

Is Tropical Biodiversity Disproportionately Sensitive to Human Pressures?

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Background

The sensitivity of species to human pressures is expected to vary across the world

There are a number of reasons to expect tropical biodiversity to be most sensitive:

- Species in the tropics are more specialist, in terms of climatic niches [MacArthur, 1972, *Geographical Ecology*], diets [Forister et al., 2015, *PNAS*] and habitats [Salisbury et al., 2012, *Ecol Letts*]
- Species in the tropics tend to be closer to their climatic niche limits [Sunday et al., 2014, *PNAS*]
- Tropical regions have a much shorter history of human impacts, so the most sensitive species are often still present [Balmford, 1996, *TREE*]
- Tropical species have smaller geographical ranges [Stevens, 1989, *Am Nat*] and slower pace of life [Wiersma et al., 2007, *PNAS*], characteristics associated with higher sensitivity [Newbold et al., 2013, *PRSB*; 2018, *PLoS Biol*]
- Tropical climates are less variable seasonally and interannually, so species may be less tolerant of environmental changes [Janzen, 1967, *Am Nat*]



Key Findings

We find that tropical biodiversity consistently responds more negatively to human pressures than non-tropical biodiversity

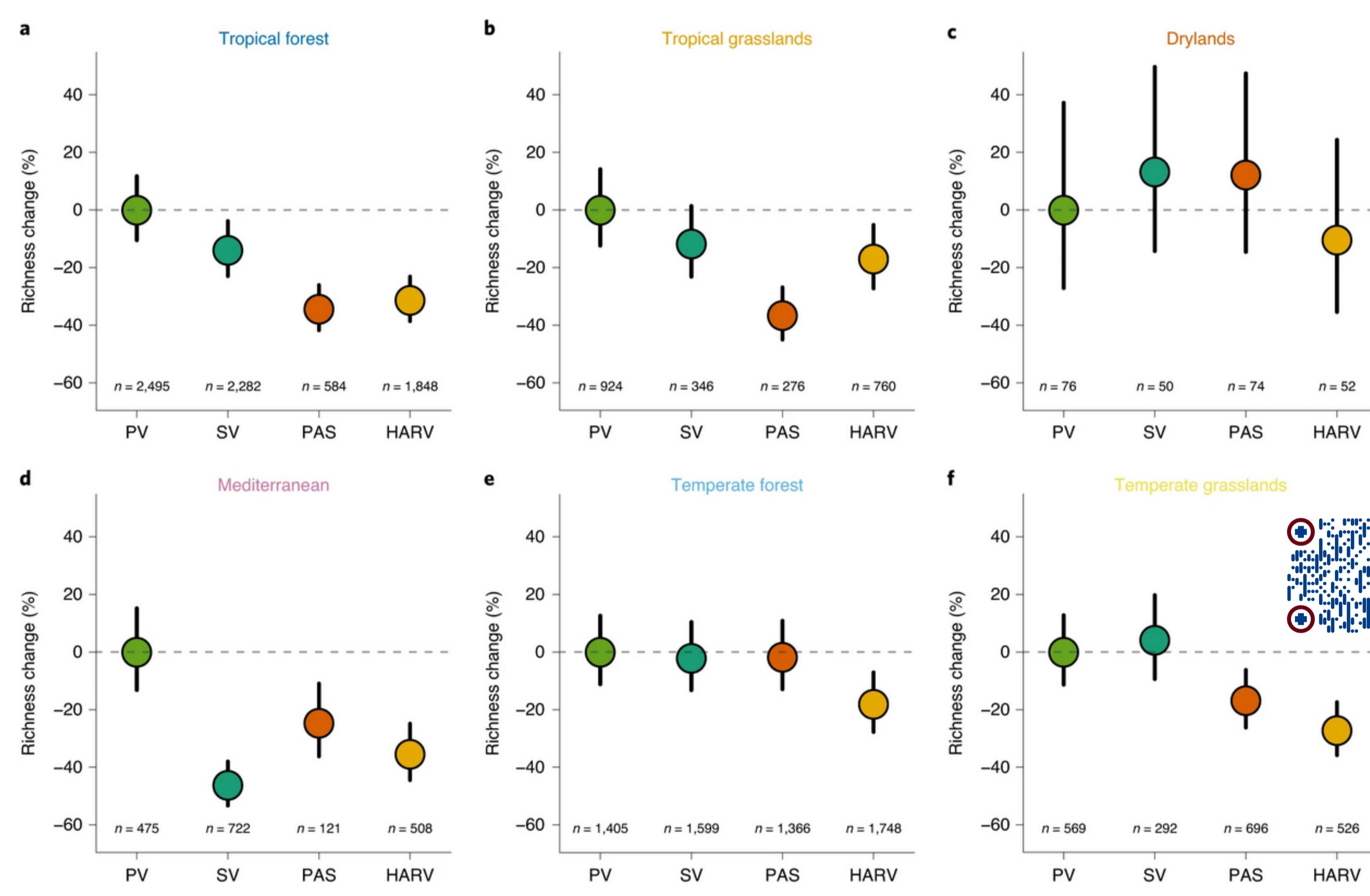


Figure 1. Tropical and Mediterranean biodiversity responds most negatively to human land use. PV = Primary vegetation; SV = Secondary vegetation; PAS = Pasture (livestock grazing); HARV = Croplands and tree plantations. [Newbold et al. \(2020\)](#).

[Nature Ecology & Evolution](#)

