A global approach to assess terrestrial acidification impacts on plants

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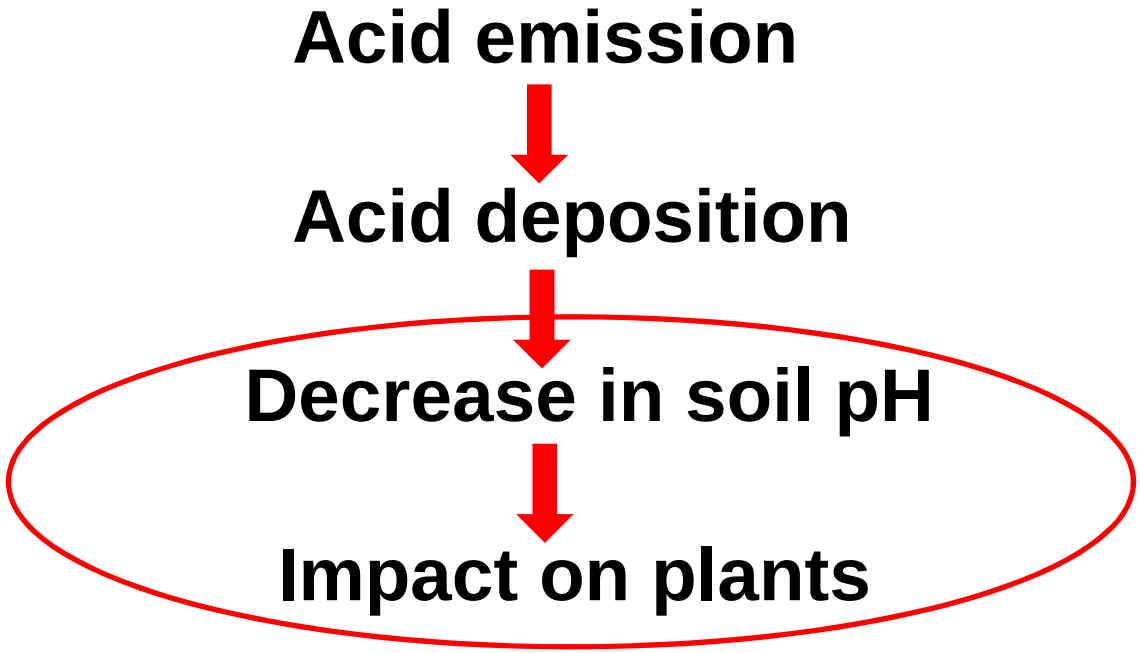
Background



Problem statement: No regionalized and global scale effect factors for terrestrial acidification

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Question

What is the regionalized and global loss in plant diversity due to terrestrial acidification?

