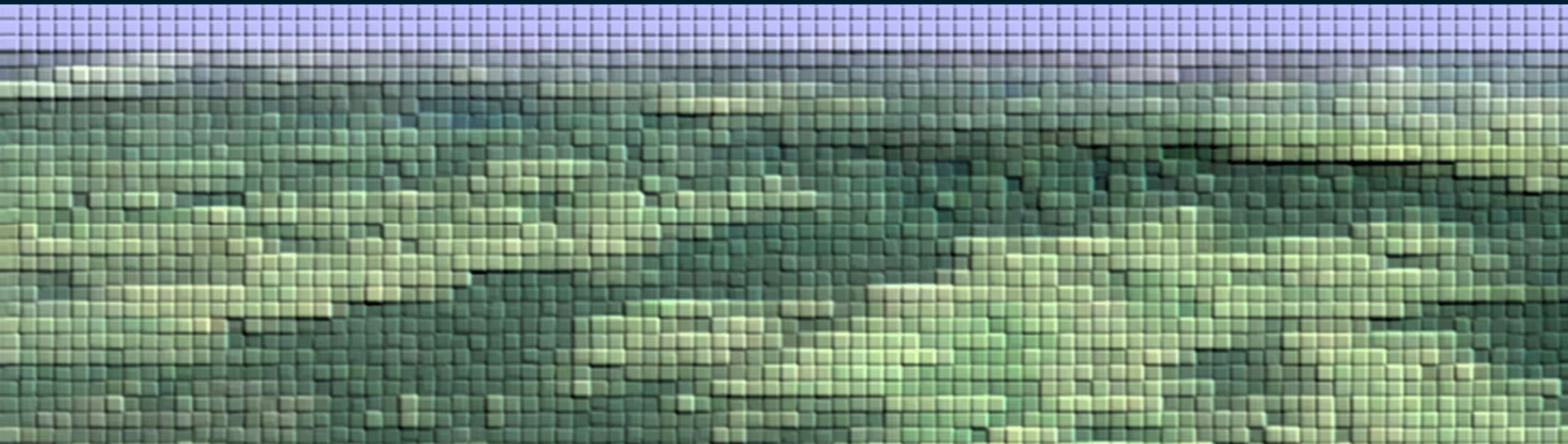




Australia's National Science Agency

# Using indicators to plan & monitor achievement of biodiversity outcomes through ecosystem restoration: a bigger-picture perspective

Simon Ferrier, CSIRO



# Dual role of indicators – monitoring and planning

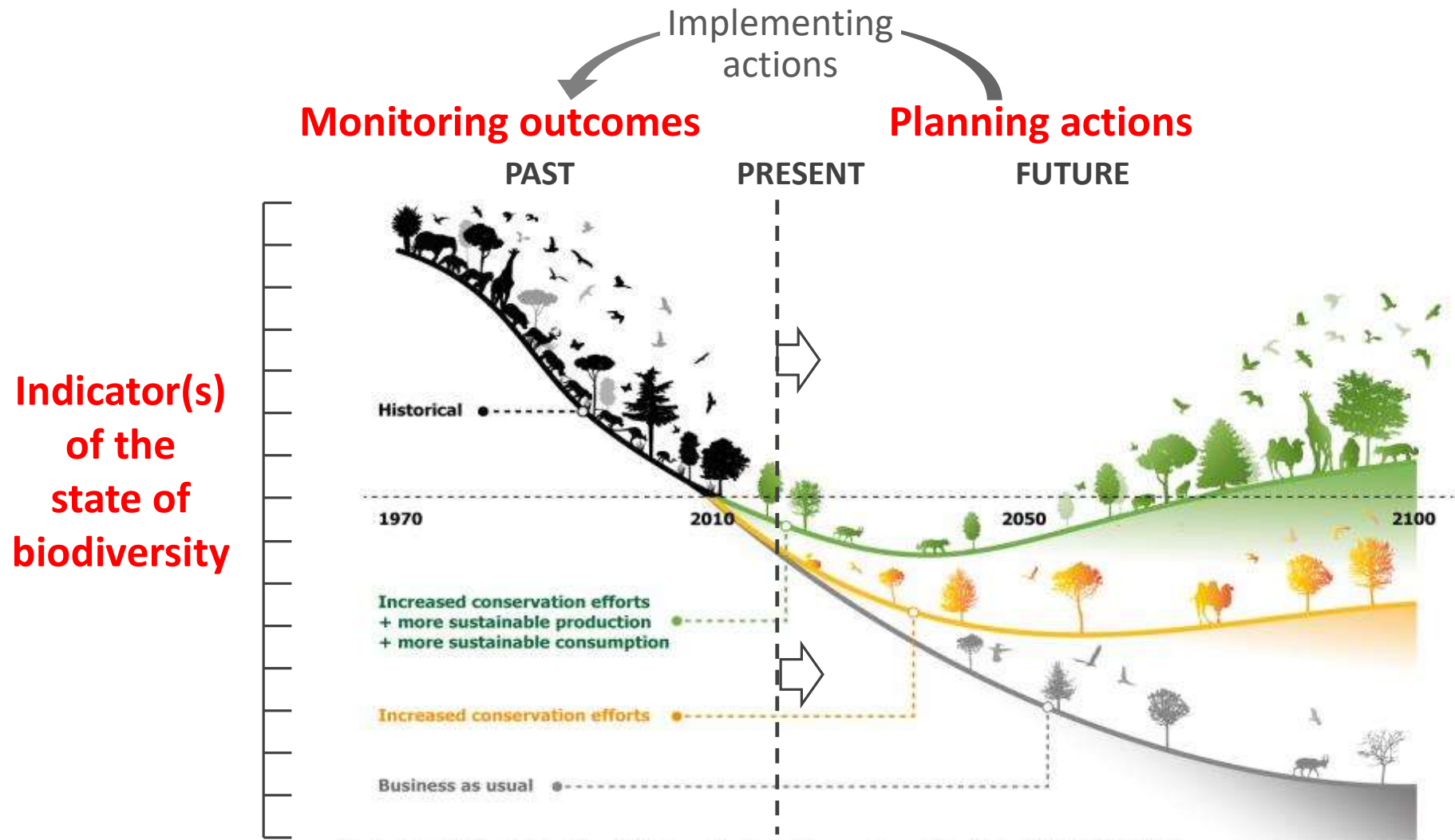
## Monitoring framework for the Kunming-Montreal Global Biodiversity Framework (Decision 15/5, Annex 1)

