

# Nature positive and carbon negative

How do we realize the future we want?

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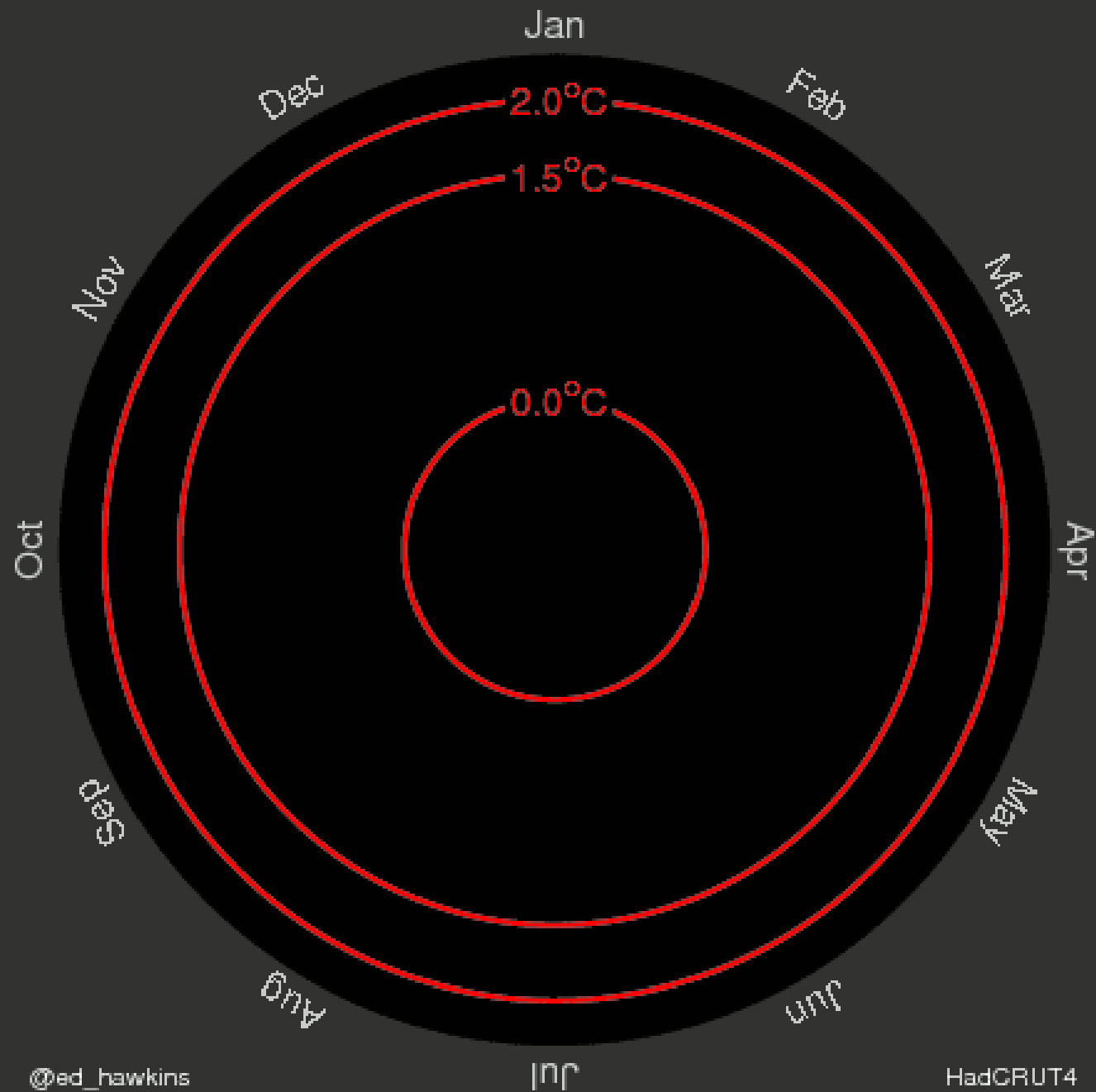
# The Greenhouse Effect



