Biodiversity change in the Anthropocene: bringing the dark diversity into the spotlight

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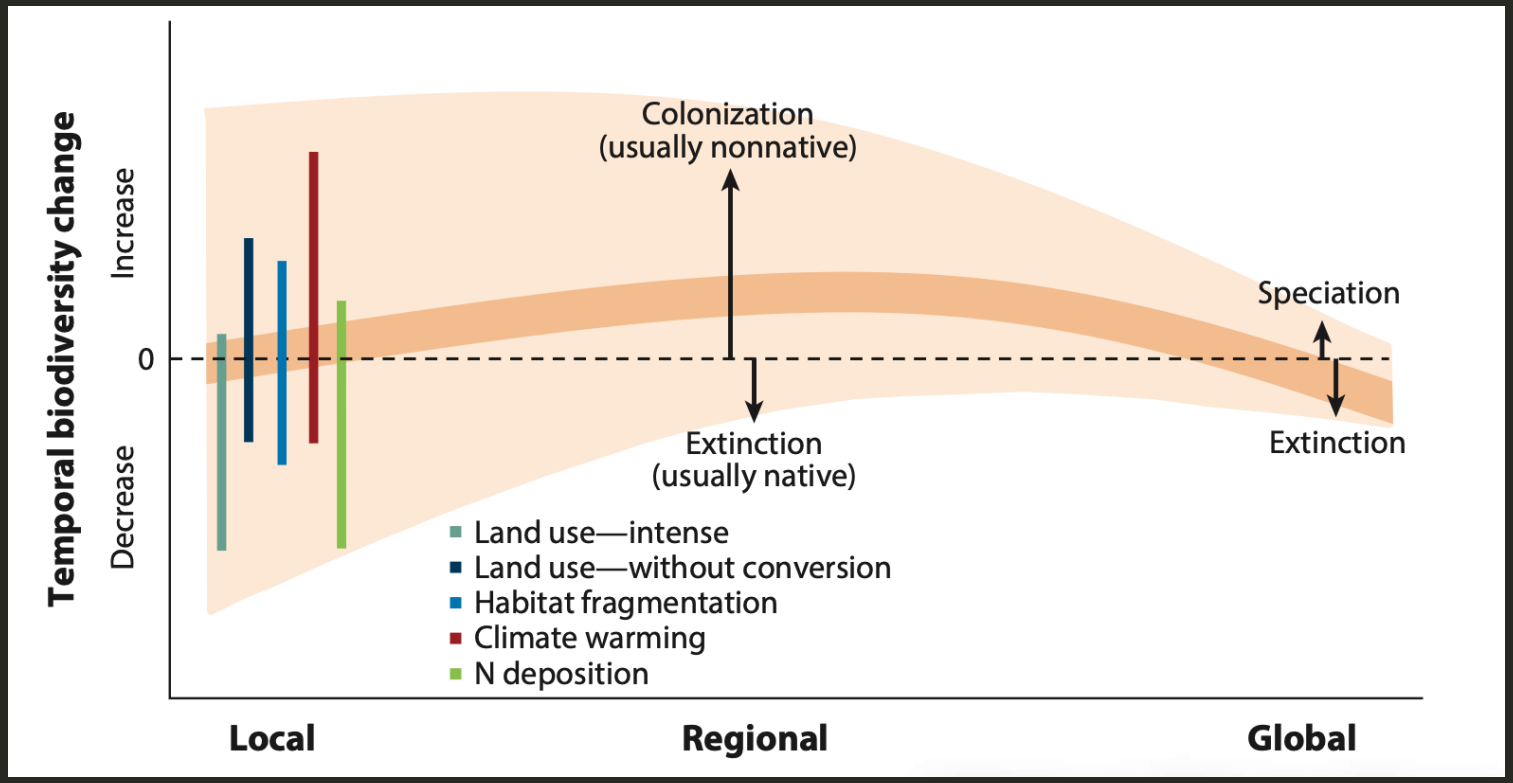
Biodiversity change: scale and temporal issues