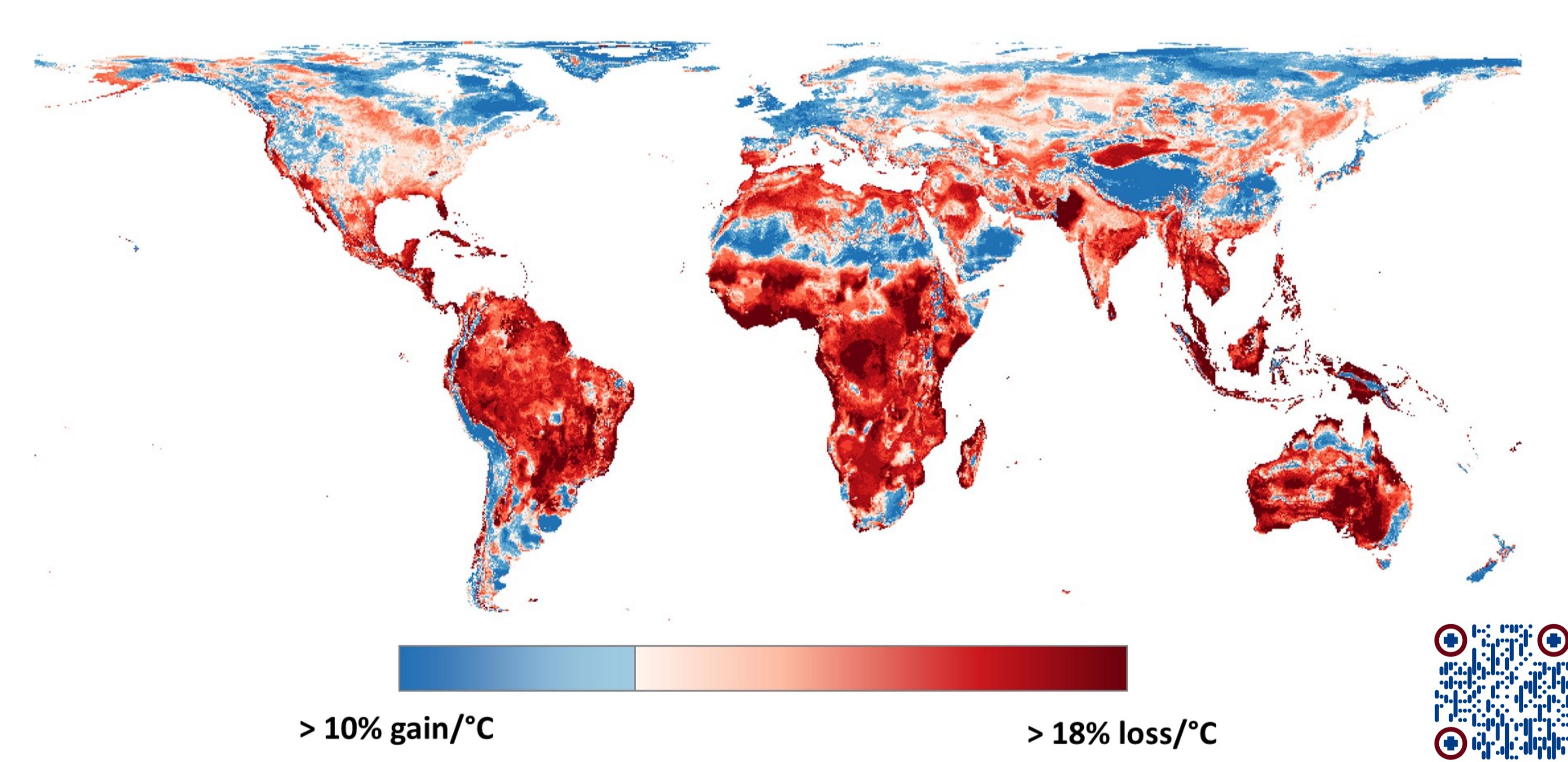


Figure 2. Each degree of temperature increase from climate change is projected to cause the greatest % loss of species from tropical areas. [Newbold et al. \(2020\)](#). *Nature Ecology & Evolution*

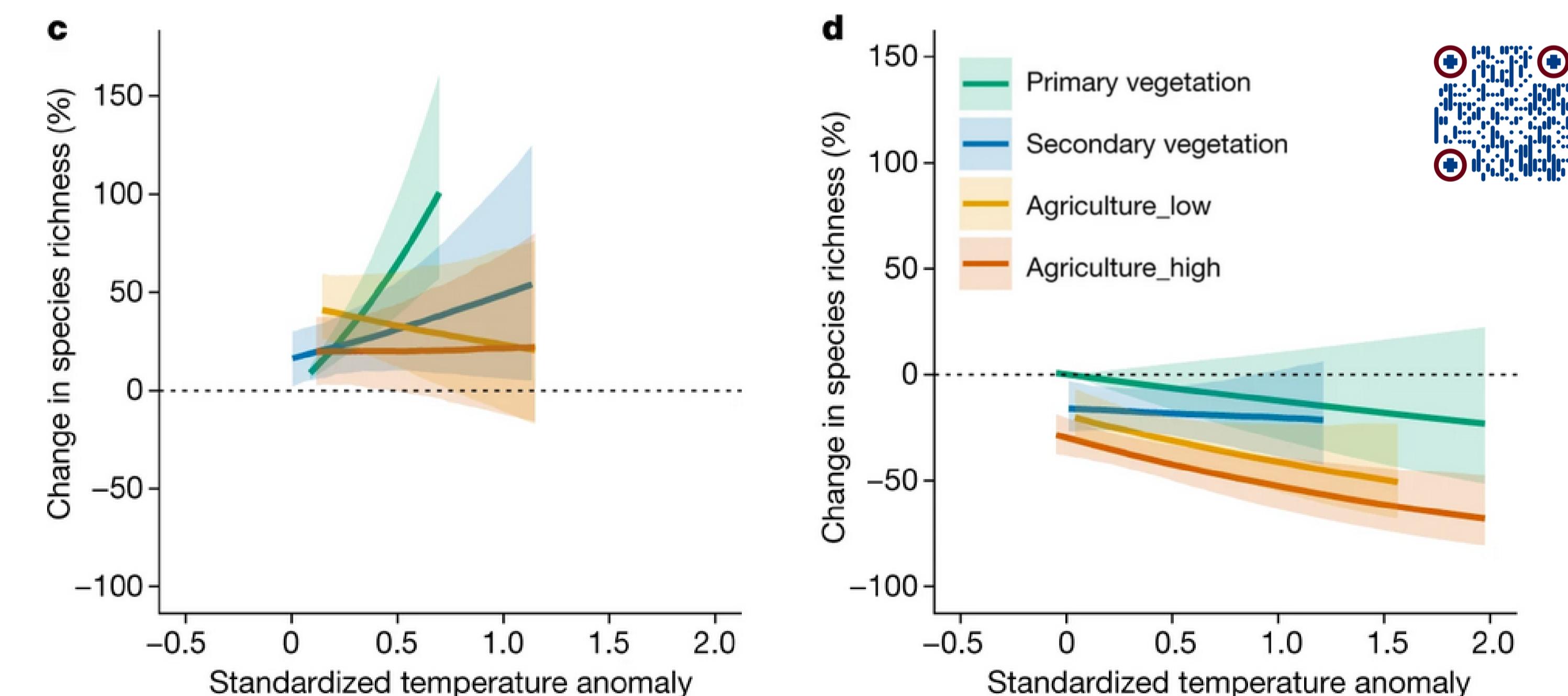


Figure 3. The interaction of rapid historical temperature increase (standardized temperature anomaly) and high-intensity agriculture is associated with the lowest levels of insect biodiversity, with reductions of > 50% in the tropics. [Outhwaite et al. \(2022\)](#). *Nature*

