation and restoration.

This theme mostly aimed at research contributing to help proposing quantitative and qualitative targets for conservation and restoration in support to integrated policies and management or practices on the ground. To this aim, analyses of trade-offs and synergies between targets of conservation and restoration measures, assessments of social and economic benefits and costs of conservation and restoration approaches and the development of integrative social-ecological approaches were welcome.

Theme 3: Knowledge for improving the effectiveness and upscaling of conservation and restoration actions.

The objectives of this theme were to scale-up processes to landscapes or regions and across gradients, integrate conservation and restoration approaches for improving their effectiveness and evaluate and consider uncertainties associated to conservation and restoration approaches for developing adaptive management.

Type of research funded

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

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

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

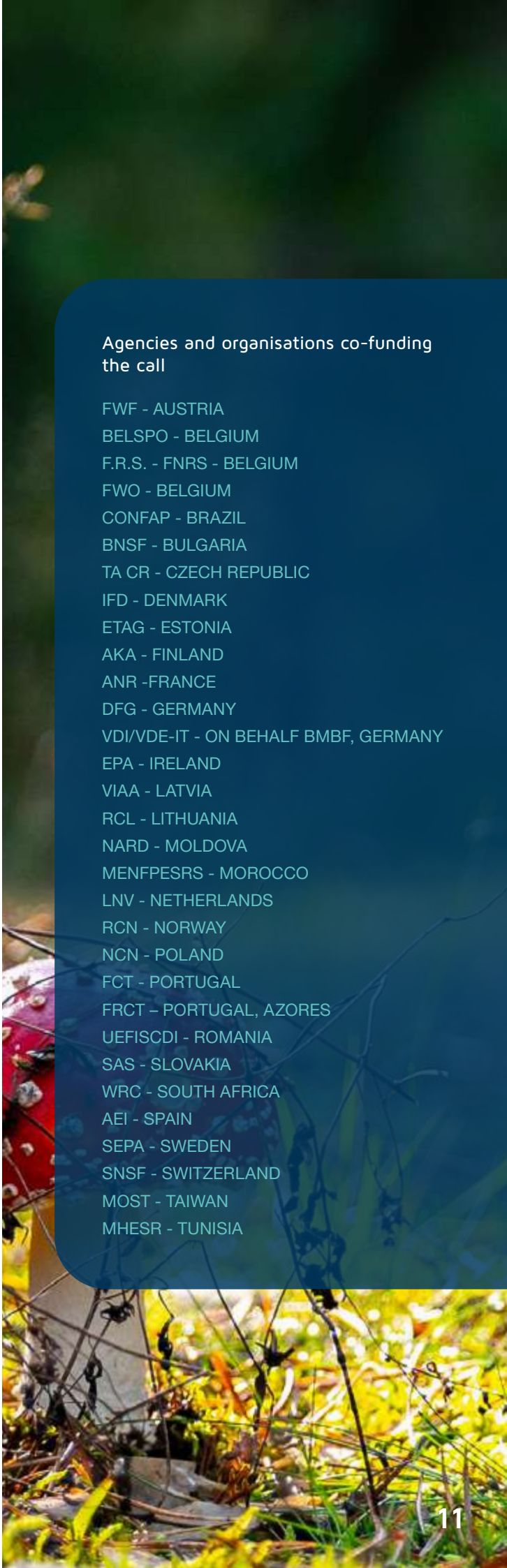
Call process

The topic of this transnational call for research proposals was a priority for the Biodiversa and Water JPI networks and their members, as defined in the Biodiversa Strategic and Research Innovation Agenda (2017-2020), and in the Water JPI Strategic and Research Innovation Agenda 2025. The conservation and restoration of degraded ecosystems and their biodiversity is recognised as being of vital importance, yet it had not been the specific focus of a call launched by Biodiversa or Water JPI. That is why both initiatives, together with the European Commission, decided to launch an ambitious joint co-funded call in 2020-2021 addressing this issue.

The content and procedures for this joint transnational call were defined by the 31 national and regional funding organisations from 27 countries participating in the call. AEI, the Spanish State Research Agency, hosted the Call Secretariat and thus played a key role in the implementation and success of the call.

The call was officially launched on 5 October 2020 with a deadline to submit pre-proposals on 7 December 2020. Eligible pre-proposals were evaluated by an independent Evaluation Committee and the shortlisted pre-proposals were invited to submit full proposals by 3 May 2021. The full proposals were evaluated by the independent Evaluation Committee as well as by external reviewers between May and September 2021. Based on the results of the evaluation process and strictly following the ranking of the projects established by the independent Evaluation Committee, the funding organisations agreed on the projects to be recommended for funding in October 2021, allowing for a start of the funded projects between December 2021 and April 2022.

All the projects have a 3-years duration. During their lifetime, they will be requested to submit a mid-term and a final report to monitor the progress of their work and outcomes.



Agencies and organisations co-funding the call

FWF - AUSTRIA
BELSPO - BELGIUM
F.R.S. - FNRS - BELGIUM
FWO - BELGIUM
CONFAP - BRAZIL
BNSF - BULGARIA
TA CR - CZECH REPUBLIC
IFD - DENMARK
ETAG - ESTONIA
AKA - FINLAND
ANR -FRANCE
DFG - GERMANY
VDI/VDE-IT - ON BEHALF BMBF, GERMANY
EPA - IRELAND
VIAA - LATVIA
RCL - LITHUANIA
NARD - MOLDOVA
MENFPESRS - MOROCCO
LNV - NETHERLANDS
RCN - NORWAY
NCN - POLAND
FCT - PORTUGAL
FRCT – PORTUGAL, AZORES
UEFISCDI - ROMANIA
SAS - SLOVAKIA
WRC - SOUTH AFRICA
AEI - SPAIN
SEPA - SWEDEN
SNSF - SWITZERLAND
MOST - TAIWAN
MHESR - TUNISIA

Evaluation Committee

The composition of the Evaluation Committee slightly differed between step 1 (21 scientific experts and 17 policy management experts) and step 2 (17 scientific experts and 15 policy management experts). All experts that participated either to only step 1 or step 2 or to both steps are mentioned below.

Scientific experts

Cara Nelson (Chair of the Evaluation Committee) – University of Montana and Chair of International Union for Conservation of Nature (IUCN) Ecosystem Restoration Thematic Group, UNITED STATES;

Asa Aradóttir – Agricultural University of Iceland, ICELAND

Susan Baker – University of Cardiff, UNITED KINGDOM

Patrick Bohlen (second step only) – University of Central Florida, UNITED STATES

Nana Bolashvili – Ivane Javakhishvili Tbilisi State University, GEORGIA

James Bullock – Centre for Ecology & Hydrology, UNITED KINGDOM

Michael Brufford – University of Cardiff, UNITED KINGDOM

Sarah Clement (first step only) – University of Liverpool, UNITED KINGDOM

Çiğdem Coşkun Hepcan (first step only) – Ege University, TURQUEY

Carsten Dormann – University of Freiburg, GERMANY

Myra Finkelstein – University of California Santa Cruz, UNITED STATES

Adriana Ford (second step only) – Imperial College London, UNITED KINGDOM

Simonetta Fraschetti – University of Naples Federico II, ITALY

Christopher Frissel (first step only) – University of Montana, UNITED STATES

Michael Fullen (first step only) – University of Wolverhampton, UNITED KINGDOM

Jim Hallet – University of Montana, UNITED STATES

Steven Handel – Rutgers School of Environmental and Biological Sciences, CANADA

George Kowalchuk (second step only) – University of Utrecht, NETHERLANDS

Antonio Lo Porto (first step only) – IRSA-CNR, Water Research Institute, ITALY

Guillermo Luna Jorquera – Universidad Católica del Norte, CHILE

Matthew Potts – University of California Berkeley, UNITED STATES

Bill Slee – The James Hutton Institute, UNITED KINGDOM

Eric Wolanski (first step only) – James Cook University, AUSTRALIA

Joy Zedler (first step only) – University of Wisconsin–Madison, UNITED STATES

Policy/management experts

Judith Fisher (vice-Chair of the Evaluation Committee) – Director Fisher Research Pty Ltd, IPBES Multidisciplinary Expert Panel, IUCN Commission on Ecosystem Management - Theme Leader Ecosystems and Invasive Species, AUSTRALIA

Karma Bouazza – Lebanon Reforestation Initiative, US Forest Service International Programs American University of Beirut, LEBANON

Peter Cochrane –IUCN Oceania, AUSTRALIA

Simon Gardner – Natural Environment Research Council, UNITED KINGDOM

Floyd Homer – IPBES, GERMANY

Colin Hindmarch – Independent Consultant, UNITED KINGDOM

Katia Hueso Kortekaas – Universidad Pontificia de Comillas, SPAIN

Manuel Lago – Ecologic Institute, Berlin, GERMANY

Fernando Magdaleno – Ministry for the Ecological Transition, SPAIN

Vinod Mathur – National Biodiversity Authority, INDIA

Angela Morgado – Associação Natureza Portugal / World Wide Fund For Nature (ANP/WWF) Mediterranean, PORTUGAL

Ivone Pereira – European Environment Agency, Copenhagen, DENMARK

Jan Plesnik – Nature Conservation Agency of the Czech Republic, CZECH REPUBLIC

Sunandan Tiwari – ICLEI local, GERMANY

Liette Vasseur (first step only) – University of Brock, CANADA

Julia Da Silva Vilela (first step only) – Self-employed, BRAZIL

Sanaa Zebakh (first step only) – Agronomic and Veterinary Institute Hassan II, Rabat, MOROCCO

Evaluation process

The submitted proposals were evaluated by an independent Evaluation Committee at step 1 and by an independent Evaluation Committee and external reviewers at step 2. Both the Evaluation Committee and the external reviewers consisted of scientific experts, as well as policy/management experts and practitioners.

The proposals were evaluated following specific guidelines and according to specific criteria that were pre-defined and communicated in advance to the applicants.

At step 1, pre-proposals were evaluated against the following criteria: fit to the scope of the call; novelty of the research; and transnational added value.

At step 2, full proposals were evaluated against the following criteria: (scientific) excellence; quality and efficiency of the implementation; impact.

At each step, three scores corresponding to the above-mentioned criteria were given to each proposal. While the three criteria had the same weight at step 1, they had a different weight at step 2, with a slightly higher weight on scientific excellence over impact and a higher weight on impact over implementation. Proposals with scores below pre-defined threshold values were not ranked nor considered for funding.

The Evaluation Committee meetings were organised remotely due to the sanitary situation on 24-26 February 2021 for step 2 and 14-16 September 2021 for step 2. During these meetings, the Evaluation Committee members had the opportunity to discuss about the pre- and full proposals and to agree on the final scores to be attributed to the pre- and full proposals.

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

From the Evaluation Committee Chairs

It was a pleasure to serve as Chair and Vice-Chair of the Evaluation Committee of the Biodiversa and Water JPI 2020-2021 Call on "Conservation and restoration of degraded ecosystems and their biodiversity, including a focus on aquatic systems." Biodiversa and Water JPI attracted competitive and high-quality submissions at both the pre-proposal and full proposal stages, as well as a diverse pool of global experts in science and policy who participated in the evaluation committee.

The topic of the call for proposals was extremely timely, given the recent launch of the UN Decade on Ecosystem Restoration and development of the post-2020 Biodiversity Framework by the UN Convention on Biological Diversity. Ambitious global targets in conservation and restoration are an incredible opportunity to reverse degradation. However, conserving and repairing degraded ecosystems is a complex challenge that requires integrating scientific knowledge about ecosystem process into prescriptions for conservation and management, as well as assessing the efficacy and effects of activities. Given this, success in global initiatives depends upon development of the knowledge base and application of knowledge to practice. Biodiversa and Water JPI's 2020-2021 call for proposals is contributing to doing just that – generating applicable and actionable new knowledge to inform and advance conservation and restoration practice. The program should result in increased global capacity for successful conservation and restoration.

The call covered three critical issues: studying the biological and biophysical processes that underpin conservation and restoration, and their interactions; assessing trade-offs and synergies between targets, benefits and policies for conservation and restoration; and increasing knowledge for improving the effectiveness and upscaling of conservation and restoration actions.

The 22 research projects funded for over 21.3Mio€ address each of these three areas, with some proposals focusing on one area, whereas others address multiple areas. The pool of funded projects will be contributing knowledge across diverse ecosystems: 24% of projects are being conducted in terrestrial ecosystems, 46% in inland water, 6% in coastal, 17% in marine, and 7% in other environments.

Because the screening process included evaluating proposals based on international management and policy contexts, funded proposals promise to be highly relevant both in terms of generating new scientific knowledge but also in advancing policy and solutions to improve the ecological and human wellbeing outcomes of conservation and restoration. Selected proposals are both trans-disciplinary and innovative and involve collaboration between scientists and stakeholder communities.

We are grateful to the evaluation committee members for their candid and constructive assessments of the quality of pre and full proposals, and for their instrumental role in assembling external reviewers and considering their comments. The high level of collegiality made chairing the scientific and policy sub-committees easy and enjoyable, and ensured fair and adequate evaluation of each submission. We are also grateful to the Secretariat, who worked efficiently and made the whole process run smoothly. This was no small task, given that all meetings of the evaluation committee had to be done virtually due to the impacts of the Covid-19 pandemic. Additionally, the evaluation committee members spanned time zones from the Western Coast of the USA to Australia; yet with careful planning by the secretariat, we completed our work on schedule.

Prof. Cara Nelson
Chair of the Evaluation Committee

Assoc. Prof. Judith Fisher
Vice-Chair of the Evaluation Committee

Analysis of the call results

Analysis of the call results

Overall figures of the call

	No. of proposals	No. of teams	Budget
Submitted pre-proposals	172	1,122	154.2 M€
Submitted proposals	92	671	88.2 M€
Selected proposals	22	162	21.3 M€

With a total of 172 pre-proposals submitted by 1,122 participating teams, this 2020-2021 call attracted a high number of applicants, demonstrating the interest from the scientific community for the themes proposed within the call.

Out of the 172 eligible pre-proposals received, the Call Steering Committee decided to fund the 22 highest ranked proposals for a total amount of over 21.3 million euros, which represents a success rate of ca. 12.8%. Given the very high competitiveness of the call, the success rate was lower than the average success rate in Biodiversa calls (which is of 17.1%), but close to the average success rate in Water JPI calls (which is of 11.7%). Yet, thanks to the high flexibility of several funding organisations who agreed to increase their budget, it was possible to fund the maximum number of top-ranked proposals.

Geographical origin of the applicants

The large majority (95.8%) of the teams who submitted a pre-proposal came from the 25 countries participating in the funding of the BiodivRestore call, i.e., Austria, Belgium, Brazil, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Ireland, Latvia, Lithuania, Moldova, Morocco, Netherlands, Norway, Poland, Portugal (including the Azores), Romania, Slovakia, South Africa, Spain, Sweden, Switzerland, Taiwan, and Tunisia. Unfortunately, no research team from Moldova submitted eligible pre-proposals.

The remaining 4.2% came from 22 additional countries, mostly from non-European countries not participating in the Call (2.6%).

Teams from countries not participating in the joint call were sub-contracted or self-funded partners.

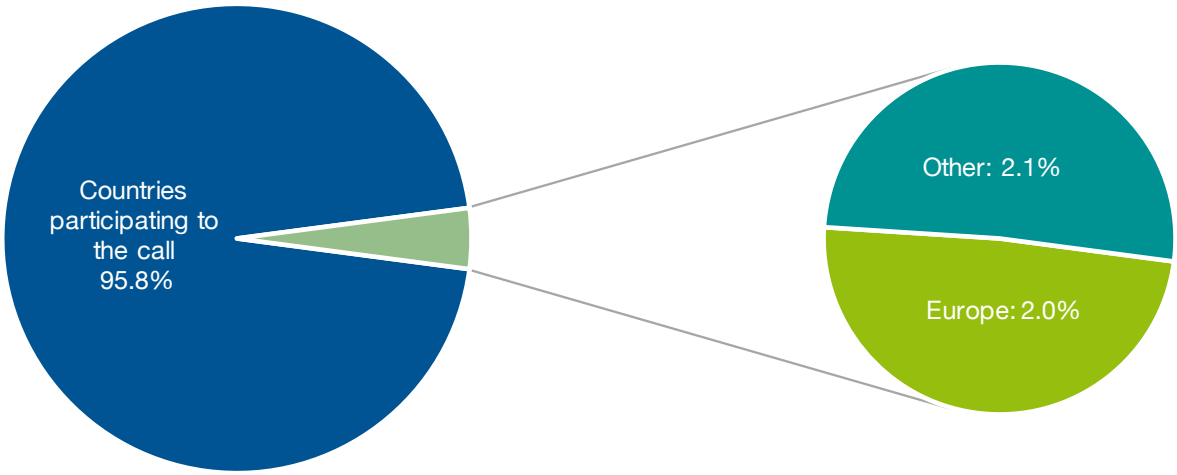


Fig. 1: Geographical origin of the applicants participating in the BiodivRestore call.

Reserved and requested budgets

The reserved budgets for the participating countries were published during the announcement of the call which might have influenced the budget requests made by applicants. The highest values of both reserved and requested budgets were observed for Germany and France (Fig.2 and 3). For Austria,, Czech Republic, Denmark, Estonia, Germany, Ireland, Norway and Poland, the percentage of requested budget in the full-proposals matched almost exactly the amount of reserved budget of the country. Spain and Sweden had much higher requests than reserved budget. In contrast, in spite of having a large reserved budget, Brazil had low budget request.

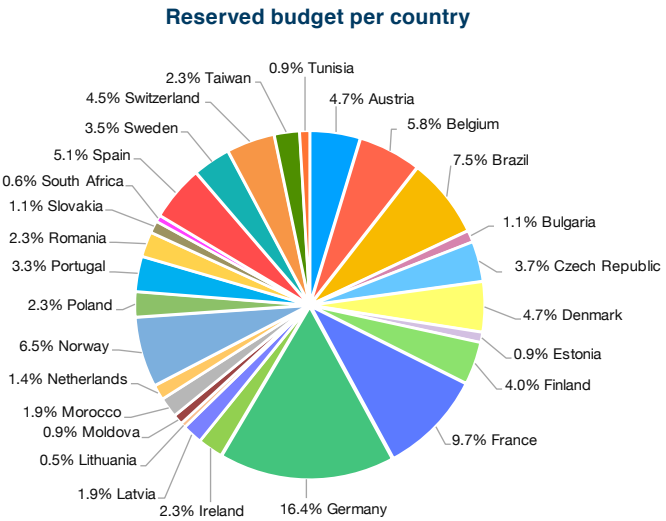


Fig. 2: Distribution of the reserved budget among participating countries.

In some cases, such as for Austria, Belgium (Wallonia), Finland, France, Poland, Portugal (including the Azores), Spain, Sweden and the Netherlands, the initially reserved budget proved to be insufficient compared to the financial demand from the successful applicants. Yet, thanks to the flexibility of these funding organisations, this did not jeopardise the call outcome.

On the other hand, some funding organisation did not use their reserved budget, due to a lower success of their research community. Ultimately, the 22 top ranked projects could be funded, strictly following the ranking list established by the independent Evaluation Committee.

