

Synergy Conference Side Event

*"Catalysing nature-based solutions for biodiversity, climate change, and sustainable development through ecosystem restoration", ¥*

@United Nations University, 20 July 2022

# Climate and Biodiversity: Synergies and trade-offs

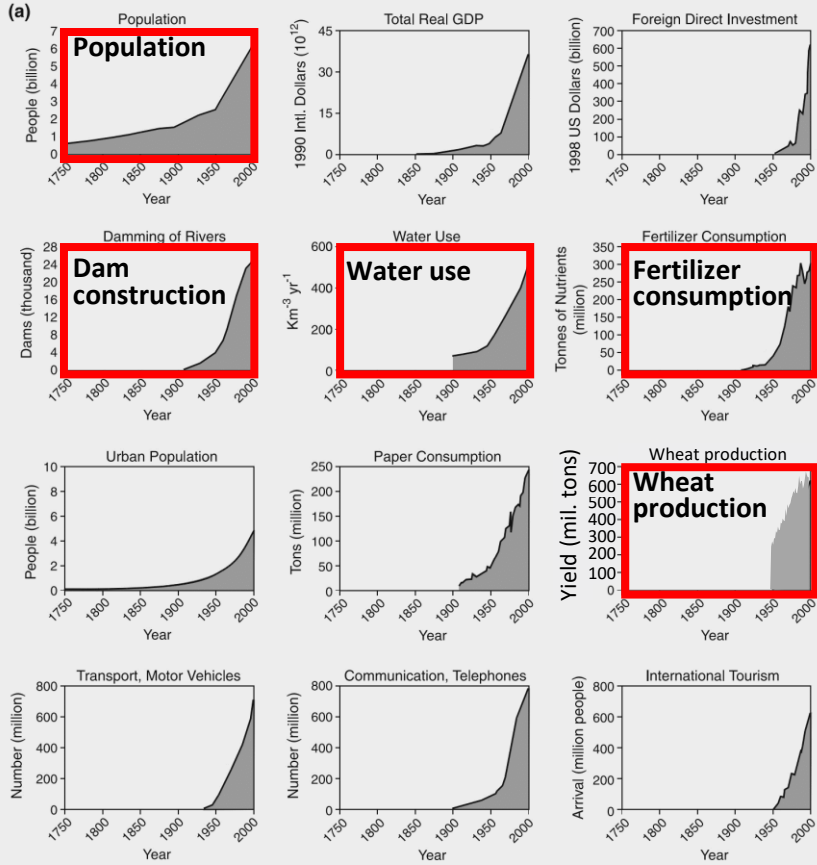
**Shizuka Hashimoto**

University of Tokyo

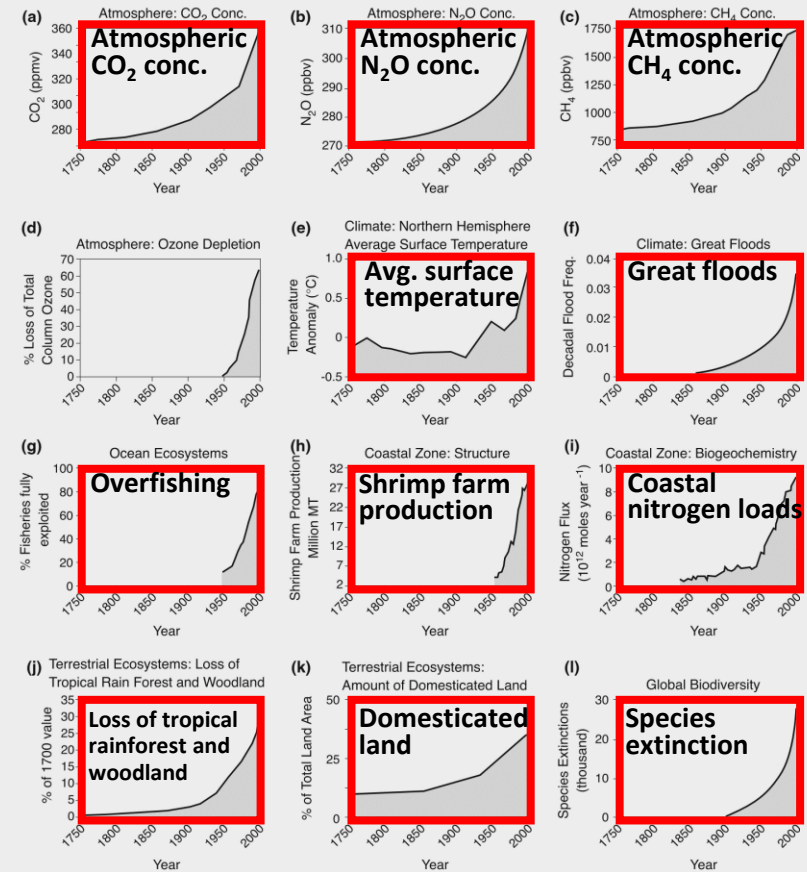
# Expansion of human activity and environmental changes over the past 250 years

