

How Biodiversity affects Human Health and Well-Being

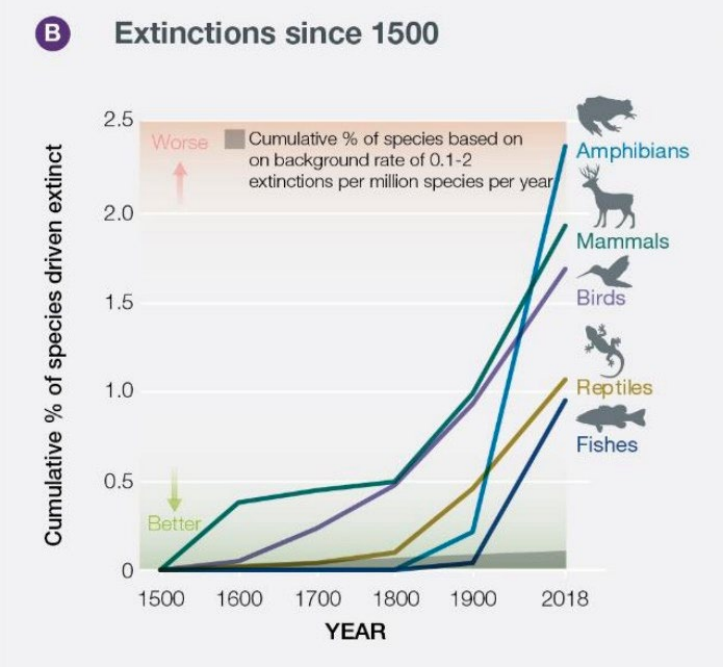
Joel Methorst

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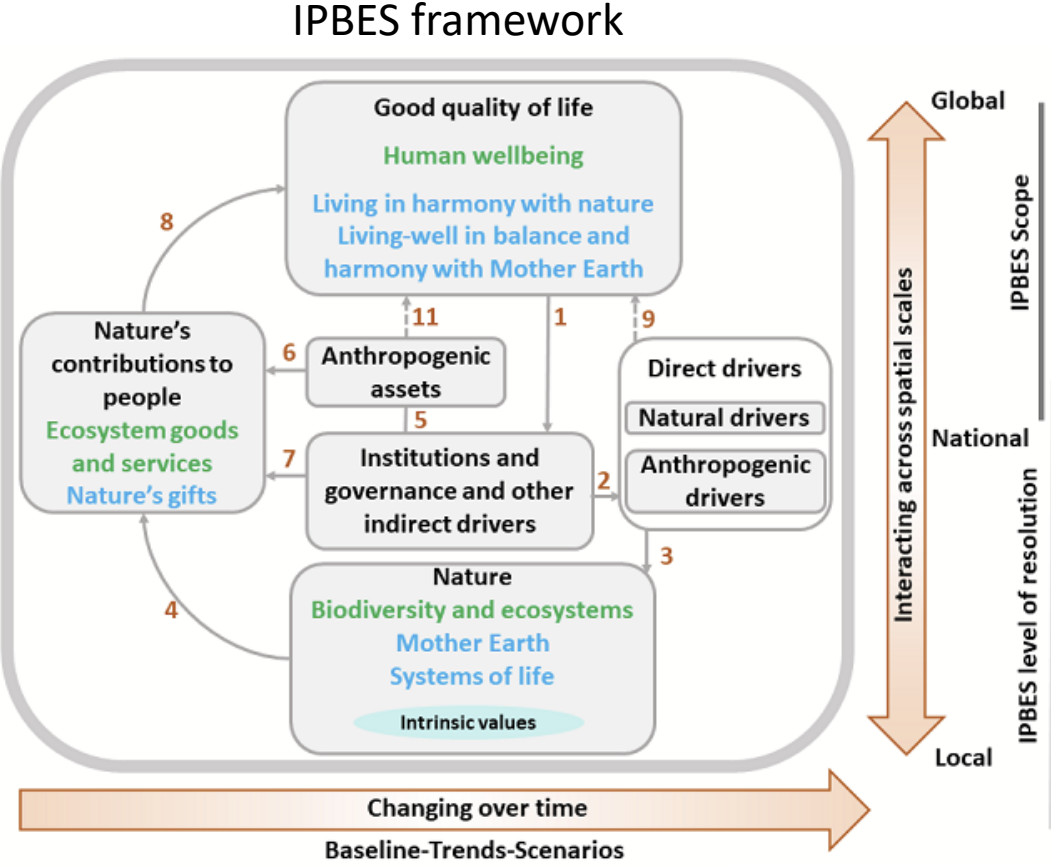
Biodiversity and well-being

Global biodiversity loss

- IPBES global assessment report



IPBES Global Assessment Report (2019)

