

# Diversity of EU habitat types is correlated with geography more than climate and human pressure

Marco Cervellini<sup>1</sup>, Michele Di Musciano<sup>2</sup>, Piero Zannini<sup>1</sup>, Simone Fattorini<sup>2</sup>, Borja Jiménez-Alfaro<sup>3</sup>, Emiliano Agrillo<sup>4</sup>, Fabio Attorre<sup>5</sup>, Pierangela Angelini<sup>4</sup>, Carl Beierkuhnlein<sup>6</sup>, Laura Casella<sup>4</sup>, Richard Field<sup>7</sup>, Jan-Christopher Fischer<sup>6</sup>, Piero Genovesi<sup>4</sup>, Samuel Hoffmann<sup>6</sup>, Severin D. H. Irl<sup>8</sup>, Juri Nascimbene<sup>1</sup>, Duccio Rocchini<sup>1</sup>, Manuel Steinbauer<sup>6</sup>, Ole Reidar Vetaas<sup>9</sup>, and Alessandro Chiarucci<sup>1</sup>

<sup>1</sup>Alma Mater Studiorum University of Bologna

<sup>2</sup>University of L'Aquila

<sup>3</sup>Universidad de Oviedo

<sup>4</sup>Institute for Environmental Protection and Research (ISPRA)

<sup>5</sup>Sapienza University of Rome

<sup>6</sup>University of Bayreuth

<sup>7</sup>University of Nottingham

<sup>8</sup>Goethe-Universität Frankfurt am Main Fachbereich 11 Geowissenschaften Geographie

<sup>9</sup>Univ. of Bergen

July 27, 2021

## Abstract

**Aims:** Habitat richness, i.e. the diversity of ecosystem types, is a complex, spatially explicit aspect of biodiversity, which is affected by bioclimatic, geographic and anthropogenic variables. The distribution of habitat types is a key component for understanding broad-scale biodiversity and for developing conservation strategies. To test which factors are related with habitat richness we used EU habitat distribution data to answer the following questions: i) how do bioclimatic, geographic, and anthropogenic variables affect habitat richness? ii) which category is the most important? iii) how do interactions among these variables influence habitat richness and which combinations produce the strongest interactions? **Study area:** European Union (excluding Greece) plus the United Kingdom. **Methods:** We used the distribution maps of 233 terrestrial habitat types defined by the European Environmental Agency, to calculate habitat richness for the EU 10 km x 10 km grid map. We then investigated how environmental variables affect habitat richness, using generalized linear models, generalized additive models and boosted regression trees. **Results:** The main factors associated with habitat richness were geographic variables, with negative relationships observed for both latitude and longitude, and a positive relationship for terrain ruggedness. Bioclimatic variables played a secondary role, with habitat richness increasing slightly with annual mean temperature and overall annual precipitation. An interaction between anthropogenic variables was important: the combination of increased landscape fragmentation and increased population density strongly decreased habitat richness. **Main conclusions:** This is the first attempt to disentangle spatial patterns of habitat richness at the continental scale, as a key tool for protecting biodiversity. The diversity of European habitats is correlated with geography more than climate and human pressure, reflecting a major component of biogeographical patterns similar to the drivers observed at the species level. The interaction between anthropogenic variables highlights the need for coordinated, continental-scale management plans for biodiversity conservation.

## Hosted file

ms.docx available at <https://authorea.com/users/427674/articles/531825-diversity-of-eu-habitat-types-is-correlated-with-geography-more-than-climate-and-human-pressure>