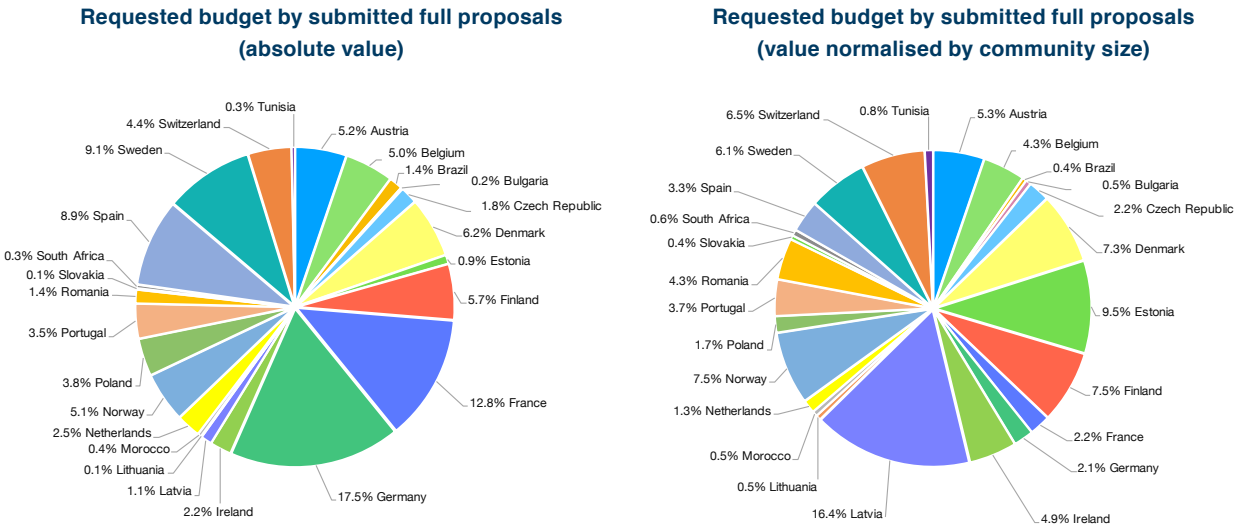


Fig. 3: Budget requested to participating countries by the applicants in the submitted full-proposals, in absolute values (left) and values normalised according to the size of the national scientific community (right) - [source Eurostat 2019, UNESCO 2019, all sectors, Full Time Equivalent unit]. Note that depending on the countries, requested budget may, or may not, include salaries for permanent positions.

Despite a relatively low participation in terms of requested budget (Fig. 3), the scientific communities from Estonia, Latvia, Lithuania and to a lesser extent from Ireland and Romania seem to have responded well to this call once the budget requests are normalised according to the estimated number of researchers from all scientific areas in each country. Unfortunately, we do not have numbers of the size of the biodiversity research communities per se, which would have improved the normalisation.

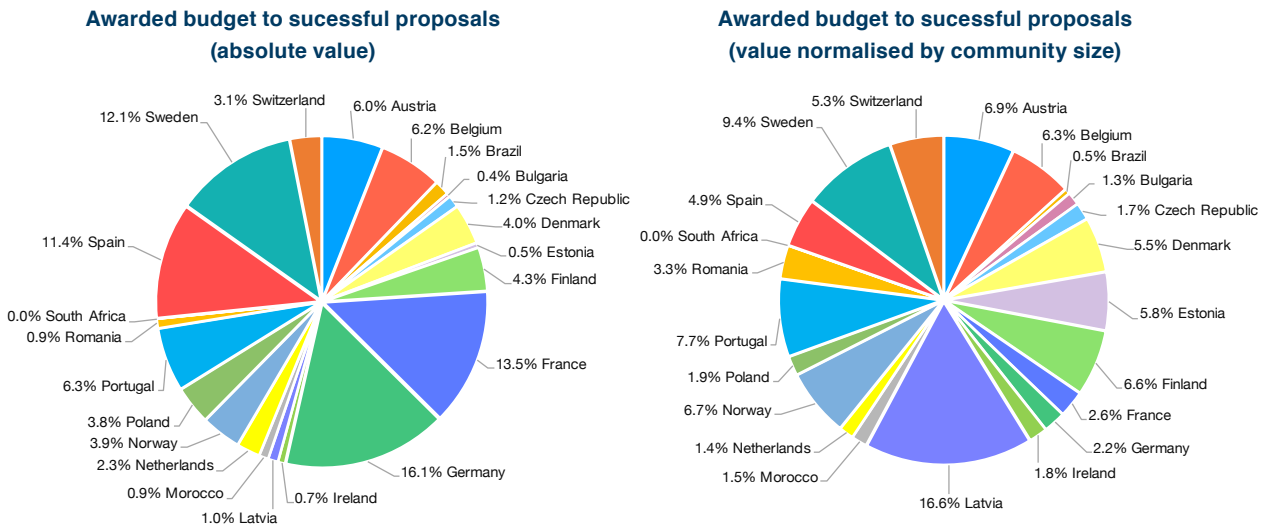


Fig. 4: Distribution of awarded budget to the successful applicants among participating countries in absolute value (left) and in values normalised according to the size of the national research community (right)- [source: Eurostat 2019, UNESCO 2019, all sectors, Full Time Equivalent unit].

The teams of the 22 funded projects come from 22 different countries (Fig. 4). The largest number of funded teams mostly come from the countries with the highest amount of reserved funding, namely France and Germany. Spain and Sweden have a high number of team financed in comparison to their reserved budget. Again, it is worth comparing the funding amounts between countries both in terms of absolute values and in terms of amounts normalised according to the estimated number of researchers from all scientific disciplines in each country (Fig. 4). These normalised numbers are more representative in highlighting the high success rate observed for countries such as Estonia, Latvia, and to a lesser extent Finland, Norway, Romania and Switzerland.

Picture from FreshRestore project: Macro invertebrate (surber) sampling in Norway

Success rate per country

The Bulgarian, Moroccan, Portuguese and Spanish research teams applying to the BiodivRestore call had a particularly good success rate at the second step of the evaluation process (ratio of granted to requested funded amounts), i.e. above 30% (Fig. 5). These figures should however be viewed with caution for some countries, given their low number of submitted proposals.

Despite the participation of Lithuania, Moldova, Slovakia and Tunisia in the call, none of the 22 funded projects involved a research team from these countries, likely due to the low number of submitted proposals including teams from these countries. The research teams from Tunisia were no longer involved at the second step of the evaluation process, while no research team from Moldova submitted eligible pre-proposals.

Among the successful proposals, five (23%) include teams from the outermost Regions (ORs) or Overseas Countries and Territories (OCTs), namely the Azores (Portugal; Azores participating per se in this call), the Canary Islands (Spain) and the Reunion Island (France) and six (27%) include teams from non-EU countries, namely Brazil, Morocco and South Africa.

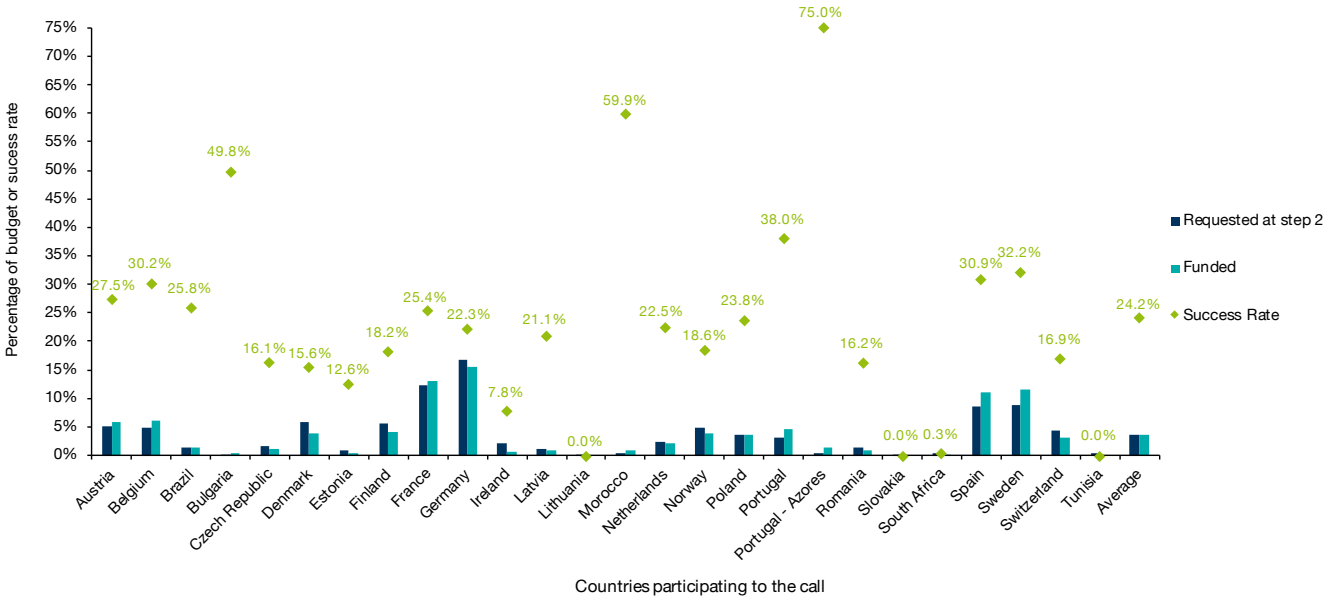


Fig. 5: Comparison of the percentage of budgets in the proposals between countries at the submission phase (requested at step 2 – blue bars) and after selection (funded – turquoise bars), along with the financial success rate (green diamonds).

Project coordinators

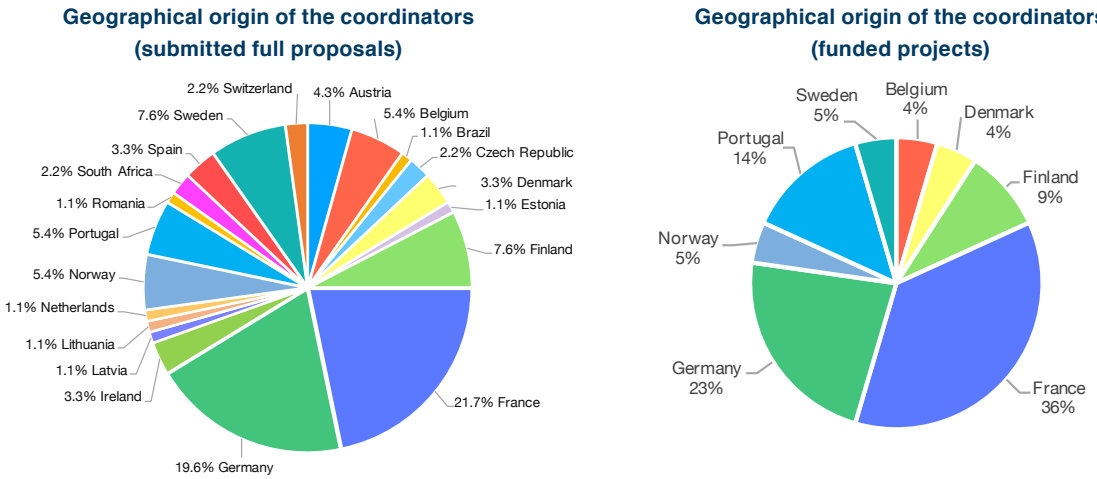


Fig. 6: Geographical origin of the coordinators in the submitted full-proposals (left) and funded projects (right).

At the full proposal submission stage, the project coordinators represented 20 countries participating in the call (Fig. 6), whereas the coordinators of the pre-proposals represented 25 countries participating in the call (out of 27).

In the end of the process, the coordinators of the funded projects only come from 8 countries. Again, these figures should be viewed with caution since they represent the geographical spread of coordinators only. Still, it can be noted that the French, German, and Portuguese coordinators were very successful.

Call themes and sub-themes addressed by the proposals

This BiodivRestore joint call was composed of three main themes: Theme 1 - Studying the biological and biophysical processes at stake for conservation/ restoration, and their interactions; Theme 2 - Assessing trade-offs and synergies between targets, benefits and policies for conservation and restoration; and Theme 3 - Knowledge for improving the effectiveness and upscaling of conservation and restoration actions. One project could address several themes. During the submission phase, the project's coordinator had to indicate to which theme(s) they applied.

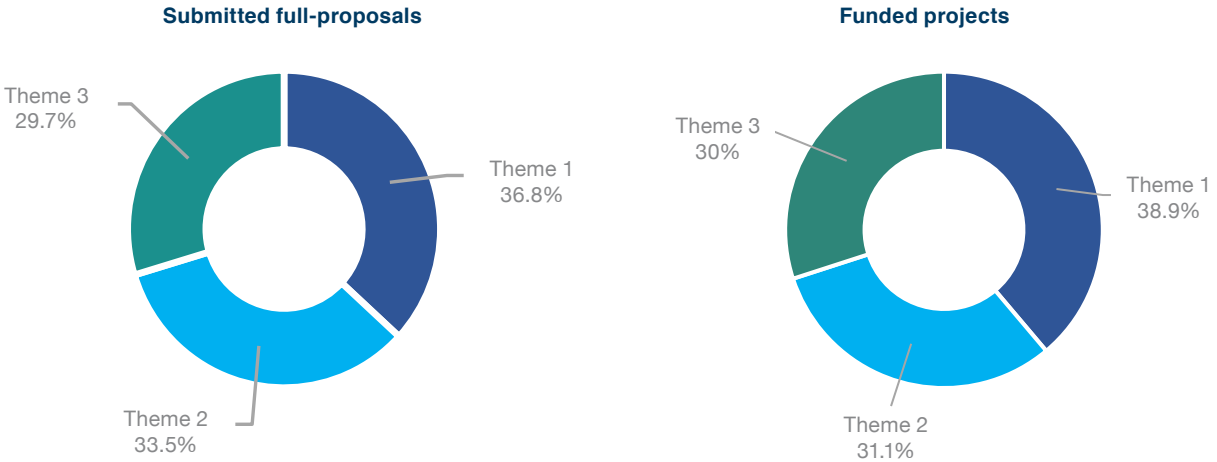


Fig. 7: Percentage of total requested budget for themes 1, 2 and 3 in the submitted full-proposals (left) and funded projects (right).

Overall, there was a fairly good balance in the way the full-proposals and funded projects addressed the three themes of the call (Fig 7), with a slightly higher interest for theme 1 on studying the biological and biophysical processes at stake for conservation/ restoration, and their interactions, and somewhat lower interest for Theme 3 on the knowledge for improving the effectiveness and upscaling of conservation and restoration actions.

Studied environments

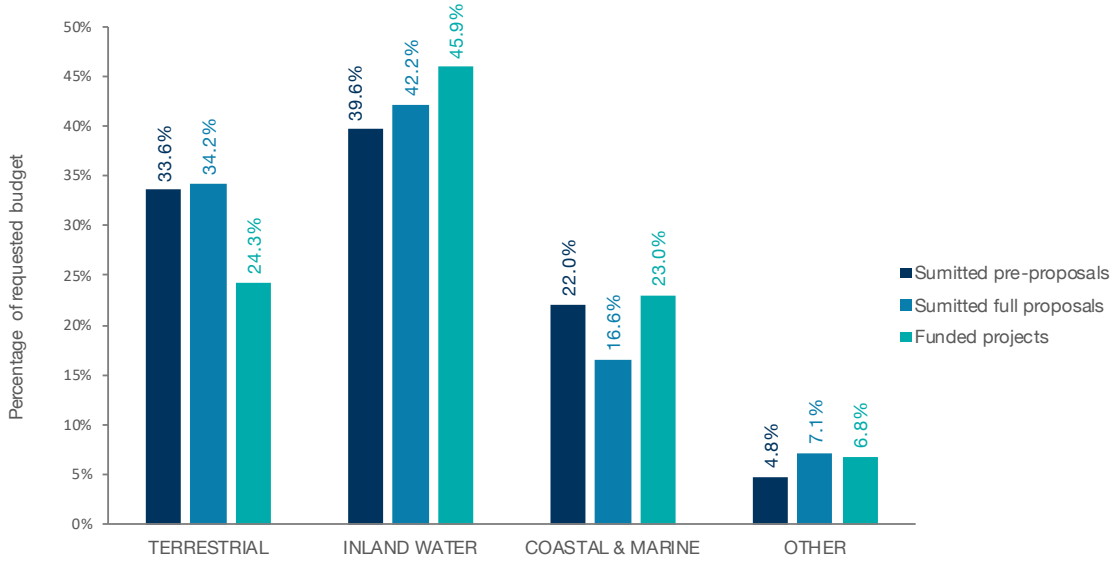


Fig. 8: Distribution of budgets of submitted pre-proposals, full-proposals and funded projects according to the studied environments. One proposal can address several environments.

Submitted and funded proposals focused primarily on inland waters, secondly on terrestrial ecosystems and thirdly on marine/coastal environments (Fig. 8). The more important representation of proposals addressing inland ecosystems (as compared to other Biodiversa calls, where terrestrial environments are the most represented) is most likely due to the fact that this call was launched in collaboration with the Water JPI – addressing water challenges; although all environments were eligible a focus on aquatic systems was indicated in the title of the call. The collaboration between Biodiversa and the Water JPI may have allowed to reach a broader research community working on aquatic systems.

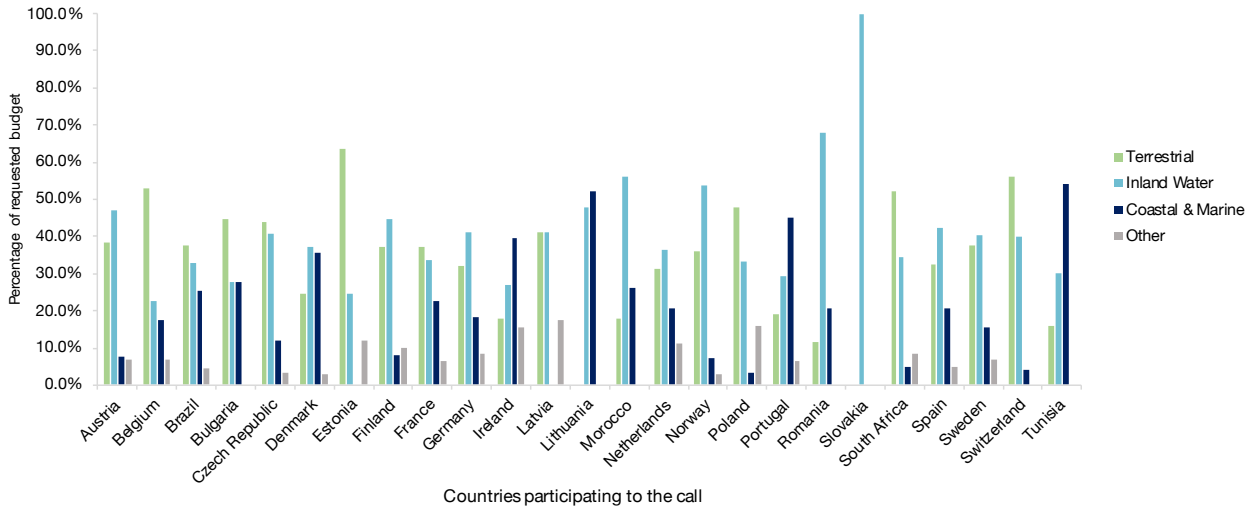


Fig. 9: Percentage of the requested budget in the submitted full-proposals by country according to the studied environment.

For several countries, there was a good balance in terms of budget requests for the environments covered by their applicants. This is particularly true for Brazil and Denmark. Some other countries had some environments more covered than others.

Morocco, Norway, Romania and Slovakia – and to a lesser extent Austria and Lithuania had for example the highest portion of inland water-focused submitted full-proposals (for Slovakia, even all proposals focused on inland-water environments). The terrestrial environments were largely represented in the proposals submitted by Belgian, Estonian, Polish, South African and Swiss applicants. When it comes to the marine and coastal environments, Ireland, Lithuania, Portugal and Tunisia were among the countries with the highest proportion of full-proposals focusing on these environments.

Given the small number of teams originating from some countries (including Bulgaria, Estonia, Latvia, Lithuania, Ireland, Israel, Slovakia, South Africa, Tunisia and Turkey), these figures should be taken with caution.

