SPECIES HABITAT NETWORK

MODELING TO GUIDE NATURE CONSERVATION

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“We [...] show that in multifunctional, human-dominated landscapes, biodiversity conservation needs a coherent large-scale spatial structure of ecosystems. Theory and empirical knowledge of ecological networks provide a framework for the design of such structures[1].”

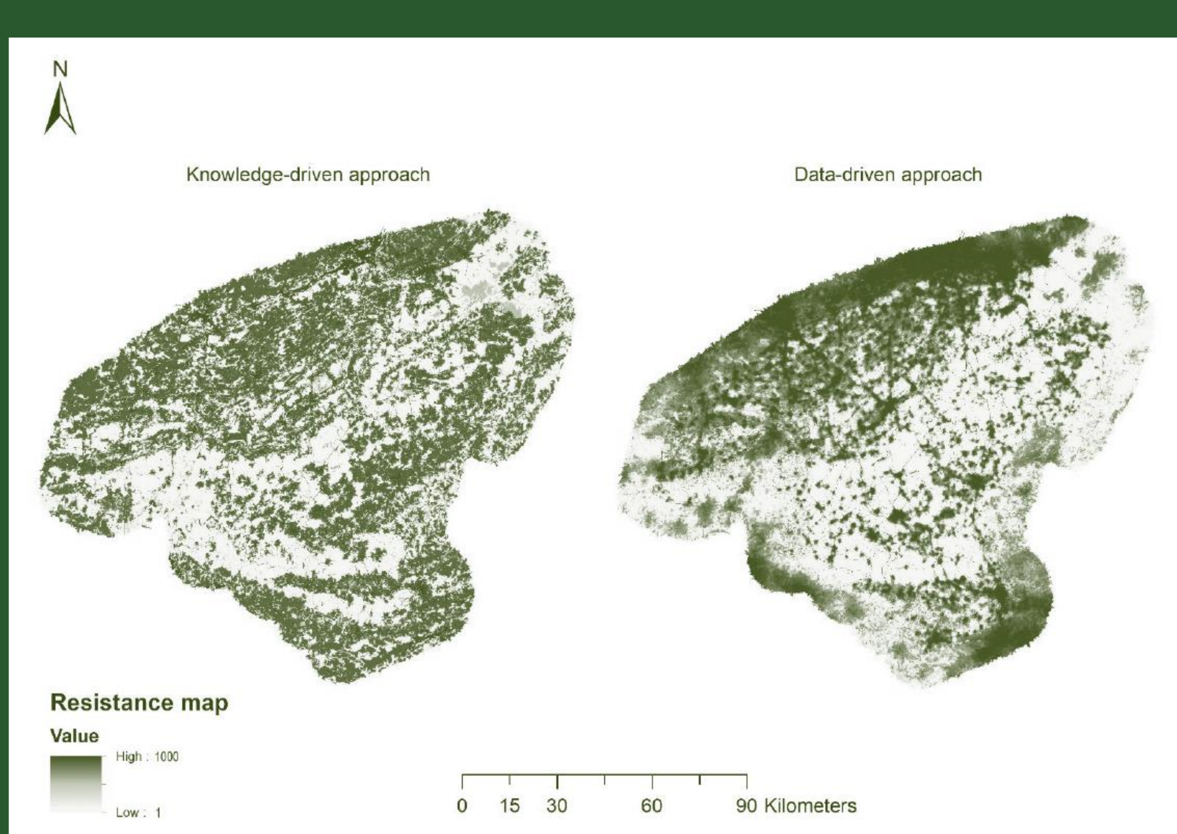
INTRODUCTION

- Habitat fragmentation due to human activity is increasing species extinction rates[2].
- The lack of connectivity could be efficiently addressed by implementing ecological networks a.k.a. habitat networks [1,3].
- In this study, three different approaches of habitat network modeling were tested and compared based on the case study of the wildcat (*Felis silvestris* Schreber, 1777).