Human activities have greatly expanded along with modernization, which triggered environmental degradations.

## Human activities

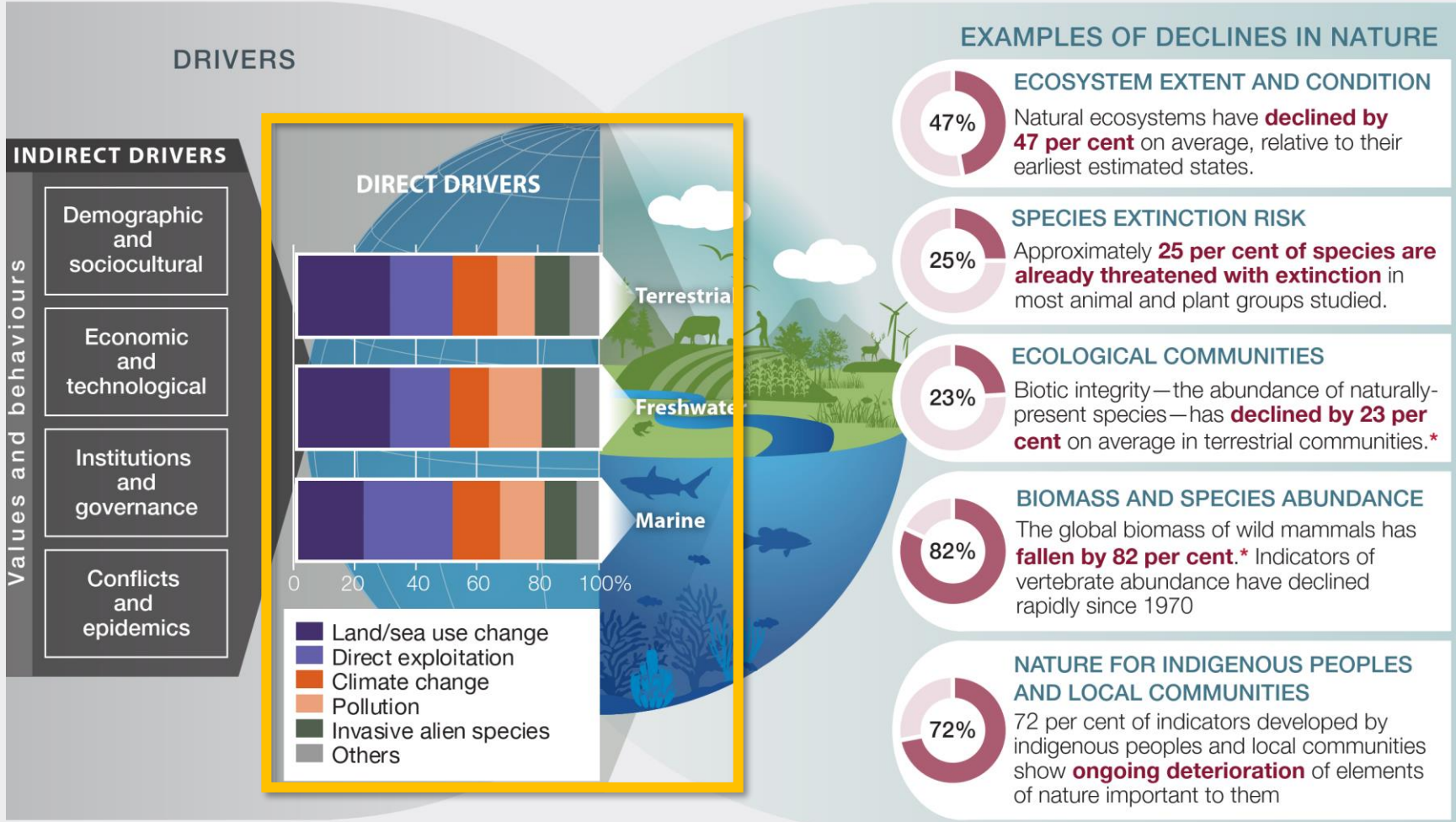


## Environmental consequences



\* The horizontal axis is the year in AD (1750-2000), and the vertical axis is the unit for each indicator (e.g. Population in "people", GDP in "dollars")