Conclusion

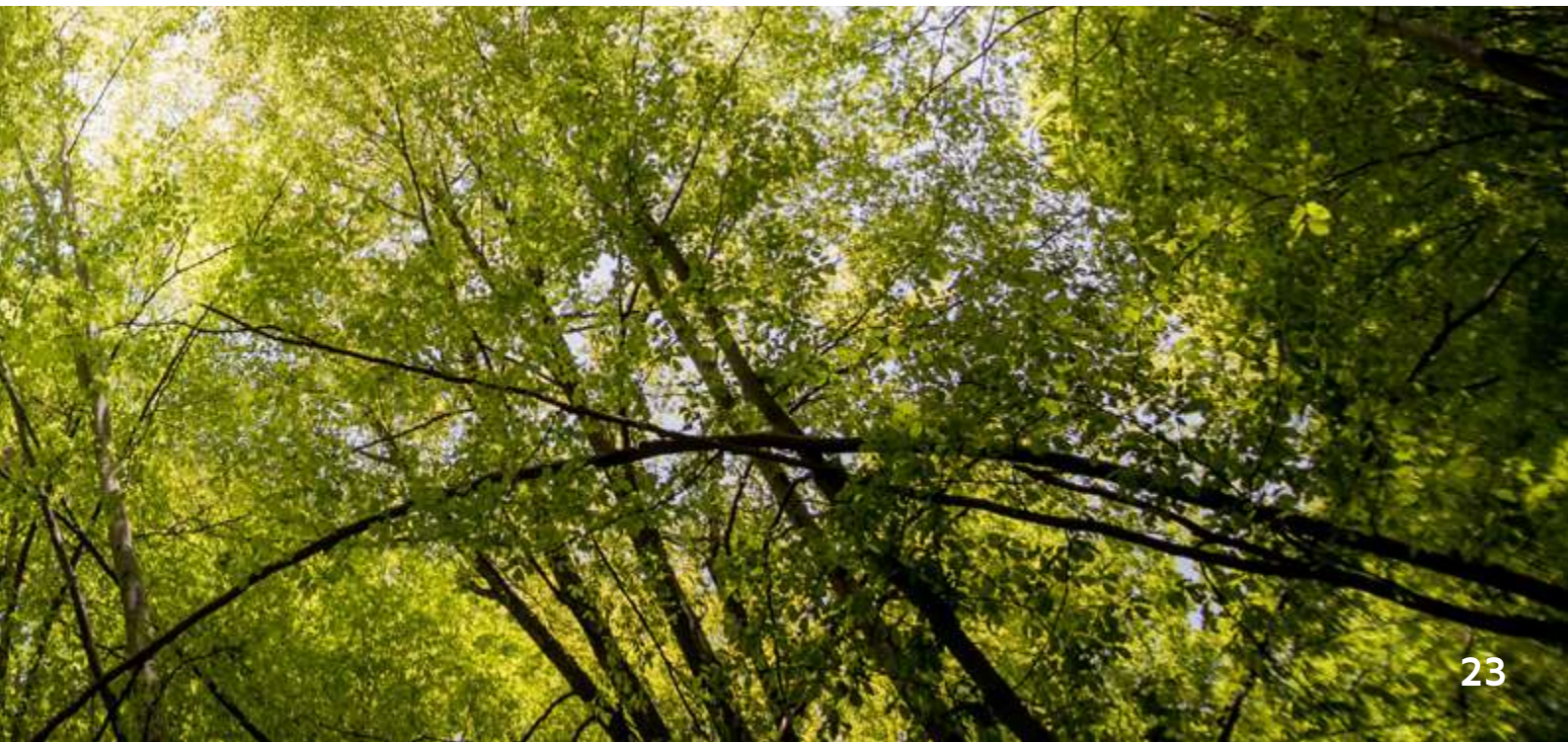
The analysis presented above provides a good insight into the implementation and results of the BiodivRestore joint call. The following aspects were found useful for future calls:

- Overall, the extremely high number of pre-proposals received shows the relevance of the topics of this call for the research communities. The success of the Biodiversa – Water JPI collaboration is confirmed by the good responsiveness of the water research community and the high number of proposals with a focus on aquatic systems.

- Unfortunately, some countries participating in the call did not have any team in the 22 proposals selected for funding. This was the case of Lithuania, Moldova, Slovakia and Tunisia. This situation can be largely explained by the fact that these teams were not well represented in the submitted pre-proposals (for Moldova there was even no eligible pre-proposals submitted), and subsequently full proposals.

- Thanks to the initial balance in the amounts of funding reserved by countries and to the flexibility of funding organisations to increase their budget when needed, BiodivRestore partners were able to fund the highest number of top ranked projects, strictly following the outputs of the selection procedure.

- In the framework of BiodivRestore, Biodiversa and the Water JPI will now implement a range of activities and a continuous dialogue with the funded projects to increase the outcomes of the individual projects.Biodiversa and the Water JPI will also explore other joint actions to reinforce synergies among the programmes.



Picture from the Transloc project: Pilot translocations of Silene ciliate at Parque Nacional de Guadarrama, Spain.

Presentation of the 22 funded projects

BiNatUr

Bringing nature back – biodiversity-friendly nature-based solutions in cities

DURATION
01.03.2022 – 31.03.2025

TOTAL GRANT
€ 1,246,023

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Ecology, Evolution and Environmental Changes, University of Lisbon, Portugal

CONTEXT

Climate change has dramatic consequences for the quantity, quality, and seasonal distribution of water. One result being the increased flash-flooding and soil erosion in urban areas. Nature-based solutions (NBS) aim to protect, sustainably manage, and enhance biodiversity and the delivery of ecosystem services, while also incorporating societal needs and challenges. Water-based NBS ("aquaNBS") are implemented in many European cities and it is assumed that aquaNBS (e.g. ponds, streams) provide multiple ecosystem services and enhance local biodiversity. However, knowledge of their biodiversity and their links to ecosystem services provision in cities is limited.

BiNatUr will quantify the role of biodiversity and its linkages with ecosystem services in urban aquaNBS, with an overall aim of improve the planning, building, restoration, and management of aquaNBS. To this aim, a holistic approach to analyse the interactions between social, ecological and technological factors of aquaNBS at three spatial scales in five European cities will be used. The study sites encompass the European climatic gradient from Mediterranean to boreal regions, enabling the transfer of solutions among regions.

MAIN ACTIVITIES

BiNatUr research focuses on four questions: (1) How are biodiversity and ecosystem services of aquaNBS mediated by social, ecological, and technological factors, (2) how do factors vary among cities and regions?, (3) how does biodiversity influence regulating ecosystem services provided by aquaNBS?, and (4) how can urban planning effectively design, manage, and monitor biodiversity and ES of aquaNBS? BiNatUr adopts a mixed-method approach by combining qualitative and quantitative research methods. The project focuses on the social possibilities and constraints, working at the city scale to study the decisions made when planning, designing and managing aquaNBS. In addition, BiNatUr will analyze landscape patterns of urban environments in order to identify critical social, ecological, and technological factors influencing biodiversity and ecosystem services of aquaNBS.

The project will also conduct place-based studies and analyse the biodiversity and regulation of ecosystem services of the selected 12 aquaNBS in five case areas (Antwerp, Berlin, Helsinki, Lissabon and Poznań).

OUTCOMES AND EXPECTED IMPACTS

Restoring habitats in urban areas is critical to provide key ecosystem services, especially under the effects of global climate change. BiNatUr brings new scientific evidence on the role of urban water-related NBS to support ecosystem services and linkages between biodiversity. A previous EU Biodiversa project (BioVeins) identified aquatic habitats in cities as the ones more understudied and also with more potential to provide a wide range of conditions for urban biodiversity and ecosystem services. BiNatUr will build on that knowledge to provide guidelines on how to implement these improvements, taking into consideration the holistic approach provided by the social, ecological and technical systems framework. The cities chosen for BiNatUr are largely representative of the European climate and provide a unique opportunity to quantify the effects of the conditions of this framework on aquaNBS biodiversity and ecosystem services. BiNatUr will model results at the city scale and at the continental scale, highlighting the value of European-wide collaboration. By studying cities in representative climatic regions, BiNatUr will provide solutions that may become important in the future under climate change. This south-to-north transfer of knowledge may also result in the adoption of solutions that have been shown to work in southern locations by the northern partners of BiNatUr.

PROJECT CONTRIBUTION TO POLICIES AND/OR SOCIETY

BiNatUr will support the Urban Greening targets of European Biodiversity Strategy for 2030 by providing new information about ecological conditions, biodiversity values and ecosystem services provision of aquaNBS. BiNatUr is also closely linked to the EU Nature Restoration Targets because it will provide guidelines to local practitioners how to improve biodiversity in aquaNBS; improvements that can also extend beyond the urban areas studied. BiNatUr produces practical guidelines and recommendations on how urban planning can effectively co-design, monitor, and enhance the biodiversity and ecosystem services of aquatic NBS. BiNatUr also aims to publish practical information (e.g. technical case cards) in project partners' official languages.

EXPERIMENT, CASE STUDIES

BiNatUr project has five urban case study areas in five countries. In each case area local partners will select 12 aquaNBS as research sites for detailed ecological and environmental analyses. Field inventories cover eDNA monitoring for algae and diatoms, estimation of habitat quality, water staple isotope analyses, inventories of aquatic macrophytes, macroinvertebrates, and surrounding vegetation. In addition, we will provide landscape analyses using available data sources (GIS, remote sensing) in each set of 12 study sites. We will conduct document analyses and expert interviews to analyse policy, planning and management practices related to aquaNBS in each case study area.

FUNDERS

- The Research Foundation - Flanders (FWO), Belgium
- Academy of Finland (AKA), Finland
- VDI/VDE-IT, Germany
- National Science Center (NCN), Poland
- Fundação para a Ciência e Tecnologia (FCT), Portugal

Example of local aquaNBS in Helsinki, Finland

BIOCONSENT

Decision-making Support for Forest Biodiversity Conservation and Restoration Policy and Management in Europe: Trade-offs and Synergies at the Forest-Biodiversity-Climate-Water Nexus

DURATION
01/03/2022 – 31/03/2025

TOTAL GRANT
€ 1,246,023

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CONTEXT

Despite ambitious global and EU policy targets, biodiversity is under increasing threat. Biodiversity decline and degradation of ecosystems continue at an alarming rate, especially in forests that harbour 80 percent of terrestrial biodiversity worldwide. Only 0,7 percent of forests in Europe are in a primary condition; many primary and old growth forests lack effective protection and the majority of forest habitat and species in protected (Natura 2000) as well as managed forests are in a non-favourable conservation status. Enhanced conservation and restoration of forest habitats, species and functions are essential for biodiversity and provision of ecosystem services. Ambitious policy targets are important, but they are not enough to reverse the biodiversity crisis. While strong positive and negative interdependencies exist between biodiversity, forestry, climate change and water management, effective biodiversity goal achievement presupposes cross-sectoral policy coherence and implementation across EU, national and local levels. Effective implementation also depends on supportive behavioural responses by forest owners and conservation managers who have to respond to multiple policy and socio-economic drivers forcing them to make trade-offs under complexity, uncertainty and climate change. Previous research suggests that cross-sectoral goal conflicts and failures to understand behavioural responses constitute major barriers to achieving desired forest biodiversity outcomes.

MAIN ACTIVITIES

To address the knowledge gaps and inform decision-making to address the problems mentioned above, BIOCONSENT will implement innovative inter- and transdisciplinary activities. Five main activities will be implemented:

1. Mapping policy targets and instruments as well as assessing the cross-sectoral policy integration and actor coordination at the biodiversity-forestry-climate-water nexus
2. Exploring forest owners' and conservation managers' behavior and behavioral changes under different scenarios required for positive transformation towards sustainable socio-ecological systems with improved forest biodiversity status

3. Integrating biophysical, social, economic and policy drivers shaping forest conservation in modelling tools and restoration as well as quantifying and assessing the outcomes of alternative conservation and restoration measures on forest biodiversity and ecosystem service provision across spatial and temporal scales
4. Upscaling and disseminating project findings as well as co-designing policy and management recommendations for decision making support
5. Communicating and disseminating the results of BIOCONSENT.

OUTCOMES AND EXPECTED IMPACTS

BIOCONSENT addresses knowledge gaps and policy needs by developing novel integrative socio-ecological approaches and tools, and by applying and disseminating these approaches and tools in participatory research activities with practitioners and workshops for policymakers and stakeholders, including public and private forest owners and managers, environmental NGOs, scientists, consultants and concerned citizens initiatives. BIOCONSENT will define and quantify forest biodiversity conservation and restoration outcomes to understand benefits and risks associated with alternative policy and management trajectories, and to assess which restoration policies, practices and management actions are effective under what conditions.

Through its novel approach, BIOCONSENT aims at developing outcomes of particular added value and its impact, notably by developing:

1. an integrated socio-ecological system approach addressing the forest-biodiversity-climate-water nexus (state of the art scientific and popular publications);
2. innovative ways to explore pathways of change through linking policy/governance and actors' behavioural change (innovative participatory methods);
3. novel techniques to integrate human behaviour in forest models to bridge across spatial scales (from stand to EU level, new simulation models); and
4. enhanced decision support tools enabling decision makers in policy and practice at different geographical scales to make informed choices, explore synergies, and balance trade-offs (scientific papers, practitioners' publications; new maps, tablet software).

PROJECT CONTRIBUTION TO POLICIES AND/OR SOCIETY

BIOCONSENT will inform the European Green Deal, the new EU Biodiversity Strategy to 2030, the new EU Forest Strategy to 2030, the EU Habitats Directive and the EU Water Framework Directive, and related forest biodiversity conservation and restoration policies at the national and regional level in Europe.

An inter- and transdisciplinary approach will ensure participation from concerned parties and organisations across EU and (sub-)national decision-makers in policy and practice that can help maintain and restore forest biodiversity while reducing climate change, improving water quality and safeguarding a sustainable and multifunctional use of forests.

EXPERIMENT, CASE STUDIES

The policy analysis, scenario development, behavioural experiments and modelling will be carried out in six case studies. This includes five regional case studies in four European countries (Bulgaria, Germany, Spain, and Sweden) and a cross-country case study at the EU-27 level. The case studies are selected to reflect the variety of EU bio-geographical regions (e.g., Boreal, Continental, Mediterranean), policy and governance systems (unitary/federal states) and socio-economic (richer/poorer EU countries) contexts. Upscaling of the results be achieved through cross-comparison and active science-policy-practice interface across the (sub-) national and EU-27 level case studies.

FUNDERS

- Austrian Science Fund (FWF), Austria
- Bulgarian National Science Fund (BNSF), Bulgaria
- Academy of Finland (AKA), Finland
- VDI/VDE-IT, Germany
- Agencia Estatal de Investigación (AEI), Spain
- The Swedish Environmental Protection Agency (SEPA), Sweden

Forest landscape in Bavaria, Germany

BioReset

Biodiversity restoration and conservation of inland water ecosystems for environmental and human well-being

DURATION

01.04.2022 – 31.03.2025

TOTAL GRANT

€ 898,338

MORE INFORMATION

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Coastal & Marine Environmental Toxicology Department, Interdisciplinary Centre of Marine and Environmental Research (CIIMAR), Matosinhos, Portugal

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CONTEXT

Pollution is threatening the biodiversity of inland waters that are vital to society and the future of the Earth. A major source of this pollution are effluent discharges from wastewater treatment plants. The treatment processes used in these plants do not efficiently remove emerging contaminants, such as pharmaceuticals and microplastics, which lead to health hazards to non-target species, including humans. This polluting source limits the conservation and restoration of freshwater systems. At the same time, there is a need for strategies to up-scale restoration solutions and for rapid and simple to use methodologies to assess conservation and restoration progress; i.e. assessment strategies anticipating the success of conservation/remediation measures in suitable timescales, ensuring reliable data comparison over time and space, and guiding intervention measures. BioReset will promote ecosystem recovery and conservation through a combined approach including: cutting-edge advances in existing wastewater treatment processes and developing methodologies to assess ecosystem conservation and restoration provided by these treatments based on investigating diatom communities, laying the foundation for a global quality index for ecological status and ecosystem assessment.

MAIN ACTIVITIES

BioReset will thus advance treatment processes (chemical, physical, biological and their combination) to promote ecosystem recovery and conservation and to develop assessment strategies. Diatoms, unicellular algae that can be found all over the world in practically all kinds of aquatic environments, will be used to model ecosystem conservation and restoration since their communities show high levels of biodiversity. Application of Raman spectrosocopy to diatoms will provide an expeditious method to compare different recovery strategies and water treatment processes, allowing to address timescale and key conservation/restoration questions. The full environmental, economic, and social viability of the upgraded and innovative treatment technologies will be assessed. Based on this knowledge, scale-up studies in

geographically different sites (Portugal and Spain) will be performed to ascertain the technical and economic feasibility at a larger scale and recommended action guidelines will be issued.

BioReset also envisages the creation of a representative space-time picture of the presence of emerging contaminants in inland waters and its correlation to effects on diatom communities. For this, powerful analytical techniques, such as gas- and liquid chromatography, will be used. Besides these methods, and to obtain real-time information, miniaturised analytical platforms that can perform fast and on-site monitoring will also be employed.

Knowledge transfer and validation within the scientific community, effective dissemination of practical outputs for incorporation by industry, and establishing credibility and attracting inputs from new stakeholders will be achieved through publications in international journals and presentations in conferences, an international workshop with multi-sector stakeholders at the end of the project, newsletters and press releases, and promotional material with technical information in digital format (BioReset's website). This will lead to BioReset's brand recognition, raising awareness on the topic and triggering policy changes according to the given recommendations.

OUTCOMES AND EXPECTED IMPACTS

The BioReset project will produce data about ecosystem recovery and conservation and methodologies for wastewater treatment and pollutant monitoring which is valuable information for policy makers, governmental authorities, wastewater treatment plant stakeholders, and environmental managers who design approaches and interventions to achieve and maintain biodiversity and a good ecological state of freshwater ecosystems. The project activities will be paired with outreach actions addressing regulatory authorities, industry, academia, and the general public to raise awareness and best practices towards ecosystems conservation. Because diatom communities will be used as bioindicators of ecosystems status, and wastewater treatment plants located in different countries are involved, BioReset will allow to draw implications and assessment strategies of global usefulness.

PROJECT CONTRIBUTION TO POLICIES AND/OR SOCIETY

BioReset will contribute to halt degradation of freshwater ecosystems, promoting their conservation and creating the necessary conditions and strategies to regenerate their health and evaluate their recovery. The project is strongly aligned with the objectives of the European Green Deal and several Sustainable Development Goals (SDG) of the United Nations: SDG 6 - Clean water and sanitation, SDG 15 - Life on land, and SDG 17 - Partnerships for the goals. The participation of partners from different countries emphasises its real approach and aim of solving issues representing not a local but a worldwide problem. It is also aligned with 2030 targets of its post-2020 Global Biodiversity Framework, for example by deploying solutions to reduce threats to biodiversity, namely reducing chemical and plastic loads to the environment, by improving knowledge about the conservation and recovery of aquatic ecosystems and their monitoring, or by creating multi-stakeholder partnerships to generate solutions at the local, national, regional and global levels and mainstreaming biodiversity globally.

EXPERIMENT, CASE STUDIES

The best formulations for pharmaceutical and/or microplastic removal will be tested in pilot plants with wastewaters provided by Portuguese and Spanish wastewater treatment plants. These experiments will be carried out during the last semester of the third year of the Project. Diatom biofilms for ecosystem technologies and the electrochemical platforms will be tested to monitor the pharmaceutical and/or microplastic removal treatments.

FUNDERS

- Agencia Estatal de Investigación (AEI), Spain
- The Research Council of Norway (RCN), Norway
- Fundação para a Ciência e a Tecnologia (FCT), Portugal
- Swedish Environmental Protection Agency (SEPA), Sweden

Wastewater treatment plant (Cacia, Portugal).

BIO-TRADE

Protecting Biodiversity through Regulating Trade and Business Relations

DURATION
01/03/2022 – 28/02/2025

TOTAL GRANT
€ 998,000

MORE INFORMATION
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Raoul Wallenberg Institute for Human Rights and Humanitarian Law, Lund, Sweden

Development and Environment, University of Bern, Bern, Switzerland

CONTEXT

European consumption has a high biodiversity footprint outside Europe. Timber, soy, palm oil, cocoa and coffee are examples of everyday goods the production of which connected to biodiversity loss. Through regulating trade, supply chains, and the foreign operations of European companies, the European Union (EU) and European countries can protect biodiversity globally. As such, the EU is currently planning for example a Deforestation Regulation and a horizontal regulation on due diligence in supply chains. In this context, BIO-TRADE will analyse how the EU and European countries can protect biodiversity outside Europe. We study the topics and contents of laws as in how they set demands for regulation targets. Legal rules on trade and supply chains rely on the criteria for sustainable production and products. The criteria must be fair and transparent. We focus on how ecological and biodiversity criteria should be brought into European law so that laws are coherent and effective while being acceptable under the rules of the World Trade Organization.

