

Bringing ecology into decision-making – a comparison of approaches

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deputy director
February, 2024

First: a backstory to set the scene

Estuarine, Coastal and Shelf Science (2002) 55, 427–436

doi:10.1006/ecss.2001.0916, available online at <http://www.idealibrary.com> on IDEAL®



Do Penaeid Shrimps have a Preference for Mangrove Habitats? Distribution Pattern Analysis on Inhaca Island, Mozambique

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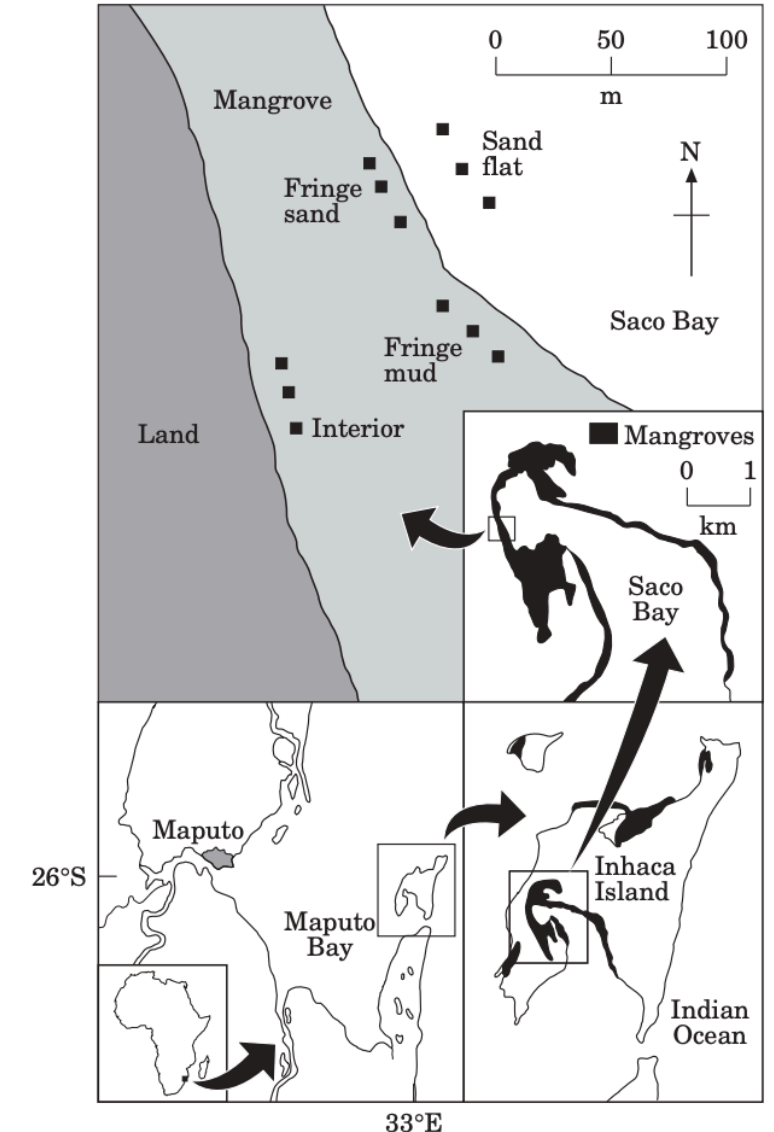
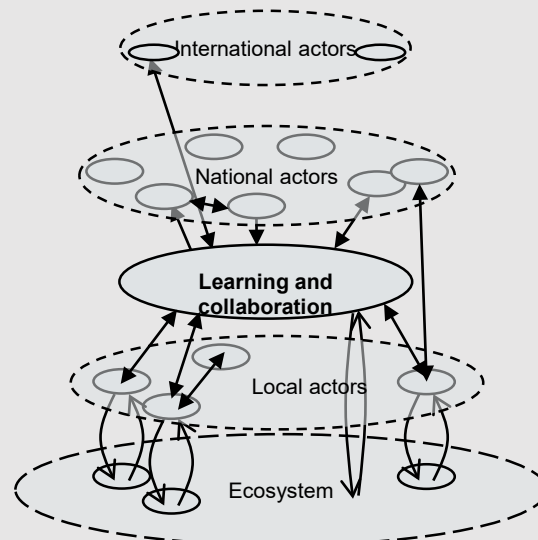
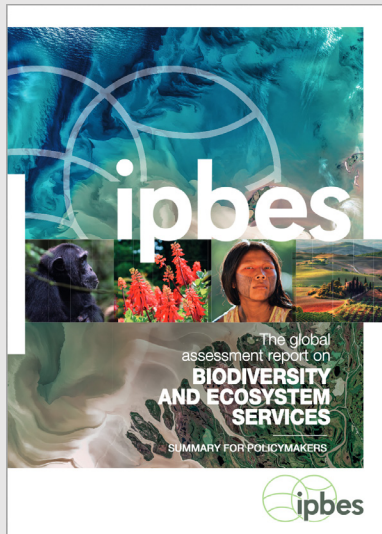


FIGURE 1. Location of stake net sampling sites at Inhaca Island, Mozambique.