- “headline indicators ... to be used for **planning and tracking progress** as set out in decision 15/6”

## Mechanisms for planning, monitoring, reporting and review (Decision 15/6)

- “use the headline indicators, supplemented by component and complementary indicators and other national indicators, in relevant **national planning processes**”
- “headline indicators as well as component, complementary and other national indicators ... should be used ... to **track contributions towards the goals and targets**”

# Dual role of indicators – monitoring and planning



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>)

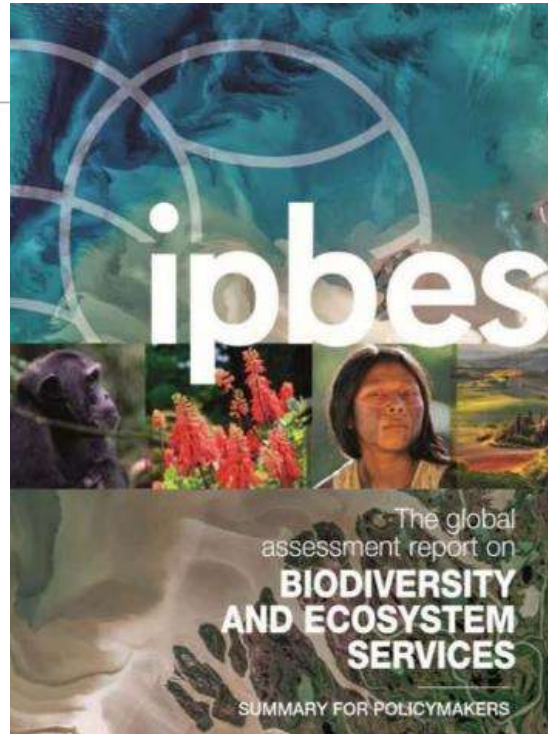
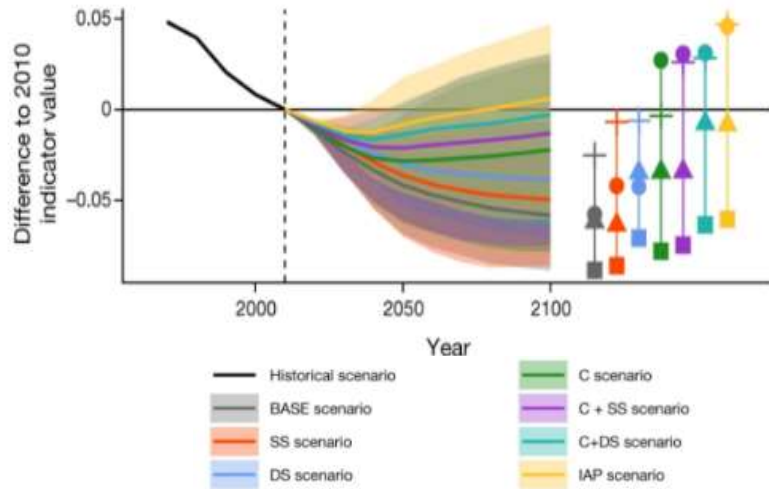
# Bending the curve of biodiversity loss to achieve a nature-positive world requires both actions addressing direct drivers (ecosystem protection, restoration etc) and actions addressing indirect drivers (sustainable production & consumption etc)

nature

Article

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

Leclere D *et al* (2020)