# Climate change is one of the major direct drivers of biodiversity decline



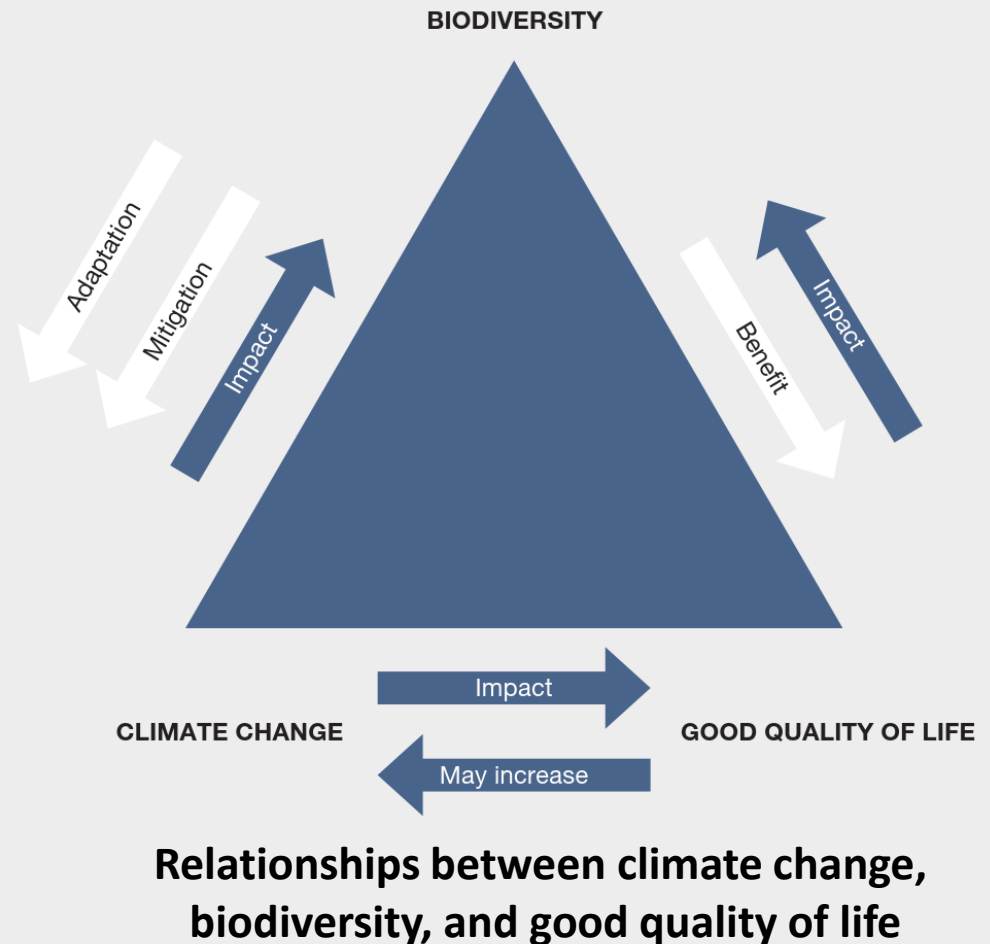
\* Since prehistory

- Terrestrial** :Land use change > Direct exploitation > **Climate change** > Pollution > Invasive alien species
- Freshwater** :Land use change > Pollution > Direct extraction > **Climate change** > Invasive alien species
- Marine** :Direct exploitation > Sea use change > Pollution > **Climate change** > Invasive alien species