Atmosphere

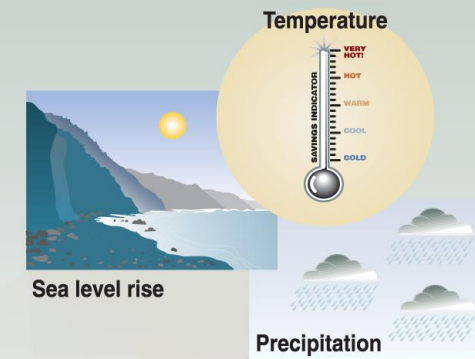
[climate.nasa.gov](http://climate.nasa.gov)

# Global temperature change (1850–2016)

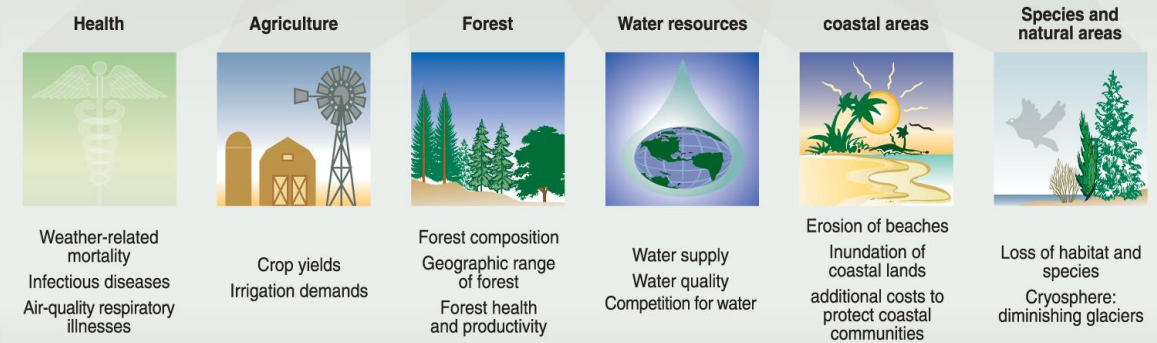


Each point on the spiral shows how a given month's average temperature deviates from the long-term average between 1850 and 1900 (the period before industrial activity really took off in the 20th century).

## Potential climate changes impact



## Impacts on...



# 1960s GLOBAL CARBON BUDGET

Atmospheric CO<sub>2</sub>



Human-Caused CO<sub>2</sub> Emissions

■ Fossil Fuels ■ Deforestation

Natural CO<sub>2</sub> Storage

■ Land ■ Ocean

Atmospheric CO<sub>2</sub> and land height scaled to annual CO<sub>2</sub> Budget (CO<sub>2</sub> Emissions) averaged by decade.  
Data: Friedlingstein et al. (2019) Global Carbon Budget 2019.

CLIMATE  CENTRAL

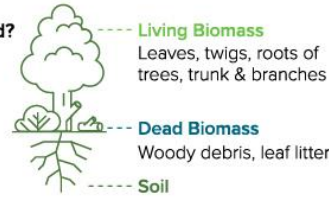
# Carbon Storage in Earth's Ecosystems

Achieving net-zero by 2050 depends on the Earth's natural carbon sinks.

Forests play a critical role in regulating the global climate. They absorb carbon from the atmosphere and then store it, acting as natural carbon sinks.

