

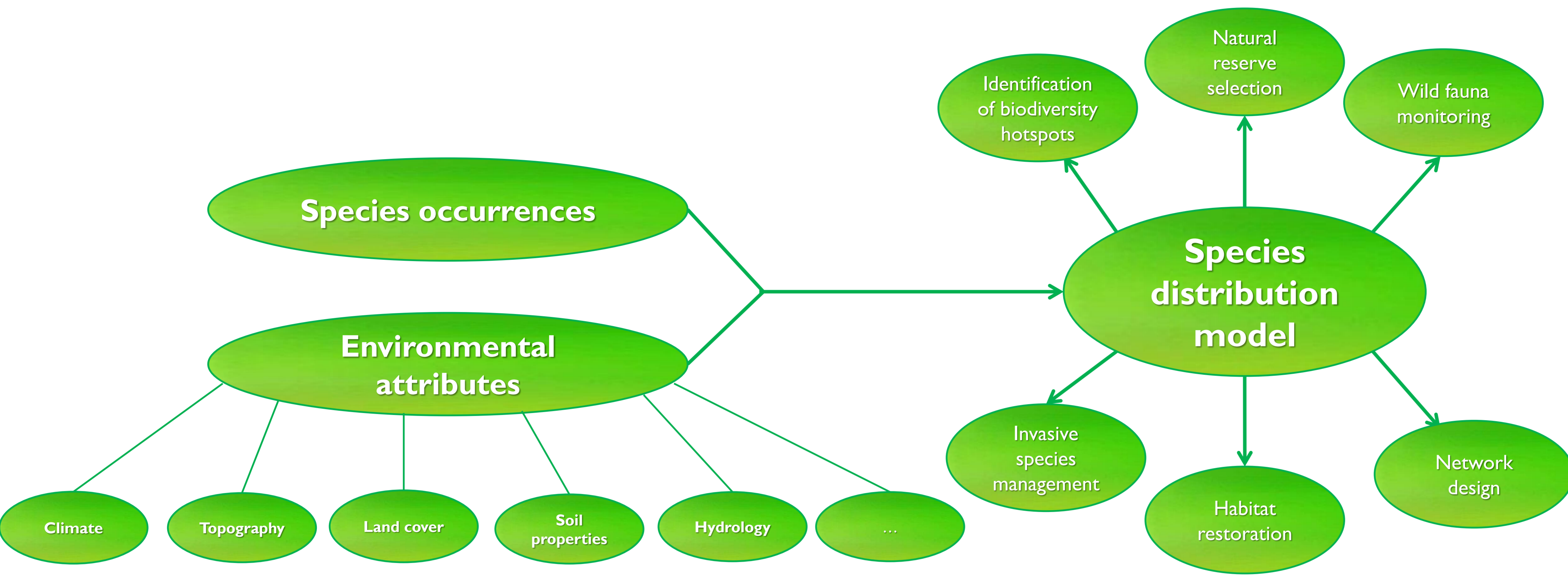
Combining remote sensing and ancillary data to improve species distribution models

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



In the Lifewatch-WB project, a database combining segmentation in homogeneous landscape units (called « ecotopes ») and environmental attributes derived from regularly updated remote sensing data (quantitative land cover attributes, solar energy,...) and other data sources (climate, topography,...) has been designed.

Objectives

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

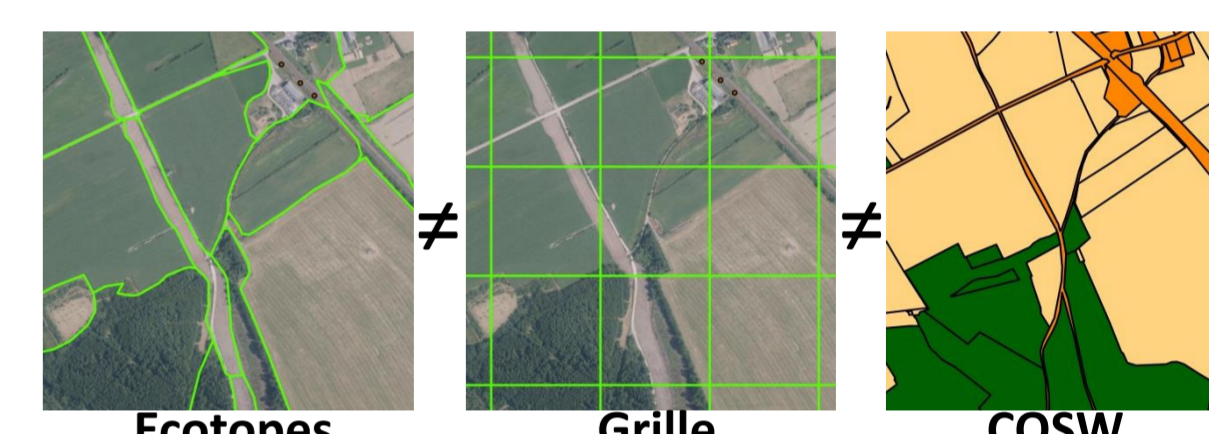
Study species



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).