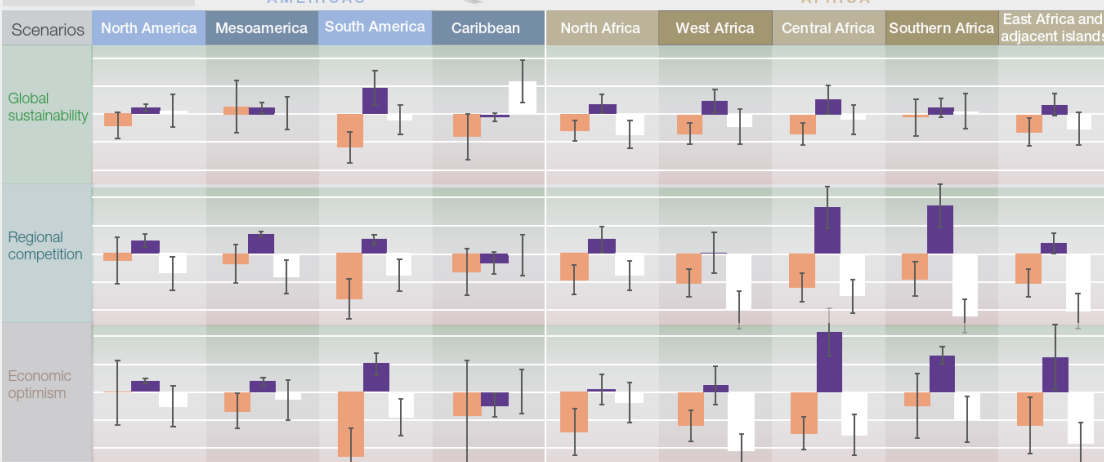
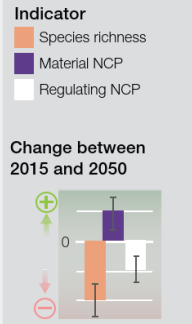
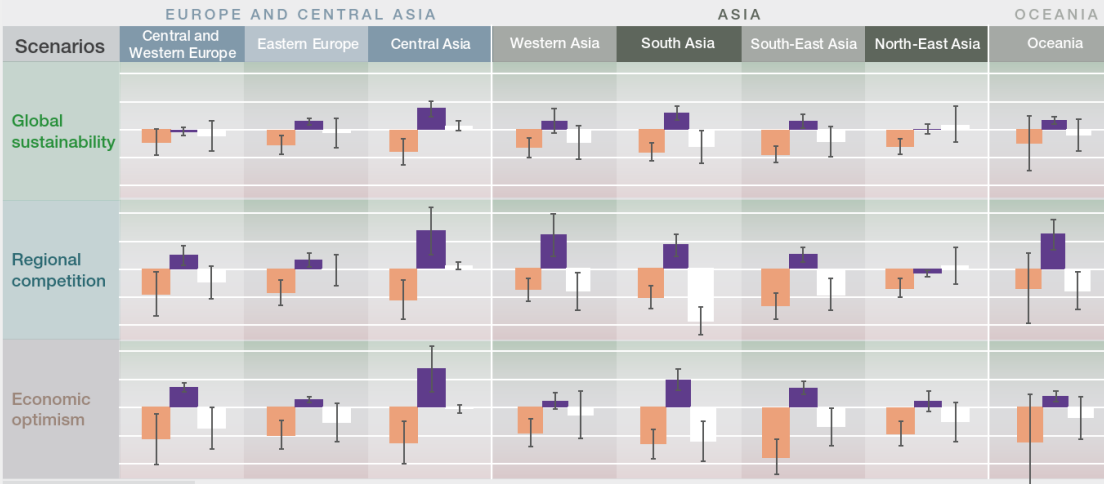
Source: IPBES (2019) The Global Assessment Report on Biodiversity and Ecosystem Services: Summary for Policy Makers.