## Where is Carbon Stored?

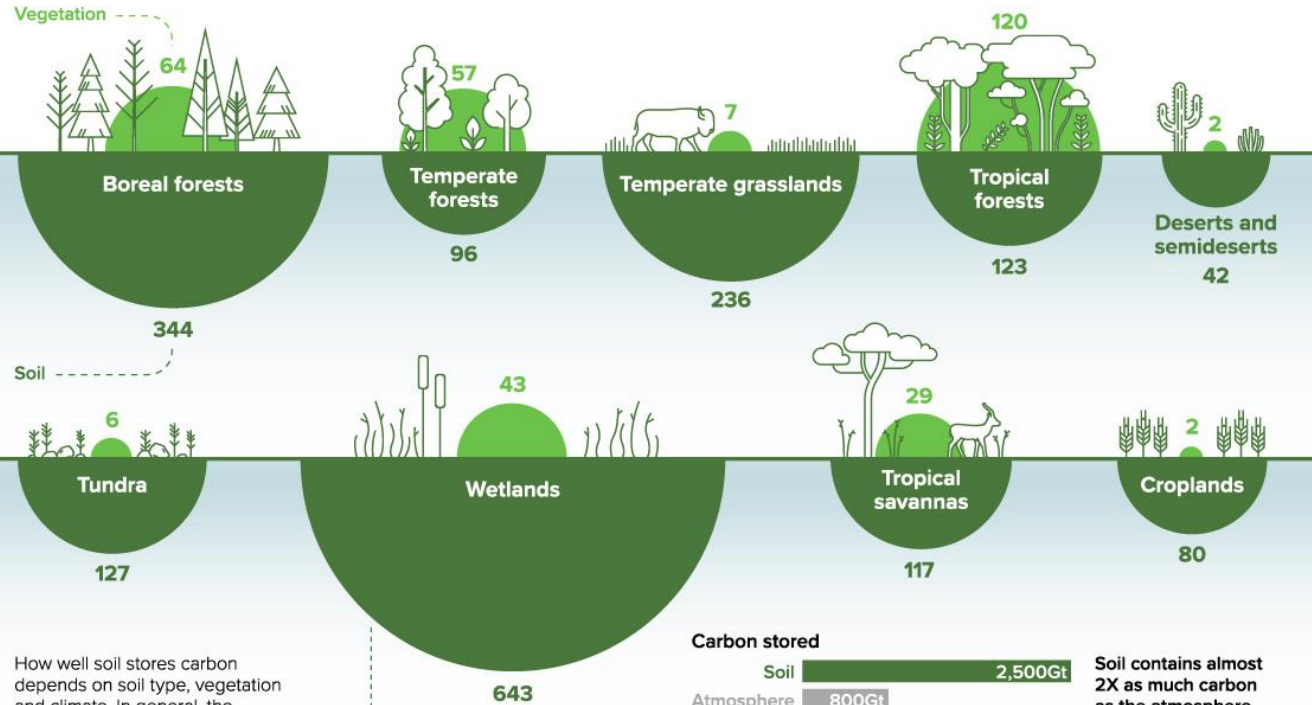
There are various carbon pools in a forest ecosystem.



## Carbon Storage Tonnes of Carbon

The world's forests absorb around **15.6 gigatonnes** of CO<sub>2</sub> each year. That's around 3X the annual CO<sub>2</sub> emissions of the United States.

However, around **8.1 gigatonnes of CO<sub>2</sub>** leaks back into the atmosphere due to deforestation, fires and other disturbances.



How well soil stores carbon depends on soil type, vegetation and climate. In general, the **wetter and colder**, the better.

Average stored carbon in tonnes per hectare at a ground depth of one meter  
Sources: IPCC; NASA

## Carbon stored



How do we keep these ecosystems 'on the map'?

How do we ensure that these ecosystems are storing as much carbon as possible and for as long as possible?

Can we restore degraded ecosystems so that they store more carbon?

Are we missing anything here?



Living up to the  
**Nature Positive**  
part

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# The Biodiversity Crises is not a 'blip on the screen' of life on Earth.....

- One million of the world's estimated 8 million species of plants and animals are threatened with extinction. (IPBES)
- 75 percent of the Earth's land surface has been significantly altered by human actions, including 85 percent of wetland areas. (IPBES)
- 66 percent of ocean area is impacted by human activities, including from fisheries and pollution. (IPBES)
- Close to 90% of the world's marine fish stocks are fully exploited, overexploited or depleted. (UNCTAD)

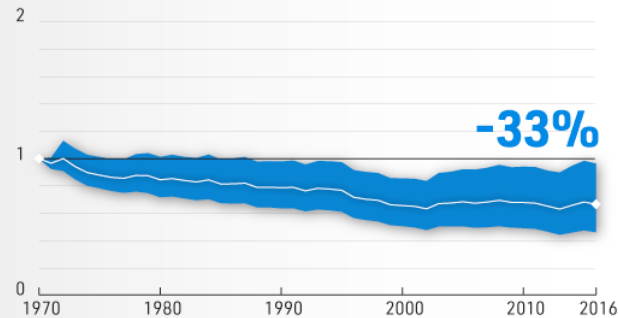
## VISUALIZING THE REGIONAL DECLINE OF EARTH'S BIODIVERSITY

The Living Planet Index (LPI) tracks the abundance of mammals, birds, fish, reptiles, and amphibians across the globe.