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Approach

Soil pH

- Predictor of plant occurence
- Indicator of soil fertility
- Data availability

Plant occurence / non-occurence

- Worldwide literature review
- Natural or semi-natural systems

Approach

Soil pH

Good predictor of plant occurence

Soil properties

Data availability

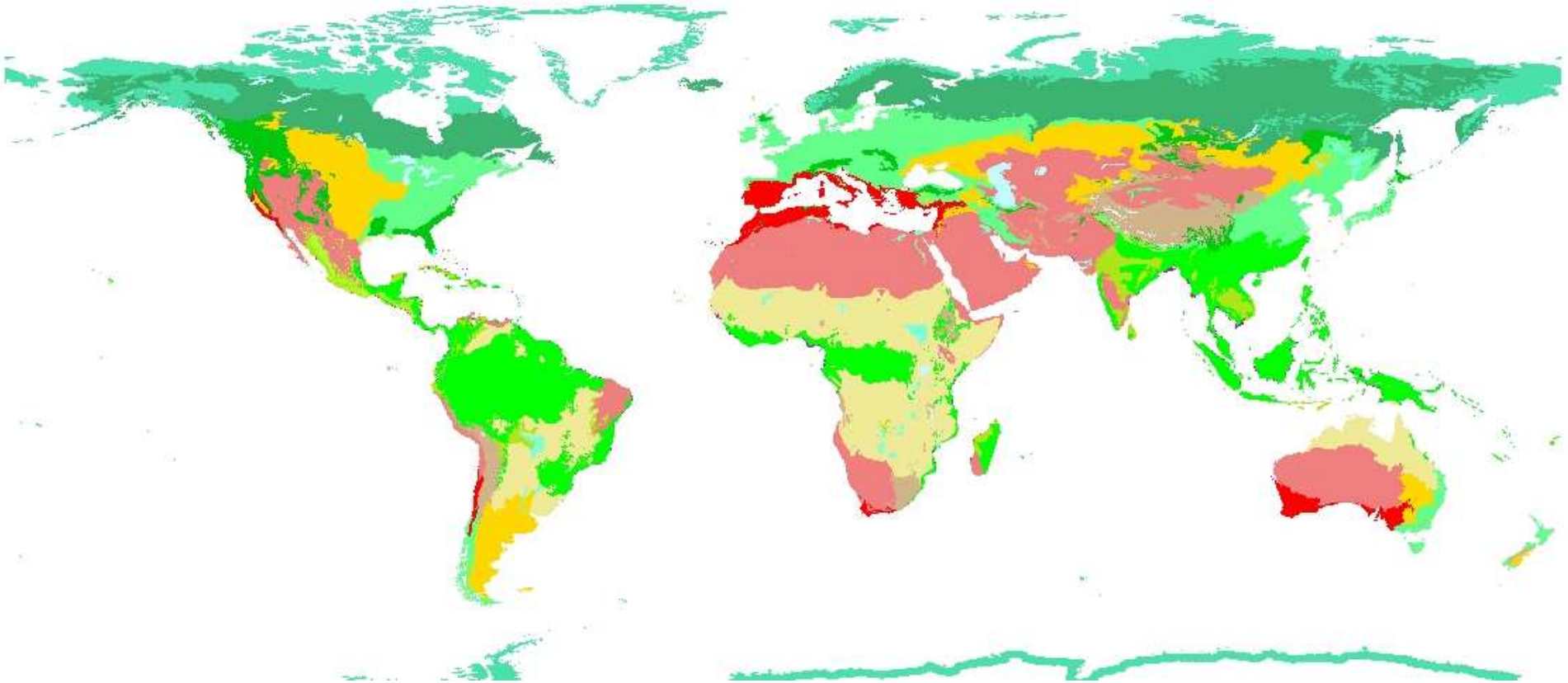
Plant occurence / non-occurence

Worldwide literature review

Natural or semi-natural systems

Approach

Biomes



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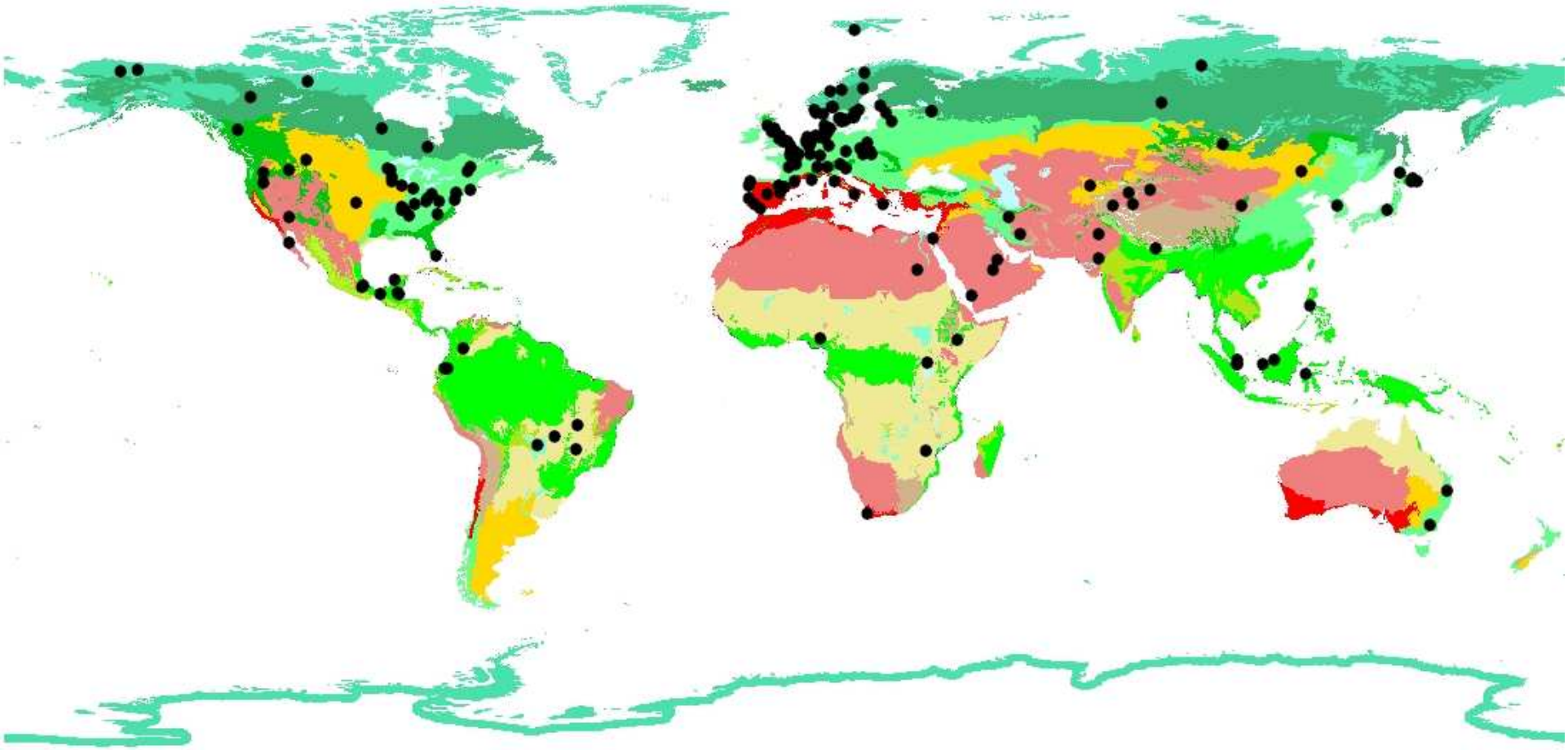
Approach