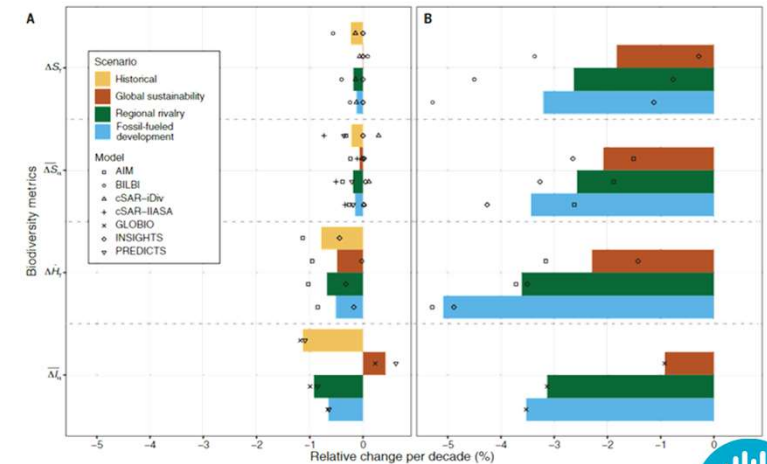


Science

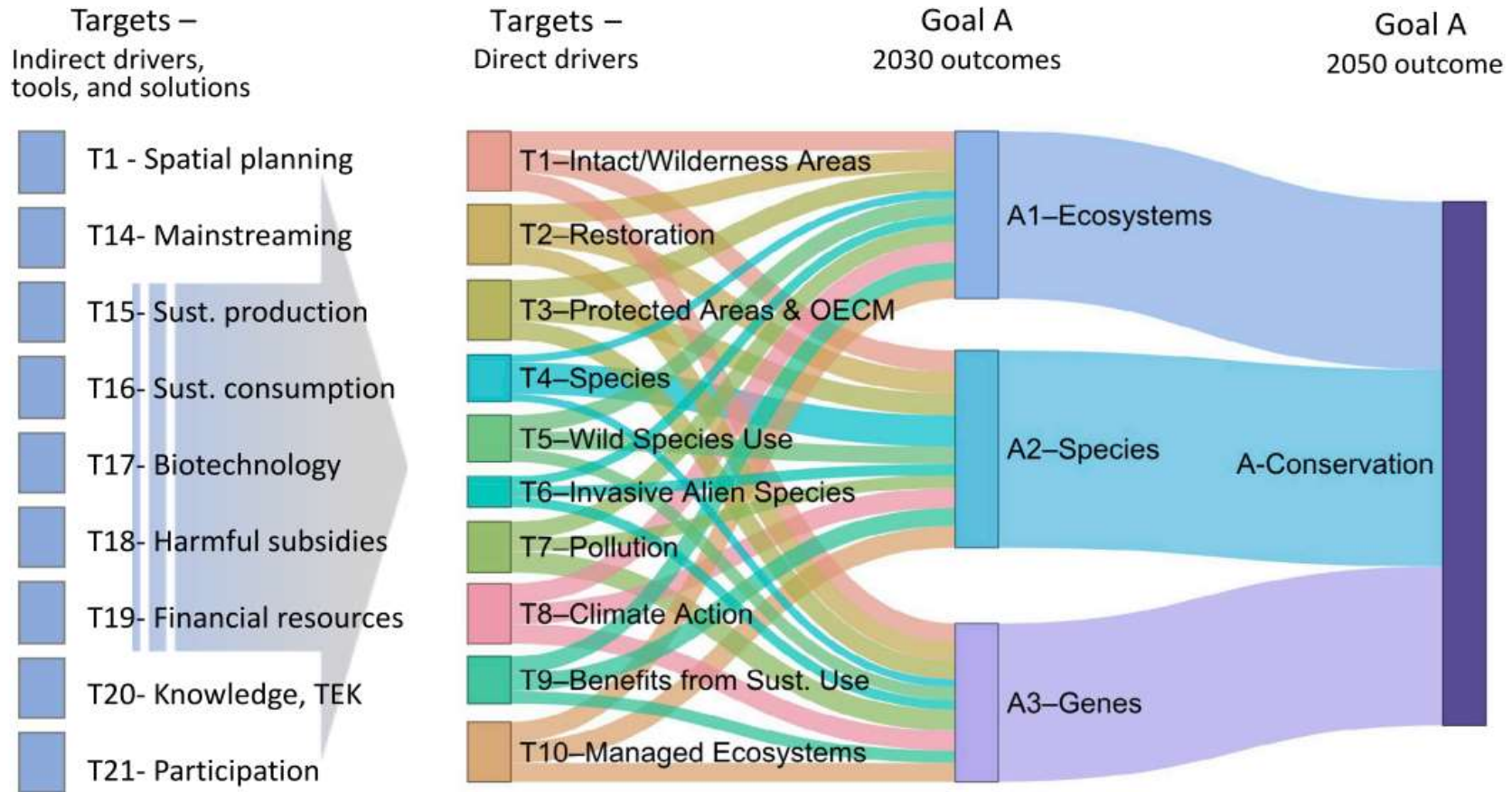
BIODIVERSITY LOSS

## Global trends and scenarios for terrestrial biodiversity and ecosystem services from 1900 to 2050

Pereira H *et al* (2024)



