

Ecological representativeness of terrestrial protected areas: sharpening the resolution of global assessment through macroecological modelling

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Global representativeness usually assessed at coarse spatial resolutions relative to landscape-level bias in PA coverage



Need to better align resolution of assessment with grain of spatial patterns in land use and biological turnover



Our initiative is achieving this by linking advances in biodiversity informatics, earth observation and modelling



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Using more than 300 million filtered and name-matched records for over 400,000 species of plants and animals

52.5 million records of 254,000 species

13.2 million records of 133,000 species

286.4 million records of 24,000 species



All vascular plants

Ants, Bees, Beetles, Bugs, Butterflies, Centipedes, Dragonflies, Flies, Grasshoppers, Millipedes, Snails, Moths, Spiders, Termites, Wasps

Reptiles

Amphibians Birds Mammals





And a newly emerging generation of enhanced 1km-resolution environmental surfaces

CLIMATE

Min Monthly Min Temp Max Monthly Max Temp Max Diurnal Temp Range Annual Precipitation Actual Evaporation Potential Evaporation Min Monthly Water Deficit Max Monthly Water Deficit

SOILS

pH Clay proportion Silt proportion Bulk density Depth

TERRAIN

Ruggedness Index Topographic Wetness Index









Sources: worldclim.org

www.soilgrids.org

www.earthenv.org

www.worldgrids.org

Incorporating advances in fine-scale terrain adjustment, and integration of remotely-sensed climate data

WorldClim: Jan Max Temp



Adjustment for effects of terrain

Macroecological compositional-turnover modelling for each combination of realm, biome & broad biological group

Continuous environmental surfaces









Inter-ecoregional MDS axes

Biological scaling of environmental space using a modified version of generalised dissimilarity modelling (GDM)



Enables assessment of "ecological representativeness" of PAs as a function of biologically-scaled environment



Thereby revealing spatial variation in ecological representativeness at the sub-ecoregional level (globally)



Conclusion

This methodology opens the way for assessing the ecological representativeness of protected areas globally at close to the spatial grain of drivers shaping land-use and biodiversity distribution.



Thank you

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