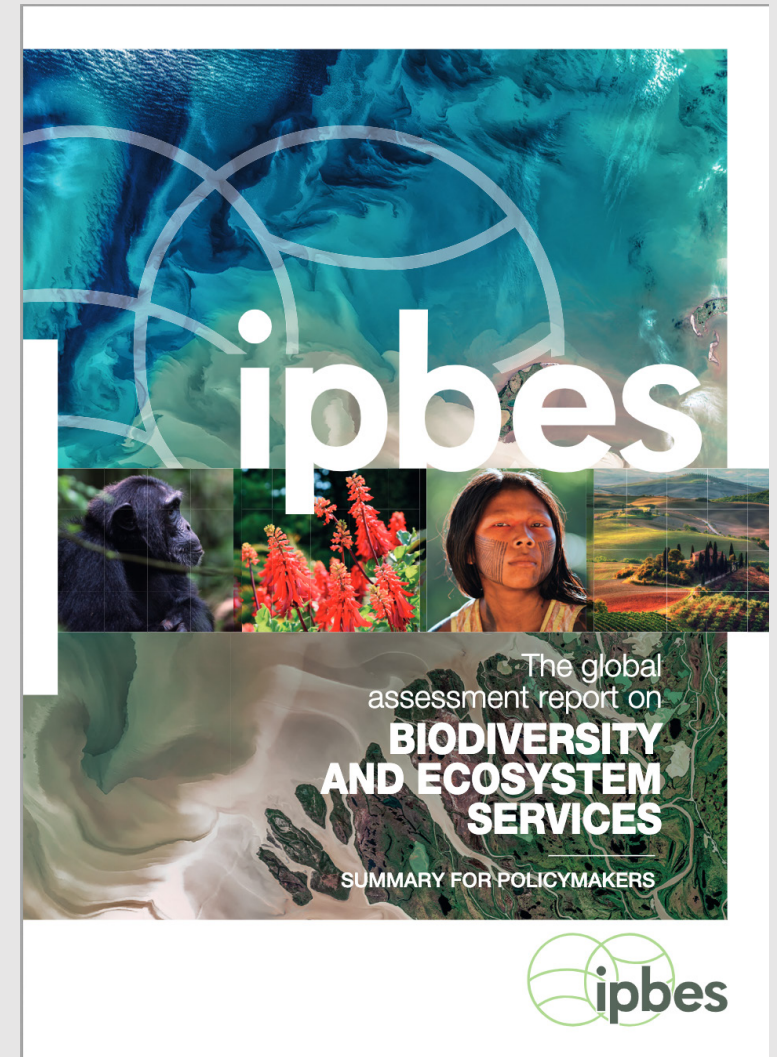
Three approaches

- Scientific assessments (Cash et al. 2003)
- Adaptive co-management (Armitage et al. 2008)
- Keystone dialogues (Österblom et al. 2022)



1. Scientific assessments: Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

- Assesses existing knowledge on biodiversity and ecosystem services – ca 15 000 sources
- Multi-year process involving several hundreds of scientists
- Report written for policy-makers in 140 member states

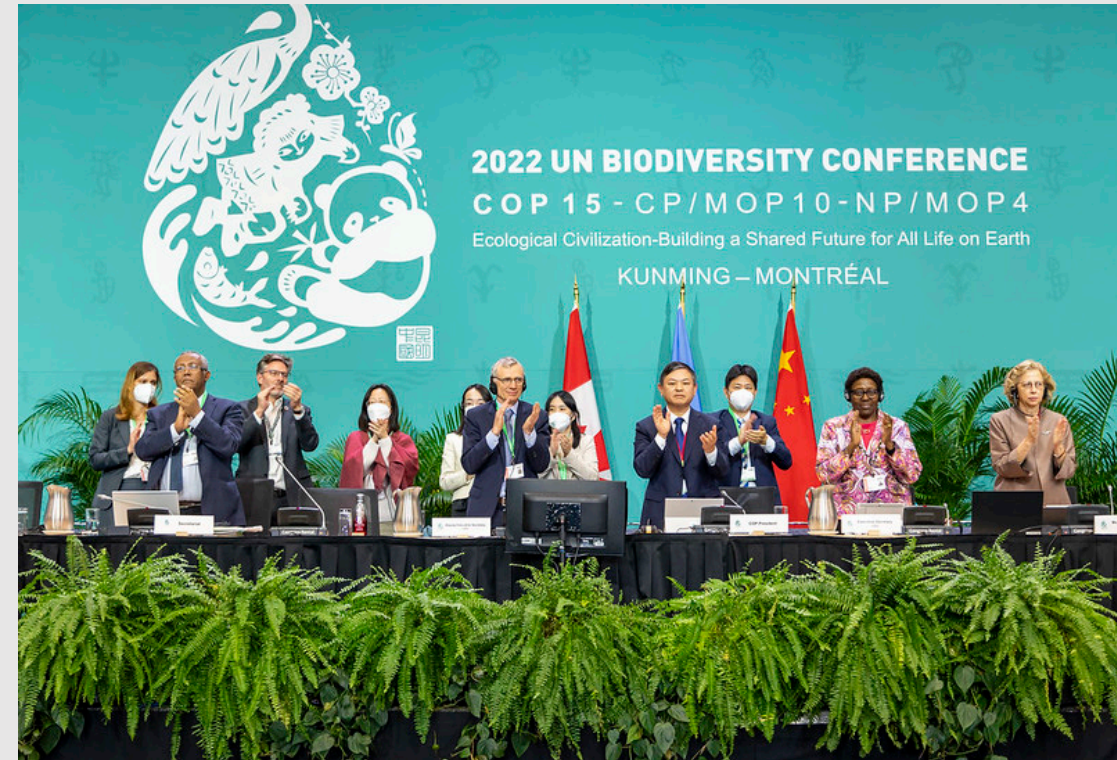


High-level messages of Global assessment (IPBES 2019)

