**SIN BIO SE** | SYNTHESIS CENTRE ON BIODIVERSITY AND ECOSYSTEM SERVICES

# SinBiose: INTEGRATING INFORMATION TO CREATE NEW AND RELEVANT KNOWLEDGE FOR SCIENCE AND SOCIETY

Photo: Fernando Pinheiro

## MULTIPLE ENVIRONMENTAL CRISES AND OPPORTUNITIES FOR TRANSFORMATIVE SCIENCE

Climate and biodiversity crises are examples of complex and intertwined problems we face today, which require innovative solutions. One way forward is to invest in the influx of new knowledge that comes from integrating diverse ideas, data, perspectives and actors to answer societal questions.

Knowledge syntheses address this need. They are not summaries or literature reviews on a given topic, but rather an amalgamation of ideas. It requires the development of an environment that fosters creativity through the integration of methods and perspectives, both academic and non-academic, and analyses and concepts development that transcend the boundaries of academic fields.

Data integration opens up new horizons for analyzing large databases and conceiving models and scenarios to find solutions to current problems. As a result, syntheses can become powerful tools for generating qualified information for decision-making on social or environmental issues, and an opportunity to drive transformative science forward.

> "You cannot plan serendipity, but you can create the right circumstances for it"
>
> **Diane Srivastava, Canadian Institute of Ecology and Evolution (CIEE)**

### SERENDIPITY:

In research, finding something unexpected that changes the course of your research in a positive way. For example, an adapted technology, a new method, or data accessed in another research area. In short, it is a process in which a fortuitous event is put to good use.



The first face-to-face meeting of all SinBiose working groups. Brasília Botanical Garden, August 2022. Photo: Marcelo Gondim - ACS/CNPq

*CNPq - Brazilian National Council for Scientific and Technological Development - is the country's main research promotion agency. Affiliated with the Ministry of Science, Technology and Innovation (MCTI), CNPq has been active since 1951. Its mission is to promote scientific, technological and innovative research and act in the design and strengthening of public policies, aiming to contribute to Brazil's social, economic, environmental and cultural development. The CNPq invests in research in all fields of knowledge through public calls for grants and supports scientific projects and strategic programs.*

## SinBiose, THE BRAZILIAN MODEL OF A SYNTHESIS CENTER

SinBiose is a pioneering Synthesis Center initiative in Brazil and Latin America, based on the experience of CNPq.

It results from a careful planning process involving research, technical visits and consultation with the scientific community and various institutions in research and environmental management fields. In 2019, with the support of MCTI, Capes, and the State Research Support Foundations, SinBiose was implemented as a CNPq research program.

SinBiose inaugurated a Brazilian model for integrative research related to major environmental issues and their reflexes on society, filling an essential gap in the Brazilian research and innovation ecosystem. The Center's work proposal involves drawing information from large databases to understand complex issues and propose innovative solutions from the science-management dialogue.

## WHAT IS KNOWLEDGE SYNTHESIS

Scientific syntheses represent an inter or transdisciplinary approach to research that integrates diverse scientific knowledge, methods, and perspectives. They aim to analyze, systematize, reorganize, or recontextualize existing data and information to generate new knowledge. They allow for the conceptualization of complex problems beyond the scope of a single discipline, data set, or research line.

SinBiose syntheses are developed by collaborative working groups, which engage in a series of meetings with appropriate immersion time to jointly develop the project in its various stages. These working groups seek to include a diversity of theoretical or thematic perspectives, gender balance, diversity of age groups and career stages, regional, ethnic and cultural representation, and international collaboration.