MAIN ACTIVITIES

BIO-TRADE will conduct research on the impacts of European regulations on business activities and biodiversity in different parts of the world outside Europe, for example in Asian and Latin American forests. The goal of our research is to recognise fair and impactful policies that enhance the realisation of environmental rights. To this aim, BIO-TRADE will:

- study laws in context: interpretation, implementation and impacts of laws;
- study trade law and supply chain laws from a business perspective;
- study laws on ecological compensation from a business perspective;
- study how environmental human rights manifest in European law;
- study the interconnection between public and private regulation;
- organise dissemination and stakeholder engagement events for a broad variety of stakeholders including youth and their

organisations, businesses and their organisations, governments, and scientists. The aim of the events is to discuss research results and to gather input for policy briefs and the Practical Guide;
- produce scientific articles, policy briefs, and a Practical Guide.

OUTCOMES AND EXPECTED IMPACTS

The main outcome of BIO-TRADE is enhanced knowledge and practical guidance on how the European Union and the governments of European countries should regulate trade, supply chains, and the foreign operations of European companies to protect biodiversity at a global scale. If European businesses and consumers stop buying goods connected to global biodiversity loss, it can serve as an example for other Western economies.

PROJECT CONTRIBUTION TO POLICIES AND/OR SOCIETY

BIO-TRADE supports evidence-based European regulation to protect and enhance biodiversity in global trading systems. The legal instruments are related to trade and imports, supply chain management, and ecological compensation that targets no-net-loss of biodiversity. Stakeholders involved in the project include EU policy makers, national governments, businesses and business organizations, civil society organizations, and consumers. The activities and results of the project will enhance transparency in global supply chains and increase the recognition of the right to a healthy environment.

EXPERIMENT, CASE STUDIES

We study and learn from the impacts of European regulations at selected economic sectors that have major impacts for biodiversity globally and where Finnish, Swedish, Danish and Swiss business and consumption is heavily involved. Our case study partners will be from the importing countries in Latin America and Asia.

FUNDERS

- Innovation Fund Denmark (IFD), Denmark
- Academy of Finland (AKA), Finland
- The Swedish Environmental Protection Agency (SEPA), Sweden
- Swiss National Science Foundation (SNSF), Switzerland

Everyday goods at the kitchen table are connected to biodiversity globally.

COAST

COnservation of mArine ecosystems around Santo AnTão, Cabo Verde: implications for policy and society

DURATION
01.04.2022 – 01.04.20254

TOTAL GRANT
€ 1,008,85

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Association of the defense of the Patrominy of Mértola, Mértola, Portugal

Oceanography and Fisheries, University of the Azores, Horta, Faial, Portugal - Azores

Association for the development of the Atlantic International Research Centre, Angra do Heroismo, Portugal - Azores

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

Marine Sciences Institute, Spanish National Research Council, Barcelona, Spain

CONTEXT

The Republic of Cabo Verde is an African archipelago, which depends largely on marine resources. Their coastal areas ensure human wellbeing through resources availability (e.g. food) and jobs. However, coastal regions in Cabo Verde are highly exposed to natural hazards and to multiple pressures associated with anthropogenic activities, including reclamation of wetlands for agriculture, water contamination and plastic pollution. They are, thus, in an enormous need for sustainable development of activity sectors linked to the sea, i.e. Blue Growth. Cabo Verde is a country where Blue Growth can help to contribute with solutions for current issues, such as high poverty rates, while building on the long tradition of local economical use of the marine environment. However, no valuable baseline knowledge on the environmental status of their marine ecosystems is available, hampering the development of measures ensuring their sustainable use, management, conservation and restoration. Information on marine habitats for this archipelago is scarce, and there is no integrated evaluation of marine resources to support knowledge-based regulations and guidelines for their sustainable use, in line with the national development trends. Santo Antão has the highest poverty rate of the Archipelago, and income inequalities, and is highly vulnerable to extreme natural phenomena (e.g. droughts, tropical cyclones).
COAST will evaluate the vulnerability of the studied marine communities and create pilot conservation and restoration actions for selected degraded ecosystems, to increase their resilience. The project will provide multidisciplinary understanding about the biodiversity and ecosystem functioning, as well as suitable indicators of recovery, which is the crucial basis to establish sound conservation or restoration measures. These are the pillars upon which conservation and restoration are to be built, allowing for implementation of integrated environmental management actions based on the best scientific knowledge.

MAIN ACTIVITIES

The COAST project will significantly contribute to understanding the status and functioning of the ocean system around Santo Antão island in Cabo Verde, as its contribution

to the country's economy. The project aims to achieve 5 main objectives:

1. To characterise and map pelagic and benthic habitats, as well as anthropogenic pressures of Santo Antão.
2. To estimate patterns of diversity in marine communities in relation to habitat features.
3. To assess the vulnerability of the studied communities to both environmental and anthropogenic pressures, through the application of risk assessment models.
4. To implement conservation and restoration actions for selected habitats/ecosystems based on the results of the first three objectives.
5. To provide baseline data that inform policymakers, authorities, institutions and practitioners towards effective marine conservation and restoration in these habitats and demonstrate the repeatability of the proposed approach in other regions.

OUTCOMES AND EXPECTED IMPACTS

COAST expects to improve current knowledge on marine habitats of Santo Antão island and to provide efficient management recommendations for their sustainable development, along with mitigation plans for the effects of global changes, in line with the needs of stakeholders and local communities. By involving key stakeholders, such as local environmental authorities (i.e. Port Maritime Agency, Porto Novo City hall) and public agencies (ADPM, Biosfera), local members from the community who directly or indirectly depend on and benefit from the ocean (fishermen), COAST will have the opportunity to actively translate science into policy interventions and will also contribute to reducing economic and social disparities, linking the needs of the marine ecosystems to the community.

PROJECT CONTRIBUTION TO POLICIES AND/OR SOCIETY

Participation in the COAST project of local NGOs, universities, fishermen and especially policymakers (local fishermen associations, local NGOs like BIOSFERA, Porto Novo city hall, local environmental agencies) from the start and the approaches and actions is ensured. COAST aims at and emphasises on the importance of the creation of guidelines with priority conservation strategies to achieve efficient management recommendations, not only locally, but also in other islands and coastal African countries. The City Hall mayor of the main village (Porto Novo) of the island has already shown his support for this project, as well as the Maritime and Port Institute, ENAPOR, local fishermen associations and Biosfera.

EXPERIMENT, CASE STUDIES

COAST will focus on assessing different biodiversity dimensions in relation to the functioning of Santo Antão marine ecosystems. Aside from coastal habitats and anthropogenic pressures mapping, COAST will also evaluate the vulnerability of the studied marine communities and create pilot conservation and restoration actions for selected degraded ecosystems, to increase their resilience. The project will also estimate potential synergies and conflicts between conservation objectives and social and economic objectives to develop and test new decision-making tools and processes for the effective development of integrated marine management plans of these areas. This will demonstrate potential societal and policy impacts. Overall, the project will provide advice on effective marine conservation and restoration in selected degraded areas, while considering uncertainties associated with such actions.

FUNDERS

- Fundação para a Ciência e a Tecnologia (FCT), Portugal
- Agence Nationale de la Recherche (ANR), France
- German Research Foundation (DFG), Germany
- Fundo Regional para a Ciência e Tecnologia (FRCT), Portugal
- Agencia Estatal de Investigación (AEI), Spain

Vulcano - Island of Santo Antão

COSAR

Context-dependence of the societal and ecological outcomes from river ecosystem restoration

DURATION
01.01.2022 – 31.12.2024

TOTAL GRANT
€ 630,789

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CONTEXT

Many river restoration projects, recreating local hydromorphological structures and habitats, have been implemented worldwide aiming at improving the ecological status of rivers. However, ecological outcomes (e.g. improved community structure and functions, reinforcement of ecosystem processes) strongly depend on multiple drivers and processes at various spatial scales, submitted to multiple human stressors, also potentially affected by past conditions legacies. The landscape "context" is crucial in restoration planning but the quantitative effects of the various context variables in restoration practice, as well as the role of metacommunities, the scale issue and the role of legacy effects are still understudied and thus poorly considered. Furthermore, knowledge also lacks on societal needs and benefits from restoration, as most operations focus on the ecological quality criteria. The achievement of societal goals is rarely reviewed and factors of success are not yet systematically examined, although this is crucial for a complete and sustainable success of restoration project. In this context, COSAR is designed to identify the combined effects of context variables on both ecological and societal outcomes of river physical restoration projects, and which combinations favour synergies or antagonisms between both outcomes types.

MAIN ACTIVITIES

COSAR aims to produce an operational framework to analyse outcomes of past restoration projects and to optimise the potential outcomes of future restoration projects in terms of both ecological and societal outcomes, by:

- defining and computing the relevant metrics to assess the ecological and the societal outcomes from restoration projects, and integrating these two sets of outcomes to assess their interrelationships at the catchment, sub-catchment and river reach scales;
- explaining how these sets of restoration outcomes are influenced by geographical, societal and environmental contexts, both considered in their spatial and temporal dimensions;
- co-constructing with a large set of stakeholder groups (national/regional/local environmental legislation and

administrations responsible for restoration planning and funding; institutions responsible for implementation of restorations; consulting companies specialized in restoration; fishing, agricultural and tourism organisations; hydropower producers; environmental NGOs) an operational adapted and science-based integrative analysis framework to assess restoration outcomes;
- providing these stakeholders with clear guidelines about how to integrate these context-dependencies in their planning of future restoration projects, optimising the chances to achieve positive results and successful restoration projects.

COSAR will analyse complementary insights from taxonomic and functional dimensions of river communities for the ecological outcomes, and on-line societal feedbacks from social media and networks for the societal outcomes. To ensure the relevance of the restoration targets, context variables, and spatial scales considered in the analyses, COSAR includes a comprehensive process of stakeholder engagement. Six dedicated workshops will be held inviting all stakeholders' groups to provide insights and feedbacks on the project design, analyses and product outreach. The stakeholders will also be involved in disseminating project results to their respective communities.

OUTCOMES AND EXPECTED IMPACTS

The COSAR project will produce an integrative analysis framework of restoration outcomes from both ecological and societal standing points to help stakeholders to design well-adapted restoration measures with respect to sites spatial and temporal context, and optimise future restoration planning.

Along with the academic valorisation of the developed knowledge and methods, COSAR main operational outcomes will be summarised:
- A compendium of fact sheets, including sector specific perspectives, context influence summaries and case-studies reviews;
- An on-line application, allowing all interested stakeholders to easily test and use the model on their own sites.

These outcomes will be largely spread thanks to the important involvement of different stakeholders' groups all along the project, the development of a project's website and the use of institutional social networks.

PROJECT CONTRIBUTION TO POLICIES AND/OR SOCIETY

The knowledge generated in COSAR will help all stakeholder groups involved to better accept and set up renaturation programs and individual projects in a targeted manner, assessing in early phase whether the achievement of specific ecological and societal goals is realistic in the respective environmental contexts, and thus help to optimise the restoration programs funding.

By providing its outputs for the next rounds of national/regional restoration planning, COSAR will also help restoration programs to better promote aquatic and floodplain biodiversity, and the good ecological status requested by the EU Water Framework Directive; but by introducing societal outcomes of river restoration, COSAR will also promote public support of river restoration, which is crucial to bring all the European streams and rivers closer to a good ecological status.

EXPERIMENT, CASE STUDIES

COSAR will use existing monitoring data from 200 restoration projects. This dataset covers Germany (77 projects), Switzerland (15 projects), Netherlands (28 projects), France (28 projects), Finland (50 projects) and Liechtenstein (2 projects). The restoration projects represent a large diversity of river types, from small headwater streams to large rivers with a focus on medium rivers, and present different physical restoration plans and measures (length of river restored, type of physical intervention). Sampled taxa include fish and macroinvertebrates.

FUNDERS

- Agence Nationale de la Recherche (ANR), France
- German Research Foundation (DFG), Germany
- Ministry of Agriculture, Nature and Food Quality (LNV), Netherlands

One year after remeandering operation on the Echandon River (FR)

Deep Rest

Conservation & restoration of deep-sea ecosystems in the context of deep-sea mining

DURATION
01/04/2021 – 31/03/2024

TOTAL GRANT
€ 1,273,431

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Adaptation and diversity in the marine environment (AD2M), CNRS/Sorbonne University, Roscoff, France
Deep Sea Ecology and Technology, Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (AWI), Bremerhaven, Germany
Marine Geosystems, (GEOMAR), Helmholtz Centre for Ocean Research Kiel, Kiel, Germany
Marine Biodiversity, Senckenberg Nature Research Society, Wilhelmshaven, Germany
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Ocean Systems, Royal Netherlands Institute for Sea Research, Den Burg, Netherlands
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Centre for Marine and Environmental Research (CIMA), University of Algarve, Faro, Portugal
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CONTEXT

The deep sea, defined as water and seafloor below 200 meters, is the largest biome on Earth accounting for 92% of the global ocean. This species-rich biome harbours numerous ecosystems including vast abyssal plains, mountain chains and canyons as well as cold-water corals, sponge grounds, hot vents and cold seeps. However, the so far relatively "pristine" deep sea is at potential risk of biodiversity and ecosystem function loss due to anthropogenic activities, including deep-sea mining. Although mineral exploitation of deep-sea resources has not yet started, the International Seabed Authority as part of its mandate defined in the UN Convention of the Law of the Sea is drafting the mining code that shall regulate exploitation in the ocean floor and subsoil thereof, beyond the limits of national jurisdiction. The ISA mandate includes the effective protection of the marine environment from harmful effects that may arise from deep-seabed related activities. DEEP REST aims at developing a novel approach to improve our capacities for science-based spatial planning and management in two ecosystems threatened by deep-sea mining. This project is extremely timely, as it directly addresses the concerns of policy-makers in a moment when seabed mining and its associated regulations are rapidly evolving from exploration to exploitation.

MAIN ACTIVITIES

DEEP REST will develop a novel approach to improve our conservation/restoration capacities in two deep-ocean ecosystems threatened by mining: nodule fields and hydrothermal vents. By combining data from large areas and across several disciplines, our project will:

1. Investigate and compare the biodiversity, functioning and connectivity of biological communities within and across ecosystems, linking to environmental conditions.
2. Evaluate the recovery potential and resilience of deep-sea communities at different degrees of disturbance, identify indicators of change and characterize tipping points.
3. Test, through experimentation, the effectiveness of different restoration actions on the recovery of communities.
4. Evaluate conservation/restoration outcomes in terms of ecosystem services and identify the governance

arrangements needed for efficient actions in concertation with stakeholders

5. Provide scientific guidance to stakeholders and policy-makers and recommendations to support deep-sea governance, ensuring a sustainable management of resources and conservation of ecosystems.
6. Communicate with stakeholders on issues linked to the exploitation of deep mineral resources. The proposed baseline studies are essential to fill knowledge gaps and to better understand the natural dynamics of deep-sea ecosystems, predict their resilience and evaluate potential conservation/restoration actions. Only with fundamental knowledge will we be able to propose relevant hypotheses concerning recovery trajectories and restoration actions needed.

OUTCOMES AND EXPECTED IMPACTS

DEEP REST will help clarify fundamental questions related to the identification of areas to be set aside for conservation, those that can be mined with minimum harm (if they exist) and those that are most adequate as reference areas to assess mining impacts. Moreover, the elaboration of appropriate restoration and conservation strategies requires addressing socio-economic dimensions. Indeed, in addition to their valuable mining resources, deep-sea ecosystems provide a wide range of ecosystem services. However, their remoteness makes their valuation difficult. Uncertainty around the quantification of those values cannot be an excuse for inaction and the implementation of a conservation framework is urgently needed prior to the start of exploitation. This is in accordance with the UNCLOS and the globally agreed mandate to protect the open ocean environment as a Common Heritage of Mankind. To this end, the project will address socio-economic issues regarding the design of this framework. A transdisciplinary analysis will be implemented in order to develop and compare different conservation strategies. This approach, combining interdisciplinarity and stakeholder engagement, will have a real impact on the conception of conservation and restoration protocols, including recommendations for the design of Marine Protected Area networks that will contribute to Aichi target 11 of the Convention of Biological Diversity.

PROJECT CONTRIBUTION TO POLICIES AND/OR SOCIETY

DEEP REST connects some of the most active deep-sea scientists in the field to experienced economists and jurists. Its strength lies in the integration of scientific knowledge across regions combining the wealth of multidisciplinary data collected by contractors and in previous national and EU projects with new key results to formulate concrete management actions and policy advice. Our strong engagement with stakeholders including policy makers, industry and NGO experts will lead to better-informed research, resulting in the development of improved management strategies for the ecosystems under consideration for mining. A strategic assessment of conservation and restoration scenarios will be carried out in a participatory manner to integrate knowledge and concerns from scientists and stakeholders. The stakeholder consultation process will be carried out through an initial scoping workshop, key informant interviews, focus groups, and multi-stakeholder groups. The results of this consultation will be used to develop policy briefs that will feed into the public debate. Actions and interactions with the general public will be ensured through different activities including video interviews, outreach conferences, theater plays and the development of a comic book. Several interactions with students and classrooms are also planned.

EXPERIMENT, CASE STUDIES

The inherent novelty of DEEP REST is the integration of environmental and biological data and the comparison of ecological processes between two contrasting ecosystems to identify key traits and functions affecting community resilience. New scientific tools, including trait-based and random-forest modelling approaches will be applied to connect biological and environmental variables across different scales. The underlying processes at stake for the recovery of disturbed deep-sea ecosystems will be identified through experimentations which will be used to better understand ecosystem functioning, assess resilience and recovery potential in real exploitation conditions. Although restoration is recognised as a potential way to mitigate mining impacts, there is a lack of empirical experience to predict if restoration can be effective in the remote ecosystems considered here.

FUNDERS

- Agence Nationale de la Recherche (ANR), France
- The Research Foundation – Flanders (FWO), Belgium
- VDI/VDE-IT, Germany
- Environmental Protection Agency (EPA), Ireland
- Ministry of Agriculture, Nature and Food Quality (LNV), Netherlands
- Fundação para a Ciência e a Tecnologia (FCT), Portugal
- Fundo Regional para a Ciência e Tecnologia (FRCT), Portugal-Azores
- State Research Agency (AEI), Spain

Mussels of the species Bathymodiolus azoricus in the vicinity of a high-temperature emission at 1700m depth on theLucky Strike vent field, Mid-Atlantic Ridge.

Emys-R

A socio-ecological evaluation of wetlands restoration and reintroduction programs in favour of the emblematic European pond turtle and associated biodiversity: a pan-European approach

DURATION
01.02.2022 – 31.01.2025

TOTAL GRANT
€ 1,045,316

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CONTEXT

The EU Biodiversity Strategy for 2030 emphasises that "we need nature in our lives". Yet, the world is currently facing its 6th biodiversity crisis partly due to land mismanagement. Habitat restoration and reintroduction of threatened species are considered an operational strategy for limiting biodiversity erosion. The European pond turtle *Emys orbicularis* (hereafter 'Emys') is of particular interest in this context: in Europe where wetlands declined by 90% since the 18th century, it has suffered the most dramatic decline of all reptiles. The fact that conservation measures in favour of Emys benefit to biodiversity and the positive public perception it enjoys, explain why Emys has received much attention from scientists and stakeholders. Over the last 3 decades, the EU has funded numerous projects for wetland restoration in favour of Emys. Yet the results of these measures need to be more intensely promoted. A key question remains unanswered: what are the most effective wetland restoration methods suitable for sustainable maintenance of the European pond turtle and associated wildlife throughout Europe?

MAIN ACTIVITIES

Emys-R consolidates an existing international network of researchers and stakeholders to share complementary knowledge and expertise on past, present and future wetlands, biodiversity and management. It is a 3-year participatory action-oriented research project based on seminal theories in humanities, social and natural sciences. It aims at testing the hypothesis that higher degrees of wetland restoration can compensate for limited capabilities of captive bred Emys to settle in the wild, and how specifically such conservation actions benefit society by bringing together people and nature. Emys-R aims at:

1. Investigate the ecological processes improving wetland restoration and Emys reintroduction based on monitoring of biodiversity and of reintroduced populations of Emys in three different contexts of land management
2. Assess trade-offs and synergies between targets, benefits and policies, with a focus on nontarget species (threatened

amphibians and invasive crayfish), and on value benefits of restoration, people's perception of restored nature, citizen science and deliberative processes involved in multi-stakeholder decision settings related to nature conservation.

