

**POSTDOCTORAL FELLOWSHIP RELATED TO BIOTA SYNTHESIS (NUCLEUS OF ANALYSIS AND SYNTHESIS OF NATURE-BASED SOLUTIONS)**

**FELLOWSHIP #2 - MODELLING FUTURE SCENARIOS FOR POLLINATION AND ASSOCIATED ECOSYSTEM SERVICES IN FACE OF LANDSCAPE AND CLIMATE CHANGES**

**1. Job Description:**

**Fields of knowledge:** Landscape Ecology, Ecosystem Services, Climate and Global Changes Modeling

**FAPESP process:** 2020/06694-8

**Project title:** BIOTA SYNTHESIS – Nucleus of Analysis and Synthesis of Nature-Based Solutions

**Principal investigator:** Jean Paul Metzger

**Postdoctoral project title:** Modeling future scenarios for pollination and associated ecosystem services in face of landscape and climate changes

**Supervisor for this position:** Danilo Boscolo

**Unit/Institution:** Department of Biology, Faculty of Philosophy, Sciences and Letters of Ribeirão Preto, University of São Paulo (FFCLRP/USP)

**Working area:** Landscape and climate change modeling applied to ecosystem services delivery and land planning policies

**Number of scholarships:** 1

**Duration:** The position is offered for 24 months, starting on May/2022.

**Grant:** BRL 7,373.10 (monthly) plus a research contingency fund equivalent to 10% of value of the scholarship (to purchase items directly related to research activity)

**Deadline for submissions:** March 14<sup>th</sup>, 2022, at 10 am, Brasilia Time (BRT), UTC -3

**Publishing date:** April, 2022

**Selection process:** The selection process will happen in two phases: *curriculum vitae* evaluation and interview. Only the 3-5 candidates presenting the best evaluated CVs will be interviewed.

**Local:** IEA-USP: Institute of Advanced Studies of the University of São Paulo, Rua Praça do Relógio, 109, ground floor, Cidade Universitária, Zip Code 05508-050, São Paulo, SP.

**Link for submission:** <https://forms.gle/yVECcrK4eyq3Y5h16>

**E-mail for contact:** [biotasintese@usp.br](mailto:biotasintese@usp.br)

## **2. General Postdoctoral fellowships 'profile:**

The Biota-Synthesis initiative seeks eight highly qualified postdoctoral fellows to be part of a “Nucleus of Analysis and Synthesis of Nature-based Solutions”. This Nucleus will be funded by the São Paulo Research Foundation, FAPESP, for a 5-year period (2022-2026) and brings together researchers from 5 Universities, 7 Research Institutes of the State of São Paulo and 4 Non-Governmental Organizations, as well as technicians and decision makers from the State [Secretariats of Infrastructure and Environment](#), Public Health, and Agriculture. The Nucleus will be based at the [Institute for Advanced Studies](#) of the University of São Paulo, city of São Paulo (SP), Brazil.

The goal of the Nucleus is to support the state of São Paulo in the development of socio-environmental public policies related to agricultural sustainability, ecological restoration, zoonosis control, and disease prevention in urban areas, considering essentially nature-based solutions.

The Nucleus will work following a “synthesis science” approach, with heterogeneous and collaborative working groups, which will meet periodically in an immersive way for brainstorming discussions. These meetings will be intercalated with the analysis and modeling of existing databases, where the active participation of postdoctoral fellows is expected. See [here](#) for further details.

The desired profile for these postgraduates is of professionals with great ability to work collaboratively in teams, with high capacity for listening and dialogue with researchers and social actors with different backgrounds and professional experiences, in addition to the modeling and analysis capabilities that will be detailed for each profile. The post-doctoral position is open to Brazilian and foreign researchers who have a PhD degree, however fluency in Portuguese is desired to facilitate the discussion and dialogue with the different actors involved in the project. Each postdoctoral fellow will have a specific research project and

supervisor, but it is expected that this group of fellows will work together, in close collaboration with the coordination team of the Biota-Synthesis Nucleus.

FAPESP postdoctoral fellowships are competitive (R\$ 7,373.10, approximately US\$ 1,340.00) and granted for 24 months, with the possibility of extension for two additional years. The fellowship includes a research contingency fund, equivalent to 10% of its annual value which should be spent on items directly related to the research activity.