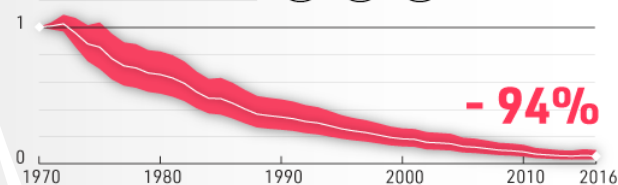
Between 1970 and 2016, vertebrate population sizes dropped by **68%** on average worldwide. However, this rate of this loss varies from region to region.

### NORTH AMERICA

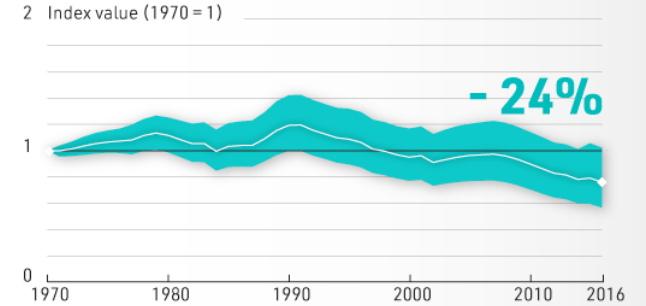


### LATIN AMERICA & CARIBBEAN

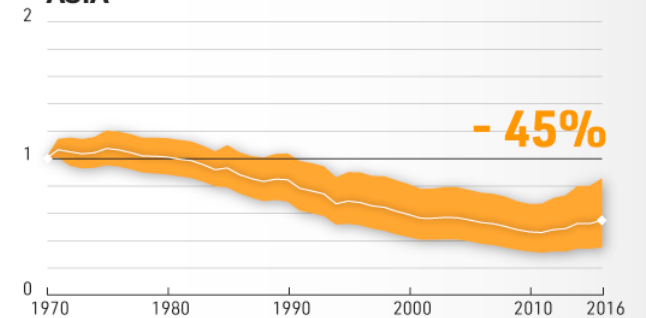
Latin America & Caribbean has seen the largest drop in biodiversity at **94%**, mainly driven by a significant decline in reptile, amphibian, and fish populations.



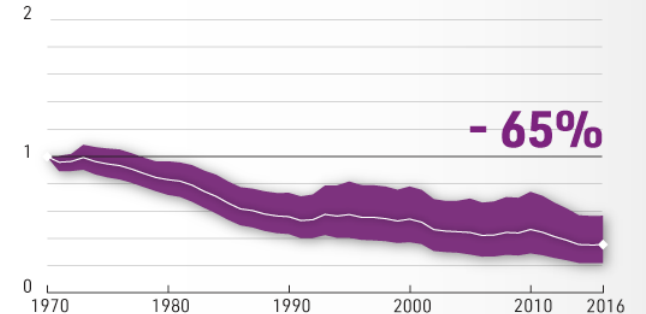
### EUROPE



### ASIA



### AFRICA



# The climate and biodiversity crises must be addressed together

## THE FIVE THREATS TO BIODIVERSITY



### Land and Sea use Change

(Including habitat loss  
and degradation)

Example:  
Agricultural land use  
which is responsible  
for **80%** of the global  
deforestation



### Pollution

Make the  
environment  
unsuitable for  
survival directly and  
indirectly



### Species overexploitation

Example:  
Overfishing  
which may decimate  
global fish  
populations by 2050



### Climate Change

Forcing the animal to  
shift range or  
confounding the  
signals that trigger  
seasonal events and  
more



