

SCENARIOS OF BIODIVERSITY AND ECOSYSTEM SERVICES

*Projecting changes in biodiversity and ecosystem services
for decision-making*

BELMONT
F O R U M
Virtual Valorization Workshop

Real Solutions to Global Problems

Effective and sustainable responses to global change require concerted cross-sectoral collaboration to develop reliable knowledge and equitable solutions. However, the scope of the issues faced can often exceed the capacity of individual organizations or national remits to realize these goals. Therefore, the Belmont Forum leverages investments and interest from across a breadth of institutions to spur the critical innovation and transformation that will result in a more sustainable future.

The Belmont Forum is a partnership of funding organizations from over 50 countries, international science councils, and regional consortia committed to the advancement of interdisciplinary and transdisciplinary science. Its operations are guided by the Belmont Challenge:

To support international transdisciplinary research providing knowledge for understanding, mitigating, and adapting to global environmental change.

The Belmont Approach

The Belmont Forum is committed to fostering solutions to global sustainability challenges through innovative transdisciplinary research, bringing together natural sciences, social sciences, and the humanities, as well as stakeholders in co-creating the knowledge and solutions for sustainable development that benefit the society.

Stakeholders contribute their values and priorities and the research teams contribute their technical expertise. A variety of stakeholder engagement and scientific tools were employed to produce project outputs. These outputs facilitated knowledge exchange between stakeholders and researchers for implementation into management, policy, and decision-making.



Biodiversity: A Call to Action

Biodiversity scenarios are essential tools for better understanding and synthesizing a broad range of observations, providing information about future impacts of global changes, developing adaptive management strategies and evaluating the implications of alternative social-economic development pathways and policy options. One of the key objectives in using scenarios is to move away from the current reactive mode of decision-making to a proactive mode in which society anticipates change and minimizes adverse impacts, capitalizing on important opportunities through adaptation and mitigation strategies. This call stimulated networking and capacity building for innovative research across social and natural science disciplines. The two years funded proposals included activities dedicated to the preparation of research proposals to a second joint call between BiodivERsA and Belmont Forum on “Scenarios of Biodiversity and Ecosystem Services”, and addressed the following topics:

- Harmonizing and integrating development and application of biodiversity scenarios across spatial scales of relevance to multiple types of decisions.
- Harmonizing and integrating consideration of multiple dimensions of biodiversity and ecosystem services.

Transnational Networks Were Created



Common Themes Focused on Improved Connections

Several common themes appeared through each of the projects in the Biodiversity I CRA synthesis, including:

- International and national scale workshops were used to advance program objectives, and were seen as good tools for engagement and networking.
- National level networks were strengthened through collaboration within existing structures and organizations.
- The projects created opportunities for mobilizing researchers for scenario development.
- Researchers use models and scenario building to link concepts to decision support.
- Projects demonstrated linkages from local to global scale values, research, analysis, and decision-making.



Stakeholder engagement
2400+

Next generation training of:



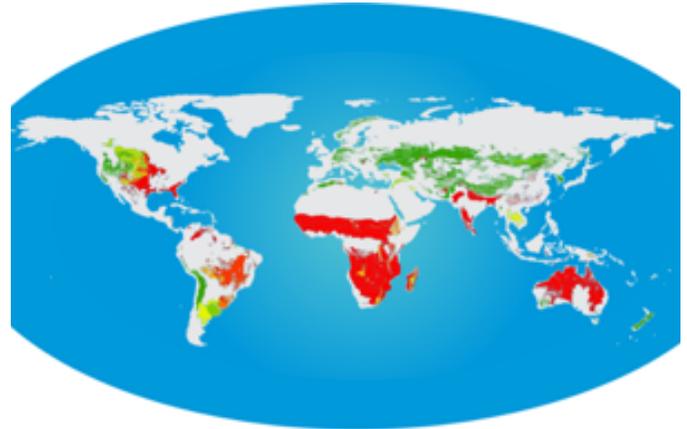
Undergraduates **6**
Graduates **49**
Post-docs **42**

Project Principal Investigators estimated stakeholder engagement and academic training provided by the project representatives.

Project Summaries

IHDBS: Impact of Human Drivers on Biodiversity in Savannas

Savannas are globally important habitat, representing 20% of both land surface and tropical biodiversity. But savannas are under threat at the global scale, because: 1) They are misclassified as forest-derived ecosystems and not recognized as valuable ecosystems in vegetation classification systems, 2) Their complex functioning is misunderstood by managers, and 3) They are easily converted either to cropland by clearing trees, or to artificial forest by planting trees. Therefore, assessing biodiversity on savanna habitats is a critical scientific challenge. In this project, an international multidisciplinary consortium from all continents, we aimed to produce scenarios of savanna biodiversity response to global change. If ecology can predict the effects of shifts in the major drivers (fire, herbivory, drought) on biodiversity at the landscape scale, economy and sociology become the dominant drivers when addressing their future at larger, regional to continental scales.



Map of grasslands showing the dominance of C4 grasses (in red) in tropical savanna ecosystems over C3 grasses (in green). Perennial grasses are classified as either C3 or C4 plants, and these terms refer to the different pathways that plants use to capture carbon dioxide during photosynthesis. Source: Caroline Lehmann.

