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Geographical variations in the impact of anthropogenic pressures on terrestrial biodiversity

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Declaration

Was the data provided to you or did you collect or assemble it?

Were you responsible for data processing or cleaning, if required?

Were any mathematical models developed by you or by your supervisor?

What role, if any, did your supervisor play in developing the analyses presented?

Introduction

Biodiversity is important because it supports life on earth via the ecosystem services provided. When ecosystems have their biodiversity intact, they can provide services such as clean air and pollination, which makes the earth habitable for humans. Biodiversity loss leads to unstable environments, as ecosystems with low biodiversity are less resistant to change. Biodiversity loss diminishes ecosystem productivity [Duffy et al., 2017] and threatens human well-being [Díaz et al., 2006].

Biodiversity is impacted by both natural and anthropogenic pressures [Nobel et al., 2020], however any mention of 'biodiversity pressures' in this study refers only to the latter. Understanding the impacts of anthropogenic pressures on biodiversity is important for creating accurate policies and conservation strategies. Accurate information about biodiversity pressures can produce more effective conservation strategies, and better informed decisions can be made, including biodiversity-conscious investments. One of many responses to the biodiversity crisis [Ogar et al., 2020] is the beginning of a global movement towards sustainable business and biodiversity-conscious investment [PRI, 2020][Forum, 2020][WWF, 2020].

Assessing the impact that investments have on biodiversity involves calculating the magnitude of association they have with each biodiversity pressure. Information is often available on the geography of a company's activities, such as where they base their factories or where they source their materials from. In the interest of making estimates about each company's biodiversity impact more accurate, the location of each company's biodiversity-related activities could be considered. If the location and magnitude of a biodiversity pressure is provided (by the company), then information about current local biodiversity and sensitivity of the biome to the pressure, accurate predictions could be made about how biodiversity-friendly such an investment would be.

Given that anthropogenic impact on the environment is worldwide [Plumptre et al., 2021], the question should be raised of whether the geographic location of biodiversity pressures affects their impact on global biodiversity. In other words, are some parts of the world more sensitive to biodiversity pressures than others? For example, does the location that a biodiversity pressure takes place change its impact on global biodiversity (regardless of magnitude)? If such geographic differences exist, they should be taken into account when attributing biodiversity-related merit to investments. Better understanding of biodiversity pressures will aid a better understanding of the implications of investments on natural ecosystems .

Literature Review

Various studies have mapped the impact of biodiversity pressures across regions/biomes [Millennium ecosystem assessment, 2005] [Sala et al., 2000], and their spatial couplings [Bowler et al., 2020], however to our knowledge, no prior research has studied geographic differences in sensitivity to such pressures. Bowler et al.(2020) concluded that despite any patterns they observed of exposure to pressures, there will always be variation due to species' varying sensitivities to biodiversity pressures. Research about species-specific sensitivities in each ecosystem is useful for local conservation pol-

icy however it would be more useful for large scale projects/policies to have information about the sensitivity of regions/biomes on the whole. The current assumption in literature is that sensitivity to biodiversity pressures is constant across biomes [Sala et al., 2000], however there is no research to support this assumption. Hence, studying variation in biome sensitivity would be useful in comparing the impact of pressures in these areas on global biodiversity.

One of the papers which studied sensitivity of species to environmental pressures [**?**], developed a set of sensitivity scores for European species, determining which species will benefit from, be indifferent to, or be negatively affected by environmental change. The study used such sensitivity scores to map the regional variation in the overall negative effect of biofuel production in Europe. The proportion of 'negatively affected' species in each region was used to map the effects.

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Studies show impacts of socioeconomic status and cultural impacts on biodiversity [Kinzig et al., 2005]. This gives reason to believe that pressures impacting biodiversity loss could have varying impacts based on their location. This research aims to investigate whether the location of a pressure affects its' level of impact on biodiversity.

Methods

Results

Discussion

Conclusion

optional section

Data and Code Availability

Data and CodeAvailabilitystatement: At the end of your Main text, before the References section, you must provide a statement titled “Data and Code Availability”, where you name a data (e.g., Dropbox, FigShare, Zenodo, etc) and a code (e.g., Dropbox, GitHub, etc.) archive 20from where the data and code can be obtained that will allow replication of your results. The code may be in the form of a single script file.

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