OUTCOMES AND EXPECTED IMPACTS

Ultimately, Emys-R will produce guidelines for optimal wetland restoration protocols in favour of Emys reintroduction and people engagement in nature conservation based on our integrative approach, a review of past and current results, and a forecasting model of distribution and abundance of Emys at the European scale.

This very first integrated analysis of socio-ecological processes in degraded wetlands will lead to socially supported, effective wetland restoration in favour of the Emys and associated local biodiversity throughout Europe.

Emys-R will host four internationally co-supervised PhD candidates who will benefit scientific training in a transdisciplinary research project while contributing to the dissemination of the results.

PROJECT CONTRIBUTION TO POLICIES AND/OR SOCIETY

Emys-R will gather scientists from different academic disciplines and stakeholders (local inhabitants, land users, nature conservation and management actors and local decision makers) to address:

1. The economic sector by assessing the value benefits of wetland restoration through a non-monetary metric, namely the habitat unit.
2. The sociological sector by assessing the values of nature given by citizens and authorities that motivate people and politicians to support and/or to engage themselves in conservation actions and to evaluate how citizens' knowledge and involvement can contribute to academic knowledge and decision making.
3. The knowledge transfer sector, by expanding knowledge dissemination and transfer between academic experts, inhabitants, local actors of nature conservation and land management and local-to-national authorities throughout Europe, where similar restoration and reintroduction actions occurred, in order to identify best practices that promote non-expert, and particularly citizen's contribution, to decision making in environmental policies.

EXPERIMENT, CASE STUDIES

Emys-R operates on 3 study sites where EU-funded wetland restoration and Emys reintroduction took place in contrasted biophysical and socio-ecological contexts (i.e. study sites' recent history; stakeholders, management and protocols involved; areas use and accessibility to the public), providing ideal study cases for assessing common and specific processes involved in the ecological and sociological success of such actions. Emys-R will occur in France (Woerr, Lauterbourg) and Germany (Neuburg am Rhein) that hosted a former INTERREG project (Cistude sans frontières / Schildkröten ohne Grenzen), and in Latvia (Sitas lake area, Silene) that was part of a former LIFE project (HerpetoLatvia).

FUNDERS

- Agence Nationale de la Recherche (ANR), France
- VDI/VDE-IT, Germany
- State Education Development Agency (VIAA), Latvia
- National Science Center (NCN), Poland

Evidence of wild reproduction of captive-bred Emys at Woerr, Francev

FishME

Social and ecological effects of Fish removal in Mountain Ecosystems

DURATION
01.04.2022 - 31.03.2025

TOTAL GRANT
€ 780,638

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Ecological Research and Forestry Applications, University of Barcelona, Bellaterra, Spain

Continental Ecology, Superior Council of Scientific Investigations (CSIC), Blanes, Spain

Plant Sciences, University of Bern, Bern, Switzerland

CONTEXT

Threats to mountain aquatic ecosystems are multiple. Yet, besides climate change, fish stocking of naturally fishless lakes has been identified as particularly detrimental to water quality and biodiversity. Due to the magnitude of the ecological impact and to the global extent of fish introductions into mountain lakes, introduced fish are perhaps the most important threat to mountain lake biodiversity, ecosystem functioning, and water quality. This threat is particularly important as fish introductions co-occur with a number of other anthropogenic activities such as human population growth, changing economic activities, land-use change, urbanisation, pollution, loss and degradation of aquatic habitats, overexploitation, flow modifications and alien species invasions. Together and in interaction with climate change, these factors accelerate and exacerbate the environmental and ecological degradation of mountain aquatic ecosystems and the loss of unique species and life forms. Yet, despite strong concerns over the long-term health and functioning of aquatic ecosystems, experimental and restoration studies that link fish stocking to pollution, aquatic disease ecology, and ecosystem health, are still scarce.

MAIN ACTIVITIES

FishME will use a multi- and transdisciplinary approach, analysing the biological impact of fish, the synergistic effect of fish and pollution and the recovery potential of mountain lakes from fish stocking. These findings will be synthesised in a socio-ecological context in the FishME Management Toolbox, linking up our work to evidence-based conservation and the work of GEO Mountains. The toolbox will hence be an important information source on removal methods, impact analysis, restoration approaches and recovery processes in mountain lakes, for national and regional park managers, policy makers, conservationists and other mountain stakeholders. These different groups will be involved in the project all along the project, with smaller, informal meetings between local partners and authorities, and larger workshops to address more specific questions.

OUTCOMES AND EXPECTED IMPACTS

FishME will deliver the knowledge base to understand trade-offs between the economic and societal benefits of fish introductions and the impact of fish stocking on mountain aquatic ecosystems. The inter- and transdisciplinary research proposed in FishME also aims to co-design and deliver the knowledge necessary to guide governance and management strategies towards the conservation, restoration, and long-term safeguard of mountain water ecosystems and their unique biodiversity. With a focus on restoration of mountain lakes, FishME addresses this gap and provides policymakers, authorities, institutions, and practitioners the information needed to support investment in appropriate policy and management measures that can help revert ongoing losses of mountain freshwater species and habitats and degradation of ecosystem and wildlife health.

PROJECT CONTRIBUTION TO POLICIES AND/OR SOCIETY

The innovative research of FishME will be to evaluate the recovery potential of mountains lakes from fish introductions. With the FishME Management Toolbox, we will enable science to predict future impacts on the ecosystem health of mountain lakes and the resulting socio-economic risks for society. FishME is responding to Aichi Biodiversity Targets 14 (ecosystems and essential services safeguarded) and UN sustainable development goals 14-15 (Life below water, Life on land), 13 (Climate action), 6 (Clean water), and 12 (Responsible consumption & production). These policies are of high importance in a mountain context and is in accordance with the EU nature restoration plan within the EU Biodiversity Strategy for 2030 and the Water Framework Directive (2000/60/EC). Supporting FishME creates the unique opportunity to establish and subsequently strengthen the link of functional ecology, socio-ecology, microbial ecology, limnology and systems biology, a highly relevant and innovative step in modern biodiversity research, restoration and conservation.

EXPERIMENT, CASE STUDIES

The studies will be done at lakes in Romania, Italy, Austria, France and Spain.

FUNDERS

- Agence Nationale de la Recherche (ANR), France
- Austrian Science Fund (FWF), Austria
- Executive Agency for Higher Education, Research, Development and Innovation Funding (UEFISCDI), Romania
- Agencia Estatal de Investigación (AEI), Spain

The lake Prat Matau in the French Pyrenees near Couflens (Ariege).

ForestFisher

Priority areas for conservation and restoration of Amazonian forest-frugivorous fish interactions and associated fisheries

DURATION
01.04.2022 - 01.04.2025

TOTAL GRANT
€ 780,638

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Land Management, Technical University of Munich, Munich, Germany

Mountain Investigation, Polytechnic Institute of Bragança, Bragança, Portugal

Wildlife, Fisheries, and Aquaculture, Mississippi State University, Starkville, United States of America

CONTEXT

The Amazon River Basin is the largest and most diverse drainage basin on the planet. The deforestation of Amazonian tropical forests to make way for crops and pastures has increased dramatically over the last decades, along with changes in climate parameters increasing the frequency of extreme hydrological events and droughts. Such changes coupled with the physical fragmentation of rivers are affecting distribution patterns, recruitment, and productivity of freshwater fish species, thus reducing a variety of livelihood options for fishing communities. Among Amazonian fishes, those with fruit-eating habits play a crucial role in maintaining forest diversity as seed dispersers and constitute a key source of food and income for traditional, local human populations. Increased deforestation, especially in riparian areas, has threatened this fundamental plant-animal interaction relevant to the maintenance of the biological and functional diversity of plant communities and ecosystems in lowland rivers. Important socio-economic impacts are to be expected because numerous frugivorous fish species are harvested by traditional riverine communities and support commercial fisheries. ForestFisher aims to integrate forest-fish interactions in the context of planning new protected areas, managing existing conservation networks, and designing restoration programmes in the Amazon River Basin.

MAIN ACTIVITIES

The main research questions addressed by ForestFisher are:

- How recent land-use changes have affected the frugivorous fish diversity? Here ForestFisher will assess the influence of recent floodplain forest structure changes (e.g., degree of riparian deforestation) on frugivorous fish diversity at local and regional spatial scales.
- Will climate, land-use, and river fragmentation changes affect the availability of suitable areas for frugivorous fish species, and thereby threaten the ecosystem services that these fish populations provide? Here land use and land cover models will be developed for future scenarios, linking land-use change, landscape patterns, and ecosystem services critical for land management and policymaking. Then priority areas

for conservation of frugivorous fish species will be selected, mapped and ranked based on the likelihood of areas to retain climatically suitable conditions for species in the face of expected changes in climate, land use and land cover, and fragmentation.

- How will climate-change driven shifts in the distribution of frugivorous fish species affect fishing communities and their traditional fishing grounds? ForestFisher will build a protocol that guides public policy- and decision-makers to design Fishery agreements aimed at preserving a fishing resource that faces potential damages from the multiple threats.

OUTCOMES AND EXPECTED IMPACTS

ForestFisher aims to identify priority areas for conservation and restoration of Amazonian forest-frugivorous fish interactions and related ecosystem services. Climatically suitable areas for frugivorous fish species, riparian vegetation, connectivity will be integrated within the hydrographic network, and the location of current fishing grounds to define conserved and degraded climatic refugia, and infer the needs of potentially displaced fisher communities.

The Amazon is at the centre of an ongoing intense international debate as highlighted in the recent COP-26 and ForestFisher will offer an approach to assess the combined effects of multiple threats on fish species. Fish species are essential to the functioning of a socio-economic system, as they offer food and income for indigenous peoples and local communities, and to the ecological processes needed for forest sustainability. From this assessment, and the inclusion of stakeholders (e.g. the Brazilian National Centre for Monitoring and Alerts of Natural Disasters, the NGO Ecoporé) and fishing communities, the project will finally offer an integrated strategy for the conservation and restoration of priority areas, contributing to successful mitigation of current and future changes and to the resilience of socio-ecological systems in the region.

PROJECT CONTRIBUTION TO POLICIES AND/OR SOCIETY

At least 1 million people are directly linked to artisanal fishing in the Brazilian Amazon. Fishes' future suitable climatic areas may become decoupled from the current location of the fishing communities, implying future food insecurity and migrations in search of better fishing grounds. This project intends to develop a participatory protocol for the conservation of fishing resources and climate refugia in the Madeira / Purus interfluvial region. This protocol will guide local/ regional public policy and decision makers to design Fishery agreements based on the scientific evidence produced by the project and the traditional knowledge brought by fisher communities.

EXPERIMENT, CASE STUDIES

ForestFisher focuses on the Amazon drainage basin at different scales and extents and on local scale fish communities from sites covering a gradient of deforestation levels in the whole Amazon drainage. This compilation of fish sampling sites will be related to landscape metrics calculated from MapBiomas Panamazonian Collection, ensuring a complete coverage of the fish diversity dataset compiled. At the scale of the whole Amazon Basin, ForestFisher will provide future scenarios, model-based projections and priority areas for conservation and restoration of riparian forests to sustain frugivore fish populations and related fisheries. These outputs will be also provided for the Madeira/Purus interfluvial region, building participatory scenarios of future Amazon land-use change. Finally, stakeholders will be engaged in extensive pilot areas within the Madeira/Purus interfluvial region to develop a protocol for digital, economic and social inclusion of local communities living on fisheries.

FUNDERS

- Agence Nationale de la Recherche (ANR), France
- Fundação de Amparo à Pesquisa do Estado do Amazonas (FAPEAM), Brazil
- Fundação de Apoio ao Desenvolvimento do Ensino, Ciência e Tecnologia (FUNDECT), Brazil
- VDI/VDE-IT, Germany
- Fundação para a Ciência e a Tecnologia (FCT), Portugal

A nearly pristine flooded forest along the Caqueta River, Colombia.

FRESHH

Farmer acceptable REstoration of Semi-natural Habitat to limit Herbicides

DURATION
01.03.2022 - 28.02.2025

TOTAL GRANT
€ 974,170

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CONTEXT

Arable ecosystems are mosaics of terrestrial and aquatic biomes that are intimately interlinked and must be considered together for robust conservation and restoration. Intensive land use, and use of agro-chemicals in particular, have led to a significant degradation of the biodiversity and ecosystem services in both terrestrial and freshwater biomes. FRESHH aims to counteract this by reducing the need for herbicide applications via weed seed regulation by carabid beetles. The key constraint in the adoption of carabids is uncertainty in effectiveness and the acceptability of biological weed control for farmers. Agro-chemicals such as herbicides are a staple of farm management and reductions in their use is a cause of considerable concern to farmers, despite the potential benefits to the environment.

FRESHH sees the agricultural landscape as a combination of three layers: farmed fields; semi-natural habitats; and freshwaters. Herbicides applied in fields may runoff into freshwaters. The installation of semi-natural habitats can intercept this herbicide runoff and also support carabids that reduce the need for herbicide applications in field. FRESHH will work to understand the costs and benefits, and opportunities and constraints of supporting weed seed feeding carabids to reduce reliance on herbicides.

MAIN ACTIVITIES

The transdisciplinary approach of FRESHH builds upon an existing network of European farmers and the reuse of existing data for carabids, weeds and management. This includes employing existing eDNA methodologies and knowledge to assess the ecological status of freshwaters. The experimentation during the project will evaluate: carabid, weed and water quality responses across established landscape gradients of habitat; and socio-economic and agronomic research with our farmer network.

Working with farmers, FRESHH will co-develop acceptable practices to conserve carabid beetles, off-setting herbicide use, restore semi-natural flora within fields and in the neighbourhood of fields, and benefit aquatic biodiversity at the EU scale. FRESHH will attempt to show whether the effects of this approach would ‘rewild’ the weed flora of farmland fields,

supporting wider farmland biodiversity and ecosystem services, and assure the ecological status of farmland freshwaters by reducing run-off of herbicide and other agro-chemicals. Leveraging benefits across the landscape layers, through improved farmer knowledge and wider stakeholder cooperation, will lead to greater adoption, and thereby restoration, and serve as a model for more sustainable, landscape-scale practices.

OUTCOMES AND EXPECTED IMPACTS

FRESHH will work to understand the costs and benefits, and opportunities and constraints of supporting weed seed feeding carabids to reduce reliance on herbicides and restore terrestrial and aquatic habitats. Leveraging benefits across landscape layers, through improved farmer knowledge and stakeholder cooperation, will lead to greater adoption and restoration, and serve as a model for more sustainable, landscape-scale practices.

PROJECT CONTRIBUTION TO POLICIES AND/OR SOCIETY

The FRESHH goals of better understanding the opportunities and constraints of rewilding and agricultural landscape conservation, for better environmental health, are core requirements of several leading visions and policies for the future of farming, including the UN SDGs, UN Decade on Ecosystem Restoration, EU Habitats Directive, The Greening and Integrated Pest Management measures of the Common Agricultural Policy and the Green Deal. These goals and requirements have recently been highlighted in policies and agreements including IPBES, the EU Nature Restoration and EU Biodiversity Strategies, and the Water Framework Directive.

EXPERIMENT, CASE STUDIES

FRESHH will work in all partner countries to understand the agroecology of farming practices in the three layers of the agricultural landscape. Using a replicated landscape experiment, centred on 60 fields, FRESHH will sample carabid species abundance, weed abundance and diversity, herbicide practices and freshwater biodiversity (using eDNA approaches). These data will enable us to link, mechanistically, farmed field, semi-natural habitat and freshwater ecological responses to management. This data will feed into our socio-economic work with farmers to test whether including agronomic, socio-economic and ecological information from the different landscape layers will leverage greater adoption of management to conserve carabid beetles, off-set herbicide use, restore semi-natural flora within fields and in the neighbourhood of fields, and benefit aquatic biodiversity.

FUNDERS

- Agence Nationale de la Recherche (ANR), France
- Austrian Science Fund (FWF), Austria
- Technology Agency of the Czech Republic (TAČR), Czech Republic
- Ministry of Agriculture, Nature and Food Quality (LNV), Netherlands
- The Swedish Environmental Protection Agency (SEPA), Sweden

Carabid beetle in a field of winter cereal

FreshRestore

Holistic evaluation and restoration measures of human impacts on freshwater ecosystems across biogeographical gradients

DURATION
01.04.2022 - 01.04.2025

TOTAL GRANT
€ 1,249,026

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CONTEXT

Freshwater ecosystems are under tremendous anthropogenic stress both at global (e.g. from climate change) and at catchment scales (e.g. from land and water use). A direct result is that freshwater ecosystems in general hold alarmingly many threatened species. This is not only problematic for biodiversity, but also for human prosperity as functional freshwater ecosystems provide a range of ecosystem services. These typically include recreation and tourism, water supply, water quality control, erosion prevention and food supply, among many. A key challenge of the 21st century is therefore to understand and predict how freshwater ecosystems respond to the suite of stressors, and concurrently how we can sustain and restore these systems at a large scale. FreshRestore aims to meet this challenge by integrating the understanding of multilevel changes in freshwater ecosystems and their surrounding landscapes with a socio-economic framework. This will allow coherent evaluation and mitigation of negative human impacts on lakes (e.g. via best practice solutions for land use), in order to support the ecosystem services provides to us people (e.g. recreational and commercial fisheries).

MAIN ACTIVITIES

FreshRestore activities will answer four specific questions:

1. How do anthropogenic stressors connect to ecological drivers across different spatial scales from local to European?
2. How do anthropogenic stressors drive population size structure and biomass, and thus the functional ecology of fishes?
3. How do natural and anthropogenic drivers interact to affect lake trophic diversity and functioning?
4. What are the biological and socio-ecological trade-offs for nature-based solutions in face of both local and global stressors?

To achieve this, FreshRestore will structure and integrate statistical models upon existing datasets of biotic and abiotic parameters, fish population structure and ecological functions across large environmental gradients in Fennoscandia. The parameters will, among others, include climate, land and water use as well as restoration and mitigation efforts (e.g., habitat restorations, wetlands, regrowth of forest and buffer zones). An

integrative modelling framework will provide valuable insights into how freshwater biodiversity is connected to the environment, how the outcome varies with anthropogenic stressors, and how these stressors can be mitigated to benefit both humans and ecosystems. The model concept will be transferred and tested with case studies in Spain.

OUTCOMES AND EXPECTED IMPACTS

FreshRestore will provide a quantification of the functional relationships between relevant units of natural ecological drivers and anthropogenic stressors across spatial scales. This will lead to new knowledge on the effects of environmental drivers and anthropogenic stressors on freshwater biodiversity. FreshRestore will also expand this knowledge with quantifications of how interactions between global and local anthropogenic stressors affect ecological functions which provide important ecosystem services in lakes. Furthermore, the project will identify, quantify and inform on the implementation of cost-effective nature-based solutions targeting local stressors. The outcomes will be interlinked so that the modelling framework provides the basis for an adaptive management process. This will provide a best practice tool-box where researchers and stakeholders (such as environmental agencies and policy makers at national scales, as well as owner and user associations and county administrative boards at the local scale) can work in synchrony to implement conservation and restoration actions in freshwater systems.

PROJECT CONTRIBUTION TO POLICIES AND/OR SOCIETY

FreshRestore will develop scenarios and story maps of different mitigation solutions to support adaptive management and evidence-based decision-making at local and global scales. This facilitates effective revision of current policies and approaches (when needed), where the effects of specific mitigation efforts (e.g. change in land use) can be simulated to inform long-term effects on biodiversity and natural functioning of freshwater ecosystems.

EXPERIMENT, CASE STUDIES

We will use existing data, methods and competence from Fennoscandian lakes, comprising one of the largest remaining pristine freshwater sources in the boreal and Arctic regions, to produce novel mechanistic understanding of how local anthropogenic stressors and climate interactions affect biodiversity and functioning of freshwater ecosystems. The models will be tested and generalized within specific freshwater systems of southern Europe (Spain), where we will increase the current knowledge base on functional diversity with new field-collected data combined with already published data. An important aspect of the project is thus to transfer models and approaches, developed by the different partners, to new application contexts in the other countries. The project will facilitate sharing of knowledge and expertise between data-rich (Fennoscandia) and data-poor (Southern Europe) areas and thus provide a fruitful stepping stone for future projects focusing on fish populations and lake food webs and facilitating pan-European freshwater restoration and conservation efforts.

