Combining remote sensing and ancillary data to improve species distribution models

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Species distribution modelling: a data hungry but useful tool for biological conservation

Objectives
- To assess the usefulness of « ecotope » delineation and descriptors for species distribution modelling
- To propose further improvements of the « ecotope » database

Study species

Methods

Study area: Wallonia
Three different databases were tested: the ecotopes, a grid with the same environmental variables and a categorical land cover database (COSW).

For each species, 5 modelling algorithms were tested. Model performance was assessed by 5-fold cross-validation using the Area Under the ROC Curve (AUC), and the best models obtained with each of the 3 data sources were compared.

New variables derived from ancillary data were added when they significantly improved the AUC.

Results

No significant differences (p>0.05) between ecotopes, grid and COSW

However, ecotopes are better than COSW for species with relatively small sample sizes (<200 occurrences)

New variables improve model quality for 6 of 10 species

- The ecotopes database provided acceptable to good model quality (AUC>0.7) for all species
- The quantitative land cover attributes of the ecotopes allow species distribution modelling with relatively small sample sizes (<200 occurrences) while a land cover classification fails
- Attributes related to soil, hydrology and roughness have been integrated in the ecotope database