# Key linkages and dependencies between GBF targets & goals



One Earth

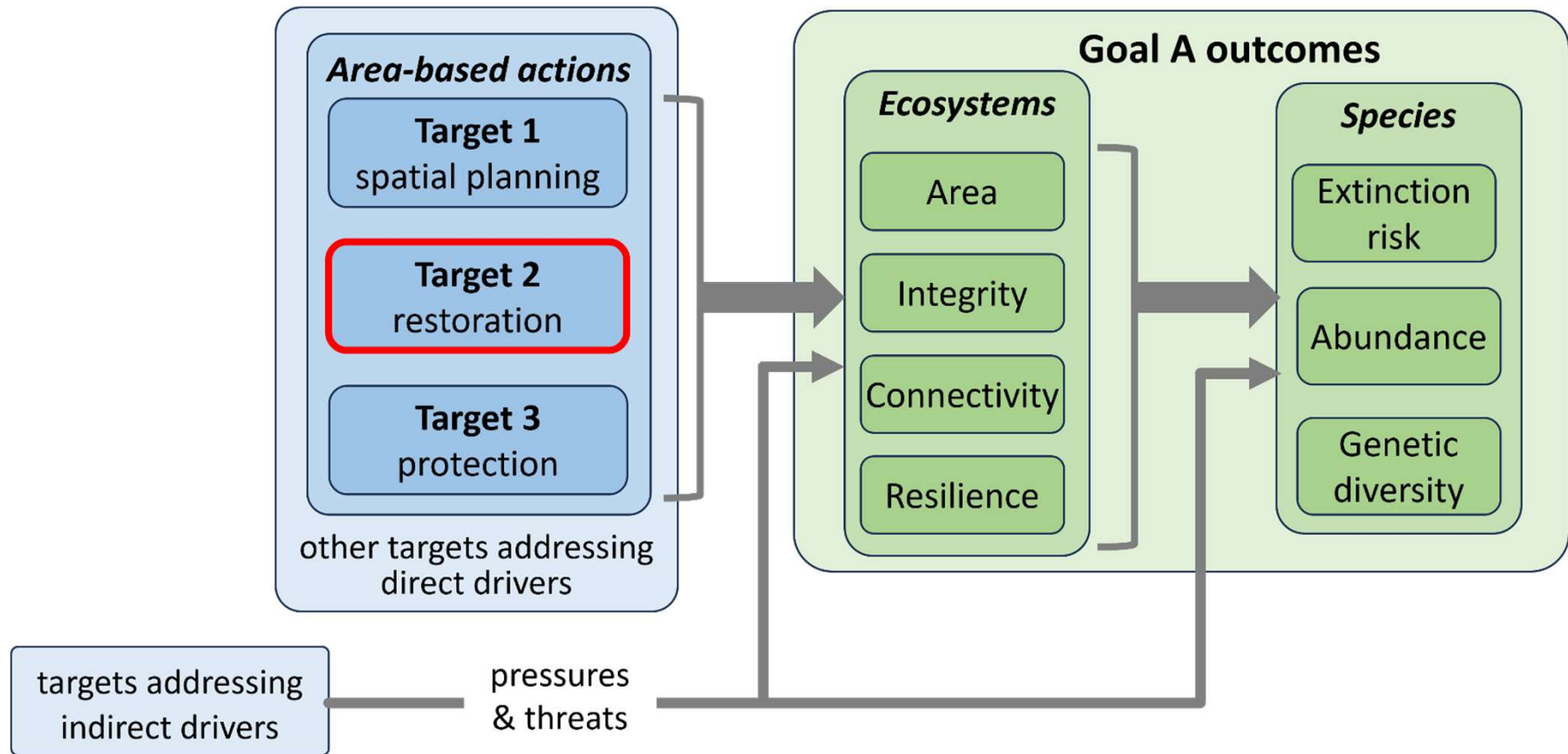
Commentary

## Achieving global biodiversity goals by 2050 requires urgent and integrated actions

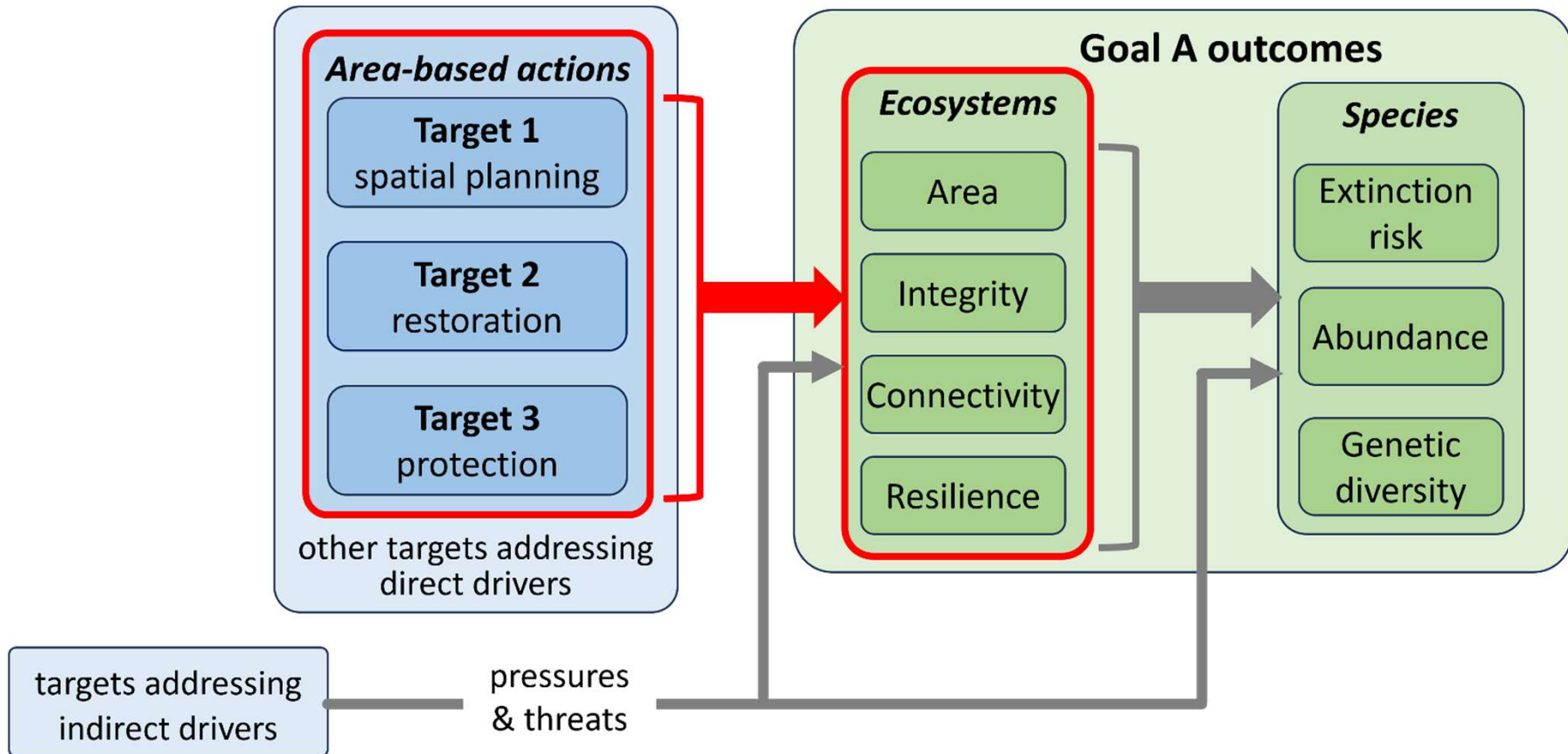
Paul Leadley,<sup>1,\*</sup> Andrew Gonzalez,<sup>2</sup> David Obura,<sup>3,4</sup> Cornelia B. Krug,<sup>5</sup> Maria Cecilia Londoño-Murcia,<sup>6</sup> Katie L. Millette,<sup>7</sup> et al (2022)