FUNDERS

- The Research Council of Norway (RCN), Norway
- Innovation Fund Denmark (IFD), Denmark
- Academy of Finland (AKA), Finland
- State Research Agency (AEI), Spain
- Swedish Environmental Protection Agency (SEPA), Sweden

How are fish populations affected?

InterRest

Interactive effects of local and landscape-scale restoration of semi-natural grasslands and agricultural fields on species interactions and ecosystem functions in different social-ecological systems

DURATION
01.03.2022 - 28.02.2025

TOTAL GRANT
€ 1,183,536

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Ecology, Autonomous University of Madrid, Madrid, Spain

Landscape dynamics & biodiversity, Forest Science and Technology Centre of Catalonia, Solsona, Spain

Stockholm Resilience Centre, Stockholm University, Stockholm, Sweden

CONTEXT

Calcareous grasslands were created by traditional land use in European cultural landscapes and are one of the most species-rich habitat types. They harbour many rare and highly endangered species but are nowadays often threatened, mainly by abandonment and eutrophication. Hence, restoration measures are urgently needed. However, transnational restoration approaches are missing and evaluations within regional restoration schemes focus usually only on indicator species or species richness and ignore their biotic interactions, ecosystem functions and the landscape context. Especially species interactions are important indicators of restoration success as they are often more sensitive to environmental changes and determine vital functions that are necessary to stabilize ecosystems. InterRest will analyse and link multiple interaction networks representing different ecosystem functions (e.g. decomposition, pollination, predation) and social-ecological interactions.

MAIN ACTIVITIES

InterRest will investigate species interactions across different trophic levels including plant-soil, plant-pollinator and bird-food resource interactions, in restored and degraded calcareous grasslands that are embedded in different socio-ecological and landscape contexts in three countries (Germany, Spain and Estonia). Additionally, InterRest will measure ecosystem functions including soil functions, pollination and predation. It is hypothesised that local restoration measures will lead to more complex and stable interactions and improved ecosystem functions compared to degraded sites. Moreover, InterRest will investigate whether landscape-scale restoration with agri-environment schemes can make local restoration more effective through additive or synergistic effects. Finally, investigations of a range of social and ecological factors that enhance or suppress stakeholders' willingness and capacities to accomplish local and landscape restoration will be conducted. Several stakeholders, such as farmers, nature conservation organisations, land managers and local conservation authorities, are responsible for the restoration

of the calcareous grasslands. Based on stakeholder interviews and ecological data, InterRest will develop social-ecological networks for a better understanding of human-nature interdependencies.

OUTCOMES AND EXPECTED IMPACTS

It is expected that agri-environment schemes increase the connectivity of calcareous grasslands, especially in isolated sites with no other calcareous grasslands in the surroundings. Analysing the social contexts of the restoration programs and identifying key factors that impact capacities will allow to achieve local and landscape restoration goals. Importantly, InterRest will investigate how social interdependencies impact biological interactions as indirect drivers. To synthesise the results of this project, ecological networks and social networks will be combined to identify conservation priorities and possible trade-offs with respect to the restoration of calcareous grasslands and important ecosystem functions they provide.

PROJECT CONTRIBUTION TO POLICIES AND/OR SOCIETY

By focussing on habitats with extremely high conservation value, the results of InterRest will contribute to several Aichi targets, i.e. reduction of habitat degradation (Target 5), sustainable management of agricultural landscapes (Target 7), improvement of the conservation status of calcareous grasslands and integration of grasslands in well-connected landscapes (Targets 11, 12) and dissemination of knowledge to relevant stakeholders (Target 19) who can transfer the findings in their conservation schemes. Moreover, InterRest will contribute to the Global Biodiversity Framework with its foci on the restoration of degraded grasslands and the improvement of habitat connectivity within agricultural landscapes (Goal A) and a better understanding of social-ecological interactions including the valuation of nature's contributions to people associated with the grasslands (Goal B). The results will also inform the European Habitats Directive on the effects of restoration measures on species interactions and ecosystem functions and how they are linked to social networks. Knowledge on the contribution of agri-environment schemes at the landscape scale to the restoration of calcareous grasslands can be integrated into the Common Agricultural Policy. For instance, future schemes could be applied at landscapes scales and target the improvement of grassland habitat connectivity through targeted measures and regionalized, cooperative agri-enviromnent schemes. The project will therefore contribute to safeguarding the precious biodiversity in calcareous grasslands, their interactions and functions and promote resilient ecosystems in European cultural landscapes.

EXPERIMENT, CASE STUDIES

The empirical research will be carried out in three case study regions that cover continent-wide variability of calcareous grasslands ecosystems in Europe by comprising Mediterranean (Spain), continental (Germany) and boreal (Estonia) biogeographical regions. The selected regions represent different social contexts with various stakeholder perspectives allowing to generalise the InterRest results beyond one specific case study by analysing similarities and differences between restoration approaches.

FUNDERS

- German Research Foundation (DFG), Germany
- Belgian Science Policy (BelSPO), Belgium
- Estonian Research Council (ETAg), Estonia
- Ministry of Agriculture, Nature and Food Quality (LNV), Netherlands
- State Research Agency (AEI), Spain
- The Swedish Environmental Protection Agency (SEPA), Sweden

Calcareous grassland (foreground) and agri-environmental measure in Catalonia, northeast Spain.

MPA4Sustainability

Enhancing MPAs' role in restoring biodiversity while maintaining access to ecosystem services

DURATION
01/04/2021 – 31/03/2024

TOTAL GRANT
€ 1,110,675

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Nonlinear Dynamics and Evolution, Mathematical Research Center, Cerdanyola del Valles, Spain

Aquatic Resources, Swedish University of Agricultural Sciences, Lysekil, Sweden

CONTEXT

Currently, there are more than 17,000 marine protected areas (MPAs) around the world covering close to 9% of the oceans. Yet, only 23% of them have a clear management plan and only about 1% of them have had management effectiveness evaluations. Such management plans are crucial for the success of MPAs, but the development and implementation of those plans often meet financial and infrastructure obstacles. Even if guidelines exist, they do not systematically explain how to measure, monitor, and manage trade-offs between biodiversity targets and socio-economic impacts of MPAs. Particularly, there are currently no guidelines for developing adaptive plans to ensure the transformative change that MPAs are to bring for ecosystem restoration and conservation, biodiversity improvement, and to meet UN SDG targets. This is the key gap mpa4sustainability will address by conceptualising MPAs as interventions on complex socio-ecological systems and trying to appraise how they affect their journeys towards sustainability.

MAIN ACTIVITIES

MPA4Sustainability will assess how existing MPAs can be used not only to achieve biodiversity targets, but also to maximise their contributions to the blue economy while respecting Nature. To do so, MPA4Sustainability will:

1. Estimate how changes in biodiversity associated with MPA establishment, and embedding in existing spatial management, and management are related to ecosystem service exploitations. A retrospective approach will be used to estimate how biodiversity indicators are associated with ecosystem service exploitation richness, yield and resilience in existing MPAs depending on their characteristics and objectives.
2. Estimate the dynamics of these socioecological networks of biodiversity and ecosystem service exploitation, the variety of states they can occupy, and the detection of possible cases of socio-ecological systems close to tipping points, using prospective analytical and computational approaches. There will be a focus on estimating the role of

MPA management actions and human pressure in driving those changes.
3. Assess whether readily available indicators can be used to monitor progress and adjust management of MPAs to ensure sustainability and the achievement of biodiversity targets.
4. Carry out policy analyses to evaluate how networks of MPAs, that can come from varied regulatory frameworks, can have added value for regional biodiversity and ecosystem service targets.

OUTCOMES AND EXPECTED IMPACTS

MPA4Sustainability will advance knowledge of the form and function of coupled human-nature marine systems and how they can be exploited sustainably and efficiently monitored and managed.

- MPA4Sustainability will produce a practical Decision Support System and tool for managers and policy advisors. This Decision Support System will consist in guidelines accompanied by an open source, user-friendly simulation platform to use in the comprehensive task of developing an integrative MPA management plan to consider the socioecological trade-offs, identify management actions, develop a monitoring programme, and recognise how adjacent existing MPAs can be used synergistically.
- MPA4Sustainability will provide practical guidelines to implement the Decision Support System in three European case studies.

PROJECT CONTRIBUTION TO POLICIES AND/OR SOCIETY

Current MPA design frameworks and guidelines assume that MPAs can fall along a protection continuum from fully-protected no-take areas to multiple use areas and that the closer to full protection an MPA is, the more it contributes to healthy oceans and benefit people. However, this continuum may suffer abrupt transitions between states due to non-linearity in socio-ecological systems. MPA4Sustainability will expand these guidelines, which influence regulatory implementations of European Directives – such as the Habitats, Birds and Marine Strategy Framework Directives –with a decision support system fulfilling the ambition the European Biodiversity Strategy and Green Deal. It will also contribute to IUCN's Global Standards and User Manual of the Green List.

EXPERIMENT, CASE STUDIES

MPA4Sustainability will use three European case studies representing typical MPA configurations in terms of management complexity and management phases.

1. Cerbère-Banyuls is an old MPA which has recently been embedded within the Golfe du Lion marine park with various protection zones, managed by multiple agencies.
2. Madeira has established one of the newest Site of Community Importance to conserve highly mobile species. Its management plan needs to be integrated with existing adjacent MPAs.
3. A mosaic of MPAs exist in Øresund, the strait between Sweden and Denmark. Øresundsvandssamarbejdet (stakeholder consortium) is exploring the potential to create a coherent network of MPAs.

FUNDERS

- Innovation Fund Denmark (IFD), Denmark
- Agence Nationale de la Recherche (ANR), France
- Fundação para a Ciência e a Tecnologia (FCT), Portugal
- State Research Agency (AEI), Spain
- Swedish Environmental Protection Agency (SEPA), Sweden

Bottlenose dolphin with a year-round presence in the SCI Cetáceos Madeira.

NARROW

Narratives on Restored Water

DURATION
01.03.2022 - 31.03.2025

TOTAL GRANT
€ 532,044

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https://www.slu.se/narrow

http://www.snowchange.org/narratives-on-restored-water/

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Snowchange Cooperative, Lehtoi, Finland

Geography and Sustainability, University of Lausanne, Lausanne, Switzerland

Global Protected and Conserved Areas, International Union for Conservation of Nature (IUCN), Gland, Switzerland

CONTEXT

NARROW will examine effective nature conservation and climate change mitigation led by local communities. This will be done by looking at restoration, rewilding, biodiversity, greenhouse gas flux (GHG) and carbon storage of Swedish and Finnish inland waters, wetlands and adjacent meadows and forests. Different sectors of society (e.g. local communities, including Saami people, academics and administrative actors) will be involved. NARROW will examine the success of these locally led restoration projects by bringing together social (oral histories, narratives, values) and ecological (GHG, biodiversity measurements) methods. Ultimately, NARROW will ask the following questions: what are the ecological, cultural, social and spiritual values that inspire local communities to restore and protect different inland water-land systems? Why are they important and how are such values determined and reflected in national and international policy contexts?
Two interrelated hypotheses are posted. The first hypotheses is that diverse, inclusive governance is essential for long term conservation outcomes, this includes local participation and locally led governance. The second is that international environmental targets can be met in the long-term through their various local strategies including restoration, diverse governance situations and their vitality. In this way, NARROW improve the understanding of how effectiveness of local participation and governance contributes to achieving biodiversity targets.

MAIN ACTIVITIES

NARROW will study the governance contexts of different sites in Finland and Sweden, building on the hypothesis that local communities and their contextualisation is essential for effective and equitable conservation. Interviews and dialogue workshops will be performed in order to seek local access to formal power structures. Through NARROW, the changes in biodiversity and emissions of greenhouse gases in the sites, with an emphasis on cultural keystone species will be assessed. This assessment will primarily rely on existing data and be complemented with data collection. Local knowledge

and values regarding local areas and natural resources will also be analysed. Using narrative research, and "braided knowledge" production, we assess change in specific locations, cultural settings and home areas. These results will then be analysed and linked up with international OECM (*other effective area-based conservation measures*) guidelines (to understand governance vitality and effectiveness. These results will also be disseminated in national to international policy arenas, e.g. the Swedish Mångfaldskonferensen, and the 2025 IUCN World Conservation Congress.

OUTCOMES AND EXPECTED IMPACTS

Several research questions will be answered by NARROW that will contribute to biodiversity conservation at a local, national and international level:

- How do the different governance structures and processes involve local communities and enable them to take decisions for restoration? Who takes decisions, why and how?
- Can we demonstrate added value for biodiversity and ecosystem services through community-led restoration? What is the role of cultural keystone species?
- In addition to the governance data and the biological data, what are the key narratives of "new natures" manifesting in the local places? What role do cultural keystone species play? How do local people express new relationships and values that emerge through restoration and rewilding?
- What is the government vitality and long-term effectiveness of the five sites, and how is this related to the agency, knowledge and narratives of the local actors? How applicable and relevant are the IUCN assessment guidelines to the different local situations and are there lessons learnt from these areas that can be used for further development of these guidelines?
- How can local perspectives inform and influence regional and global policy? Can global policies help to defend, support and recognise local communities?

PROJECT CONTRIBUTION TO POLICIES AND/OR SOCIETY

At the local level, NARROW will make a strong case for integrating views, voices, perspectives and narratives of local communities as key factors in achieving biodiversity conservation outcomes. At the national level, NARROW will engage with Convention on Biological Diversity focal points and report to the World Databases on Protected Areas and OECMs. At the EU level, the results will influence EU policymaking and EU Member States as the target to protect 30% is likely to be included in National Biodiversity Strategy Action Plans. At the international level, NARROW will suggest improvements to the OECM global guidelines.

EXPERIMENT, CASE STUDIES

Our study sites are connected to inland waters. We will focus on five study areas:

Koitajoki basin in North Karelia, Salojenneva wetland in Western Finland and Näätämö basin, a Saami home area in Lapland (Finland), and

Gredelby pastures/Trunsta marsh and the Voxnadalen Biosphere Reserve, including the Sässman area of Voxnan River, with a lake, wet meadows and pastures (Sweden).

We will in these areas conduct interviews and dialogue workshops with the local actors, measurements of greenhouse gas emissions, and biodiversity observations.

FUNDERS

- Swedish Environmental Protection Agency (SEPA), Sweden
- Finnish Academy of Sciences (AKA), Finland
- Swiss National Science Foundation (SNSF), Switzerland

Rewilding area of Salojenneva in western Finland.

NICHES

Nature's Integration in Cities' Hydrologies, Ecologies and Societies

DURATION
01.04.2022 - 31.03.2025

TOTAL GRANT
€ 601,098

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Landscape Architecture, University of Sheffield, Sheffield, United Kingdom

Civil & Environmental Engineering, Northeastern University, Boston, United States of America

Environmental Science and Technology, Universitat Autónoma de Barcelona, Bellaterra, Spain

CONTEXT

Combined drainage systems transport wastewater, stormwater and urban runoff together to a sewage treatment plant. Heavy rainfall can flood these systems and exceed capacities, resulting in the discharge of excess wastewater and contaminated runoff directly into rivers, streams or other nearby water bodies. High resultant water pollution poses a serious threat to aquatic biodiversity, especially in urban areas whereimpervious surfaces prevent rainwater infiltration and increase the likelihood of such overflow events. surfaces prevent rainwater infiltration and increase the likelihood of such overflow events.

There is thus an urgent need to identify new solutions for reducing this burden both on sewage systems and aquatic ecosystems. Nature-Based solutions (NBS) are proposed as an alternative to the cost-intensive renewal of wastewater systems and as a supplementary element to existing stormwater management systems, having the potential to alleviate pressure during high rainfall events while also providing wider societal and environmental benefits. Societal uptake remains limited due in part to lacking evidence, approaches and targeted guidance that take the wider social-ecological-technological system (SETS) into account. NICHES aims to fill this gap by defining a holistic SETS framework for understanding restorative NBS for urban runoff mitigation and the resultant reduction of impacts on aquatic systems.

MAIN ACTIVITIES

NICHES will utilise five global cities as co-design arenas to explore the potential for mitigating combined sewage overflow (CSO) through NBS and thereby reduce negative impacts on aquatic ecosystems. Working together with stakeholders in our case studies (e.g. policy makers, practitioners, NGOs and community groups and the wider public, sectoral actors and the private sector), the project will examine the ecological, social and economic impacts of CSO on aquatic ecosystems. An integrated assessment framework will also be developed to understand the potential of NBS for urban runoff mitigation and explore trade-offs in meeting the needs of populations in different parts of the urban system. Finally, the project will co-conceive transition pathways for integrating restorative

NBS into urban policies. The pathway development will build on i) a governance and policy analysis related to the management of urban waters and ii) an integrated assessment framework to assess stakeholders' needs and values against political and economic feasibility. A co-design approach across all activities will engage relevant stakeholders and ensure the relevance and wider applicability of results for increased uptake.

OUTCOMES AND EXPECTED IMPACTS

NICHES will demonstrate restorative NBS's mitigation potential for tackling combined sewer overflow and diffuse pollution impacts on aquatic ecosystems through the enhancement of urban water retention capacities. This will be accomplished by advancing scientific knowledge about restorative NBS via new approaches and applications of impact assessments, models and transitional governance approaches.

More specifically, NICHES will utilise five case studies to co-create knowledge and develop a shared understanding of restorative NBS that can be applied to avoid storm-water runoff. This will help to overcome policy and planning silos by creating an interdisciplinary understanding of NBS potentials in water management and facilitate wider NBS implementation and CSO reduction. Second, a novel ecosystem provisioning module will be generated to enable decision-makers to oversee the consequences of CSO events on ecosystem service provisioning. Third, NBS scenario maps will support increased consideration of hydrological impacts in planning and decision-making. Additionally, NICHES will develop an integrated water assessment framework for restorative NBS. The holistic approach includes consideration of trade-offs and synergies between target, benefits and policies for conservation/restoration. Finally, NICHES will co-develop transition pathways for increased integration of NBS within existing local policy frameworks in the areas of e.g. water management, biodiversity protection, and climate change adaptation. The project will also support more integrated governance approaches to overcome institutional lock-ins and path dependencies.

PROJECT CONTRIBUTION TO POLICIES AND/OR SOCIETY

NICHES will generate new knowledge to improve NBS effectiveness and upscaling for (aquatic) restoration and to mitigate impacts from combined sewage overflow. Strong stakeholder involvement through co-development processes will enable an active discourse and the inclusion of end-user perspectives in the design of the NBS and transition pathways. Targeted outreach and exploitation activities with the key local stakeholder groups outlined above as well as national and EU decision-makers and technical experts, the research community and sectoral actors will enhance policy development and the exploitation of project results within the NICHES case study cities and beyond. A final virtual conference will serve to bring representatives of these groups together to create an interactive setting for dialogue and learning. Support for numerous EU policies such as the Water Framework Directive, Biodiversity Strategy for 2030 and upcoming Restoration Plan as well as the Flood Directive, Water Trewatment Directive and Adaptation Strategy) will be provided through biodiversity and natural resource protection, increased NBS uptake, and improvements to human health and water quality.

EXPERIMENT, CASE STUDIES

NICHES follows a three-tiered engagement approach, which entails:

1. the co-development and comprehensive application of key methods across three core cities (Barcelona, Rotterdam, Boston);
2. an in-depth application of select innovative methods in single cities;
3. a refinement, validation and extraction of lessons learnt through a targeted involvement of and integration with all five NICHES cities (including Berlin and Sheffield as peripheral cities) to foster upscaling and wider application beyond the project.

These five cities represent diverse social, economic and ecological contexts, levels of experience with NBS and related policies, and sewage and climate challenges.