### Invasive species and disease

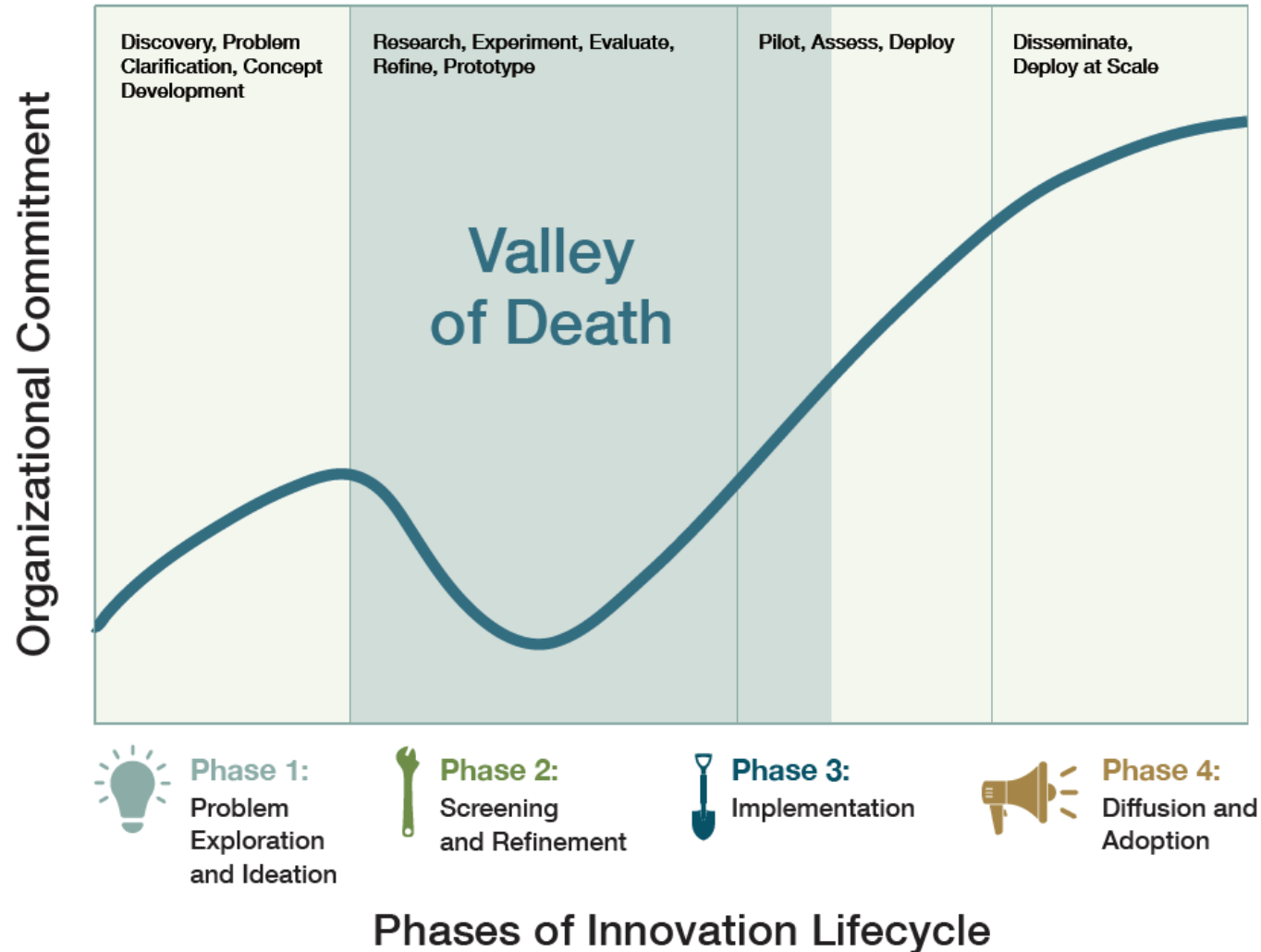
Compete with native  
species for space,  
food and other  
resources; sometimes  
spread disease that  
native species have  
no immunity of





***Now what?***

# Crossing the Valley of Death in Climate and Biodiversity Solutions



Some solutions are in the widespread implementation stage.

Most solutions are at Phase 2...the Valley of Death.

How do we screen and refine in the most cost and time effective way possible?