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Approach

Potentially non-occuring fraction of species

Observed: $$PNOF = 1 - \frac{\text{Species Richness}_{\text{pH}}}{\text{Species Richness}_{\text{optimum pH}}}$$

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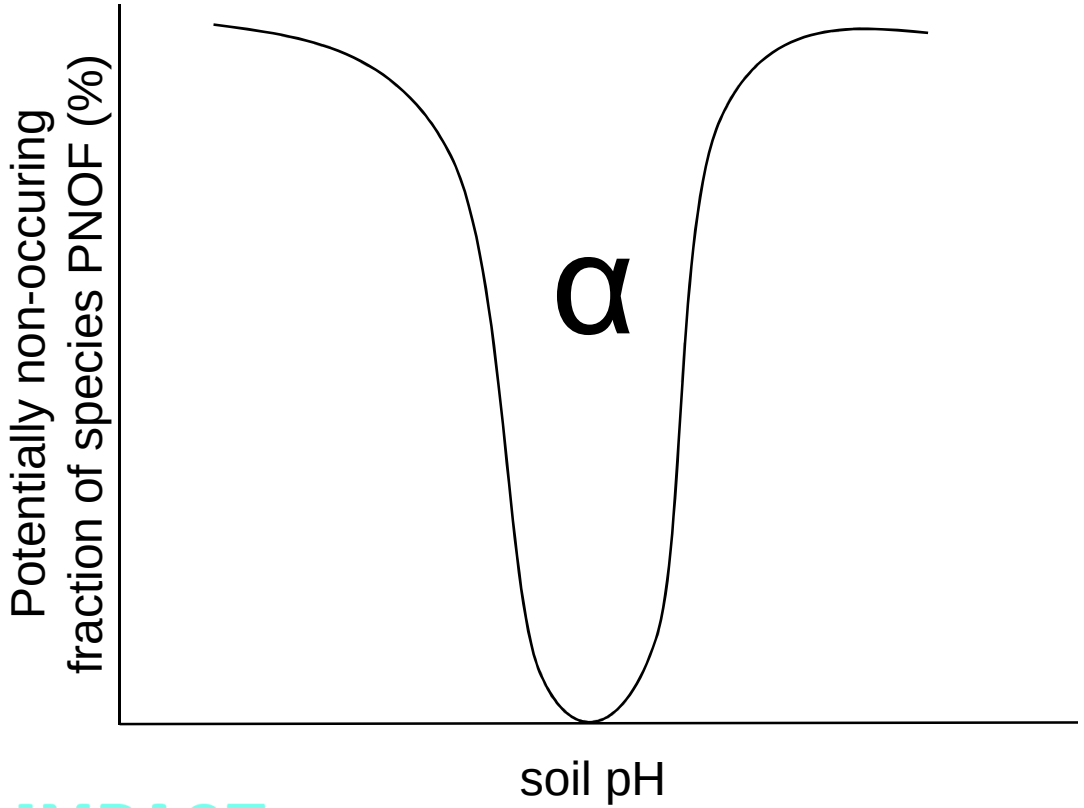
Approach