FUNDERS

- VDI/VDE-IT, Germany
- Ministry of Agriculture, Nature and Food Quality (LNV), Netherlands
- Agencia Estatal de Investigación (AEI), Spain

Temporary dam to contain sewage overflow in Rotterdam, NL

REMOVE_DISEASE

Conservation and restoration of degraded insular biodiversity: impacts of the removal of introduced mammals on the dynamics of infectious diseases in seabirds across islands of the Southern Ocean

DURATION
01.04.2022 – 31.03.2025

TOTAL GRANT
€ 400,428

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Bird Life International, Cambridge, United Kingdom

Falklands Conservation, Stanley, United Kingdom

Seabird Conservation Programme, Bird Life South Africa, Johannesburg, South Africa

Institute for Coastal and Marine Research, Nelson Madela University, Port Elizabeth, South Africa

FitzPatrick Institute of African Ornithology, University of Cape Town, Rondebosch, South Africa

CONTEXT

Invasive species are one of the main threats to biodiversity, and species most susceptible to invade inhabit marine islands which were home to >90% of the bird species that have gone extinct over the last 500 years. Island ecosystems are unique and particularly vulnerable to invasive species, disease spread and other threats. Relatively recently, a momentum has been building worldwide to control the spread of introduced species, develop protocols to decrease the risk of introducing new species, and, when possible, eradicate invasive alien species. In the Southern Ocean, the impact of these threats on Antarctic and sub-Antarctic terrestrial ecosystems is particularly exacerbated by environmental change. Ambitious restoration projects based on the eradication of introduced mammal species from islands (such as rats, mice and cats) are being implemented, but they very rarely consider the potential role of pathogens as a threat to native seabirds, despite their potential importance. In this context, project REMOVE_DISEASE aims at exploring the impact of the eradication of introduced species on the dynamics of pathogens and biodiversity on islands.

MAIN ACTIVITIES

In densely breeding species, such as seabirds, the threat posed by pathogens is increasingly recognised, and in some cases introduced mammal species are suspected to be playing key roles as maintenance reservoirs or vectors of transmission, such as on Amsterdam Island, in the south of the Indian Ocean, where yearly epizooties of avian cholera kill thousands of nestlings. Records of infectious diseases of seabirds have been reported on other islands, where they could contribute to threaten host species. In this project, we aim at exploring the effects of the eradication of introduced mammal species on the dynamics of exposure of native seabird species to infectious agents on islands. Moreover, we will explore the mechanisms by which those changes may occur and their potential long-term implications. By including avian scavengers as sentinel species in epidemiological surveys pre- and post-eradication, we will maximise our ability

to detect effects. In parallel, we will investigate how consideration of these epidemiological aspects could benefit the implementation of large-scale biodiversity restoration projects. REMOVE_DISEASE will benefit from interdisciplinary approaches, independently funded restoration efforts, and from being conducted on islands that have been the subject of detailed monitoring and conservation biology studies by the international partner teams.

OUTCOMES AND EXPECTED IMPACTS

The test of the eco-epidemiological impact of introduced mammal eradication plans on eco-epidemiological dynamics will directly benefit from being conducted in anticipation and in parallel with the management plans to restore the ecosystems. The outcomes of REMOVE_DISEASE will further have relevance for inverse zoonoses, i.e. the transmission of infectious diseases from humans to wild animals, which has specifically been identified as an important risk in southern polar areas in the case of enterobacteria and coronaviruses. The four self-funded partners and stakeholders, the National Nature Reserve of the French Southern Lands, Bird Life International, Falklands Conservation and Bird Life South Africa, will be engaged via their involvement in the project meetings, the coordinated planning of fieldwork, and the interpretation and dissemination of the results. Each eradication project costs much, so the explicit consideration of the possible extra benefit of eradicating infectious disease may be of critical importance. The communication plan will benefit from the strong experience of several of the partners, notably BirdLife Internatiobal , but also the academic teams. The study will be conducted in polar contexts, with relatively simple systems (few species), but the results will be of importance for eradication of introduced mammals on islands worldwide, including in temperate and tropical ecosystems.

PROJECT CONTRIBUTION TO POLICIES AND/OR SOCIETY

The findings could highlight how the eradication of introduced species from islands can directly benefit the conservation of biodiversity by relieving native species from predation pressure from those species, but also indirectly via its effect on disease agents. This is especially important in the current context of global change, with potential increased risks of infectious disease spread and emergence. Stakeholders involved as partners are a government environmental agency (the National Nature Reserve of the French Southern Lands) and non-governmental organisations (BirdLife South Africa, Falklands Conservation, and BirdLife International) that are critically involved in biodiversity conservation. The direct involvement of stakeholders in an international setting will contribute to achieving the objectives of the project and its broad implications.

EXPERIMENT, CASE STUDIES

The project will focus on three groups of islands of the Southern Ocean which host large native seabird populations of albatrosses, penguins and burrowing petrels, suffering from introduced mammal species. Case studies benefiting from detailed long-term monitoring of bird populations will be conducted on Amsterdam Island (French Southern and Antarctic Lands), Marion Island (South Africa) and New Island (Falkland/Malvinas Islands). The implementation of restoration efforts via introduced species eradication plans such as on Amsterdam and Marion islands will enable a quasi-experimental approach of the effect of introduced species on eco-epidemiological dynamics.

FUNDERS

- Agence Nationale de la Recherche (ANR), France
- Fundação para a Ciência e a Tecnologia (FCT), Portugal
- Water Research Commission (WRC), South Africa

Entrecasteaux cliffs, Amsterdam Island, where albatrosses suffer from rats and infectious disease.

RESPOND

Restoring and Managing Biodiversity and Ecosystem Services of Temporary Pond Landscapes

DURATION
01/04/2021 – 31/03/2024

TOTAL GRANT
€ 1,182,860

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Ecology, Autonomous University of Madrid, Madrid, Spain

CONTEXT

Temporary ponds (i.e. ponds that seasonally dry) are a ubiquitous component of global biomes found from the equatorial forests to the arctic tundra. However, with the intensification of agriculture and hydrological modification of landscapes, these systems have largely disappeared in Europe and are often strongly degraded. Despite their unique biodiversity, most temporary ponds lack any formal protection. They also have a poor reputation. For instance, they are often overlooked or considered sources of mosquitoes. However, there are also strong indications that they fulfil important roles in landscapes but the full scope of ecosystem services they provide has not been quantified. Their biodiversity includes a threatened group of crustaceans: the large branchiopods. These have survived in temporary ponds since the Devonian period more than 350 million years ago and they are likely to have a disproportionately large effect on the proper functioning of these ecosystems as keystone species and ecosystem engineers. But this remains to be investigated.
In this context, five major issues will be tackled in ResPond: the unprotected status of most temporary ponds in Europe (i), the degraded status of most of these ponds (ii), the variable success of temporary pond restoration and creation projects (iii), the poor understanding of temporary pond ecosystem services which may be due to the absence of keystone species (iv) and the poor knowledge/ bad reputation of temporary pond with regards to ecosystem disservices (e.g. as a source of mosquitoes).

MAIN ACTIVITIES

ResPond will implement the following activities:

1. Develop an effective framework for temporary pond conservation in Europe and North Africa. ResPond will synthetise existing temporary pond survey in order to categorise them into separate conservation units. The units will be mapped in accordance with the level of protection and threat they are facing, to define prioritized conservation areas.
2. Produce guidelines to reduce degradation and promote

more effective conservation and restoration. This will be defined by combining information found in literature, and in consultation with pond managers and scientists.
3. Reconstruct the ecosystem services of temporary ponds and the pivotal role of large branchiopods. Large scale experiments will be performed in Poland, Spain, Belgium and Morocco

The activities carried out by ResPond will involve governmental policy makers at the EU, national and regional levels, land owner and managers (eg. LIFE project coordinators, national parks, nature managers). During the course of the activities performed by ResPond, farmer organisations and NGOs (WWF anf Birdlife international) will also be consulted and collaborations with the European Pond Conservation network (EPCN) and the UK based Freshwater Habitat Trust (FHT) will help to disseminate knowledge through their respective platforms. Policy briefs, articles and meetings will allow ResPond to engage with these policy makers and stakeholders. Finally, ResPond will reach out to the local communities in Poland, Spain, Belgium and Morocco to develop generic communication tools (animation videos, organism search charts) reaching local communities in the EU and beyond.

OUTCOMES AND EXPECTED IMPACTS

The goal of this project is to be a catalyst for more effective long-term conservation of temporary pond biodiversity and ecosystem services. This will be done by synthesising available data on temporary pond biodiversity patterns and by experimentally resolving critical knowledge gaps that currently prevent more effective conservation and restoration.
ResPond will produce clear guidelines for temporary pond conservation, creation, and restoration, propose a regional conservation framework and organise a range of outreach activities. In the long run, this project aims to improve protection, reduce degradation, improve creation and restoration projects and improve the overall reputation of temporary ponds.

PROJECT CONTRIBUTION TO POLICIES AND/OR SOCIETY

Project results will be provided to policymakers (e.g. EU organs such as the European Environment Agency, European Agricultural Agency and national and regional organs involved in nature and land management in different European member states as well as Morocco) to:
1. Deliver scientific baseline information on this ecosystem type and its threats and identify leverage points for effective policy changes
2. To increase the support base for policy changes at a regional, national or European level. Examples of policy changes could be to compensate farmers for temporary ponds on their land, or a future extension of the Habitats Directive in which different temporary pond types may be considered. The project's guidelines may lead to improvements in management and creation of temporary ponds, e.g. by increasing the success of LIFE projects.

EXPERIMENT, CASE STUDIES

ResPond will perform joint experiments in Belgium, Poland, Spain and Morocco to expose the drivers of temporary pond ecosystem services and use a questionnaire-based approach to document the perceived services and disservices associated with this habitat.

FUNDERS

- The Research Foundation – Flanders (FWO), Belgium
- Ministry of National Education, Vocational Training, Higher Education and Scientific Research (MENFPESRS), Morocco
- National Science Centre (NCN), Poland Agencia Estatal de Investigación (AEI), Spain

Fairy shrimp Branchipus schaefferi, a typical European temporary pond inhabitant

RESTOLINK

Quantifying restoration success across biomes by linking biodiversity, multifunctionality and hydromorphological heterogeneity

DURATION
01/04/2022 – 31/03/2025

TOTAL GRANT
€ 772,957

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Ecology and Environmental Science, Umeå University, Umeå, Sweden

CONTEXT

Restoration approaches to improve the hydromorphology of streams are increasing worldwide but often fail to recover good ecological status and biodiversity. Yet, the evidence for the dominant effects of hydromorphology on biodiversity and ecosystem functioning suggests that the strong potential for hydromorphological restoration is not fully explored in stream rehabilitation. It is argued that restoration often fails because it does not consider the spatial scales of stream hydromorphology that are most relevant to biodiversity and ecosystem functioning. Moreover, traditional indicators of restoration success based on the composition of biological communities may not show the same recovery trajectory as key ecosystem functions, such as organic matter decomposition and nutrient retention. RESTOLINK proposes a novel framework for evaluating restoration success by mechanistically linking hydromorphological heterogeneity at relevant scales, multi-group biodiversity, and the multifunctionality of stream ecosystems. We will apply this framework to streams across a broad latitudinal gradient from boreal to tropical biomes and will thus test how biome-specific factors such as climate, vegetation, and hydrology set the boundaries for local restoration responses.

MAIN ACTIVITIES

RESTOLINK's aim is to propose and test a novel framework for quantifying restoration success that connects hydromorphology with biodiversity and essential ecosystem functions. It builds upon three conceptual approaches grounded in hydraulic and ecological theory. In doing so, RESTOLINK will advise how the restoration of in-stream complexity must be designed to return freshwater biodiversity and ecosystem functioning to sustainable levels efficiently, thereby providing a blueprint for better restoration efforts. A unique aspect of RESTOLINK is the broad assessment of restoration efforts in freshwater ecosystems ranging from the Brazilian Cerrado to the boreal forest landscapes of northern Sweden. This allows testing whether ecosystems differing in regional biodiversity, key climate drivers, and underlying geologies respond similarly

to restoration measures. RESTOLINK will benefit from the early involvement of stakeholders and the local administrations, ensuring that end-user demands will be targeted adequately in the project. Regular meetings with local administrations will also provide end-users and practitioners with information on what aspects should be considered in restoration projects. In addition to the organisation of interactive knowledge exchange workshops with practitioners, regular annual newsletters will be published. To target specific practitioners and public sector end-users, for example, those directly involved with water treatment and technology, environmental monitoring, and water resources management. The main aim of these activities is to transfer scientific knowledge to achieve the success of restoration projects in fluvial ecosystems.

OUTCOMES AND EXPECTED IMPACTS

Interlinking multi-group biodiversity, multifunctionality, and hydromorphological heterogeneity will advance the fundamental understanding of the functional role of biodiversity and contribute substantially toward a novel science-based management of freshwater resources. Applying RESTOLINK's concept will link restoration actions (i.e., measures to improve stream hydromorphology) mechanistically to their intended outcome (recovery of biodiversity). This will help improve restoration efforts and establish indicators of ecosystem functioning. RESTOLINK expects that evaluating the functional response across biomes will help tailor indicators applicable over wider geographical ranges. Similarly, through cross-biome assessment, the project will be in a position to establish general guidelines for restoration that may prevent local authorities from engaging in efforts that are unlikely to be successful, given unique regional drivers of stream structure and functioning. RESTOLINK envisages a close collaboration with national and international stakeholders to collaborate with (e.g., local environmental agencies in each country to be involved or consulted (e.g., federal environmental agencies, European Topic Centre on Inland, Coastal and Marine waters, European Centre for River Restoration), and to be informed (e.g., environmental ministries).

PROJECT CONTRIBUTION TO POLICIES AND/OR SOCIETY

The primary aim of RESTOLINK is to advise how the restoration of in-stream complexity must be designed to return freshwater biodiversity and ecosystem functioning to sustainable levels efficiently. Moreover, the project will establish ecosystem functions as indicators of early restoration success that can also be used to assess ecosystems' functional status. Hence, RESTOLINK addresses three policy frameworks. The biodiversity strategy of the European Union for 2030 aims at restoring 25.000 km of European rivers to a free-flowing state to improve the threatened freshwater diversity and ecosystem functions. A deeper understanding of critical spatial and temporal restoration scales to improve biodiversity and ecosystem functions can be provided by RESTOLINK's research. RESTOLINK will also establish indicators and provide recommendations about the sensitivity, variability, and applicability of functional indicators across biomes that can be.

EXPERIMENT, CASE STUDIES

Data will be collected in country-specific case studies, where sites will be studied that have been restored at least five years before the project starts. Restored reaches are compared with positive and negative controls, which allows for quantifying restoration success as either the deviation of a given restored site from the negative control or its convergence with the positive control. Our approach will enable us to identify the most effective management practice for each biome and allows us to quantify the physical conditions under which management measures are successful. Fieldwork is conducted in Sweden, Germany, Spain, and Brazil, respectively but guided by joint field protocols that allow the standardised collection of relevant data.

FUNDERS

- VDI/VDE-IT, Germany
- São Paulo Research Foundation (FAPESP), Brazil
- Agencia Estatal de Investigación (AEI), Spain
- Swedish Environmental Protection
- Agency (SEPA), Sweden

Stream restoration will be successful if hydromorphological heterogeneity is restored at spatial and temporal scales relevant to biodiversity and ecosystem functioning

RESTORESEAS

Marine Forests of animals, plants and algae: nature-based tools to protect and restore biodiversity

DURATION
01/04/2022 - 31/03/2025

TOTAL GRANT
€ 1,998,129

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Oceanography, Laboratory of Ichthyology, Federal University of Espírito Santo, Vitoria, Brazil

Forest Protection and Wildlife Management, Mendel University, Brno, Czech Republic

Marine Science, Senckenberg Society for Natural Research, Wilhelmshaven, Germany

Biology, Chouaib Doukkali University, El Jadida, Morocco

Freshwater and Marine Ecology, University of Amsterdam, Amsterdam, Netherlands

Environment, Norwegian Research Centre, Bergen, Norway

Oceanograpy & Fisheries, IMAR/University of Azores, Horta, Portugal - Azores

Aquaculture and Sustainable Marine Ecosystems, University of Las Palmas, Telde, Gran Canaria, Spain – Canary Islands

Marine Sciences, University of Gothenburg, Strömstad, Sweden

CONTEXT

The losses of marine forests are catastrophic tipping points accelerating the degradation of ecosystem services that are essential for humanity and all species. These services include nursery, shelter and feeding grounds for many species including providers of human food security, coastal protection, and counteracting climate change by carbon sequestration, for which seagrasses are one of the most efficient ecosystems on Earth. Yet, with these habitats being out of sight and challenging to reach, below the ocean surface, marine forest restoration is both rare and difficult to monitor. RESTORESEAS studies the biological and biophysical processes at stake of the key species involved in these hypotheses in the Atlantic Ocean, and their interactions to help determine the effectiveness of restoration and conservation action. The project aims to further the scientific understanding of the role played by specific, genetic and functional diversity in marine forest ecosystems of the Atlantic Ocean, with a focus on seaweed, seagrass and corals. Building upon novel hypotheses, experimentation on propagation, indicators and global models will permit the assessment of the conditions for large scale conservation and restoration approaches.

MAIN ACTIVITIES

RESTORESEAS activities will test and investigate hypotheses developed to restore marine forests through the following set of activities :

1. Surveys and habitat suitability/biodiversity models for the Atlantic Ocean, with unprecedented marine data richness to map hotspots of rich pristine marine forest habitats to propose conservation priorities under future scenarios of climate change and other pressures, to map habitats requiring restoration.
2. Conducting surveys/ Mapping and coupling habitat suitability/biodiversity models for the Atlantic Ocean with unprecedented data to identify hotspots of rich pristine marine forest habitats in order to propose conservation priorities under future scenarios of climate change and other pressures, and prioritise habitats requiring restoration.
3. Comparatively testing different approaches (clonal versus sexual propagation) for restoration of different types

of marine habitats in different types of marine ecosystems, including effects of species and population genetic biodiversity, focusing on roles of symbiont microbiomes and of adaptive genetic traits.
4. Developing efficient strategies (eDNA of seawater and sediments) for long-term monitoring of the benefits of restoration and conservation, aiming for standardized approaches across regions and habitats, that will continue beyond the project and that can infer past baselines (sediment eDNA).

OUTCOMES AND EXPECTED IMPACTS

RESTORESEAS will test the role of different species, their associated microbiomes, as well as functional diversity, in order to reveal the state of marine forests, their unique biodiversity and their patterns across sites and across time in order to embrace the intricacies and dynamics of microbial communities present in natural populations of habitat forming seaweeds, seagrasses and corals. Rather than focusing on the restoration of keystone species, these approaches will help determine critical sizes for ecosystem stability and allow the quantification of long-term outcomes of conservation and restoration approaches.

The use of novel indicator tools of ecosystem function and diversity (genetic tools), historical trends (sediment cores and future models), carbon sequestration, comparing temporal trajectories and baselines will provide the knowledge necessary to implement effective conservation and restoration policies of keystone habitats. This would also help improving management practices for conservation and restoration, that will be planned to account for climate change, extreme events, and diseases.

Working both empirically at a local scale and with large scale models and global data, RESTORESEAS will also provide information on conditions for effective conservation and restoration at different scales, that can be adapted.

PROJECT CONTRIBUTION TO POLICIES AND/OR SOCIETY

The societal/policy value starts with direct integration of civil, professional, political, and technical organisations with relevance for the target areas and goals, including direct involvement of citizens and fishermen. RESTORESEAS will for example involve fishermen in the course of the project to help monitor incidental catches of corals and identiy the regions where there is a degradation of the benthic habitat. RESTORESEAS is also planning on working with university students to ensure knowledge transfer.

The broad scale modelling and mapping of key marine forest sites of the Atlantic, and the nature-based solutions for restoring marine degraded areas will inform concrete policy plans with local, regional and global impact towards the achievement of the global Aichi targets, the Paris Agreement, UN Sustainable Development Goals and will match the targets of the EU Biodiversity Strategy for 2030 and the UN Decade on Ecosystem Restoration.