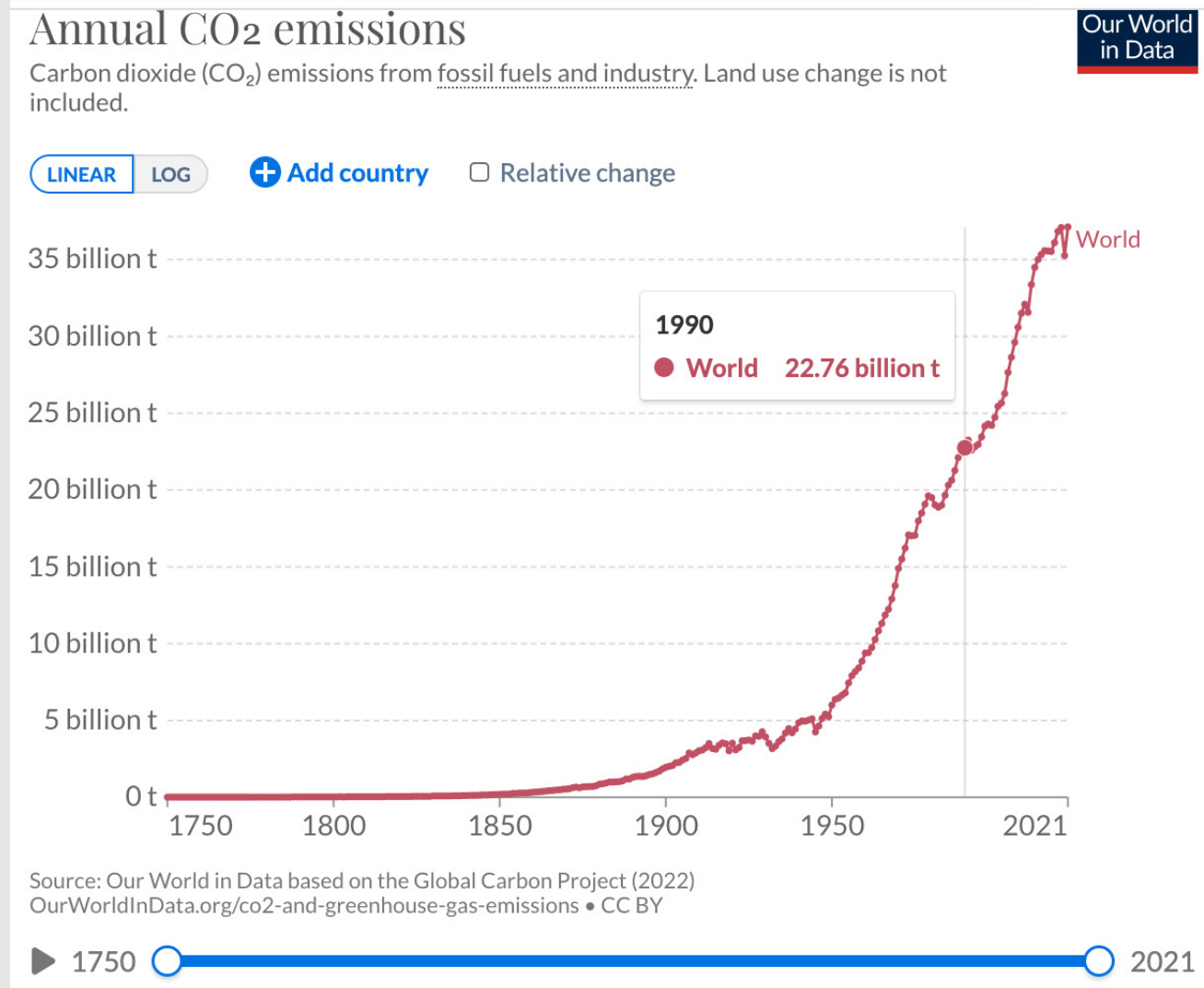
- 1 million species threatened with extinction
- Drivers of loss include (1) changes in land and sea use; (2) direct exploitation of organisms; (3) climate change; (4) pollution and (5) invasive alien species.
- Three-quarters of the land-based environment and about 66% of the marine environment have been significantly altered by human actions – less severe in areas managed by Indigenous Peoples.
- Negative trends in nature will continue to 2050 and beyond in all of the policy scenarios explored in the Report, except those that include transformative change
- Negative trends in ecosystems undermine progress towards 80% of the assessed targets of the Sustainable Development Goals, related to poverty, hunger, health, water, cities, climate, oceans and land.

How decision-makers responded (CBD 2022)

- Protect 30% and restore 30% by 2030, recognizing indigenous territories
- Prevent over-harvesting
- Reduce pollution (nutrients, pesticides, plastics)
- Require large and transnational companies and financial institutions to monitor, assess, and transparently disclose their risks, dependencies and impacts on biodiversity through their operations, supply and value chains and portfolios



However, the track-record is questionable



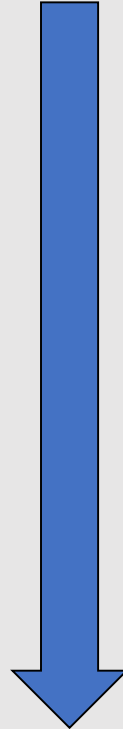
- First IPCC Assessment Report published in 1990
- Paris agreement to limit warming to well below 2 degrees adopted in 2015
- Global emissions keep rising

This model is incomplete

Central policy-maker (e.g.
Environmental ministry)