Fitted:

$$PNOF = 1 - \exp\left[-\frac{(pH-\alpha)^2}{\beta}\right]$$



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Approach

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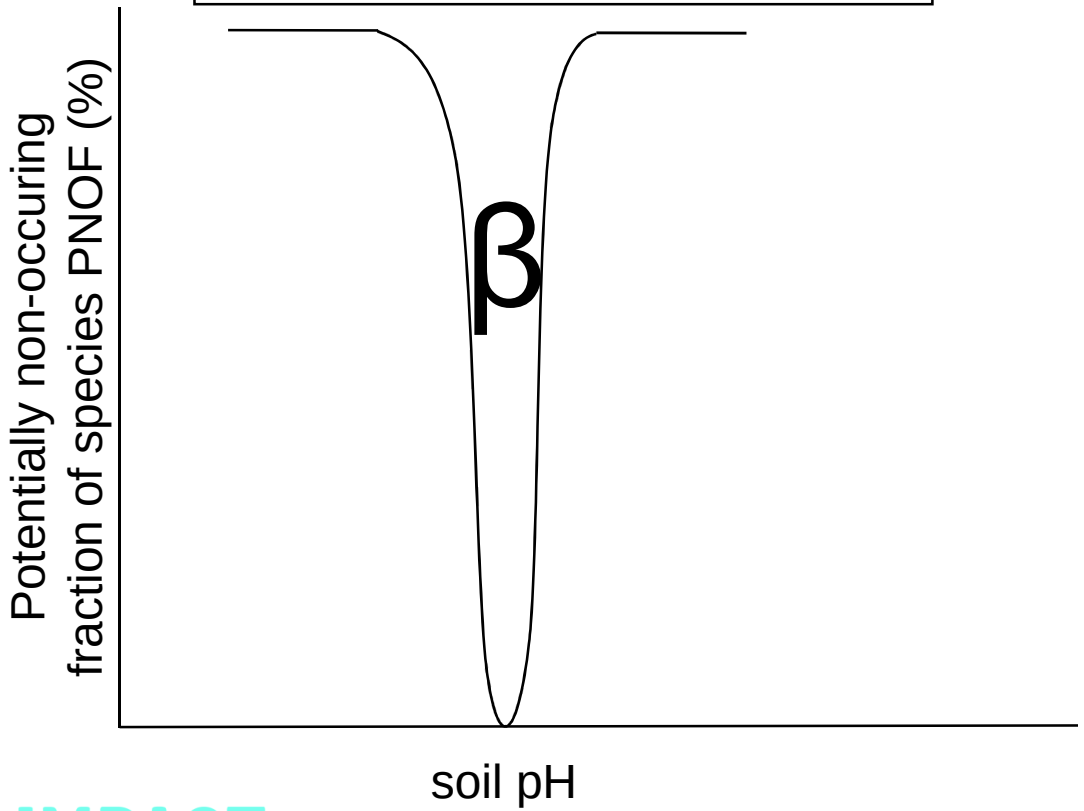