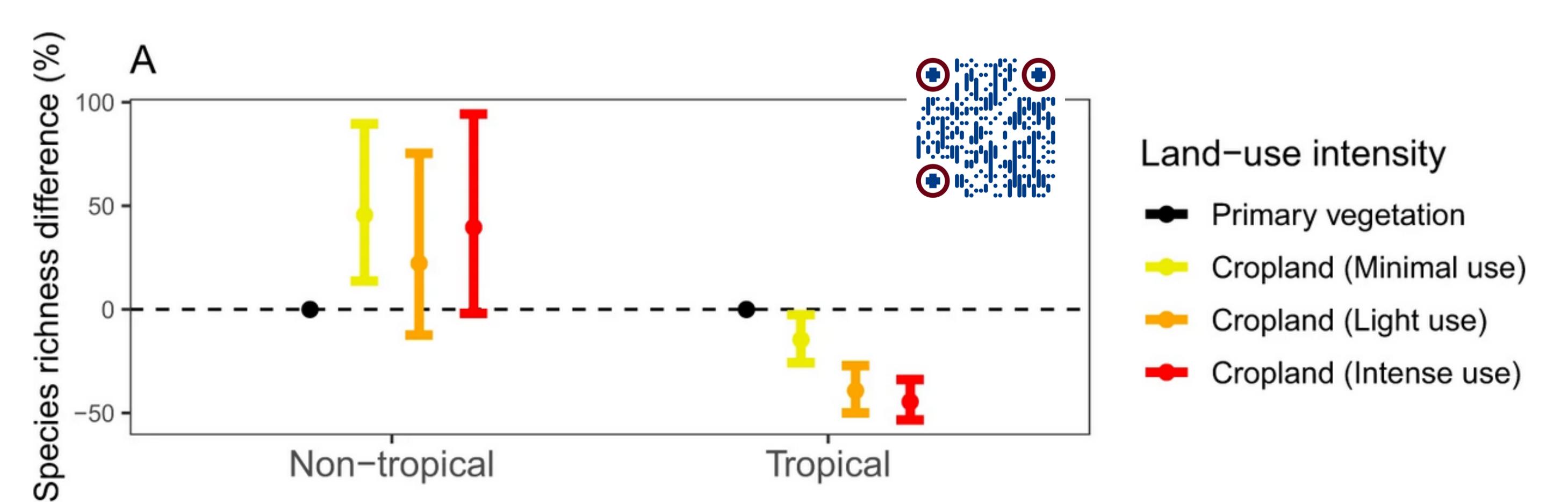
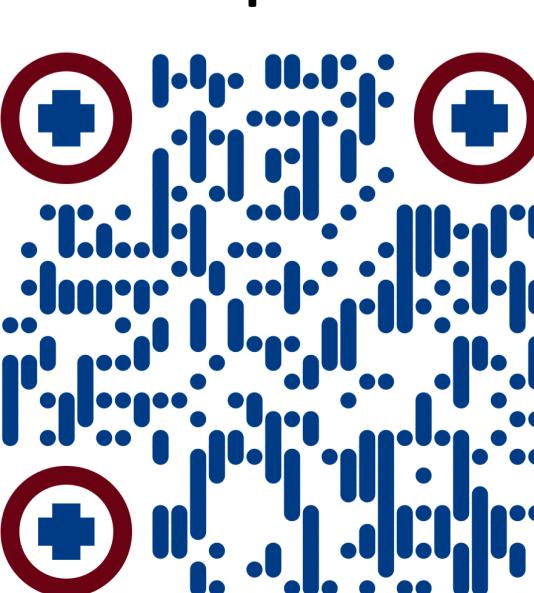


Figure 4. Pollinator biodiversity is reduced in high-intensity cropland, but only in tropical regions. [Millard et al. \(2021\)](#). *Nature Communications*

Online poster:



Biodiversity models and projections need to account for the differential sensitivity of biodiversity in different regions