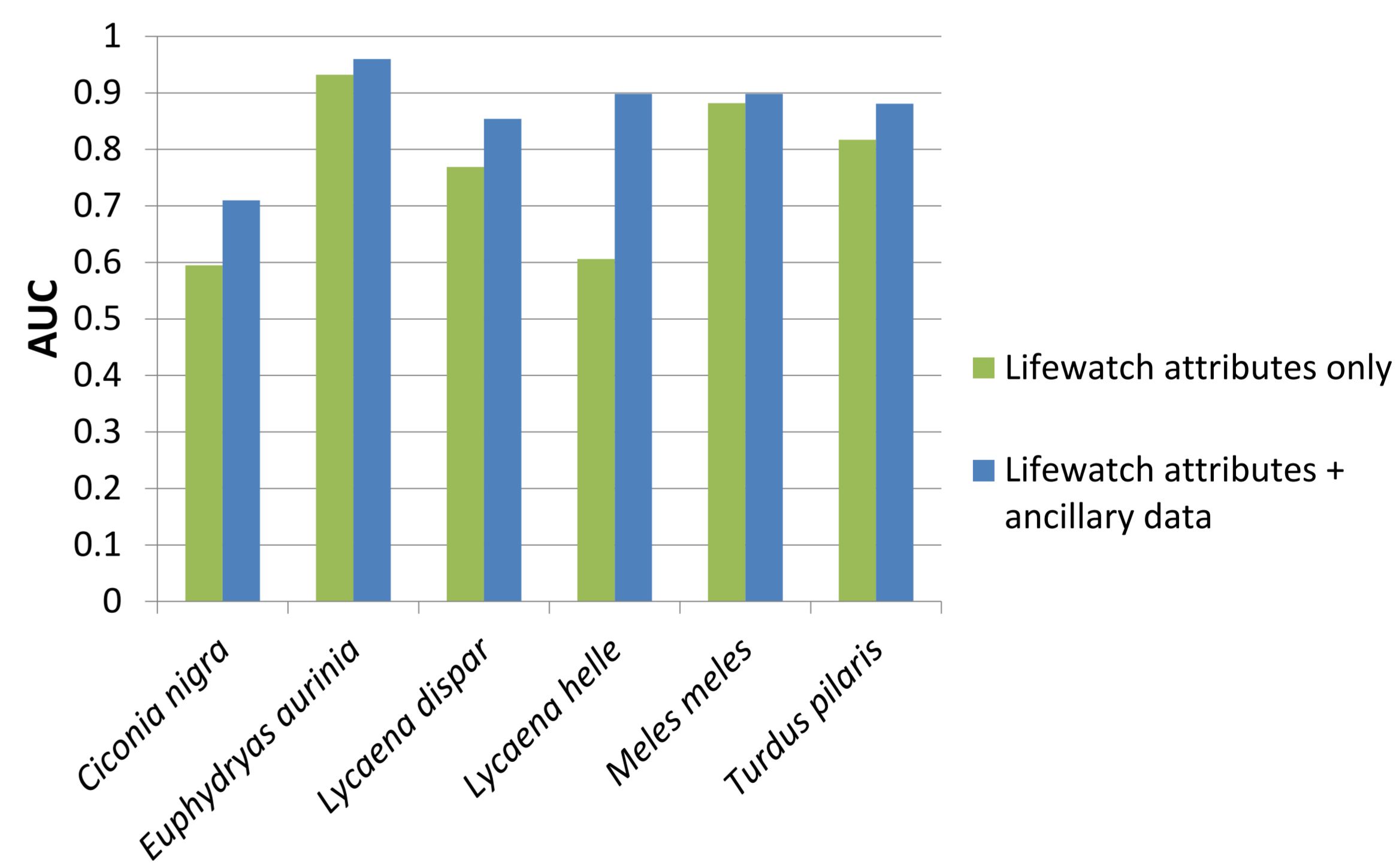
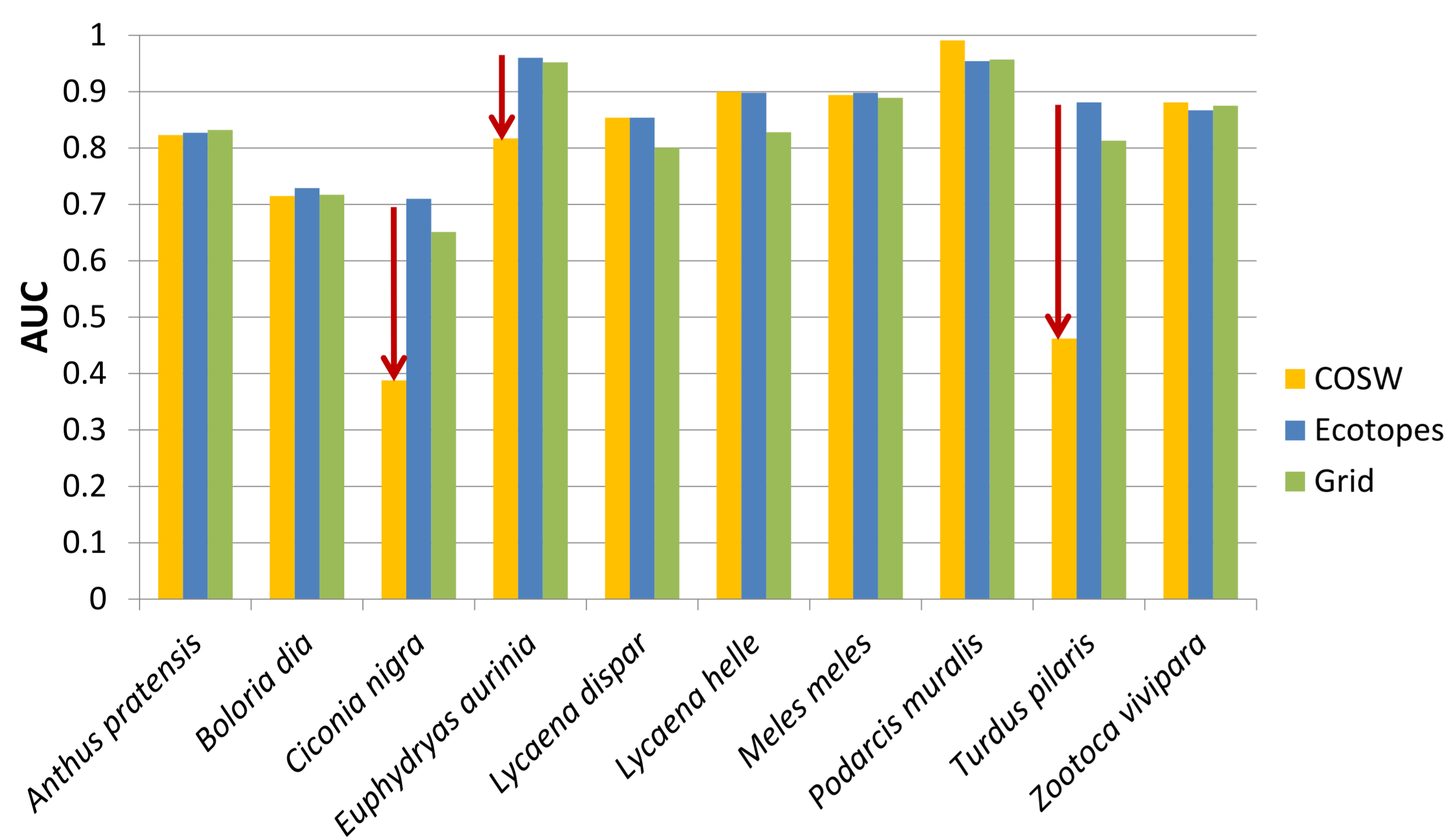