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Approach

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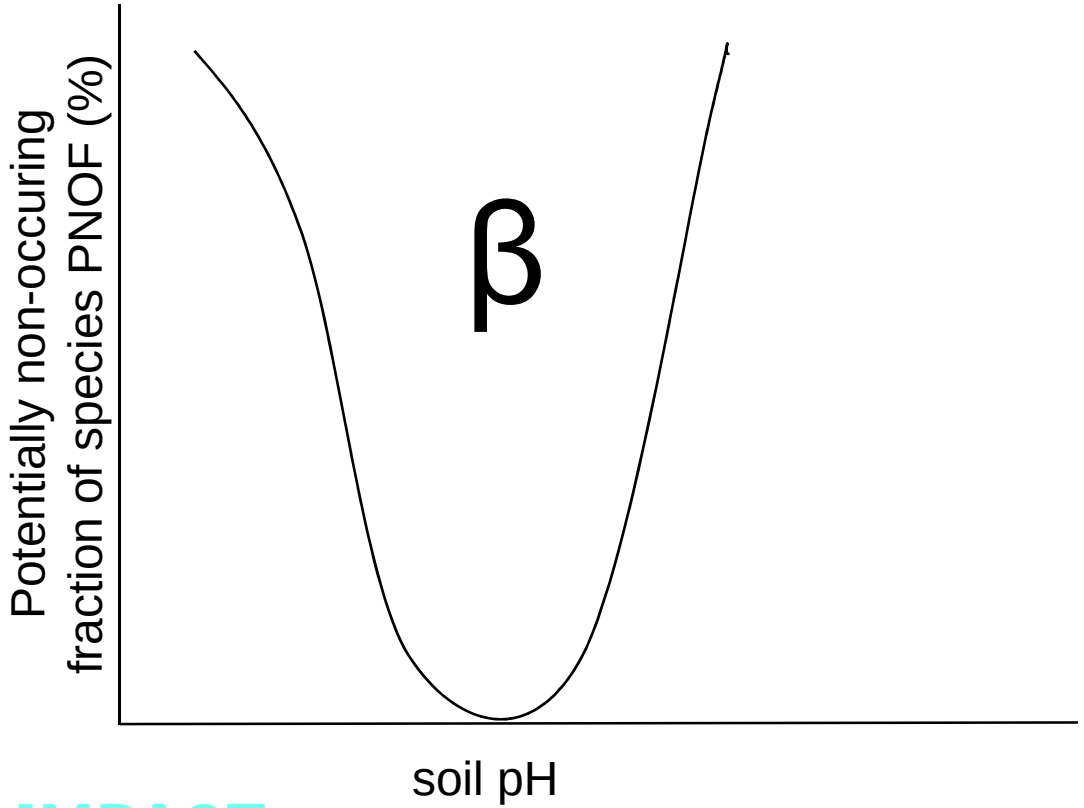
$$PNOF = 1 - \exp^{\left[-\frac{(pH-\alpha)}{\beta}\right]}$$



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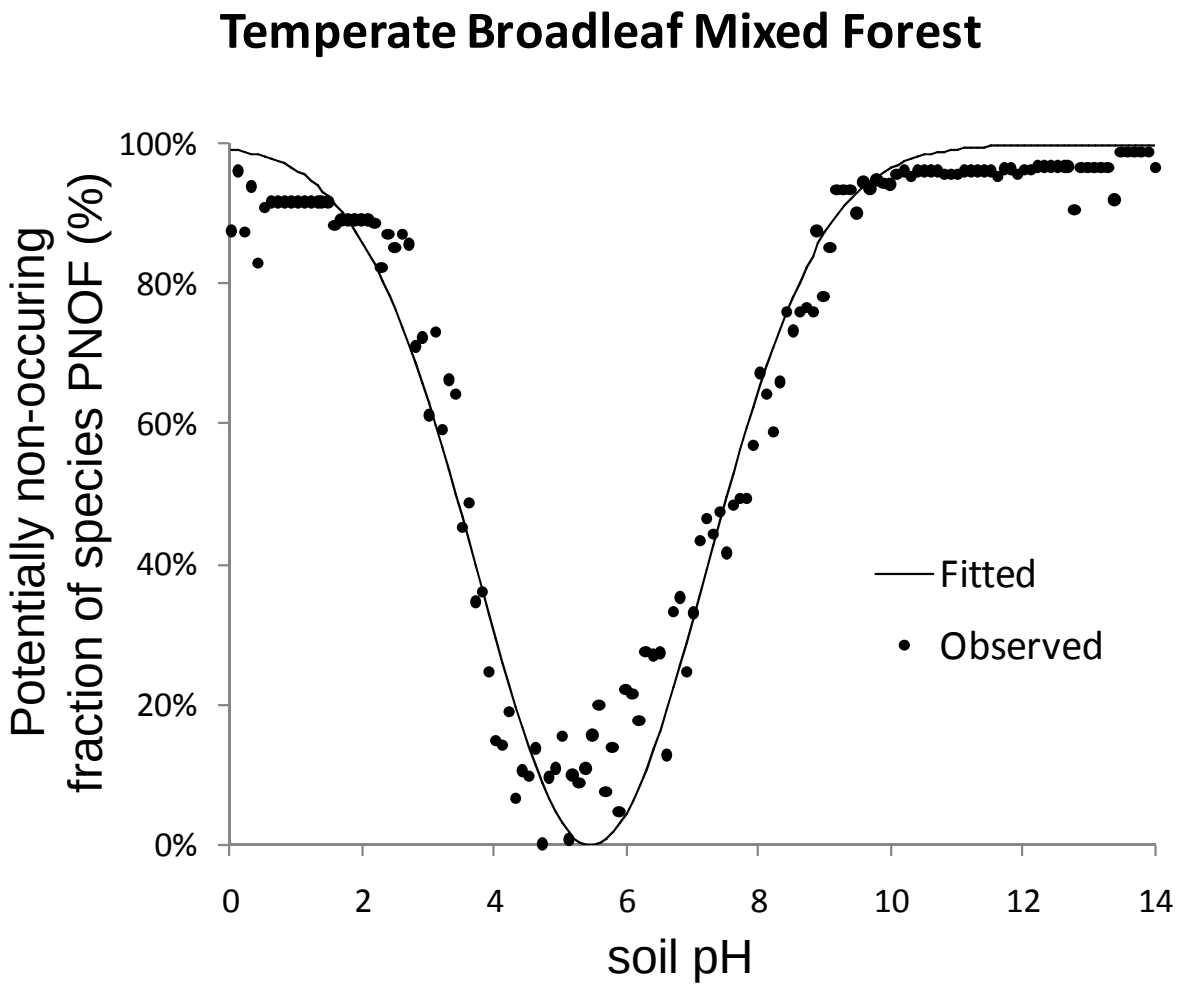
Results



