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What is that map for? Aiding the clear communication of uncertainty in species distribution maps by considering their usage in practice.

Communicating uncertainty in maps of species distributions is a challenge for researchers. There are a rich variety of possible approaches, each of which require varying levels of statistical expertise in order to interpret outputs correctly. This is a particular concern when communicating to audiences with a range of statistical backgrounds.

To aid researchers in making decisions about communicating uncertainty in species distribution maps, we suggest asking a clarifying question: What will the maps be used for? The answers to this question can illuminate potential issues and limitations with conventional outputs of species distribution models, and motivate novel ways to summarise outputs to address specific aims.

We illustrate with a case study investigating the spatio-temporal distribution of an endangered tropical bird. Responses to our question include "Is the spatial distribution changing?", "Is there expansion to the north of the study region?", "Where are the hotspots?", "Are the hotspots diffusing/coalescing?", and "Are the hotpots moving?". We highlight problems with conventional model outputs for addressing these questions. Rather than leaving the crucial last step of interpretation to take place informally in the minds of the audience, we advocate operationalising each key question as a statistical problem and addressing it within a statistical framework. This directly links the uncertainty in species distribution estimates to the key take-away messages of the analysis. This approach requires modellers and domain experts to collaborately closely to ensure the statistical framework meets the objectives of the study as closely as possible.