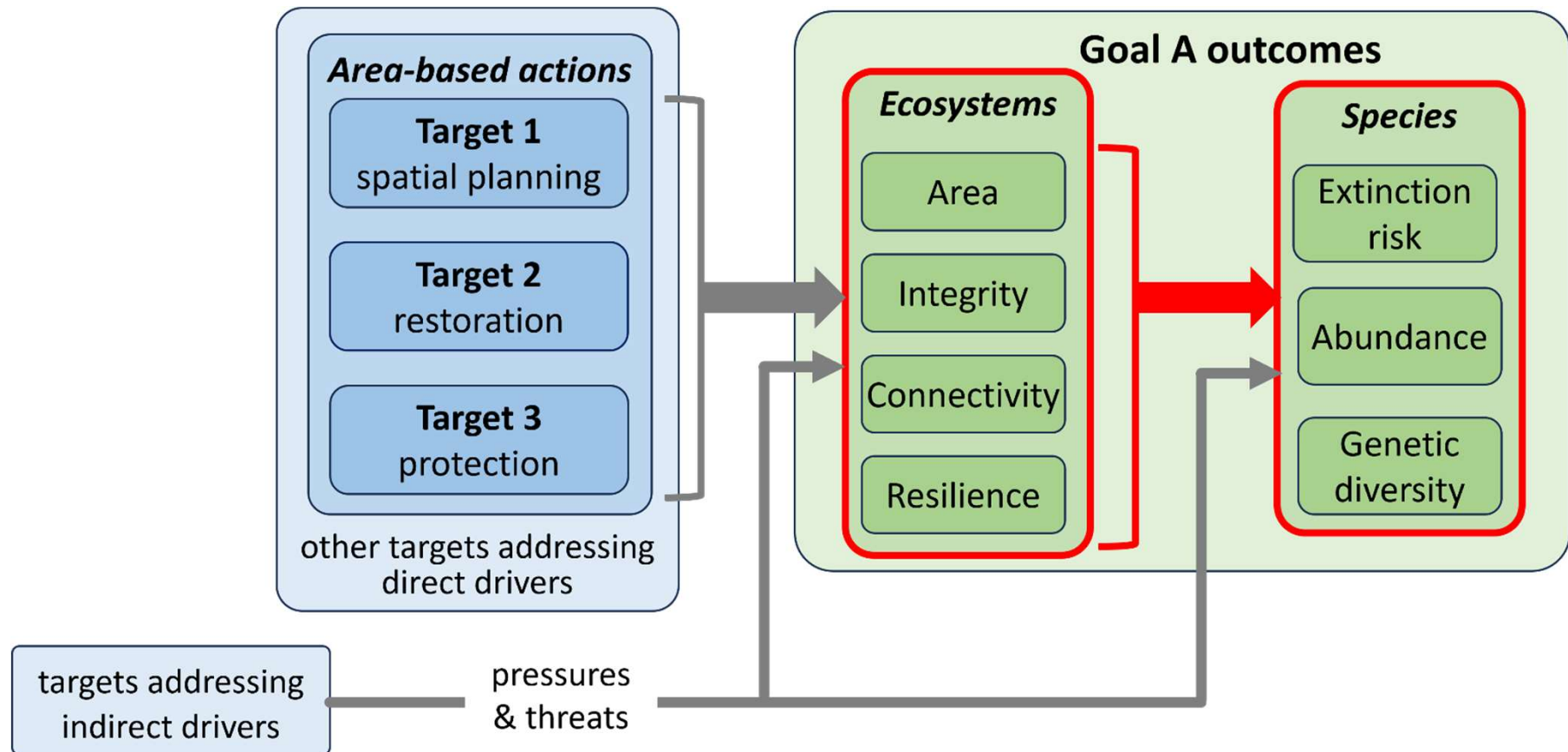
# Let's take a closer look at part of this complexity



# Area-based actions under Targets 1, 2 and 3 will in combination shape ecosystem-level outcomes under Goal A



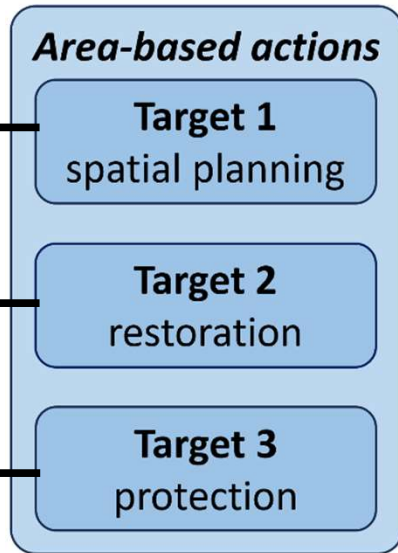
# Changes in ecosystem area, integrity, connectivity & resilience will then have flow-on consequences for species-level outcomes under Goal A