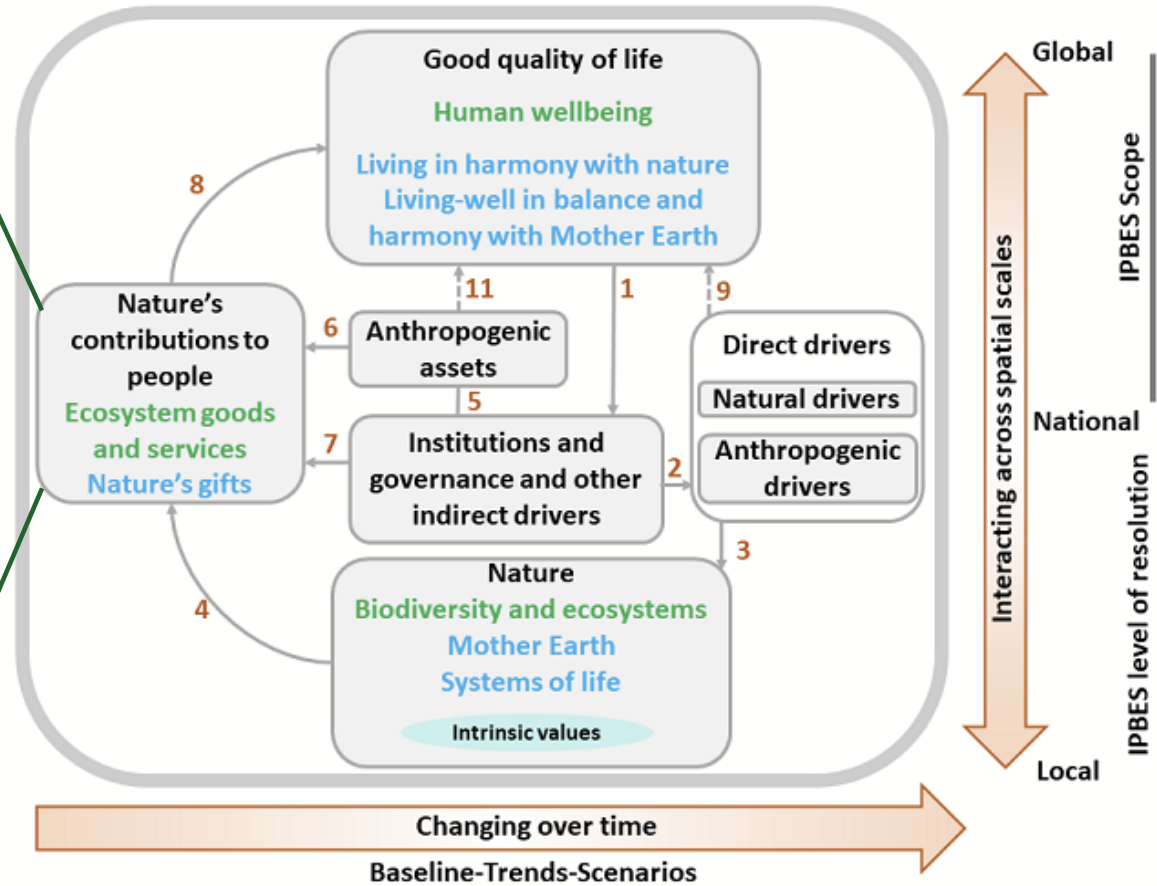


Diaz et al. (2018) *Science*

Introduction

IPBES Framework

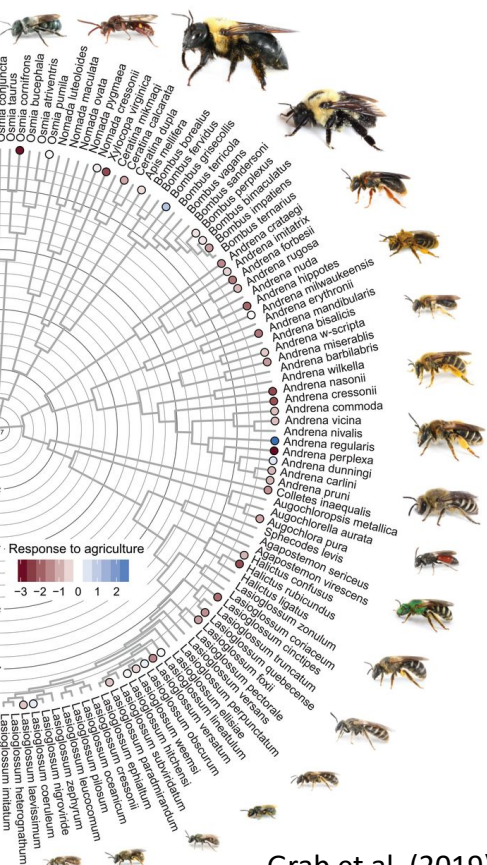
1. Non-Material
 - Health, Identity, Learning
2. Material
 - Food, Timber
3. Regulating
 - Climate, Air Quality, Water, Nutrient Cycle



Diaz et al. (2018) *Science*

Biodiversity and well-being

Biodiversity definition



Grab et al. (2019) *Science*

“ ‘Biological diversity’ [biodiversity] means the variability among living organisms [..] and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems. “

Convention on Biological Diversity (CBD)

- Taxonomic Diversity
- Ecosystem Diversity
- Genetic Diversity



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Biodiversity and well-being

Human well-being definition



“A perspective on a good life that comprises access to basic resources, freedom and choice, health and physical well-being, good social relationships, security, peace of mind and spiritual experience.” (IPBES)

Human health is “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity” (WHO)

ipbes.net/glossary/well-being (2021)

Biodiversity and well-being

Scientific evidence

- Increase in research over the past years
- Indicators for taxonomic diversity
 - e.g. species richness, abundance

RESEARCH ARTICLE

Is Variety the Spice of Life? An Experimental Investigation into the Effects of Species Richness on Self-Reported Mental Well-Being

Lukas J. Wolf^{1*}, Sophus zu Ermgassen², Andrew Balmford³, Mathew White⁴,
Netta Weinstein¹

**Psychological benefits
of greenspace increase
with biodiversity**

Richard A. Fuller^{1,*}, Katherine N. Irvine²,
Patrick Devine-Wright^{2,†}, Philip H. Warren¹
and Kevin J. Gaston¹

