

## Land cover determines threatened and alien species richness in a mixed urban-natural municipality

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Species richness is frequently modelled for a limited number of species, either globally or for a local area, including relatively labor-intensive data gathering. For policy makers, a spatial extent of municipality level, richness of large species assemblies across taxa, and habitat categorization used by multiple administrative bodies are more useful for forming the base of management decisions.

We aim to use the plethora of species records which are now freely available through online databases, and detailed maps of land cover to investigate what land cover factors affect the distribution and richness of threatened and alien species across a urban-natural municipality.

We used GBIF records to build spatially explicit GLS models to predict richness of all species, threatened (red-listed) species and alien (black-listed) species in 500m\*500m grid cells across Trondheim municipality, Norway, a region spanning a steep urban-natural gradient.

We show that land cover is an important factor determining species richness for the investigated groups. We also find that alien species are positively associated with human-modified urban land cover, whereas the most characteristic habitat associated with threatened species is coastal areas. All species are positively affected by increasing habitat heterogeneity, the relative effect is however stronger for threatened species than for alien ones.

For future management, these results point to a need to ensure protection of coastal areas and management focused on high levels of habitat heterogeneity on a 500m\*500m scale, if threatened species are to be favored. Likewise, urban areas should be carefully monitored and managed to assess the spread of alien species.