Regional/Local authority

Local natural resource user



Decision-making

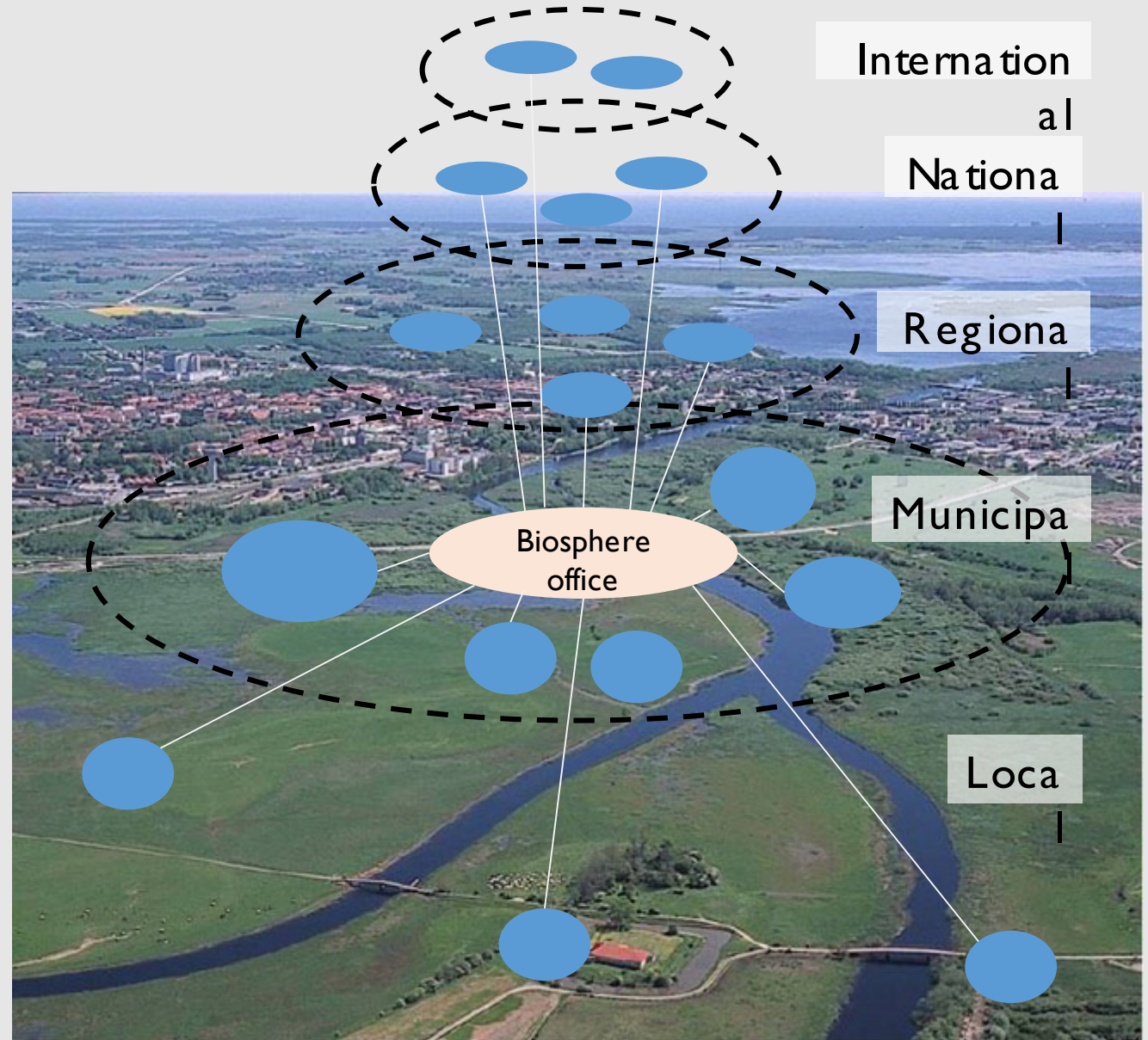
Implementation and
monitoring

Behavioural response

2. Adaptive co-management: Kristianstads Vattenrike

- Combines local and scientific knowledge
- Flexible collaborations, connecting sectors and scales
- Shared vision: "Good for people and nature"

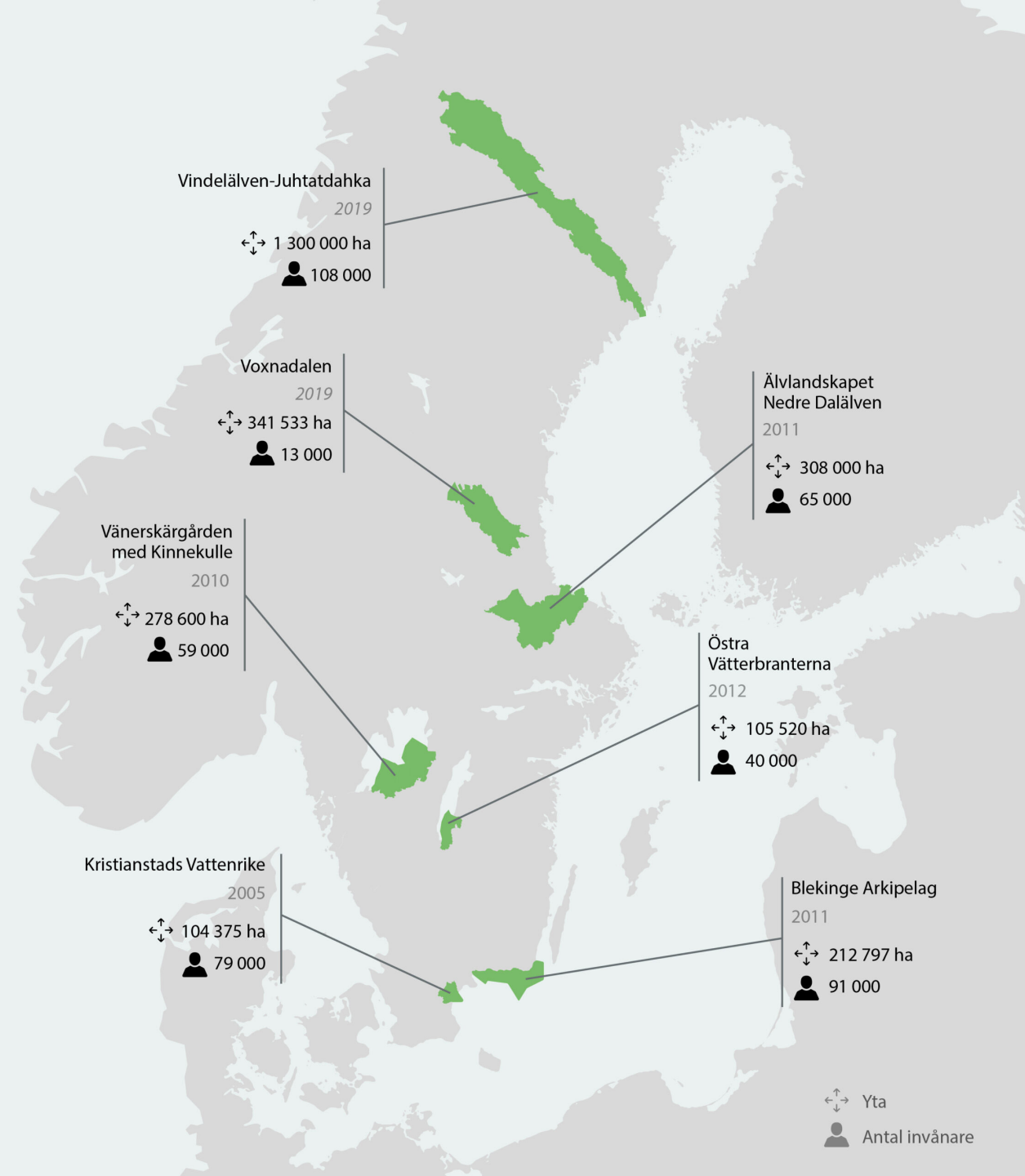
(Olsson et al. 2004, Folke et al. 2005, Schultz et al. 2015)