**Doses of Neighborhood Nature:
The Benefits for Mental Health
of Living with Nature**

DANIEL T. C. COX, DANIELLE F. SHANAHAN, HANNAH L. HUDSON, KATE E. PLUMMER, GAVIN M. SIRIWARDENA,
RICHARD A. FULLER, KAREN ANDERSON, STEVEN HANCOCK, AND KEVIN J. GASTON

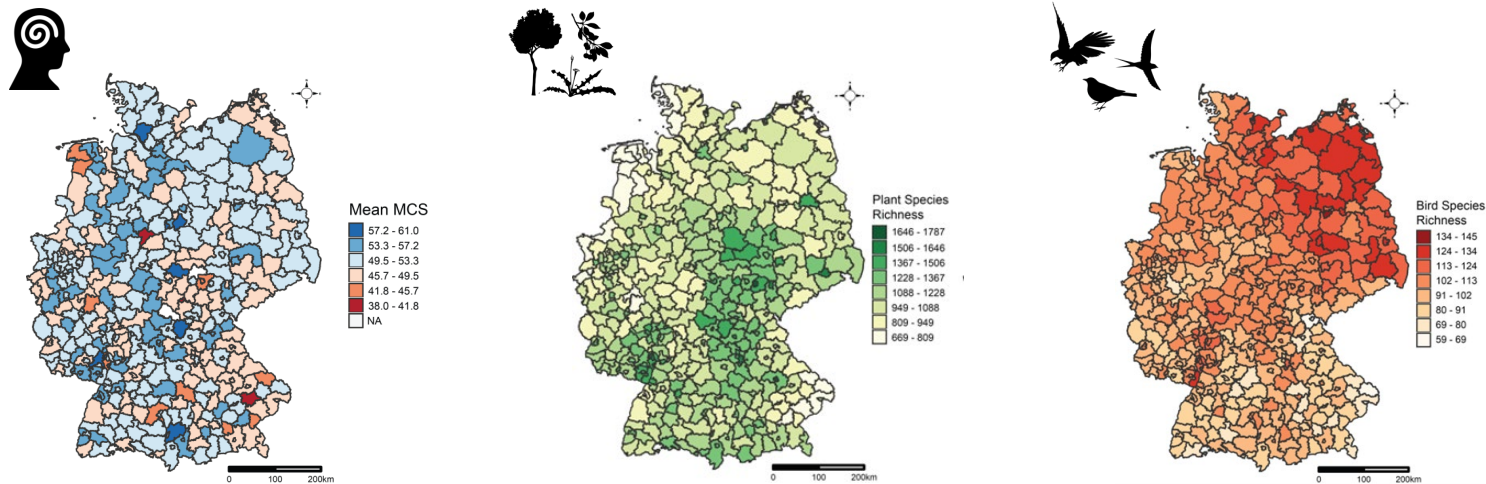
Fuller et al. (2007) *Biology Letters*
Cox et al. (2017) *Bioscience*
Wolf et al. (2017) *PLoS One*

Biodiversity and well-being

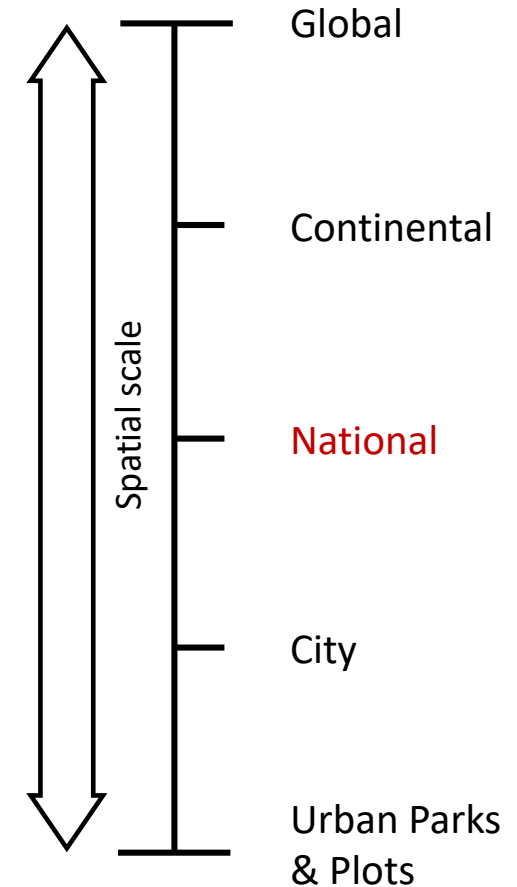
Macro-level studies

Species richness is positively related to mental health – A study for Germany

Joel Methorst^{a,*}, Aletta Bonn^b, Melissa Marselle^b, Katrin Böhning-Gaese^c, Katrin Rehdanz^d