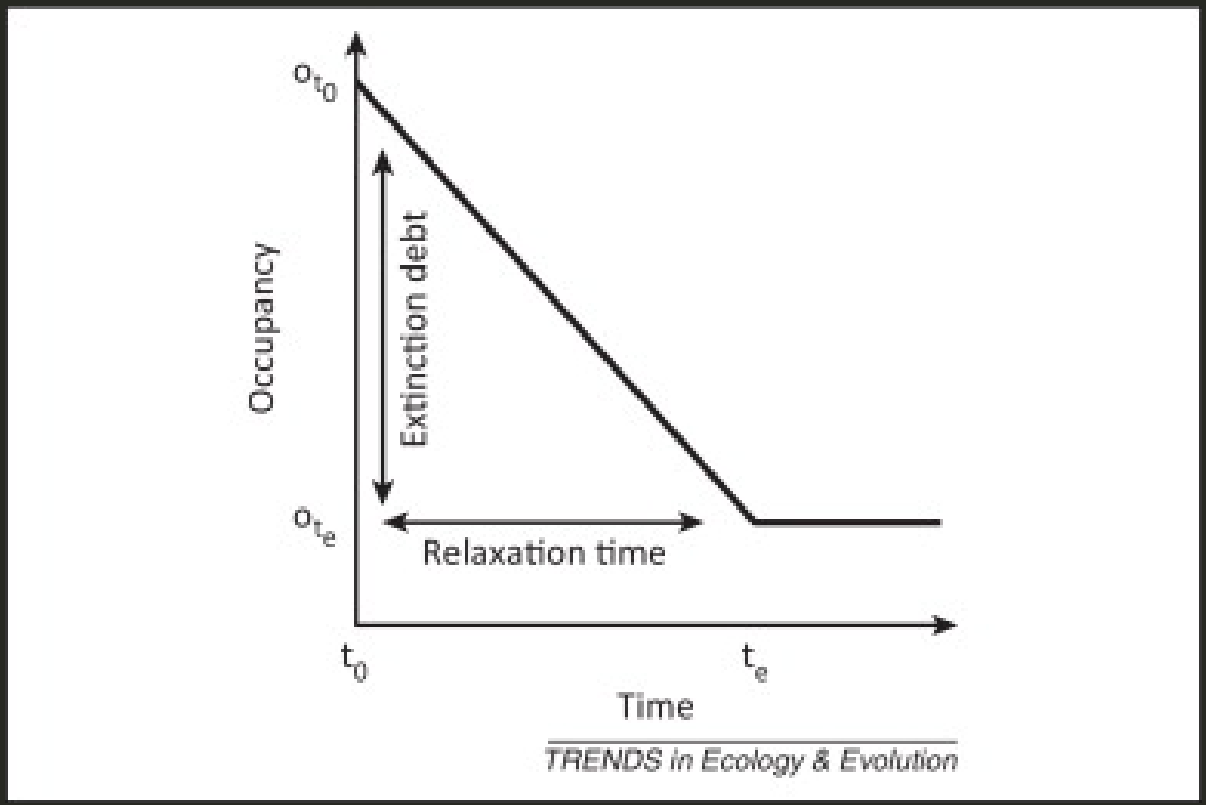
- First issue: Global change is affecting species differently depending on the scale
- Second issue: Species will not either disappear or colonize a new site instantaneously

Biodiversity change: scale and temporal issues



Vellend et al. 2017 Annual Reviews

Biodiversity change: scale and temporal issues



Hylander & Ehlér 2013 TREE

Species might not disapear nor colonize a site just after an environmental change. It will take time!

How to tackle both scale and temporal issues?

- We hypothesize that considering both observed and dark diversity through time we can tackle both spatial and temporal scale issues.

Dark diversity inspiration

- Dark diversity has been inspired by the Dark matter idea in physics
- Dark matter composes more than 80% of the universe
- It is important to keep the functioning of galaxies
- We cannot see the dark matter but measure it

Dark diversity: what is this?

By definition: Dark diversity corresponds to the species that can potentially be present in a community but are currently absent

- Like dark matter, dark diversity cannot be seen but measured.
- Three different methods have been proposed so far:
- Co-occurence
- Habitat preference
- Habitat suitability

Therefore, our guess is:

- By looking at the dark diversity we have both faces of the coin
- Species going locally extinct might persist in dakr diversity for some time
- After a change, before arriving in the local site, new species might be detected in the dark diversity.
- In summary it gives us time either to protect species from regional extinction or to facilitate speceis colonization (restoration) or prevent some species to colonize (invasive species).
- We will be one step further.

What have we done so far?

- The first chapter of my thesis is focused on propose this new framework

Temporal lags in observed and dark diversity in the Anthropocene.

- We show the arguments and hypothesis and create a simulation to show how this information can be applied in real ecosystems

Next steps: applying this idea using real data to understand how global change have affected, is affecting and will affect biodiversity change in future.

- Past: pollen data to understand how vegetation change in terms of species pool have changed over time.

We show patterns of both observed and dark diversity over millenia

- Present: Biotime dataset and lichen data
- Future: Mechanistic models

Take home message

- Dark diversity can be seen as a buffer of species under environmental change
- By tracking both observed and dark diversity we can be more equiped to predict species gains and loss
- Such information might help us to better deliniate restoration and conservation activities