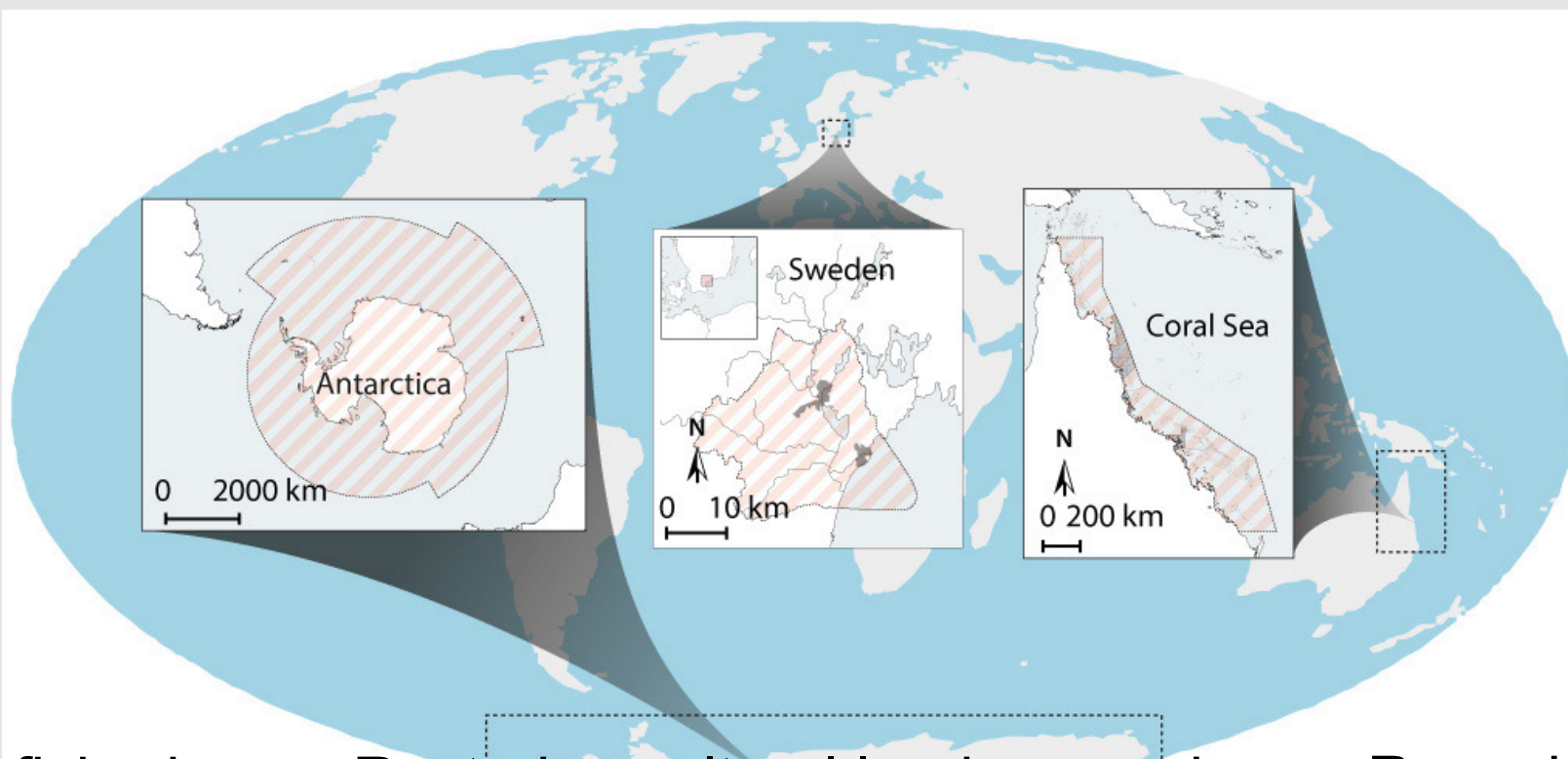


Sweden's first UNESCO biosphere reserve in 2005



www.biosfarprogrammet.se





Curbing illegal fisheries
in the Southern Ocean



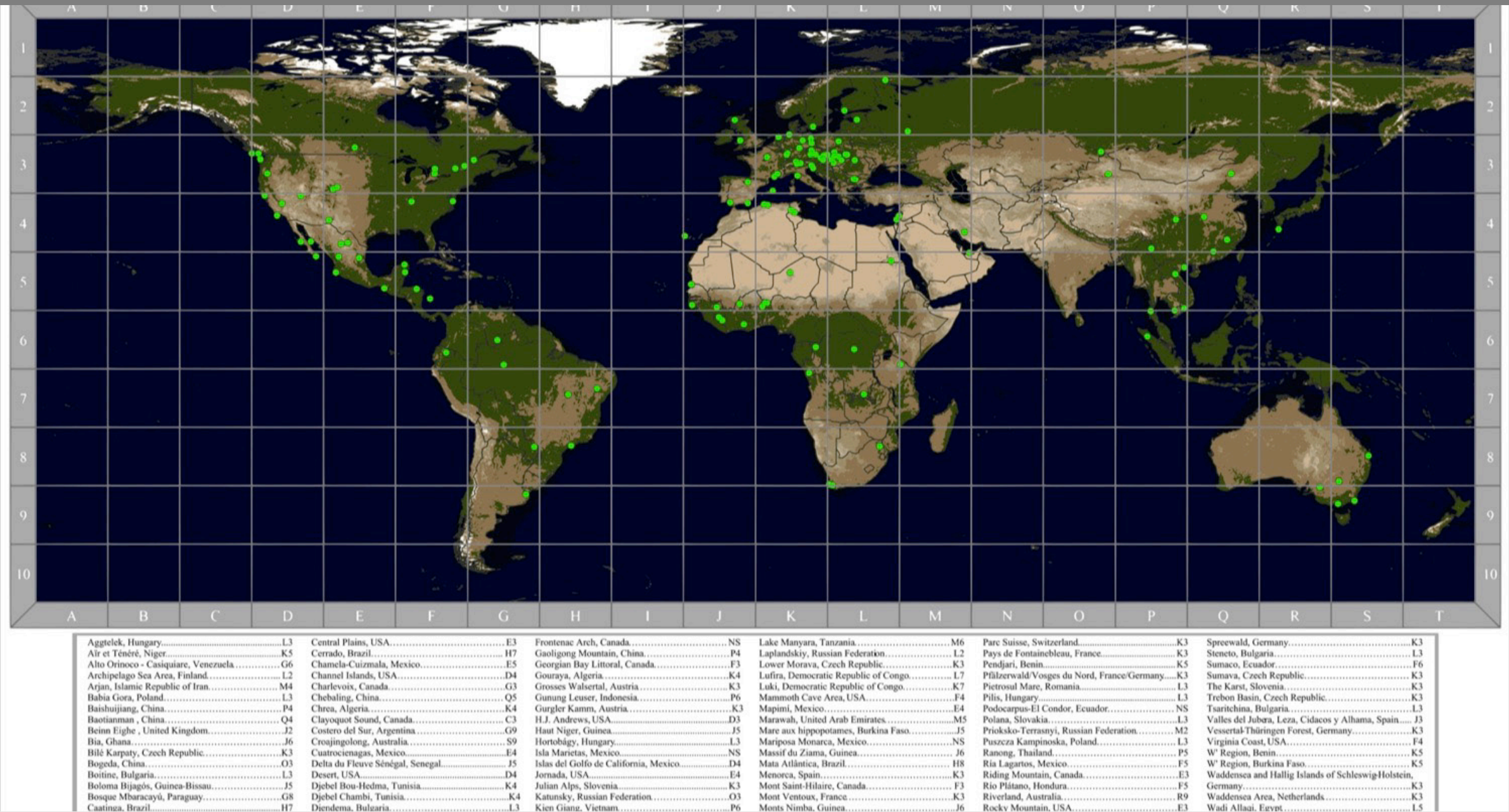
Restoring cultural landscapes in
Kristianstads Vattenrike