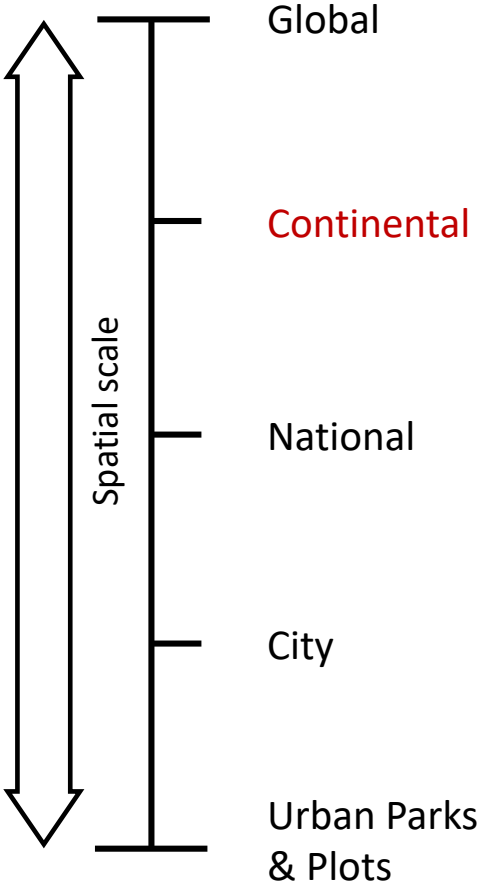
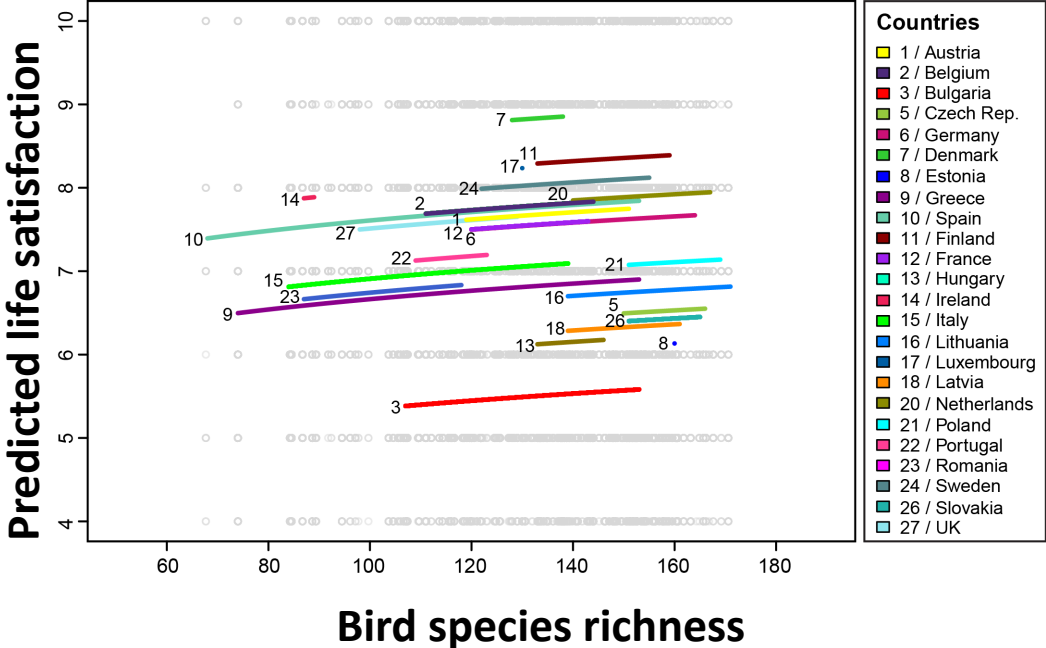
Methorst et al. (2021) *Landscape and Urban Planning*



Biodiversity and well-being

Macro-level studies

Positive effect of birds species richness



Methorst et al. (2021) *Ecological Economics*

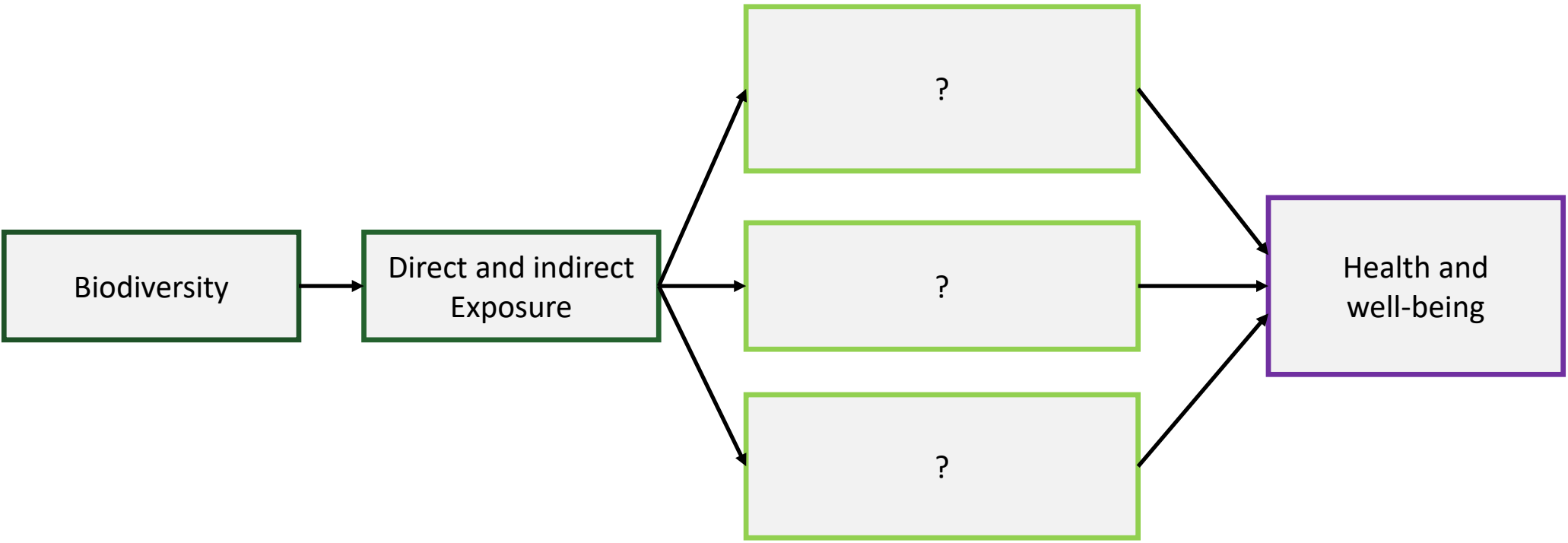
Biodiversity and well-being

Research bias and methodological issues

- Often no causal inference possible
- Majority of research from developed countries
 - e.g. Europe, USA
- Data availability
 - Objective vs. perceived biodiversity measures

Pathways and mechanisms

What are the pathways?



