

The response of ecosystems to an increasingly variable climate

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Background:

- ✓ Ecological communities ranging from polar terrestrial to tropical marine environments are affected by climate change.
- ✓ Rising temperature has increased the intensity and frequency of weather extremes due to which a large number of species are facing the risk of extinction.
- ✓ Uneven distribution of temperature sensitive species and warming rate across the globe have highlighted the need for present type of studies.

Aims:

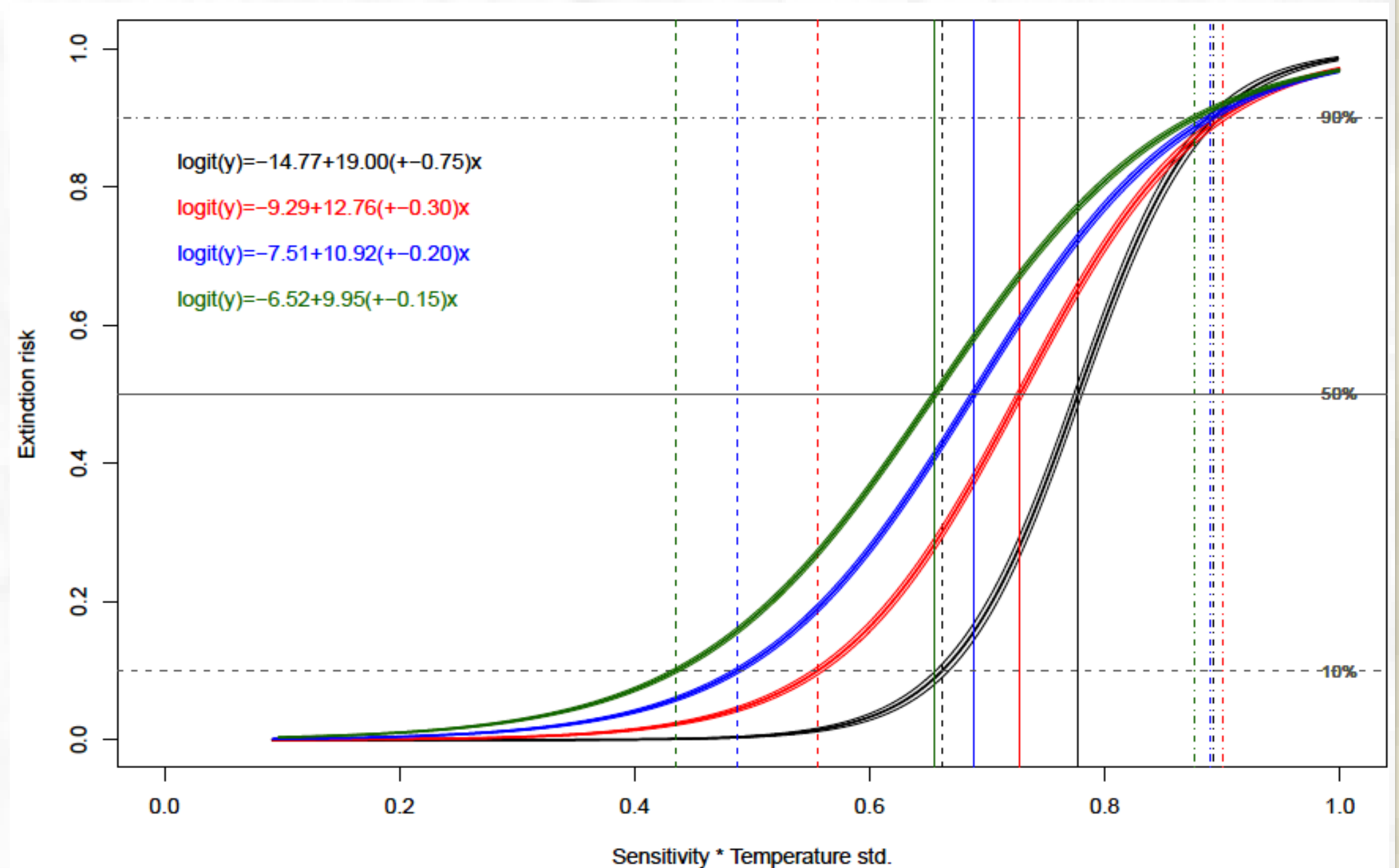
- ✓ To investigate how sensitivities of species to increasing temperature variability affect extinction risk.
- ✓ To understand how connectance and species-richness affects community robustness with respect to increasing temperature variability.

Method:

- ✓ Food web dynamics based on a generalized Rosenzweig-MacArthur model.
- ✓ Triangular shaped food webs with 6,12,18 and 24 species.
- ✓ Connectances with 0.07, 0.14, 0.21 and 0.28.
- ✓ 32 scenario, 400 replicates per scenario.
- ✓ The growth of a species was a function of temperature sensitivity and temperature standard deviation.

Results:

- ✓ Extinction risk of species increased with temperature variability and temperature sensitivity.
- ✓ Extinction risk of species increased with increasing food web size.
- ✓ Rapid increase in extinction risk when temperature variability crossed a lower threshold, especially for species-poor food web.



Logistic regression curves with 95% confidence band [black, red, blue, green curve for 6, 12, 18, 24 species respectively] showing the risk of extinction as a function of the product of temperature sensitivity and temperature standard deviation. Formula denotes the linear regression equations. 10%, 50% and 90% extinction thresholds are also indicated in figure.

Conclusions:

- ✓ The effect of temperature sensitivity and temperature variability varies depending on the size of food web community.
- ✓ The risks of extinction of species in species-rich communities are higher as compared to species-poor communities.

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