## PATHS FOLLOWED

SinBiose brings together a set of principles, strategies and results that define a new framework for the practice of synthesis science in the country. Ultimately, this will result in science that works better for society.
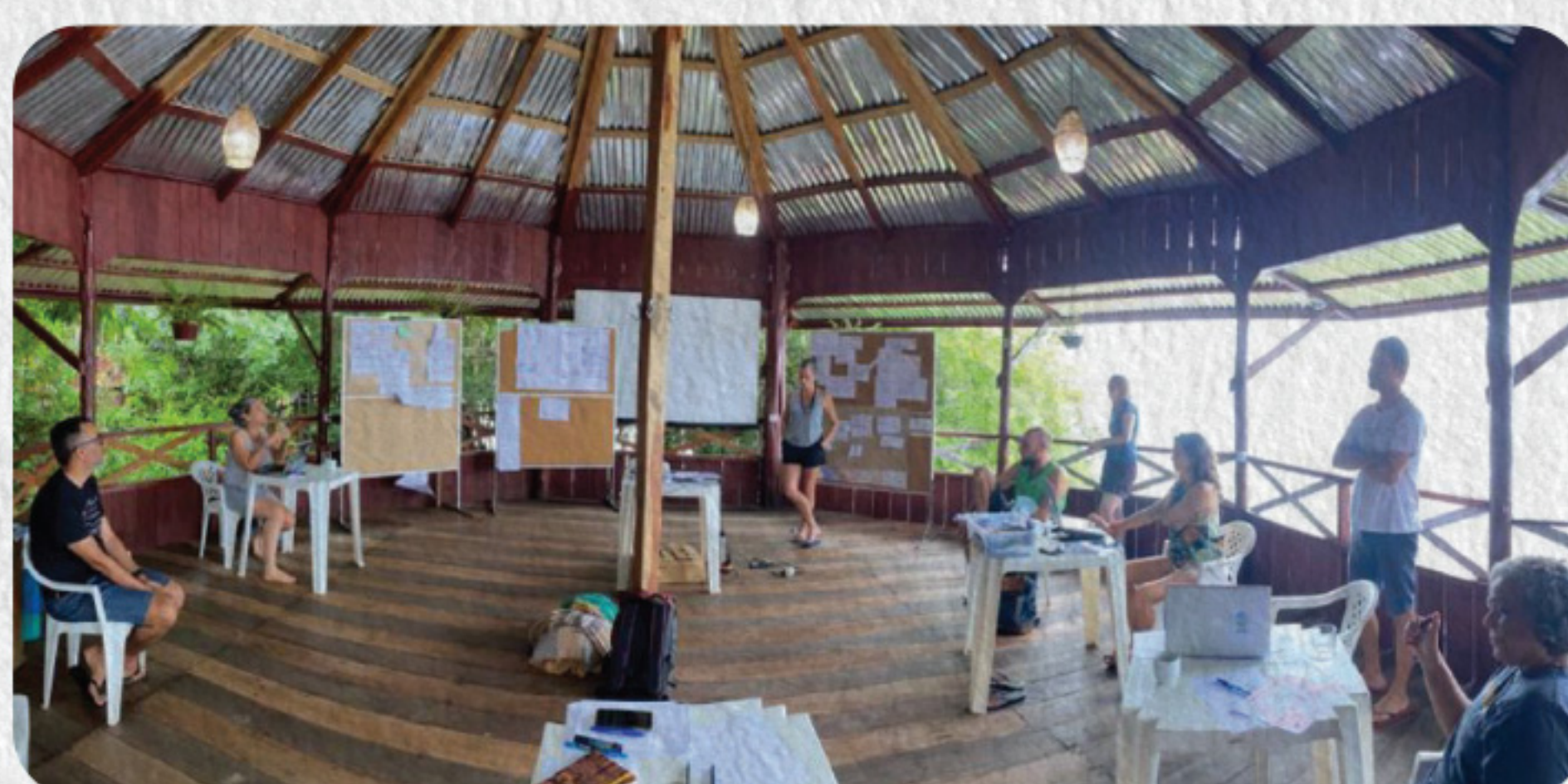
### Getting started... (or principles)

- **Interdisciplinarity**: integration of perspectives, concepts, theories, data, and practices to achieve a systemic understanding of the problem under study by each research group. The plurality of specialties in the composition of the groups is key.

- **Diversity and inclusiveness:** the formation of heterogeneous working teams is encouraged to promote a greater diversity of ideas, values, motivations and methods in scientific work and thus better answers for society.



### The middle...(or strategies)

- **Co-production of knowledge:** is the joint production of knowledge between academic and non-academic actors in the search for solutions to identified problems.

- **Data Science:** data science encompasses the theories, techniques and tools that enable scientists to combine and integrate large amounts of data and extract meaningful insights from them. It is a key element of synthesis science, which relies on access to existing data and the ability to analyze it. This process makes discovery more efficient, transparent and reproducible.

- **Communication:** an indispensable link to the ultimate purpose of SinBiose is the dissemination of the messages of the working groups to different sectors of society. SinBiose has a strategic communication plan, which includes supporting the dialogue between working groups and decision-makers.

- **Internationalization:** International cooperation helps to share experiences, improve the groups and gain global recognition. This is done through research partnerships, technical visits and the translation of the Center's main products into other languages.

### The aim... (or focus)

- **Focus on decision-making:** the production of information to support better decisions, whether in the public or private sector, always based on scientific evidence, presented in a simple way, and based on issues that decision-makers face daily. Objective summaries of relevant research, recommendations on options and proposals for action are some of the groups' outputs that can contribute to public policy debate.

## FIRST PHASE WORKING GROUPS (2020-23)

**GrassSyn** - aimed to synthesize knowledge on Brazilian grassy ecosystems through an integrative vision and respecting the specificities of the different types of grasslands and savannas in Brazil, seeking to expand the consideration of these ecosystems in public policies.

**Trajetórias** - integrated knowledge about ecosystem services and their relationship with the economic system and human health in the Amazon to inform the joint debate on the economic, environmental and health dimensions of local people's lifestyles, structures and production systems.

**Synergize** - organized databases on Amazonian biodiversity and sought to understand how the biodiversity and integrity of Amazonian forest ecosystems, rivers and streams are threatened by various agents of environmental degradation.

**Redes Socioecológicas** - produced a synthesis of knowledge about the diversity of interactions between parasites and wild animals in association with social and environmental drivers of health to understand and predict epidemics and outbreaks of neglected tropical diseases.

**Regenera Amazônia** - synthesized knowledge to propose a concept of ecological integrity of regenerating forests and identify good indicators and reference values for assessing the ecological integrity of natural regeneration in the Amazon Region.

**SPIN** - identified priority areas for conservation and restoration of plant-pollinator interactions to maximize agricultural productivity and biodiversity conservation on a national scale.

**ReefSyn** - integrated biodiversity data from Brazilian reefs to unravel spatial patterns of diversity and its determinants, to understand the effects of climate change and local impacts such as fishing on reef biodiversity, and associated ecosystem services.

## SINBIOSE SCIENTIFIC COMMITTEE 2020–23

Mercedes Bustamante (UnB, coordinator), Helder Queiroz (ISD Mamirauá), Jean Paul Metzger (USP), Marcelo Tabarelli (UFPE), Maria Teresa Piedade (INPA), Nirvia Ravena (UFPA) e Valério Pillar (UFRGS).

**EXECUTORS**