Pathways and mechanisms

Reducing harm

- Access to determinants of health via material contributions:
 - e.g. medicines or food

Medicinal Plants



Singh (2015) *Journal of Plant Sciences*

Agrodiversity

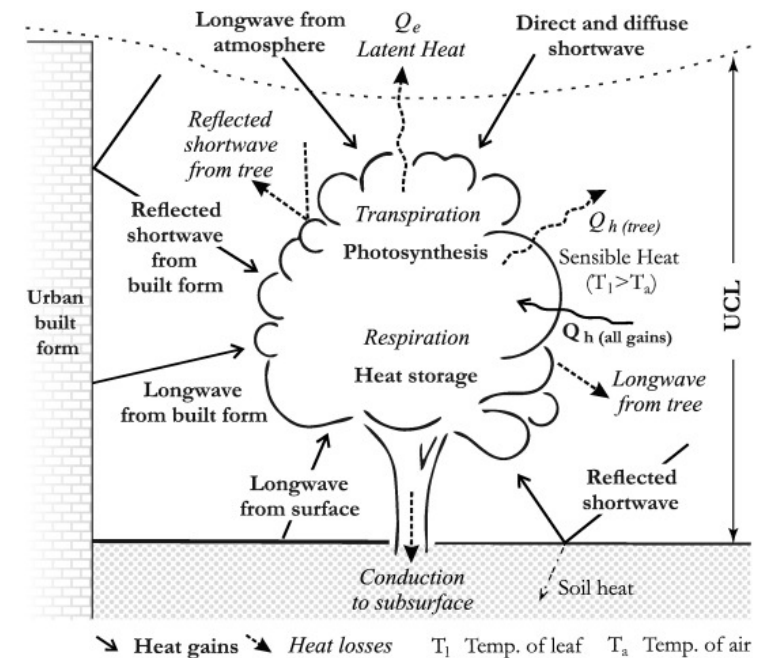


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Pathways and mechanisms

Reducing harm

- Regulation and reduction of environmental stressors:
 - regulation of air pollution
 - noise filtering
 - regulation of extreme heat
- Not many studies have tested this pathway yet



Gunawardena et al. (2017) *Science of the total Environment*

Pathways and mechanisms

Restoring capacities

- recovery of depleted adaptive capabilities
- lack of restoration can lead to mental and physical ill health

- Attention Restoration Theory
 - biodiversity may support experiences with restorative qualities

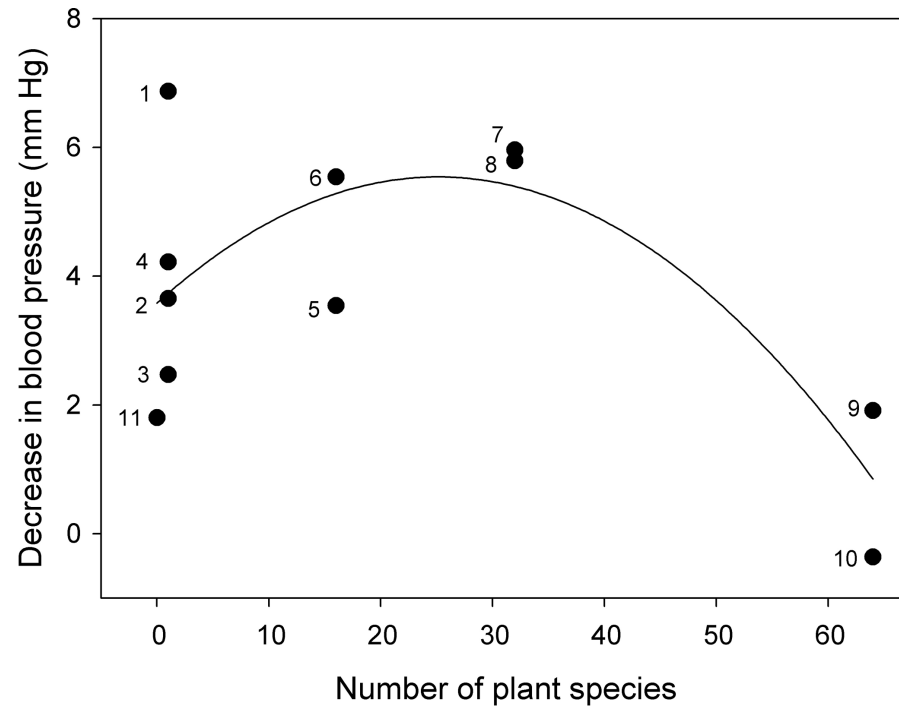
- Stress Reduction Theory
 - biodiversity might facilitate stress recovery

Marselle et al. (2020)
Kaplan (1995)
Ulrich (1983)