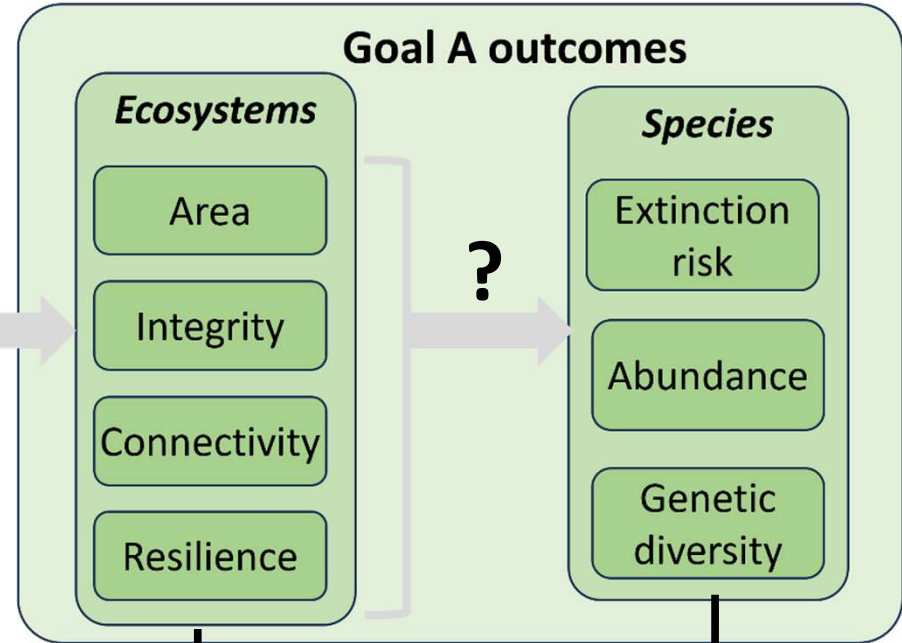


# Headline indicators do not explicitly address these linkages and dependencies

- 1.1 Percent of land and sea area covered by biodiversity-inclusive spatial plans
- 2.2 Area under restoration
- 3.1 Coverage of protected areas and other effective area-based conservation measures



?



?

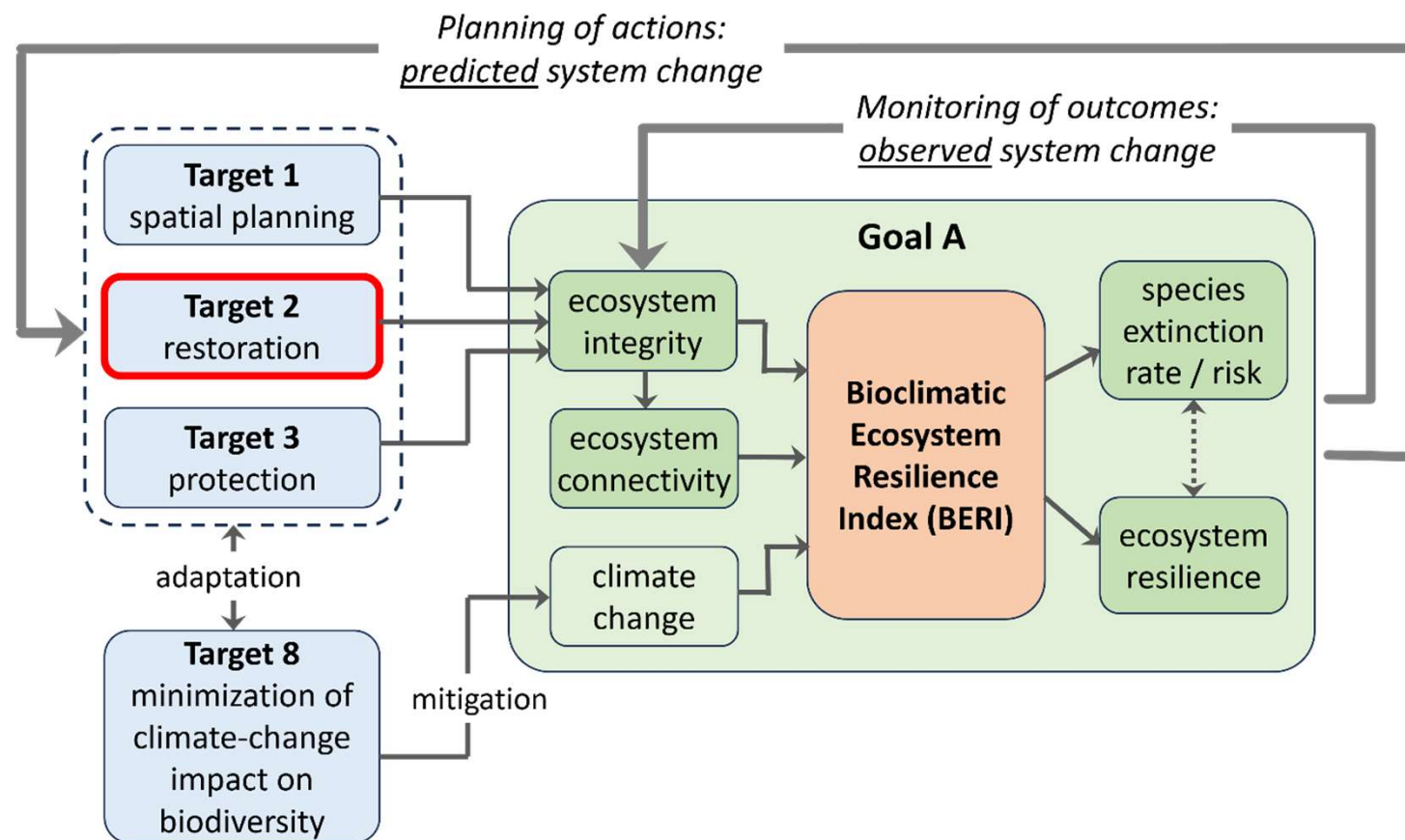
- A.1 Red List of Ecosystems
- A.2 Extent of natural ecosystems

- A.3 Red List Index
- A.4 The proportion of populations with effective size > 500