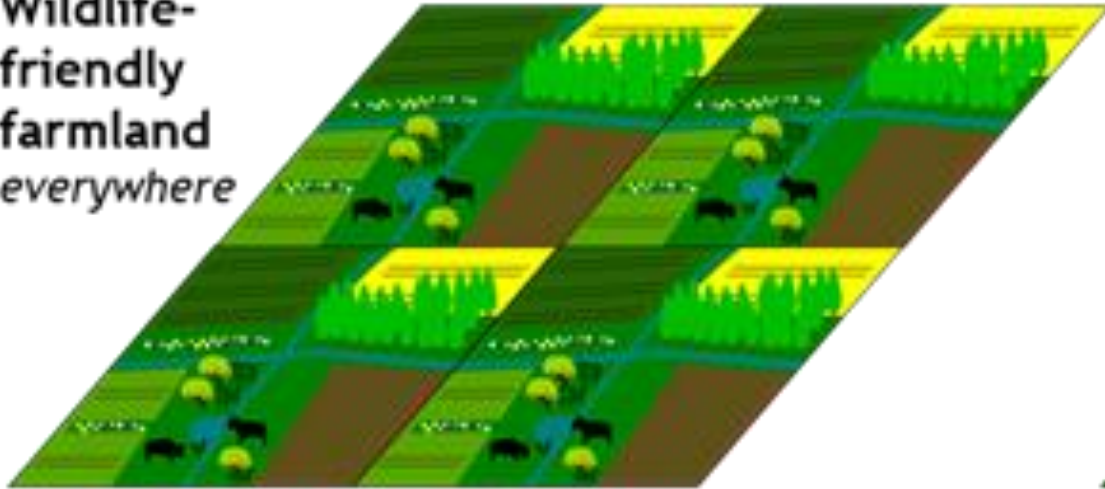
How do we sort through those solutions that seemed promising but did not work?

How do we 'name and shame' the solutions that are simply greenwashing?

Figure 1.1. The innovation lifecycle, illustrating the four phases in the overall innovation process. The “valley of death” refers to where a gap in organizational commitment and investments can impede transition from concept development to deployment (adapted from NASEM 2016).