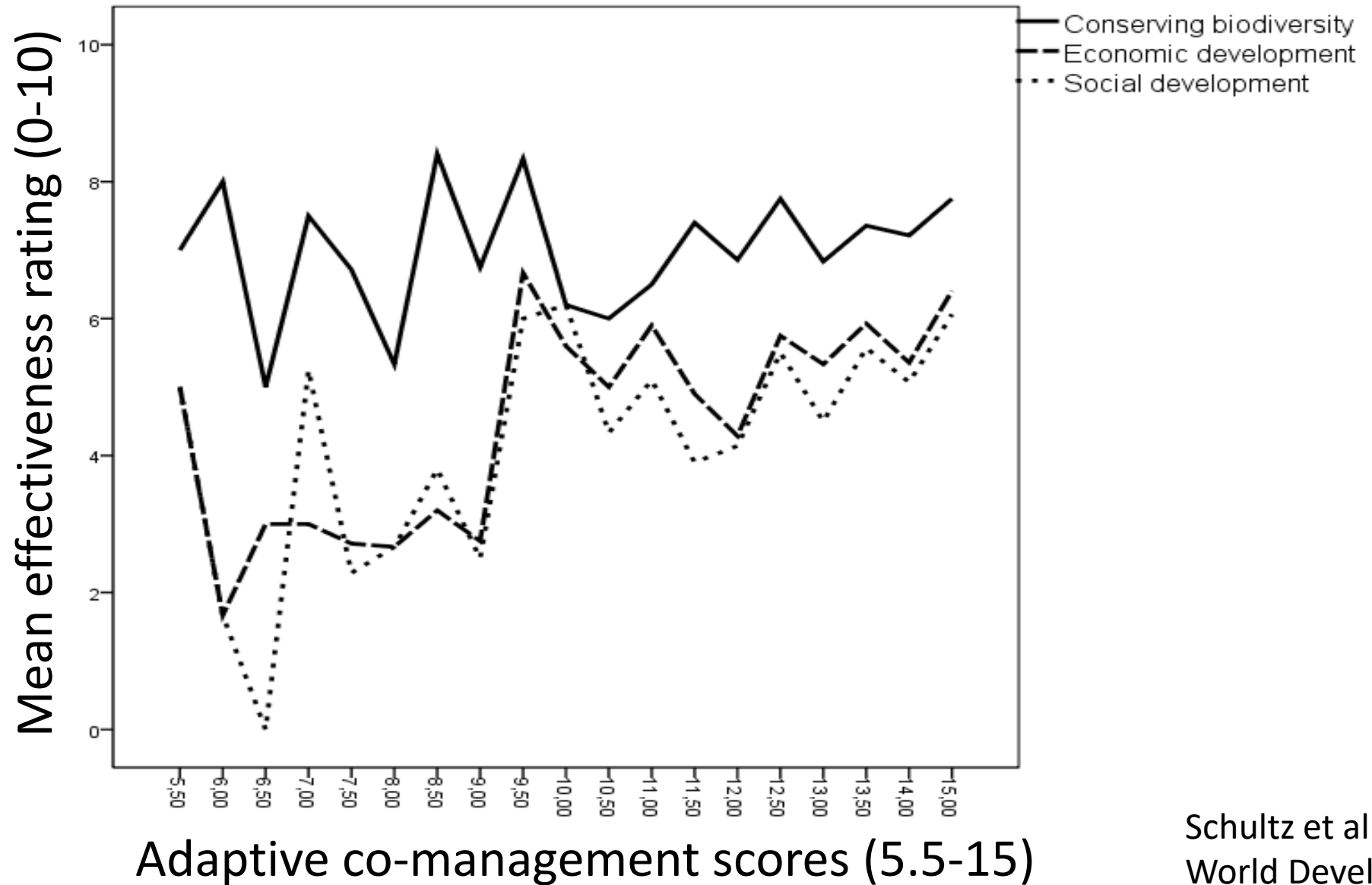
Rezoning the Great
Barrier Reef



Effectiveness and adaptive co-management (n=146 BR, 2008)



Effectiveness and adaptive co-management (n=146 BR, 2008)



Schultz et al. 2011
World Development

But what about decision-makers who influence ecosystems from afar?



Image: Globaia, in Folke et al. 2021

3.