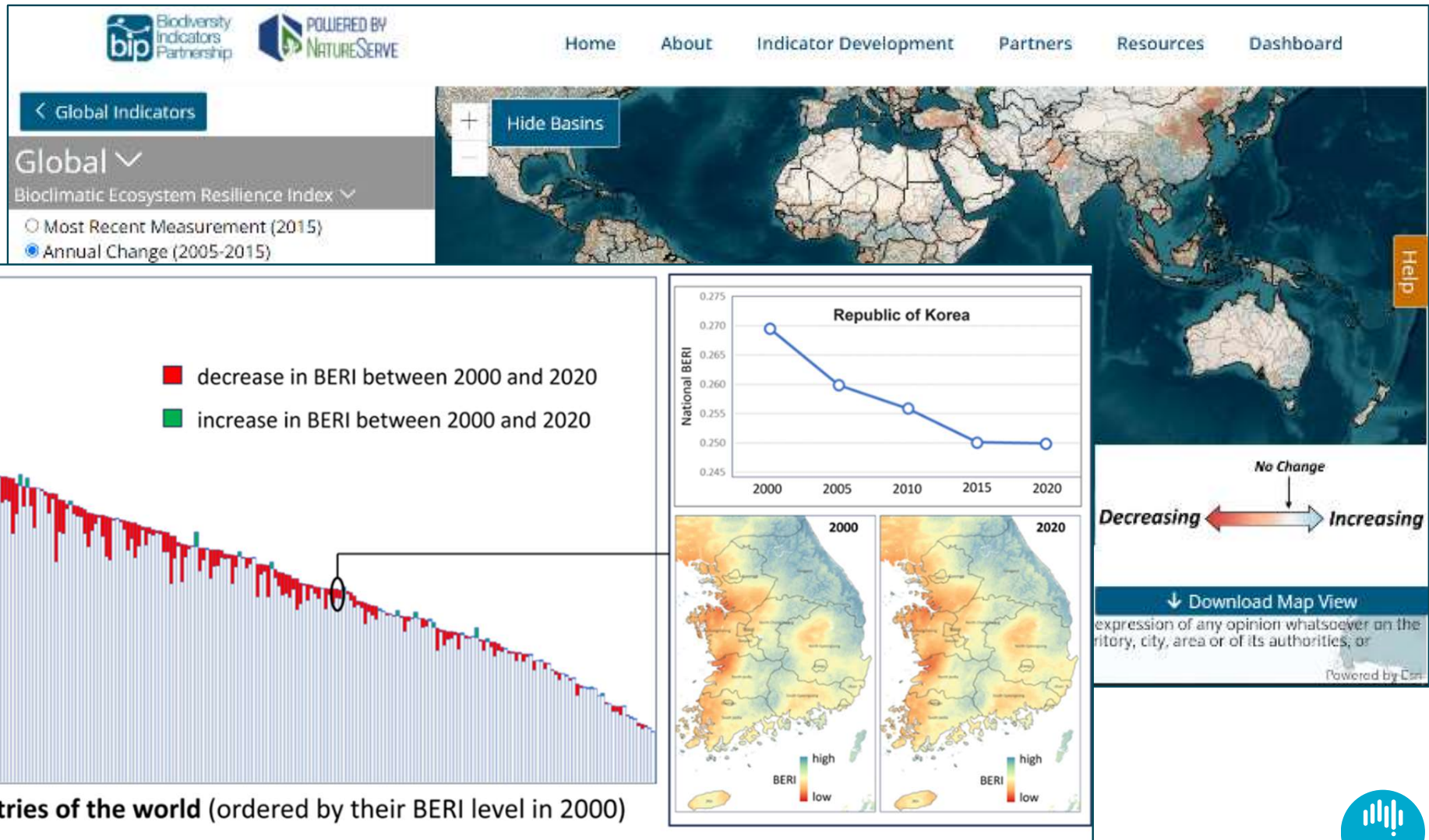


# A role for predictive (leading) indicators included as ‘component indicators’ in GBF monitoring framework, e.g. Bioclimatic Ecosystem Resilience Index (BERI)

Assessing the impact that changes in the integrity and connectivity of natural ecosystems across a landscape are expected to have on the capacity of that landscape to retain native species in the face of climate change



# Integrative monitoring of expected biodiversity outcomes globally ...



<https://event.fourwaves.com/geobon-2023/>

<https://bipdashboard.natureserve.org/>



# ... and at national, state and regional scale

**ECOLOGICAL INTEGRITY** Ecosystem integrity

**Capacity to retain biological diversity**

**Ecosystem resilience under climate change**

As the climate changes, habitats can become less suitable for the species they currently support. These species respond by either staying where they are and adapting, or moving, or disappearing. Connected landscapes allow 'climate migration', which provides opportunities for species to move when their habitat becomes less suitable.

Spatial resilience measures a landscape's capacity to support migration as species respond to climate change. This indicator assesses how well species in their current locations are connected to places with suitable habitat under future climatic conditions. It considers the rate of climate change and how habitat loss and fragmentation impede migration for all species.

Percentage spatial resilience remaining  
With current habitat and future climate  
11%  
2013

