

# **A Shiny App for spatial species distribution modeling**

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## **Abstract**

In ecology, Species Distribution Models (SDMs) are a statistical tool that has seen a substantial expansion in its implementation over the last two decades. Along with their widespread use, the complexity of the data analysed and the structures of the models used have increased.

This has led to the development of various tools to facilitate the incorporation and use of these new data and statistical methodologies, mostly embodied in new R packages and shiny applications that allow different types of SDMs to be solved. However, the Integrated Nested Laplace Approximation (INLA) approach, which has been increasingly implemented in the field of ecological sciences, has not yet been integrated into an application that can synthesise the complexity of its code into a user-friendly interface for continuous spatial modelling.

To overcome this shortcoming, we present in this work a novel application that allows the use of INLA for those who are not very experienced, or for those with experience who prefer a tool that allows them to carry out an initial analysis quickly, avoiding the process of writing code.

The app allows both geostatistical and preferential modelling. It integrates the complex and hard coding SPDE-FEM (that stands for Stochastic Partial Differential Equation, along with the Finite Elements Method) approach to perform continuous spatial analysis with a visual interface. Moreover, it allows the use of default settings that automate the process or the customisation of a large number of elements that drive the modelling process. In this way, quick initial evaluations or more rigorous studies of the data provided by the user can be carried out, depending on the user's skill and understanding of the fundamentals underpinning the application.

**Keywords:** INLA, Geostatistics, Preferential models.