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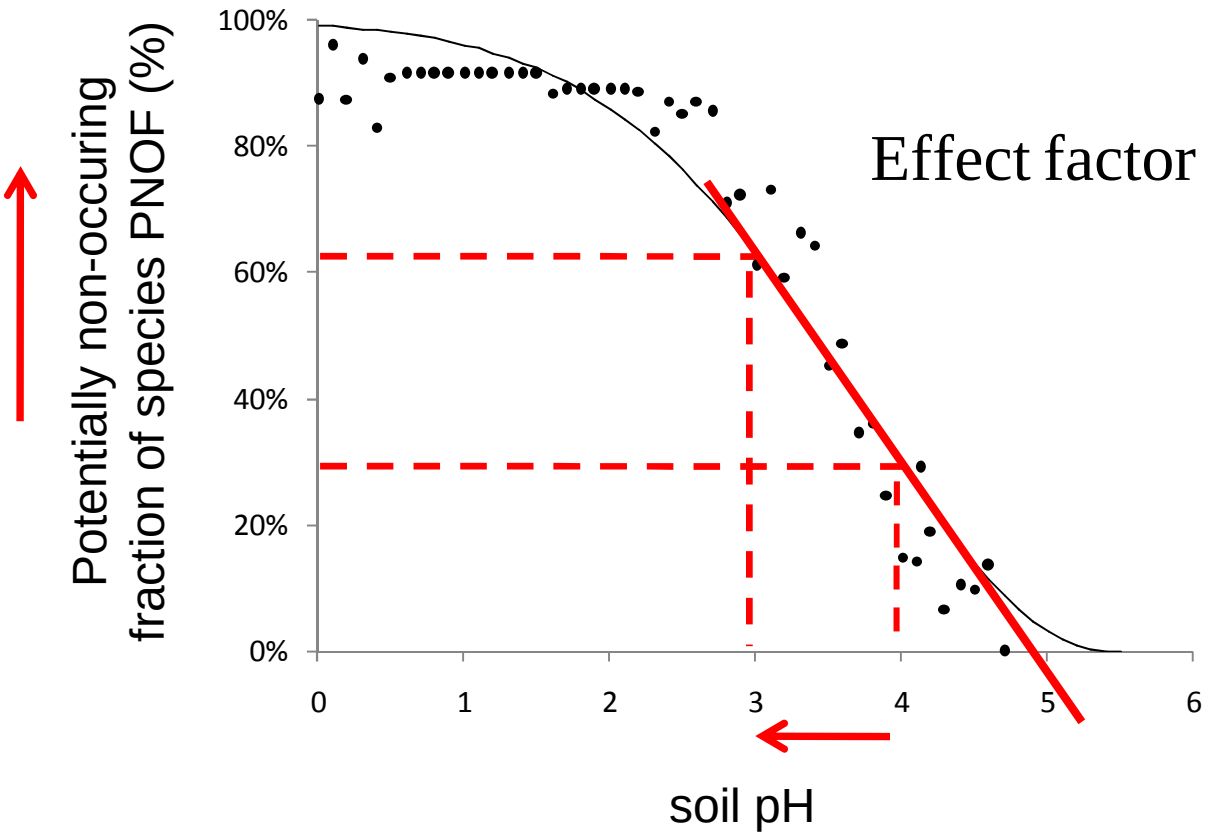
Results



