

Bayesian spatial modelling for biodiversity

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Research Group: [Statistics and Data Science](#)

Project description:

Many models assume that observations are obtained independently of each other. However, distance between observations can be a source of correlation, which needs to be accounted for in any model. For example, pollution has a spatial smooth pattern and measurements close in space are likely to be very similar. Spatial models therefore have to take into account the spatial autocorrelation in datasets in order to separate the general trend (usually depending on some covariates) from the purely spatial random variation.

This project will focus on developing and applying Bayesian spatial and spatio-temporal modelling techniques to enhance our understanding of the association between, and predict, plant species that are at risk of extinction and areas in need of protection in the face of climate change, changing land use (especially agriculture) and pollution. The pollutants of interest are nitrogen and phosphate-based fertilizers. We will leverage spatial distribution data for the entire British flora, studying changing trends in distribution and land use over 60 years. We will also include data for a range of different measures of genomic diversity (e.g. genome size and polyploidy) together with climate and soil data to uncover the role of biological and abiotic factors in predicting species at risk of extinction, and landscapes at increased risk of biodiversity loss under differing land use and climate change scenarios. The research will be undertaken in collaboration with Dr Ilia Leitch, Senior Research Leader at the Royal Botanic Gardens, Kew.

One statistical challenge that arises is that the data are available at different resolutions, and advanced methods are required to model misaligned spatial and spatio-temporal data. We will leverage recent work by Dr Silvia Liverani on Bayesian methods for misaligned areal data, and extend them to meet the needs of this research challenge in the study and understanding of biodiversity.

Further information:

[How to apply](#)

[Entry requirements](#)

[Fees and funding](#)