Master thesis

**Modeling the impact of traffic on the ecological connectivity of the home range of common birds in urban environments**

**Minimum duration of 5 months, and up to 10 months**

**Supervision**

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**Context**

Recent international agreements emphasize the essential role of ecological connectivity in maintaining ecosystems and the services they provide to humans. Defined as the "degree to which a landscape facilitates or impedes movement between resource patches," ecological connectivity supports biodiversity and ecological processes from the individual level (e.g., resource allocation within home ranges) to the metapopulation level (e.g., dispersal and gene flow between subpopulations).

Ecological connectivity models, often based on graph theory or circuit theory, provide essential information for environmental planning and biodiversity conservation. They are crucial for creating preservation networks, assessing population fragmentation, and designing urban green spaces and infrastructure that benefit both wildlife and humans. However, the application of these models is hindered by the lack of consistency in the scales and processes modeled and the difficulty of finding reliable parameter values, thus compromising confidence in their results and limiting their applicability to different contexts.

To overcome these limitations, we have been working for several years to establish a methodological framework that allows both (i) aligning how graph elements are defined (i.e., nodes and links) with the type of movement being modeled (i.e., within home range or dispersal), and (ii) basing model parameterization on species observation data that are cost-effective in terms of acquisition. This methodological framework has been successfully applied to modeling home range connectivity for several common bird species in the city of Munich (Germany). It enables the creation of connectivity maps for this city while learning about the urban ecology of target species, e.g., about the movement resistance of urban elements such as buildings and roads as well as the maximum distances between resource patches that birds are willing to travel.

**Master thesis objectives**

This Master thesis will aim to apply the methodological framework to the city of Angers on several common bird species in order to test the reproducibility of connectivity model parameterization results obtained in Munich. It will also aim to develop the model to integrate the impact of traffic on bird connectivity, an impact already demonstrated with data collected in Munich.

**Content**

The internship will consist of several tasks:

* Familiarize yourself with the existing methodological framework (coded in R and using Graphab connectivity software).
* Modeling the home range connectivity of several common bird species in Angers. Comparison and integration with results obtained in Munich.
* Development of certain aspects of the model relating to the location of resource patches.
* Development of statistical modeling aspects of the model.
* Production of connectivity maps for Angers and discussion with the urban community.
* Contribution to the writing of a scientific article

**Required Skills**

* Identification of common birds in flight
* Interest in spatial analysis and modeling and in the use of connectivity models for territorial planning
* Data analysis and processing skills and statistical modeling in R with willingness to improve
* Comfort with GIS (QGIS, ArcGIS) and motivation to learn more

**Gratification financière**

This internship comes with a financial bonus of €640 per month on average (depending on the number of workdays).

**How to apply**

The internship will take place at the BiodivAg laboratory of the University of Angers under the supervision of Dr Anne Mimet and with the collaboration of Lisa Merkens and Meret Pundsack from the Technical University of Munich.

Applications should include a CV and covering letter, to be sent to Anne Mimet (anne.mimet@univ-angers.fr) by 09/30/2025.