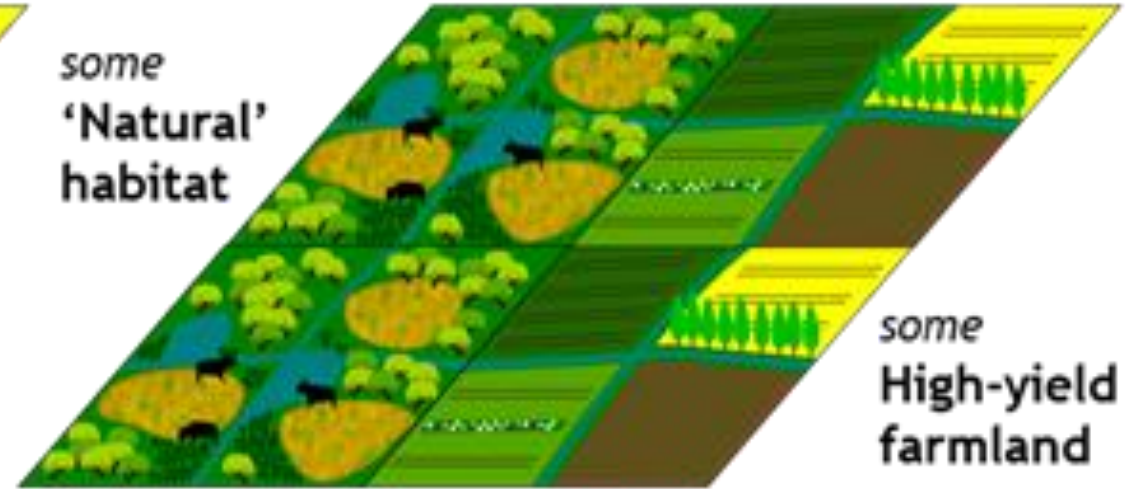
## Land sharing

Wildlife-  
friendly  
farmland  
*everywhere*



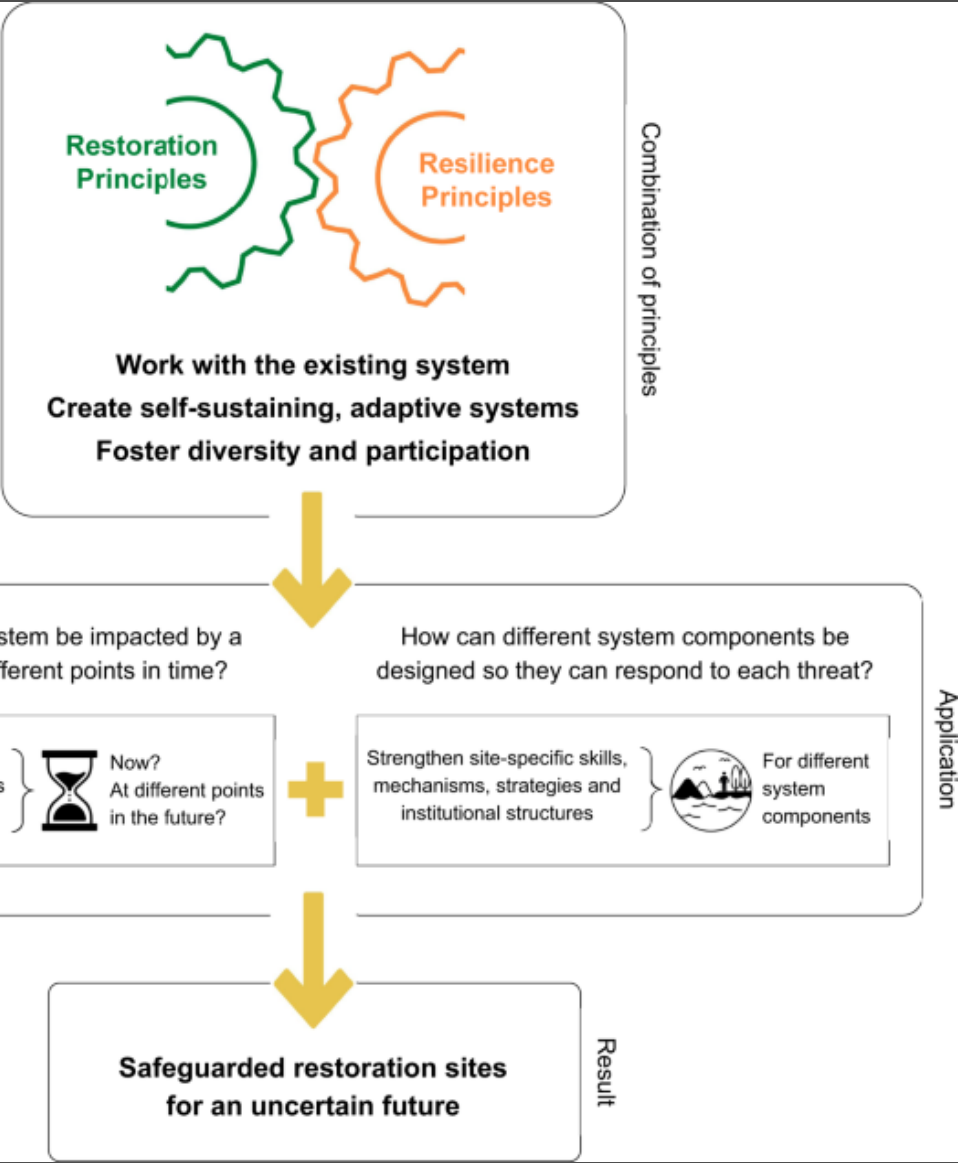
## Land sparing

*some*  
**'Natural'**  
habitat



*some*  
**High-yield**  
farmland

What effect does each option have on biodiversity and carbon sequestration?  
How do we get the 'right mix' on the landscape?