METHODOLOGY

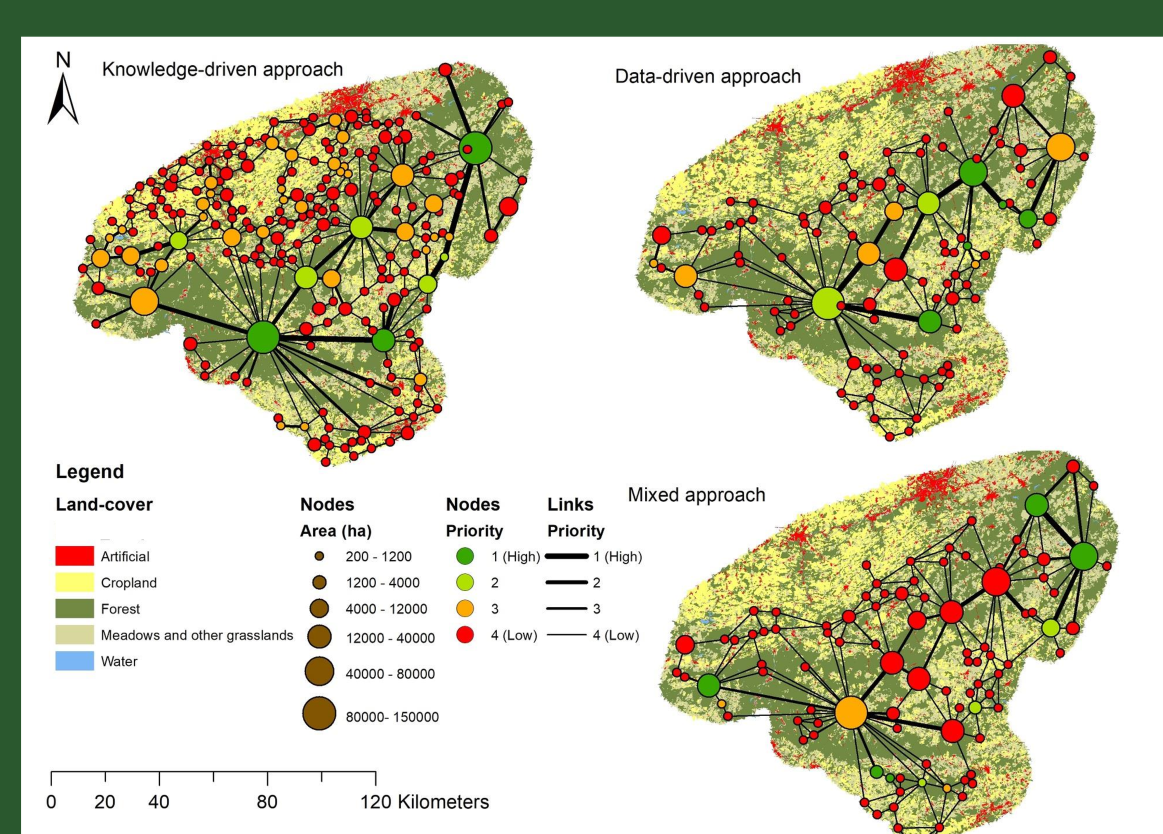
1. Two resistance maps are created, showing the cost of displacement for the studied specie. One based on scientific knowledge and the other based on wildcat distribution model.
2. Using previous maps, three habitat networks are modeled based on three different approaches: knowledge-driven, data-driven and a mixed approach using habitat map based on distribution model and resistance map from knowledge-driven approach.
3. The most important corridors for landscape connectivity are then intersected with obstacles such as roads to create priority action maps.

1.