SeaView: Scenario, Fishery, Ecological-Economic Modelling and Viability Network

Reconciling food security with biodiversity protection is a key challenge of the century, especially in the face of population growth and climate change. The case of fisheries and marine ecosystems is especially challenging in this ecological-economic perspective. Scientists advocate an ecosystem approach to identifying scenarios and management for these marine socio-ecosystems. However, the way to operationalize such an ecosystem-based fishery management (EBFM) remains challenging. Viability modeling is now recognized by a growing number of researchers as a relevant framework for EBFM.

The aim of the network SEAVIEW was to reinforce and disseminate the advances of the network teams regarding viability modeling for EBFM. To do so, SEAVIEW relied on the interdisciplinary skills in economics, ecology and modeling, as well as the case studies of international partners. The SEAVIEW network made it possible to 1) improve ecosystem model-based scenarios for the viability of fisheries and fish biodiversity, 2) disseminate these models and scenarios at a global scale through international conferences and a website, and 3) develop new international and interdisciplinary research projects.



Participants at a SeaView meeting in Paris, France.

For more information on the SEAVIEW project, visit seaview.u-bordeaux.fr

ScenNet: Scenarios of biodiversity and ecosystem services network

Scenarios are crucial tools of choice to determine and analyze options for the future, or to assess the impacts of policy decisions. Feedbacks between indirect and direct drivers of biodiversity and ecosystem change dynamically, and the implications for human well-being are infrequently and inadequately accounted for in the models and scenarios currently used. Poor understanding of scenarios and their interpretation creates barriers to their use as tools in the decision-making process.

ScenNet aimed to mobilize the scientific community and connect them with decision-makers at relevant levels for their engagement in national and international assessment processes, and to build a well-structured international community of researchers working on the interactions between socio-economic scenarios and models of global impacts on biodiversity and ecosystem services. In addition, ScenNet initiated capacity building activities to improve understanding of the development, use, and communication of scenarios, and to address geographical imbalances.



Participants at a ScenNet workshop held in Brazil, in 2016.

For more information on the ScenNet project, visit fondationbiodiversite.fr/en/scennet

TSUNAGARI: Trans-System, Unified Approach for Global and Regional Integration of Social-ecological Study toward Sustainable Use of Biodiversity and Ecosystem Services

Economic growth, land use change, and declining ecosystem connectivity have accelerated biodiversity and ecosystem service loss, especially in Asia. Scientific knowledge to assist implementation of effective conservation and management activities remains limited. Key problems are associated with integrating across ecology and social science disciplines, across global and local scales, between land and ocean, and between scientists and stakeholders. To overcome these bottlenecks, an interdisciplinary research network entitled TSUNAGARI (a Japanese term for 'connectivity') was launched. The project is based on two main perspectives: 1) integrating different disciplines of environmental research across multiple spatial scales, and 2) evaluating the importance of ecosystem connectivity between land and ocean for biodiversity and ecosystem services. During a series of stakeholder workshops, studies involving inter-/trans-disciplinary research were proposed and executed, such as linking local practices and global economic analyses, and linking local-scale ecosystem studies to decision-making processes by multiple stakeholders.



By integrating regional studies on stakeholders' practices (picture: squid trap fisheries) and economic analyses of their activities by Life Cycle Assessment, can examine whether good fishing practices by local fishers in Thailand is also environmentally sustainable, which outcome promotes motivation for further involvement of biodiversity conservation by local stakeholders.

Priority Actions from the Workshop

Discussions from the workshop identified four major areas for recommendations as priority actions:

- Develop a training program to improve capacity in the development, use, and implementation of scenarios for biodiversity and ecosystem services to inform decision-making.
- Create and improve web-based directories of scientists and stakeholders interested in biodiversity scenarios to support global networking.
- Create a platform for data and information sharing.
- Identify opportunities for continued collaboration.

Virtual Synthesis Workshop

The Belmont Forum Synthesis Workshop was held virtually, with four project teams from around the globe participating remotely. The process was convened by the Belmont Forum and facilitated by the University of Maryland Center for Environmental Science. Project teams from around the globe funded through the Scenarios of Biodiversity and Ecosystem Services Collaborative Research Action participated virtually via online software.



Participants in the first virtual synthesis workshop held in August 2018.

Workshop Participants

IHDBS: Impacts of Human Drivers (Fire, Agriculture and Grazing) on Bio-Diversity in the Savannas. *Jacques Gignoux* (Centre National de la Recherche Scientifique, France).

ScenNet: Biodiversity and Ecosystem Scenarios Network. *Cornelia Krug* (University of Zurich), *Paul Leadley* (Université Paris-Sud, France).

SEAVIEW: Scenario, Fishery, Ecological-Economic Modelling and Viability Network. *Luc Doyen* (CNRS Pessac, France), *Felipe Gusmão* (Federal University of São Paulo, Brazil).

TSUNAGARI: Trans-System, Unified Approach for Global and Regional Integration of Social-ecological Study toward Sustainable Use of Biodiversity and Ecosystem Services. *Masahiro Nakaoka* (Hokkaido University, Japan), *Xiubo Yu* (Chinese Academy of Sciences, China).

Workshop Facilitation and Science Communication

Bill Dennison, Heath Kelsey, Brianne Walsh (University of Maryland Center for Environmental Science), *Erica Key* (Belmont Forum), *Johann Müller* (The French National Research Agency).



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