# Controlling climate change and protecting biodiversity are interdependent and essential for sustainable futures and good quality of life

- If anthropogenic climate change continues, social-ecological systems will continue to be degraded
- Solving climate change requires consideration of biodiversity and vice-versa



# Meeting climate target will not halt the biodiversity decline.



- Biodiversity**  
Species richness
- Provisioning services**  
Food, feed, wood, bioenergy
- Regulating services**  
Nitrogen retention, soil retention, crop pollination, crop pest control, carbon sequestration

- **“Global sustainability”** has the smallest impact on biodiversity and ecosystem services across the globe
- Impacts and their differences are large in the **“Regional competition”** and **“Economic optimism.”**
- Provisioning services are greatest in the **“Regional competition”** scenario and **“Economic optimism,”** but at the expense of a decline in biodiversity and regulating services

Source: IPBES (2019) The Global Assessment Report on Biodiversity and Ecosystem Services: Summary for Policy Makers.



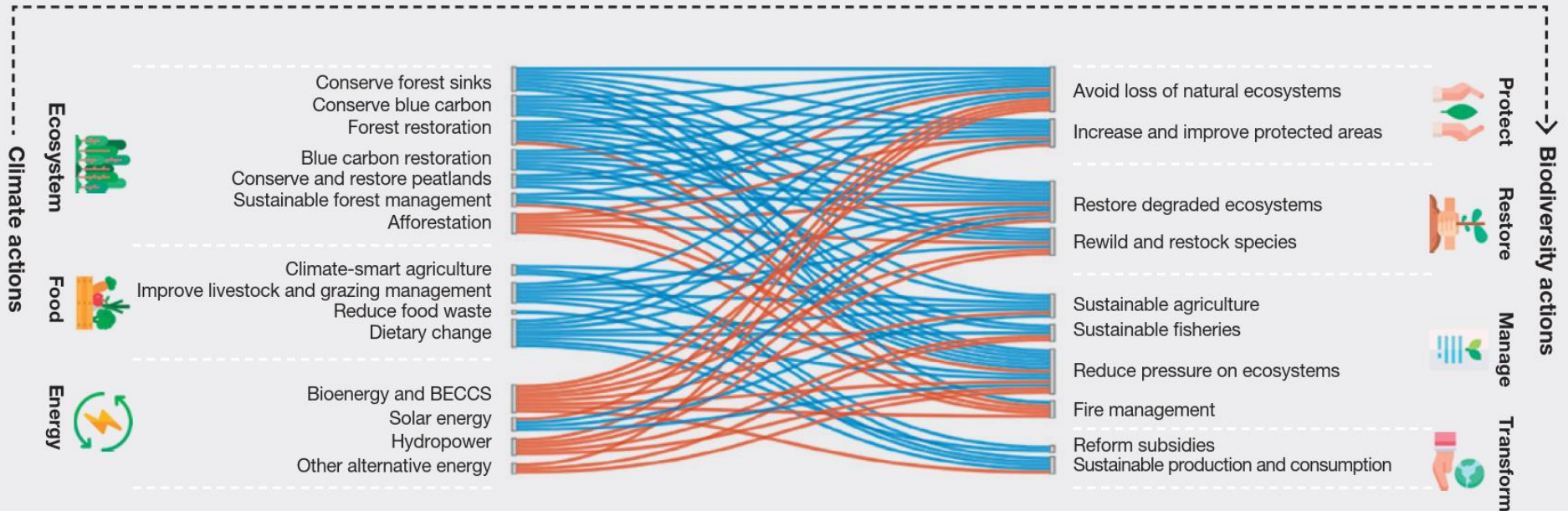
# Measures that focus only on climate change mitigation and adaptation may have negative effects on biodiversity.