**communications**  
**biology**

PERSPECTIVE

<https://doi.org/10.1038/s42003-023-04736-y>

OPEN

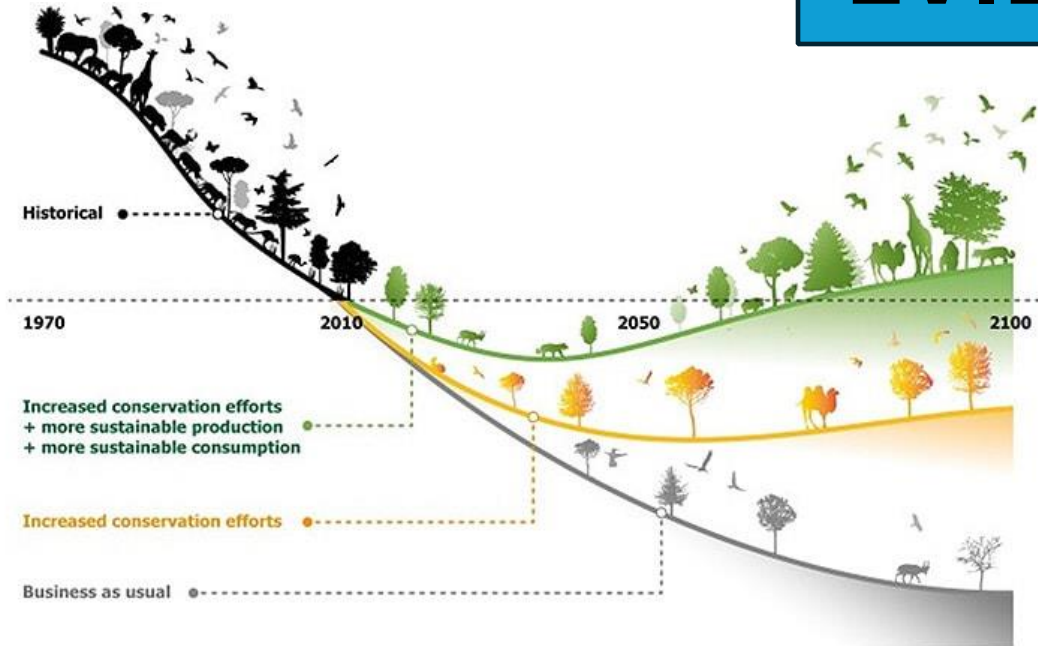
Check for updates

Future-proofing ecosystem restoration through enhancing adaptive capacity

Marina Frietsch<sup>1,2</sup>, Jacqueline Loos<sup>1,3</sup>, Katharina Löhner<sup>4,5</sup>, Stefan Sieber<sup>4,6</sup> & Joern Fischer<sup>1</sup>

# How do we achieve the future we want, and how do we know we are getting there?

## EVIDENCE



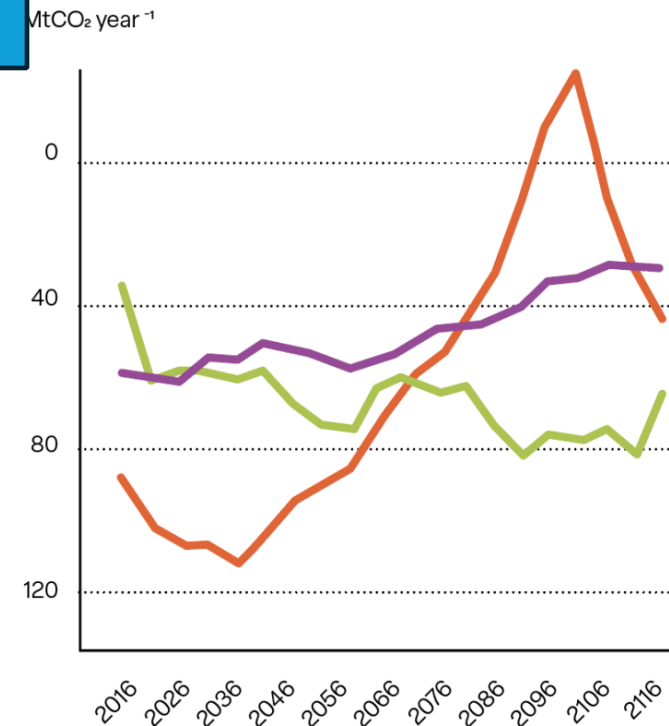
This artwork illustrates the main findings of the article, but does not intend to accurately represent its results (<https://doi.org/10.1038/s41586-020-2705-y>)

### Article

## Bending the curve of terrestrial biodiversity needs an integrated strategy

<https://doi.org/10.1038/s41586-020-2705-y> A list of authors and their affiliations appears at the end of the paper.

### Modelling of the forest carbon sink under three different Finnish forest strategies



- National Forest Strategy
- Biodiversity Strategy
- Bioeconomy Strategy

Thank you!