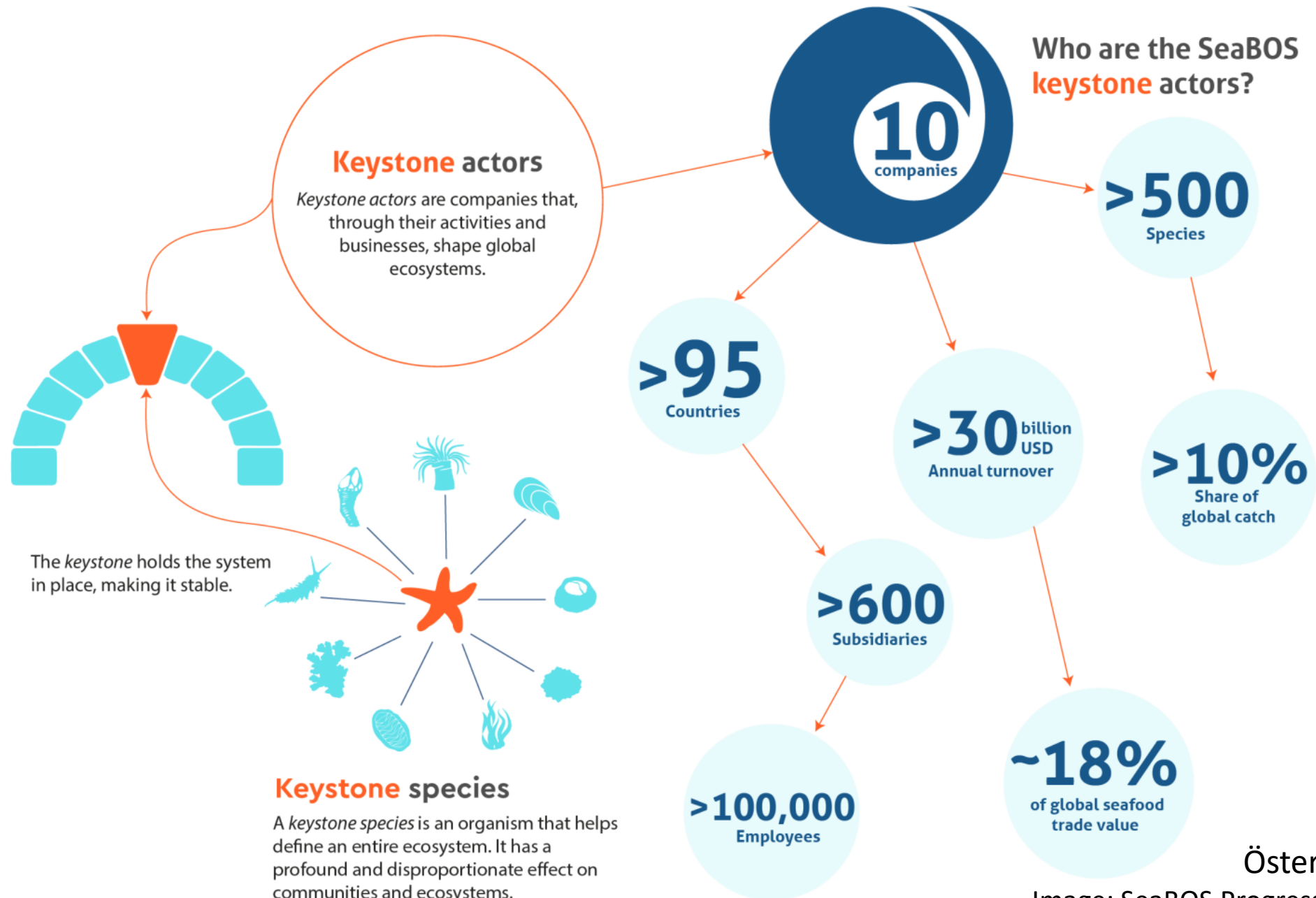
KEYSTONE DIALOGUES

Connecting science with industry leaders for biosphere stewardship



<http://keystonedialogues.earth/>

From keystone species to keystone actors



Österblom et al. 2015

Image: SeaBOS Progress Report 2017-2022

KEYSTONE DIALOGUES

Connecting science with industry leaders for biosphere stewardship



Joint Statement from the 1st Keystone Dialogue SEAFOOD BUSINESS FOR OCEAN STEWARDSHIP

PREAMBLE

We represent eight of the world's largest seafood companies, collectively operating in all segments of marine fisheries and aquaculture production, across the entire world. As leaders in the global seafood industry, we are concerned about the state of the ocean and the global environment.

We depend on a stable and resilient planet for human prosperity. However, science is already providing evidence that we have entered the Anthropocene, an epoch where humanity is now challenging the stability of Earth and its ocean.

We, as keystone actors in the global seafood industry¹, recognize that together we represent a global force, not only in the operation of the seafood industry, but also in contributing to a resilient planet with marine ecosystems continuing to produce food of high quality for present and future generations.

We already make a significant contribution to healthy and nutritious diets, as well as to employment all around the world, helping to provide food security for all. We are confident that an increased production of seafood – caught in a healthy ocean using sustainable fishing methods or farmed in sustainable production systems, by people employed in safe and fair working conditions – is both possible and critical for the future of humankind.

However, oceans are under enormous pressure. There is strong scientific evidence of growing impacts on marine ecosystems. Ocean temperatures and acidification are increasing, degradation of coastal mangroves and coral reefs is threatening critical life support systems, habitats are being destroyed, nutrient runoff and toxic substances are causing serious pollution, and the build-up of plastic waste in the oceans is a threat to many species and to human health.

Many of these challenges in the oceans are not caused by the seafood industry itself, but they all impact us directly and indirectly.

We acknowledge that the ocean is also directly affected by activities of wild capture fisheries, such as illegal, unreported and unregulated (IUU) fishing, bycatch, overfishing and modern slavery.

In the face of a growing and wealthier world population, the reliance on aquaculture as a crucial contributor to sustainable food production will increase. However, badly managed, aquaculture can have detrimental social and environmental impacts.

¹ Keystone actors determine global production revenues and volumes, control important segments of production, control ecosystems globally through production and distribution, and influence ocean governance and sustainability, see Oeschgen, V. et al. 2015, *PLoS ONE* 10(12): e0177221. <https://doi.org/10.1371/journal.pone.0177221>

- Strengthen production, equidistribution, hydrophytic land production, production, health management, including environmental management.
- Collaborate and invest in the development and deployment of emerging approaches and technologies for sustainable fisheries and aquaculture.
- Support novel initiatives and innovation for ocean stewardship.