## Climate measures that could have unexpected negative impacts include

- Large-scale monoculture of trees and bioenergy crops
- Planting trees in ecosystems that were not originally forests
- Reforestation with non-native tree species
- Wind power, hydroelectric power, mega-solar power plants
- Mining of resources for renewable energy technologies, etc.

## Effects of actions to mitigate climate change on actions to mitigate biodiversity loss

(※ — : Synergy, — : Trade-off)

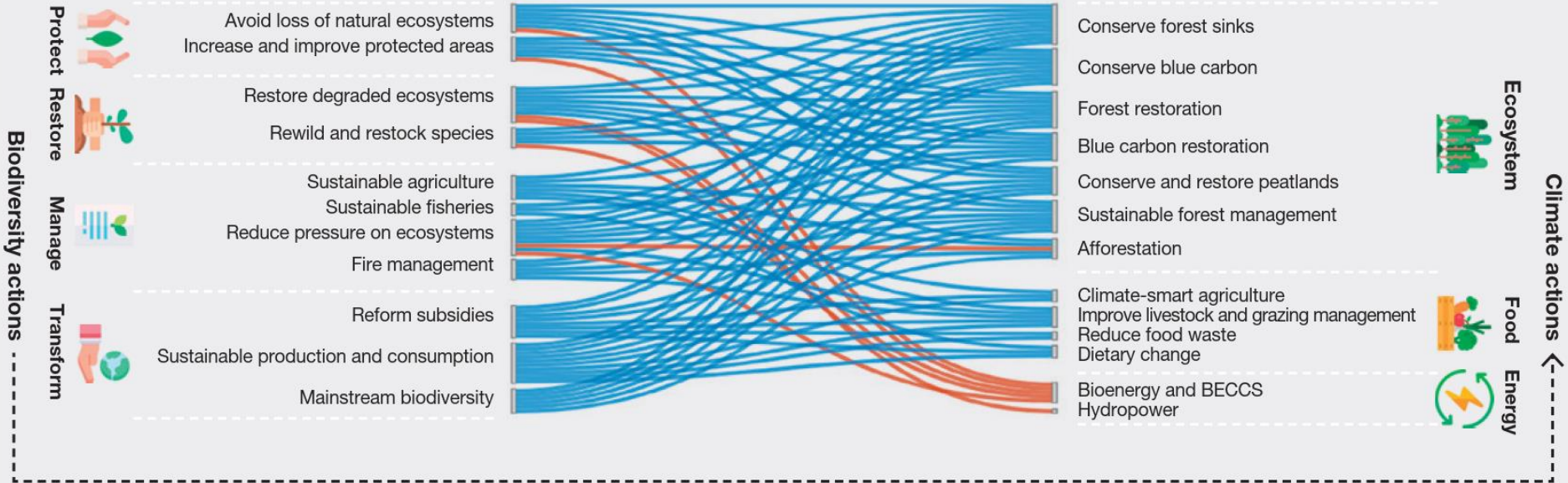


# Many biodiversity conservation measures are compatible with climate change measures.

- Protected areas, ecosystem management for conservation purposes (e.g., forest fire control, reintroduction of important species) often produce co-benefits
- Reduced per capita consumption, dietary changes, and sustainable use of natural resources will also contribute to addressing the biodiversity and climate crises

## Effects of actions to mitigate climate change on actions to mitigate biodiversity loss

(※ — : Synergy, — : Trade-off)



Source: IPBES-IPCC (2021) Scientific Outcome of the IPBES-IPCC co-sponsored workshop on biodiversity and climate change

# Conservation, restoration, and sustainable management of ecosystems will produce co-benefits for climate mitigation/adaptation and biodiversity conservation.

## Nature-based solutions (NbS) will be one of the keys

*“actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits” (IUCN)*

- Avoidance of loss and degradation of terrestrial and marine ecosystems
- Building green infrastructure in cities
- Effective through long-term and planned implementation
- NbS will only be effective if there is an ambitious reduction in anthropogenic greenhouse gas emissions.