### **3. Application procedure:**

Applications must be submitted until March 14, 2022, 10 am, Brasilia Time (BRT), UTC -3, through the following link: <https://forms.gle/yVECcrK4eyq3Y5h16>. If you have any further questions, please contact us at [biotasintese@usp.br](mailto:biotasintese@usp.br). A same applicant can apply for more than one scholarship at the same time.

- Curriculum Vitae following [FAPESP format](#), including Lattes (for Brazilian candidates), ORCID and Publons links, as well as citation indicators (e.g. number of publications and citations, H index); please indicate experience in teamwork and with the development of public policy, if applicable;
- Research statement specifying why the candidate is suitable for the fellowship position;
- Three reference persons who can be consulted if the candidate is selected for an interview.

If you don't receive any subscription confirmation by March 20<sup>th</sup>, please contact us again.

For each of the 8 fellowships, 3-5 candidates will be selected for an interview (to be done virtually). The initial selection will consider the adequacy of the candidate to the fellowship profile, as well as the candidate's professional experience and publication records.

The interviews are expected to take place at the end of March/beginning of April, and the fellowship will begin in May, after validation of the selective process by FAPESP, according to

the [Institution's norms](#). All postdoctoral fellows will be formally linked to the [postdoctoral program of the University of São Paulo](#).

#### **4. Summary of Fellowship #2 project (Modeling future scenarios for pollination and associated ecosystem services in face of landscape and climate changes):**

Pollination and pest control are fundamental Ecosystem Services (ES) for agricultural productivity and the maintenance of biodiversity. In recent decades, there has been significant worldwide increase in the proportion of intensively cultivated areas. These landscape changes can compromise ES delivery, as they are among the main causes of ES provision decline. In addition, climate change can further increase the negative effects of landscape homogenization and habitat loss, causing severe reductions in areas suitable for ES provider species survival. The resulting decrease in agricultural productivity can force farmers to occupy larger and larger areas, generating a positive feedback loop of ES loss. This dichotomy represents one of the main challenges for reconciling sustainable development and conservation. The solution to this dilemma depends on promoting an Integrated Pest and Pollinator Management (IPPM) to identify dynamic synergies and trade-offs between agricultural production and maintenance of biodiversity and the ecosystem services it provides, allowing clear guidelines for land use planning and management amidst varying land and climate change scenarios.

One of the bottlenecks in the development and application of IPPM to land use planning and management in face of changing climate is the difference in scale between published studies, climate and landscape effects and decision-making. While ecological studies generally describe phenomena occurring at narrower scales and require a high level of detail, the effects of climate change and land use management happen at broader scales. In this sense, the identification of these trade-off relationships and synergies depends on our ability to model the impact that the landscape change dynamics has on the distribution of biodiversity components and the ecosystem services provided by them at varying scales. An additional challenge is the future projection of ES delivery under the interactive influence of land use and climate change scenarios. A solution to this problem is the development and application of models based on artificial intelligence and data mining, which allows studying the association of variables even in

very large datasets with high variability and when prior knowledge about causal relationships is restricted.

Within this framework, the objectives of this post-doctoral project are firstly to apply data mining and machine learning techniques to a curated dataset of ES provider species and correspondent distribution models and relevant environmental factors to produce dynamic predictive models of ES delivery for economically relevant crops under ever changing landscapes and climate conditions. From this development, the model shall be used to make future scenarios projections focusing on climate and land use changes associated to socioeconomic development to assess their consequences for ES provision and agricultural productivity.

#### **5. Requirements for the position:**

- PhD in areas related to ecology, landscape ecology, ecosystem services, environmental analysis, or biodiversity conservation/restoration, programming/informatics directly applied to these topics, obtained no longer than 7 years before the grant acceptance date.
- Skills and experience with climate change and/or landscape change dynamic modeling and its consequences on biodiversity;
- Excellent skills and experience with quantitative data analysis, statistics and modeling, and future scenario building;
- Experience with spatial data analysis and GIS;
- Experience with programming language and softwares (R or Python, or other).
- Knowledge on working with data mining and machine learning techniques.
- Ability to work collaboratively in group, including non-academic stakeholders;
- Excellent oral and written communication skills;
- Good knowledge of Portuguese and English.