Pathways and mechanisms

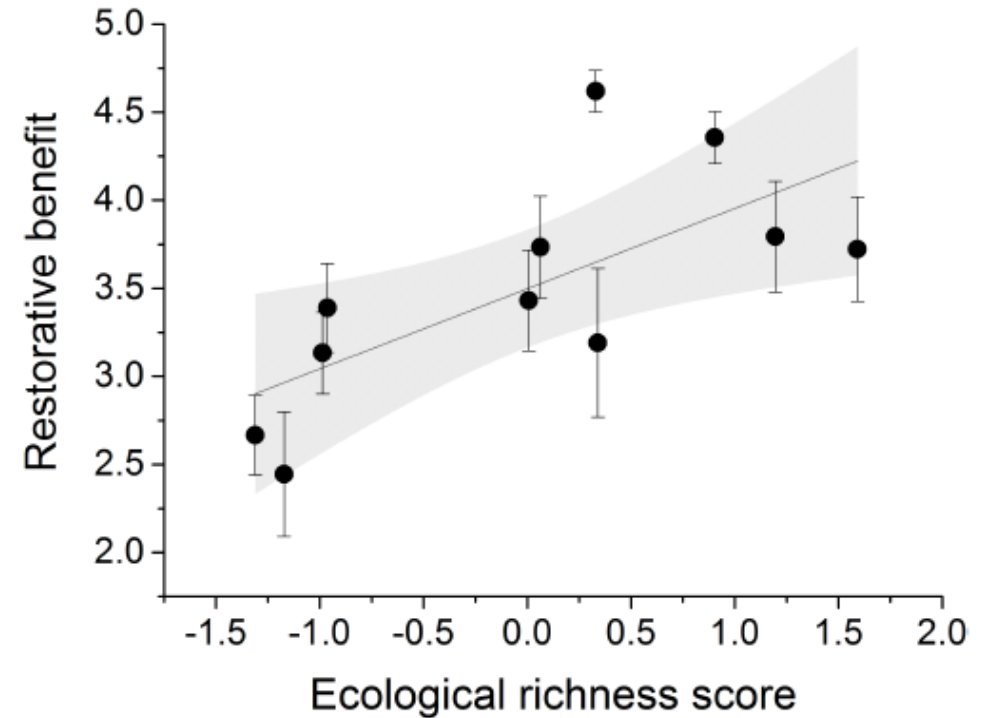
Restoring capacities

Stress reduction in Parks



Lindemann-Matthies & Matthies (2018) *Web Ecology*

Perceived Restoration



Wood et al. (2018) *Frontiers in Psychology*

Pathways and mechanisms

Building capacities

- deepening or strengthening of capabilities for meeting everyday demands

Encouraging physical activity...



..., facilitating social interactions



... and transcendent experiences

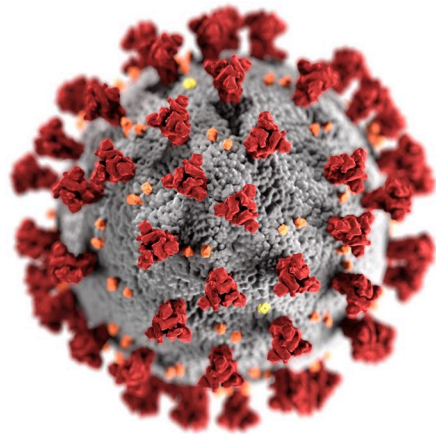


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Eleanor Bentall, rspb.org / micato.com

Pathways and mechanisms

Causing harm

- Negative effects that biodiversity or species can have for human health
 - exposure to infectious agents causing human diseases
 - increasing exposure to airborne allergens