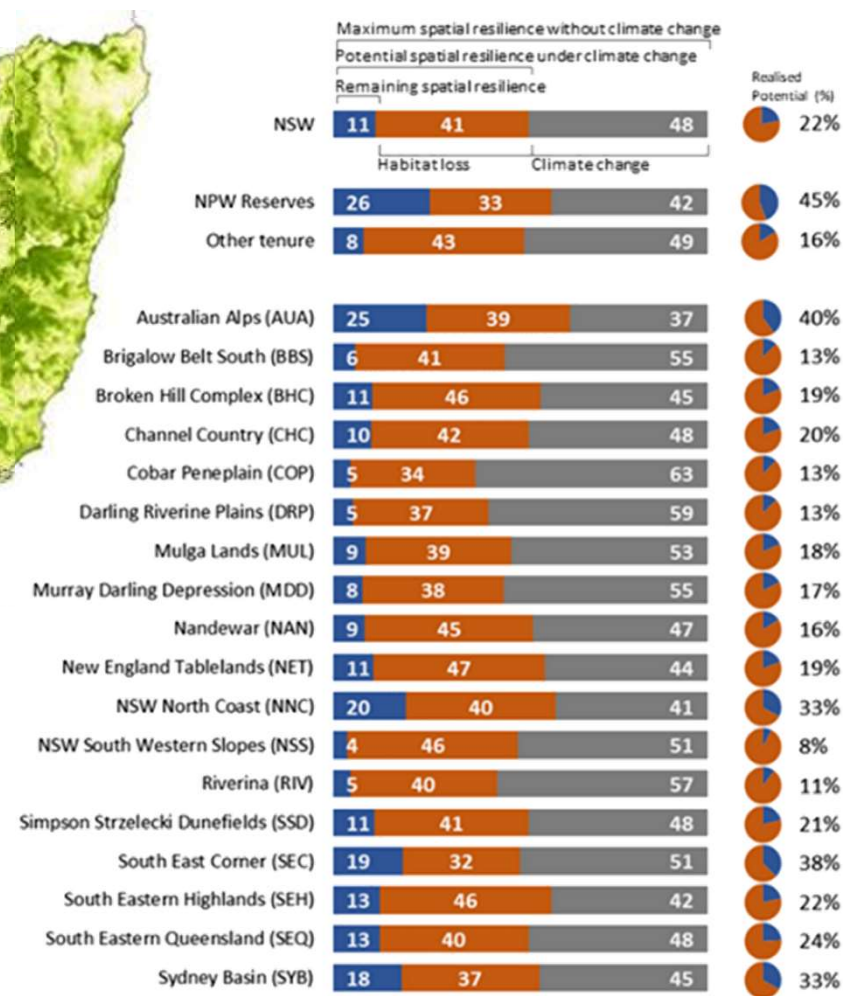
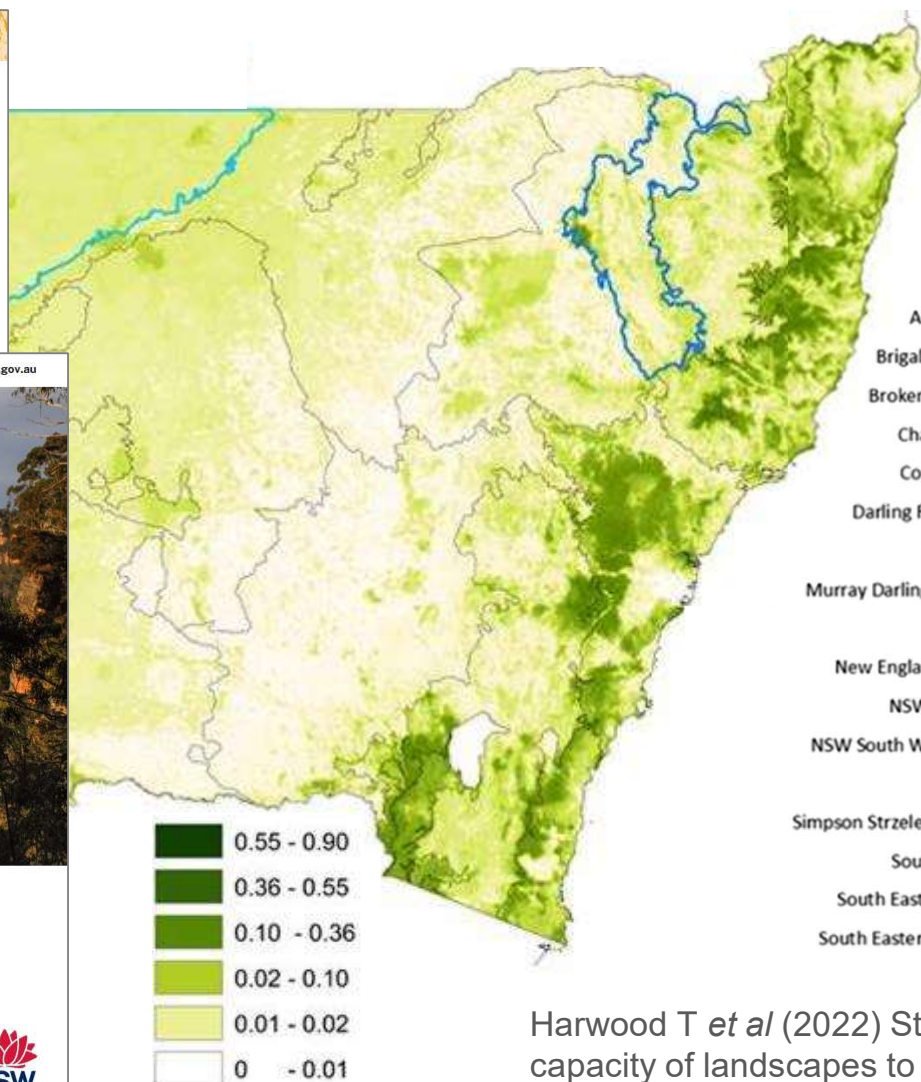
Confidence

environment.nsw.gov.au

**NSW biodiversity outlook report 2024**

Status and trends of biodiversity and ecological integrity

Department of Climate Change, Energy, the Environment and Water



Harwood T *et al* (2022) Staying connected: assessing the capacity of landscapes to retain biodiversity in a changing climate. *Landscape Ecology* 37: 3123–3139



# Thank you

**CSIRO Environment**

Simon Ferrier  
Chief Research Scientist

+61 429 550 075  
[Simon.ferrier@csiro.au](mailto:Simon.ferrier@csiro.au)

Australia's National Science Agency