EXPERIMENT, CASE STUDIES

- Mapping vulnerable/degraded marine forests of the Atlantic Ocean
- Role of habitat restoration and conservation on biodiversity
- Biodiversity in the seawater surrounding marine forests
- Biodiversity over geological time on sediments surrounding marine forests
- Roles of the microbiome in restoration of shallow marine forests and deep marine animal forests
- Diversity and role of pathogens in restoration of marine macrophytes and coral ecosystems
- Restoration of cold-water coral habitat
- Marine restoration for a future climate - phenotyping for adaptive restoration of marine forests
- Tipping points in restoration success - contrasting restoration approaches across multiple models

FUNDERS

- Portuguese National Funding Agency for Science, Research and Technology (FCT), Portugal
- Austrian Science Fund (FWF), Austria
- Research Foundation of Flanders (FWO), Belgium
- Brazilian National Council of State Funding Agencies (CONFAP), Brazil
- Technology Agency of the Czech Republic (TA CR), Czech Republic
- German Research Foundation (DFG), Germany
- Ministry of Agriculture, Nature and Food Quality (LNV), Netherlands
- Research Council of Norway (RCN), Norway
- Ministry of National Education, Vocational Training, Higher Education and Scientific Research (MENFPRESRS), Morroco
- Regional Fund for Science and Technology (FRCT), Portugal - Azores
- State Research Agency (AEI), Spain
- The Swedish Environmental Protection Agency (SEPA), Sweden

Restoration of temperate corals destroyed by fisheries by-catch in Sagres, Portugal

ReVersal

Restoring peatlands of the nemoral zone under conditions of varying water supply and quality

DURATION
01.03.2022 - 31.03.2025

TOTAL GRANT
€ 853,141

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Climate Change Ecology, Adam Mickiewicz University, Poznań, Poland

CONTEXT

The regulatory functions of peatlands in water and element cycles, their carbon sink function, and their role in biodiversity conservation have increasingly become the focus of scientific and public debate. Particularly in the course of ongoing climate change, ombrotrophic peatlands (bogs), pristine, disturbed or under restoration, are increasingly exposed to climate extremes, such as drought, with long-lasting effects on both plant and soil communities and, subsequently, on carbon cycling. Thus, climate change adds to existing difficulties and limitations in bog restoration. These problems are also related to poor knowledge of potential indicators of peatland degradation or of restoration success, such as on the dynamics and budgets of gas fluxes, levels of biodiversity, or water budgets. Moreover, peat degradation alters the water holding capacities and reduces the potential to buffer variations in water availability, further constraining rewetting and restoration. ReVersal aims at bringing together key methods from different peatland-related disciplines to address these research deficiencies, namely from palaeoecology, hydrology, biogeochemistry, greenhouse gas exchange and carbon budgeting, vegetation ecology and biodiversity, and remote sensing.

MAIN ACTIVITIES

ReVersal will evaluate degraded and restored sites and include:

1. Palaeoecological data to understand past succession and hydrology over periods of past changing climate and land-use
2. Indicators of peat decomposition and current hydrological and nutritional status
3. Indices of biodiversity in vegetation and microbial communities
4. Aim to provide robust estimates of the carbon and greenhouse gas budgets.

This evaluation will be complemented by the latest remote sensing techniques as prospective tools to assess and monitor peatland restoration sites. In the intended approach, patterns and processes behind indicators are assumed to feature complexity and nonlinearity requiring a data-driven

approach and machine-learning strategies to derive patterns from field-based data that can be transferred across peatland sites. ReVersal postulates that indicators of peatland status as outlined above can be mapped in space and time using multi-scale and multi-sensor remote sensing data, hence allowing for continuous monitoring of degraded or restored peatlands. Approaches, indicators, and results will be discussed and evaluated with local stakeholders at all sites under study. This will include among others nature conservationists, farmers, water bodies, authorities, national wetland conservation centres, and the European Competence Centre for Mires and Climate in Wagenfeld (Germany).

OUTCOMES AND EXPECTED IMPACTS

ReVersal examines and evaluates, for the first time, bog restoration pathways based on a state-of-the art evaluation of paleoecological and biogeochemical information from peat samples, putting this data into a landscape ecology context, and delivering powerful remote sensing tools for future assessment and monitoring of degraded and restored peat bogs. To this end, biological and biogeochemical conditions, and fluxes of CO2 and CH4 will be examined to mechanistically understand carbon budgets and effects of water and nutrient availability. Changes in biodiversity along degradation and restoration trajectories under past, current and future climatic and socio-economic conditions will also be explored. Additionally, uncertainties of conservation and restoration approaches will be evaluated for adaptive management strategies including trade-offs between goals and remote-sensing based models to assess degradation indicators in space and time to facilitate knowledge integration and transfer will be developed. Another activity will consist in assessing the transferability of these models across landscapes to provide cost-effective, reliable and long-term monitoring prospects.

PROJECT CONTRIBUTION TO POLICIES AND/OR SOCIETY

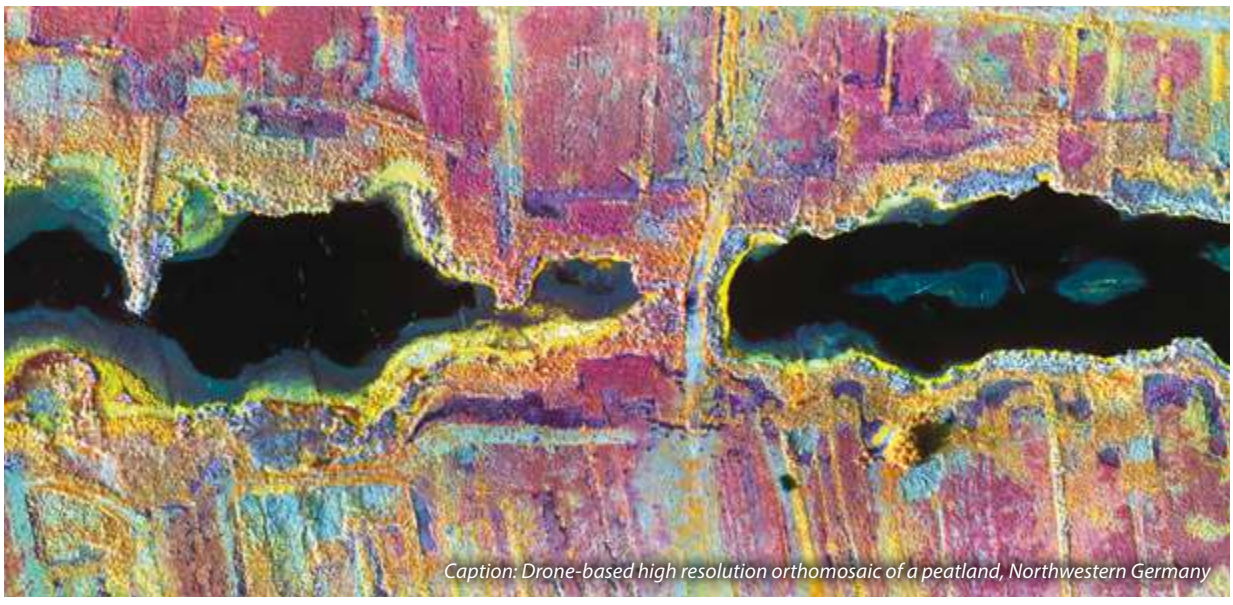
The main objective of ReVersal is to develop a spatiotemporally explicit indicator framework for peatland restoration success across peatland sites affected by drainage and/or extraction. The gathered knowledge will be communicated and create outreach in close collaboration with farmers, the peat industry, nature conservationists, water managers, and administrative bodies. We expect that the knowledge and tools developed in ReVersal will help to assess the current status and monitor the restoration of ombrotrophic peatlands in a multidisciplinary approach and on a scientific basis.

EXPERIMENT, CASE STUDIES

ReVersal will work at seven degraded or restored peatland sites, spanning a gradient of different water and nutrient availability and situated in locations that are to a varying degree affected by the observed increasing frequency of droughts in Europe. These sites are located in Austria (Pürgschachen Moor, Pichlmeier Moor), Germany (Amtsvenn, Vechtaer Moor), Poland (Bagno Kusowo), Sweden (Store Mosse), and in The Netherlands (Fochteloër Veen). Additional sites will be included for the application and testing of the remote sensing approaches.

FUNDERS

- Deutsche Forschungsgemeinschaft (DFG), Germany
- Austrian Science Fund (FWF), Austria
- Ministry of Agriculture, Nature and Food Quality (LNV), Netherlands
- National Science Centre (NCN), Poland



Caption: Drone-based high resolution orthomosaic of a peatland, Northwestern Germany

Transloc

Translocations of flora and fauna for conservation and restoration: ecological, evolutionary, and socio-economic impacts, at multiple scales

DURATION
01.03.2022

TOTAL GRANT
€ 1,304,071

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CONTEXT

Numerous stakeholders with different values and expectations conduct reintroductions, reinforcements, or assisted colonisations of wild populations in a wide range of ecosystems. While biodiversity conservation and restoration are generally implemented within a human time frame, they might constitute major transitions at the scale of evolution. Current research on conservation translocations aims to improve translocation success to ensure that they contribute to species or ecosystem recovery in the long term and that their potential impacts on social ecosystems are managed to avoid retroactively undermining their performance. However, few studies have considered a strategic approach in the assessment and optimisation of the allocation of translocation efforts at larger scales. Indeed, in the context of global changes including climate change, land use intensification and biological invasions, the extent to which an accumulation of locally implemented translocations can contribute to biodiversity conservation on regional, continental or global scales remains unclear. Since conservation translocations raise debates regarding their economic and human costs, as well as ethical and environmental issues, it is important to provide evidence-based arguments to describe where, when and how they can contribute to biodiversity conservation and ecological restoration/rewilding in their evolutionary, functional and social dimensions at larger spatial, temporal and organisational scales. This is the main purpose of Transloc.

MAIN ACTIVITIES

The main objective of Transloc is to investigate and quantify how local conservation translocations affect ecological, evolutionary and sociological trajectories of restoration at multiple scales in the Western Palearctic. It will mix different approaches from database implementation and analyses to modelling, field monitoring and experiments. Over the past years, three Parisian laboratories now involved in the Transloc project gathered information on more than 1,300 conservation translocations in the Western Palearctic, involving a wide range of taxa (e.g. mammals, birds, plants, lichens), in terrestrial

and aquatic habitats. The Transloc project will largely rely on pursuing the development of this database, collecting complementary data on a wider range of taxa (e.g. reptiles, amphibians, molluscs, insects…), and disseminating data to practitioners, stakeholders and researchers to increase common knowledge on conservation translocations and advise policies. Additionally, a batch of ongoing well-monitored field translocations and experimental translocations will be analysed from ecological, economical, and social points of view. All these data will be confronted to the development of shared success and performance criteria. For some case studies, modelling and serious games will be considered to build up translocation scenarios with local stakeholders. Beyond these local situations, networking with translocation practitioners, stakeholders including farmers, foresters, local representatives, and policy makers will be at the core of the project.

OUTCOMES AND EXPECTED IMPACTS

Transloc project will be structured to produce a wide range of outcomes. Firstly, it will particularly aim to document, quantify and analyse translocation efforts and assess their contribution to biodiversity patterns. In that aim, the costs of these programmes and the constraints and opportunities linked to policies at various scales will be considered. Secondly, the efficacy of translocations will be defined and evaluated based on both the viability of translocated populations, and their effects on species recovery at multiple scales. This will allow assessing translocation cost-effectiveness. Thirdly, the relevance of translocations will be analysed through the congruence of translocation efforts with global changes particularly climate change. Fourthly, the social and economic effects of translocations will be estimated through the study of stakeholder engagement and governance, co-benefits and conservation conflicts as well as the ethical dimensions of translocations. Finally, a global and multi-facetted synthesis of these complementary approaches will be produced to assess the performance of translocations. The potential impact of these researches will allow enhancing the understanding and implementation of translocations in the Western Palearctic but also worldwide and actively contribute to biodiversity restoration at local and global scales.

PROJECT CONTRIBUTION TO POLICIES AND/OR SOCIETY

Involving both local stakeholders and policy makers in Transloc will produce key recommendations, guidelines and policy briefs on translocation strategies and practices, systematic conservation planning and other environmental approaches embracing short and long-time scales and regional, national and European policies. Interactions with European authorities will improve the relevance of translocations for EU's biodiversity goals and those of European policies and funding for the contribution of translocations to these goals. At a global scale, the potential renewal of the IUCN guidelines on conservation translocations and new guidelines on rewilding will benefit from Transloc outcomes on the eco-evolutionary, social and economic contributions of translocations to biodiversity restoration.

EXPERIMENT, CASE STUDIES

Beyond the extensive documentation of all conservation translocations in the Western Palearctic compiled through the Transloc database, experiments and case studies will be assessed including e.g. Freshwater mussels in Belgium and France, numerous plant species in Belgium, France, Spain and Switzerland (e.g., *Marsilea quadrifolia* and other species from wetlands, *Arenaria grandiflora*, *Centaurea corymbosa*...), the guild of Vultures in Southern France and Europe, Lynx in Portugal, and Eurasian beavers in many European countries. Companion modelling will be used to explore scenarios of translocation of large mammals (e.g., European Bison) and other species with significant socio-economic impacts on local communities.

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A juvenile Bearded vulture (Gypaetus barbatus) reintroduced in Grands Causses, France

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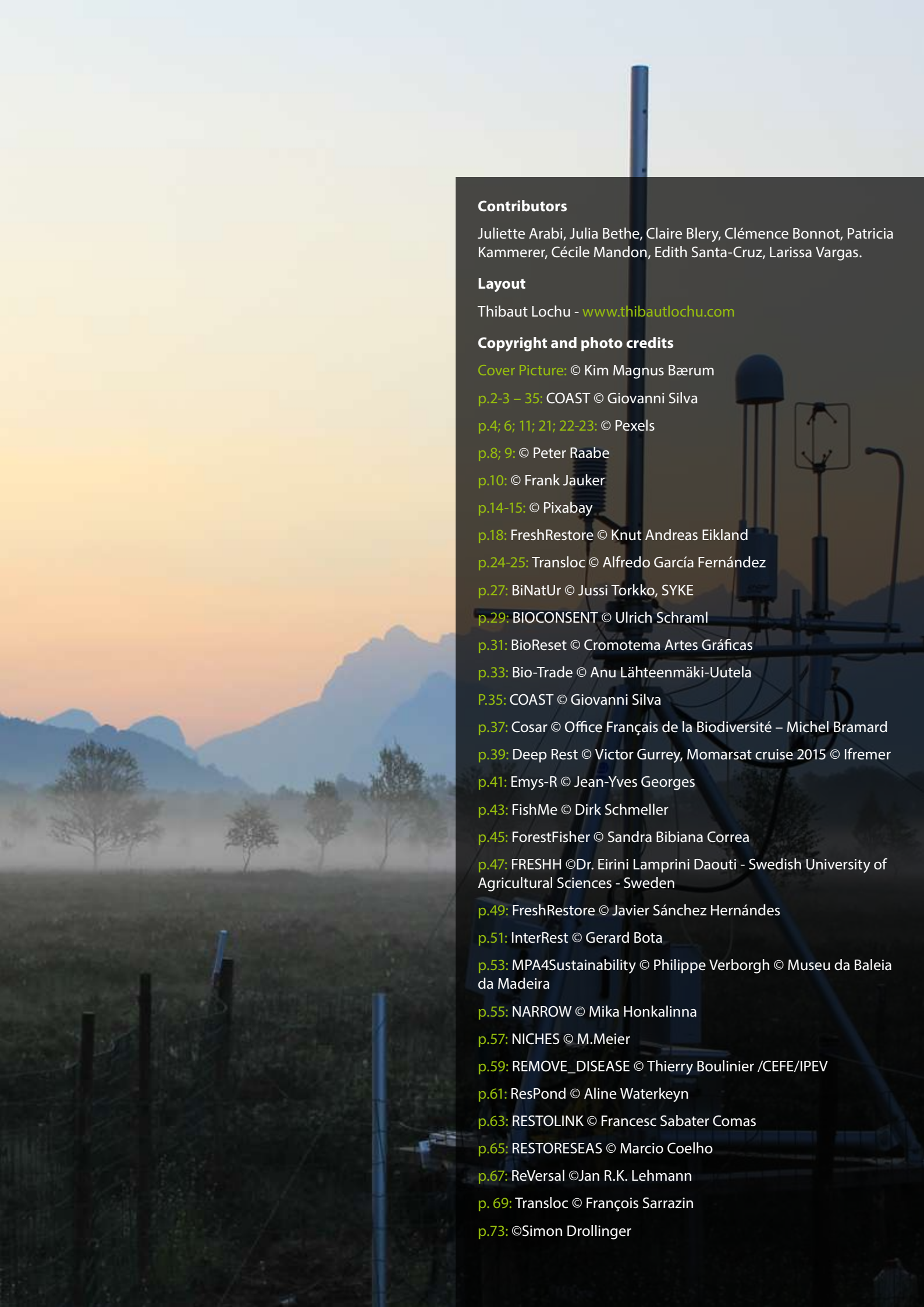

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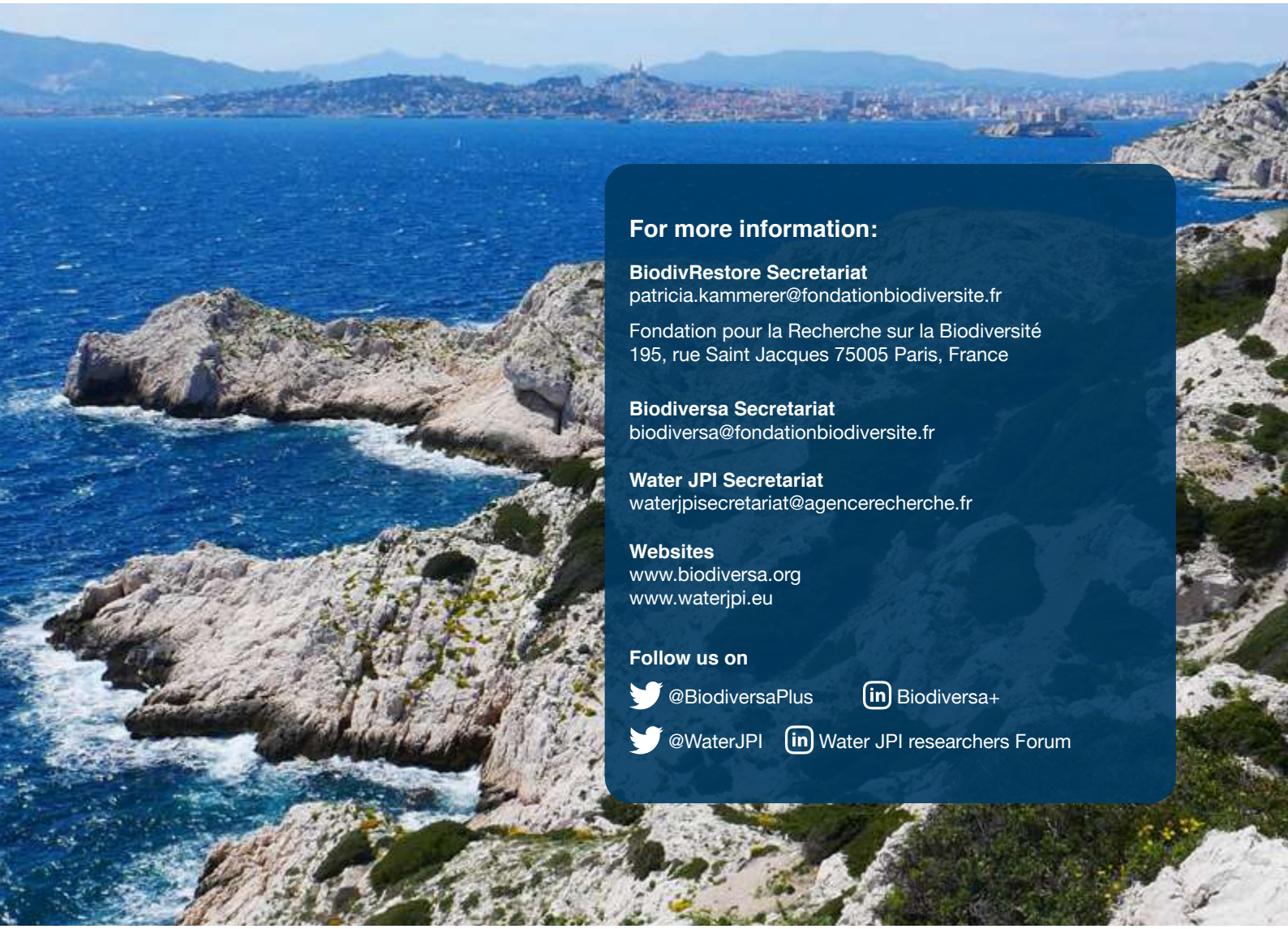

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