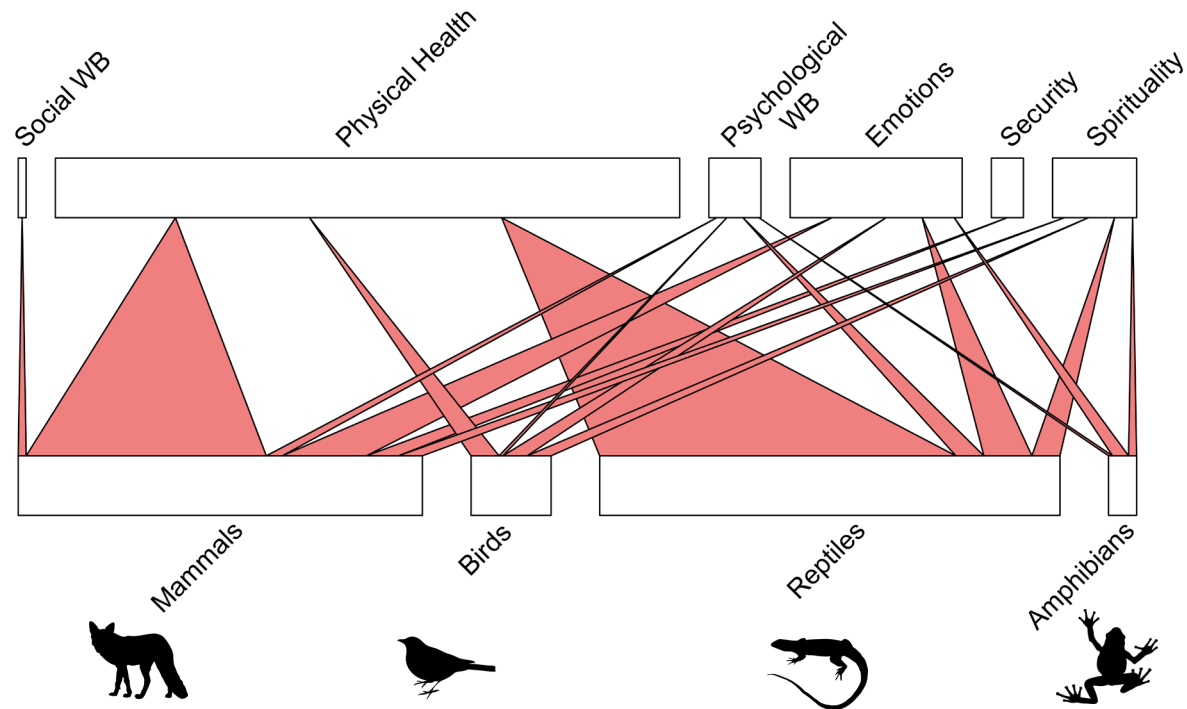


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Pathways and mechanisms

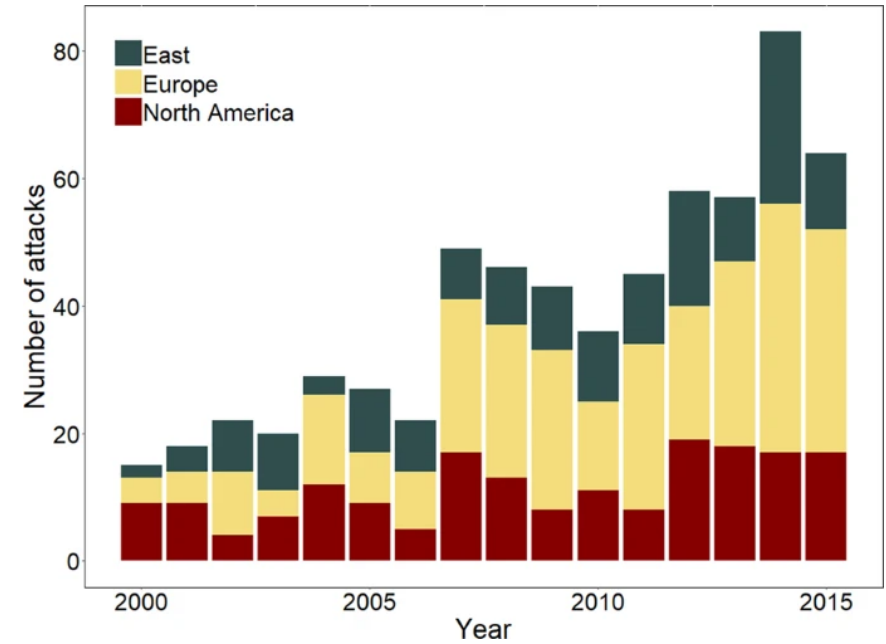
Causing harm

Negative effects of wildlife



Methorst et al. (2020) *Environmental Research Letters*

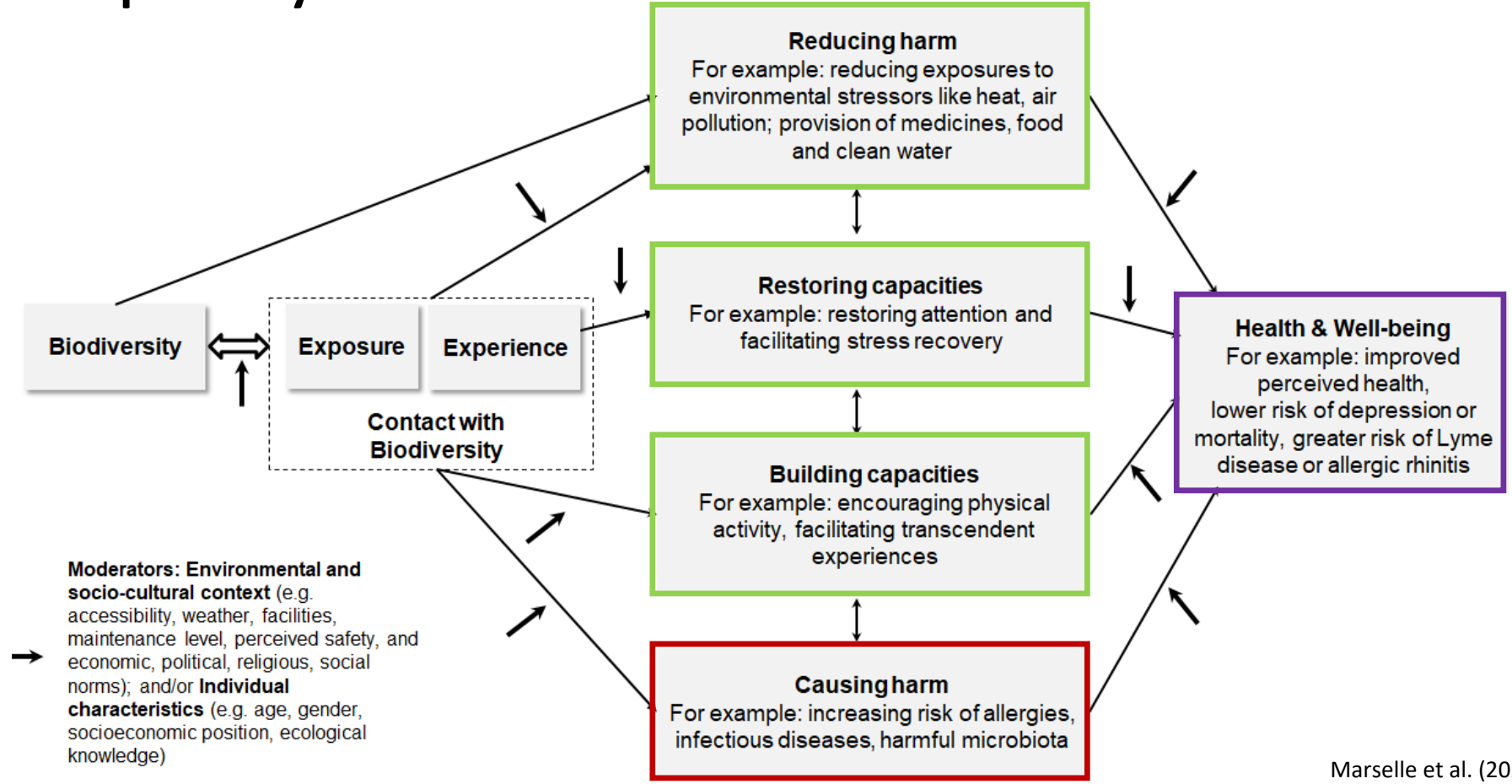
Reported brown bear attacks



Bombieri et al. (2019) *Scientific Reports*

Pathways and mechanisms

Proposed pathways

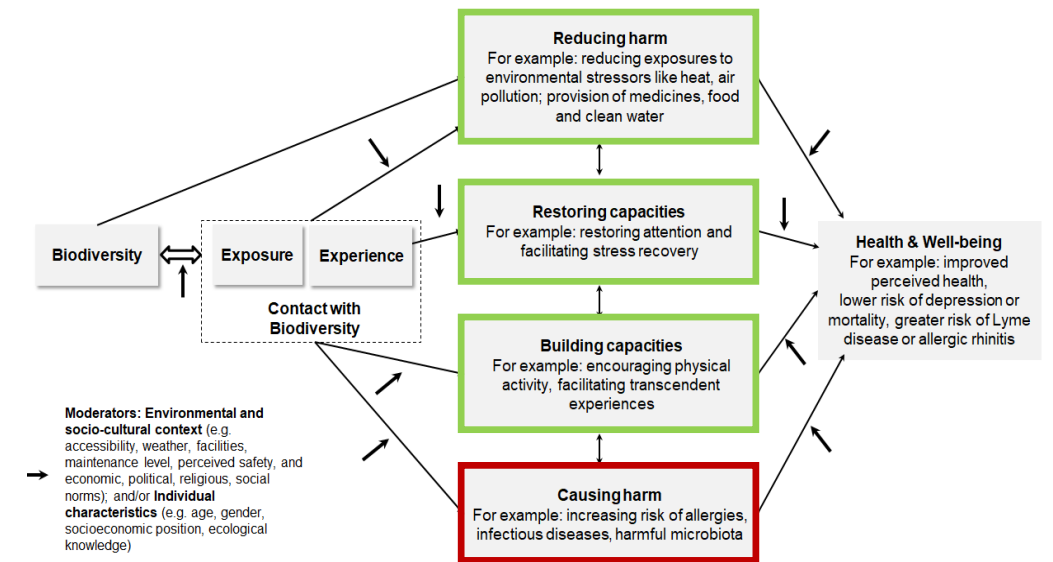


Marselle et al. (2021) *Environment International*

Conclusions