$$\text{Effect factor} = \frac{dPNOF}{dpH}$$

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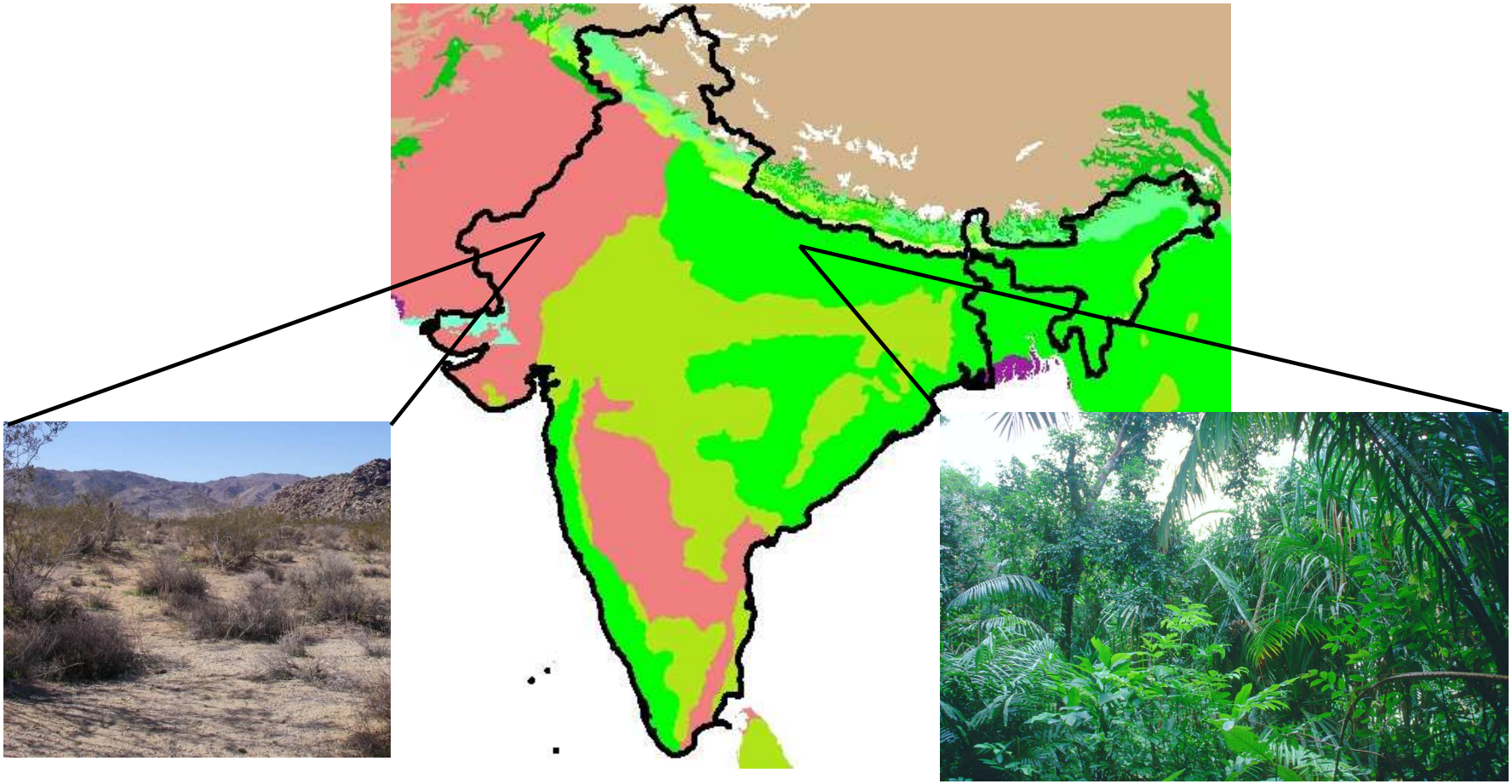
Application