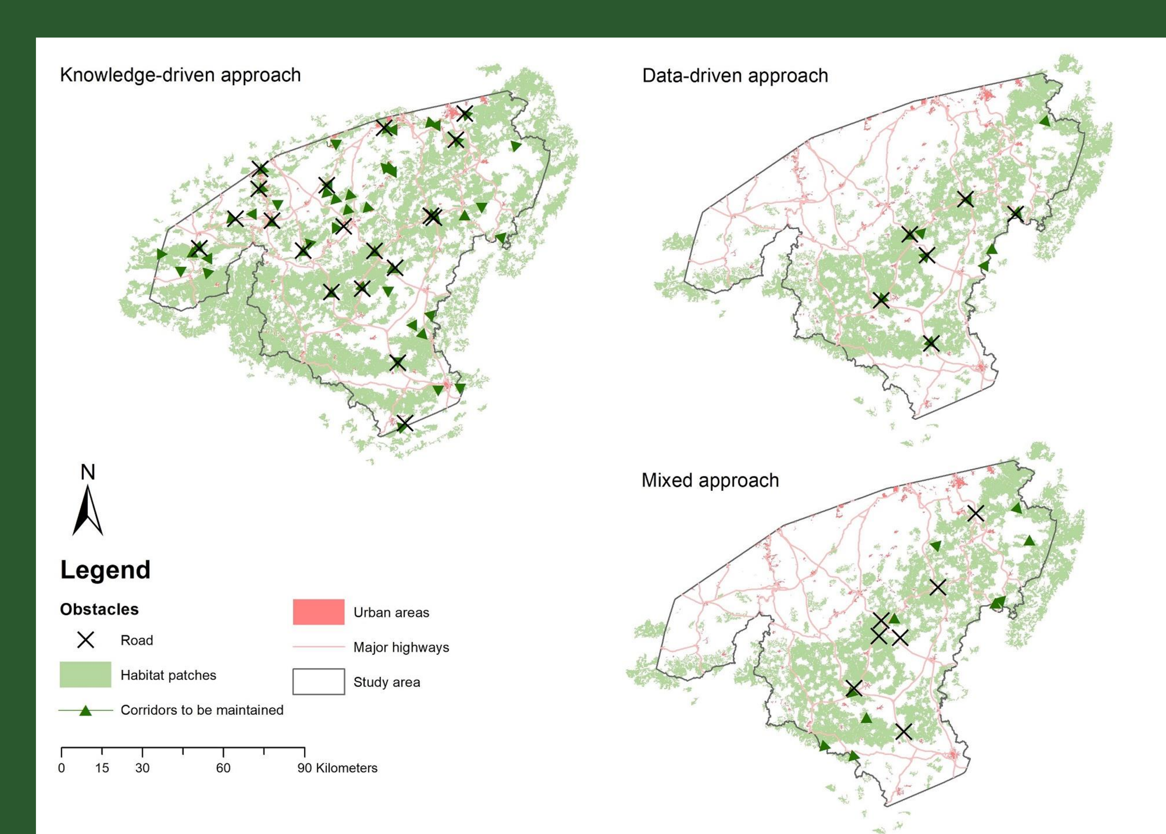
RESISTANCE MAPS

2.



HABITAT NETWORK ANALYSIS

3.



PRIORITY ACTION MAPS

RESULTS AND DISCUSSION

1. Forest and densely populated areas are distinctly identified in both resistance maps. The main differences are explained by the use of contextual variable in the distribution model used for the data-driven approach. In this approach, costs are lower for areas near forests and higher for those near artificial areas which is more coherent with the ecology of the wildcat.
2. Important patches and corridors were identified in habitat network models, which highlighted the importance to maintain connectivity between the large forest patches located along the Ardennes mountain chain.
3. Priority action maps identified some conflicts with roads that are exactly the same through the three approaches. These areas can be considered with certainty as priority areas for conservation and be used to guide nature practitioners in their efforts to restore landscape connectivity. The main difference across approaches is the large number of corridors in the knowledge-driven approach due to the greater number of habitat patches.

CONCLUSION

We conclude that the data-driven approach gave the most relevant results with the most reproducible method. We still suggest improving this approach by enhancing the resistance of blocking elements based on expertise. In the end, conservation actions were identified and could guide nature practitioners in their efforts to restore landscape connectivity.

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