Future research

- More research necessary
- Test the pathways and cultural differences
- Solve methodological issues

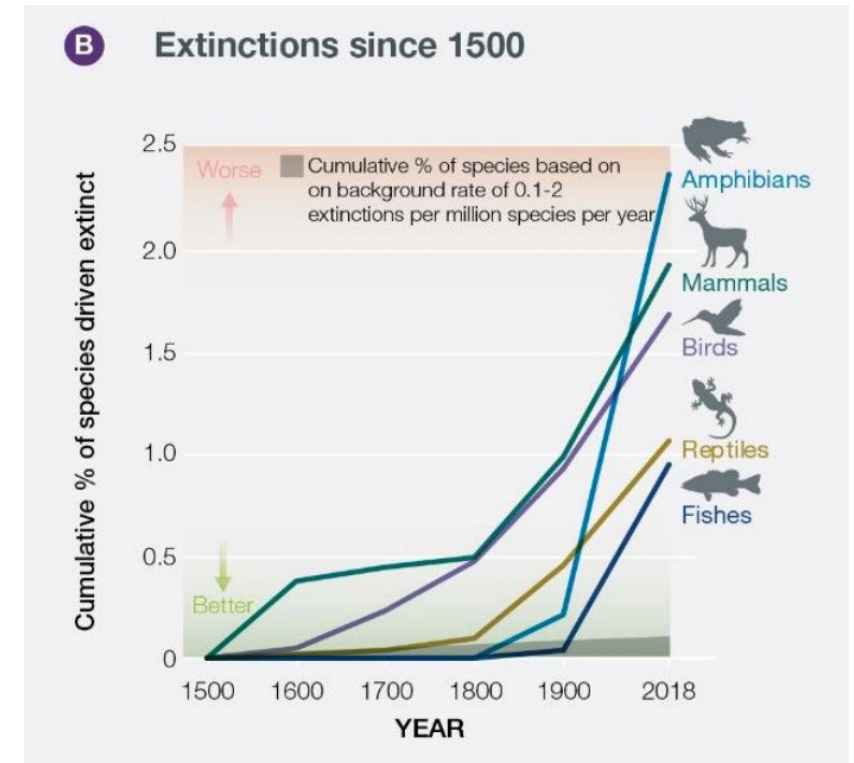


Marselle et al. (2021) *Environment International*

Conclusions

Relevance for society

- Growing evidence for the benefits of biodiversity
 - Increase awareness for policy makers and general public
- Nature conservation as a means to promote health and well-being



IPBES Global Assessment Report (2019)



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