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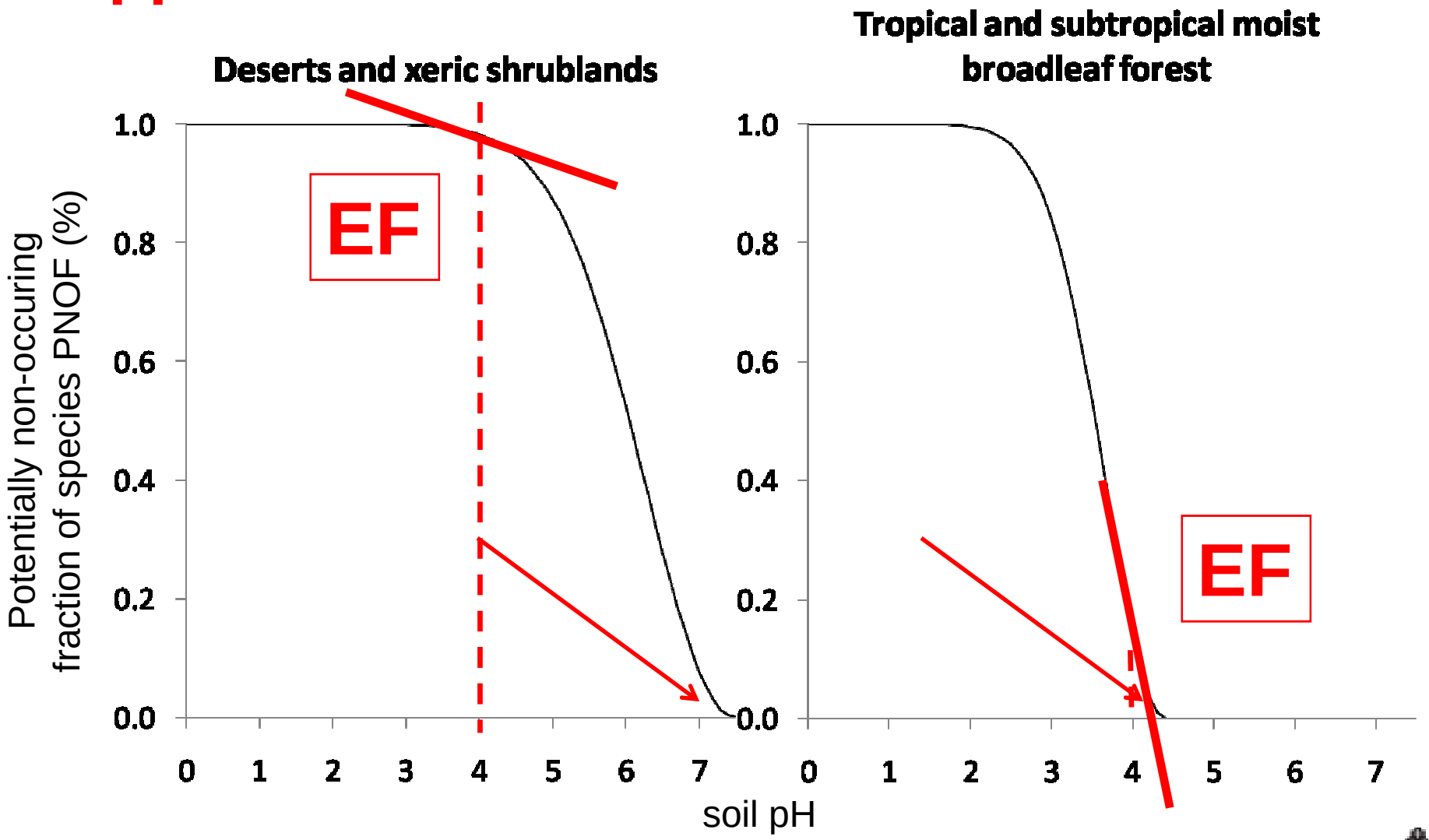
Application



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Conclusion

We derived regionalized biome-specific effect factors for terrestrial acidification at the global scale.

Losses in plant diversity are dependent upon the biome

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