For each species, 5 modelling algorithms were tested. Model performance was assessed by 5-fold cross-validation using the Area Under the ROC Curve (AUC), and the best models obtained with each of the 3 data sources were compared.

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

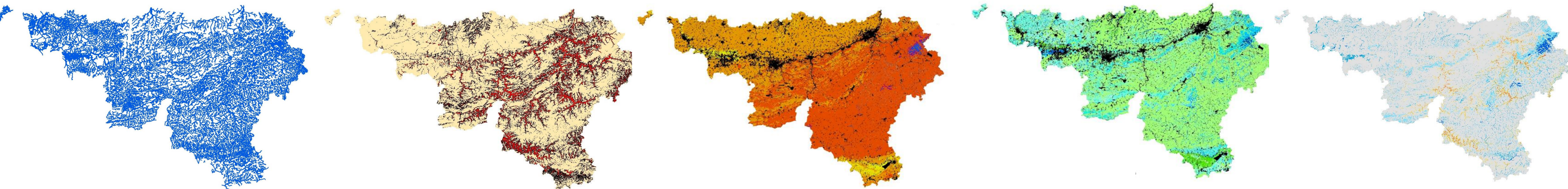
Distance to hydrological network

Terrain roughness (MNT ERRUISSOL)

Soil texture (CNSW)

Soil drainage (CNSW)

Soil marginality



- 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