The purpose of this ocean is to help provide healthy food for human consumption, and to ensure that the ocean is a source of food security and sustainable livelihoods. The purpose of this ocean is to ensure that the ocean is a source of food security and sustainable livelihoods.

We understand that the ocean is a source of food security and sustainable livelihoods. We understand that the ocean is a source of food security and sustainable livelihoods.

As ocean stewardship, we recognize and promote the production, distribution, and consumption of sustainable food, and we understand that the ocean is a source of food security and sustainable livelihoods.

SIGNATURES


Magnus Skjold
President
Atlantic Salmon Corporation


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President
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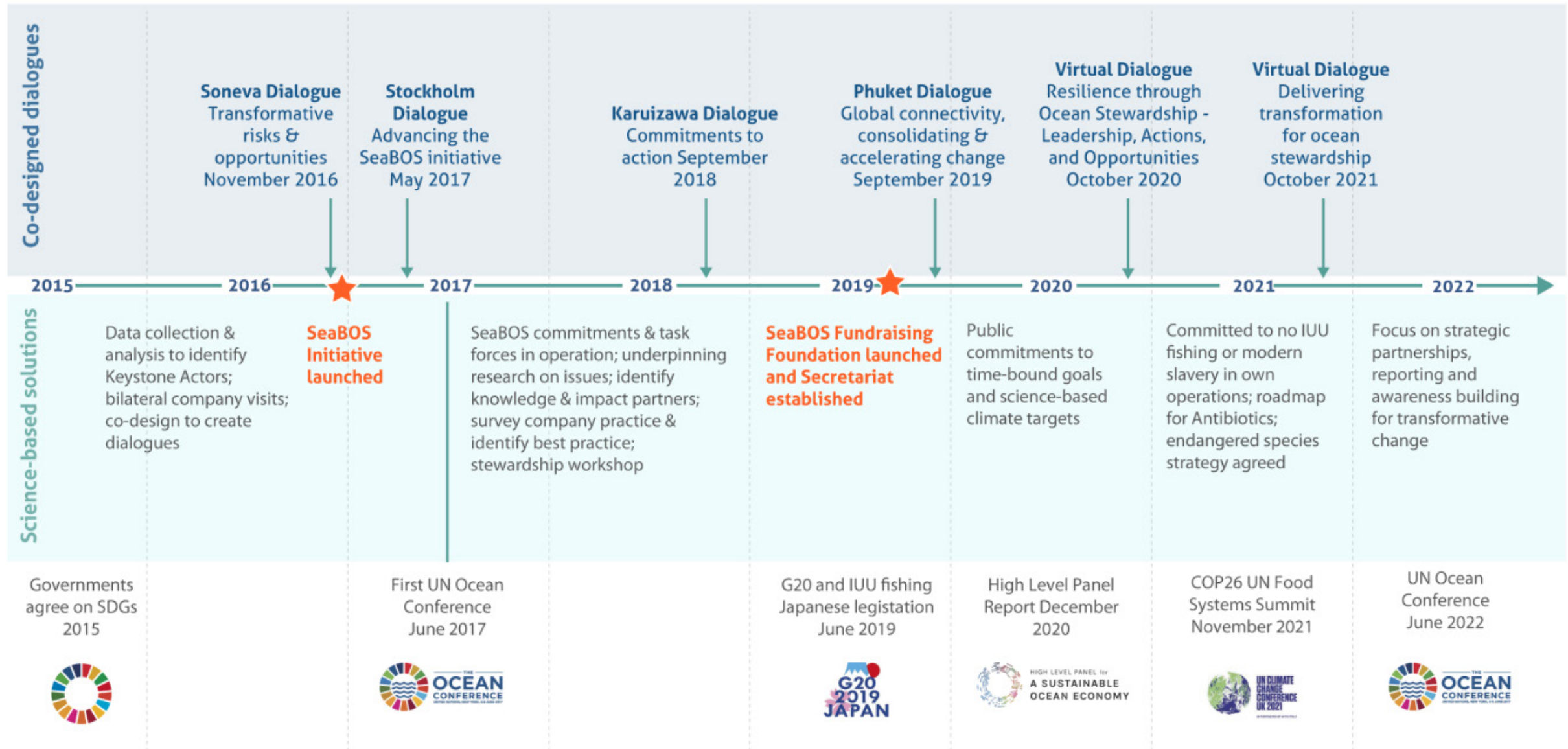

Magnus Skjold
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Atlantic Salmon Corporation


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President
Atlantic Salmon Corporation

<http://keystonedialogues.earth/>

Can this process be condensed?

SeaBOS (ocean stewardship) timeline



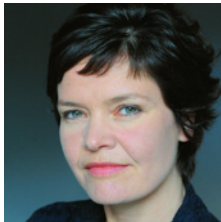


Executive Programme in Resilience Thinking

- Launched in 2018
- Tailored to CEO & Chair persons of influential companies
- Three meet-ups, including a 3-day retreat
- Supports learning and collaboration to accelerate sustainability transformations



Johan Rockström
Welcome to the
Anthropocene



Kate Raworth
Doughnut
economics



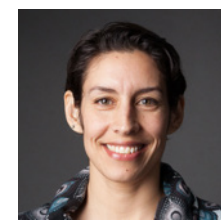
Carl Folke
Resilience
thinking



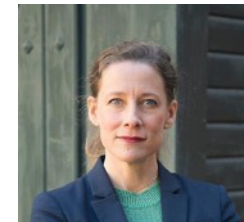
Line Gordon
Food futures



Per Olsson
Transformations



Beatrice Crona
Finance and the
biosphere



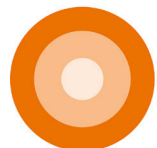
Lisen Schultz
Program director

90+ CEOs and chair persons trained since 2018

Addtech
Advania Group
Alecta
AMF Fastigheter
Apoteket
AP6
Atlas Copco
Axel Johnson
Axfood
Beijerstiftelsen
Blue Water Energy
Bona
Bravida
Clas Ohlson
Dagab
DNB Sverige
Dustin
Electrolux
Ernstströmgruppen
Epiroc
Fagerhult
FAM
Gränges Group

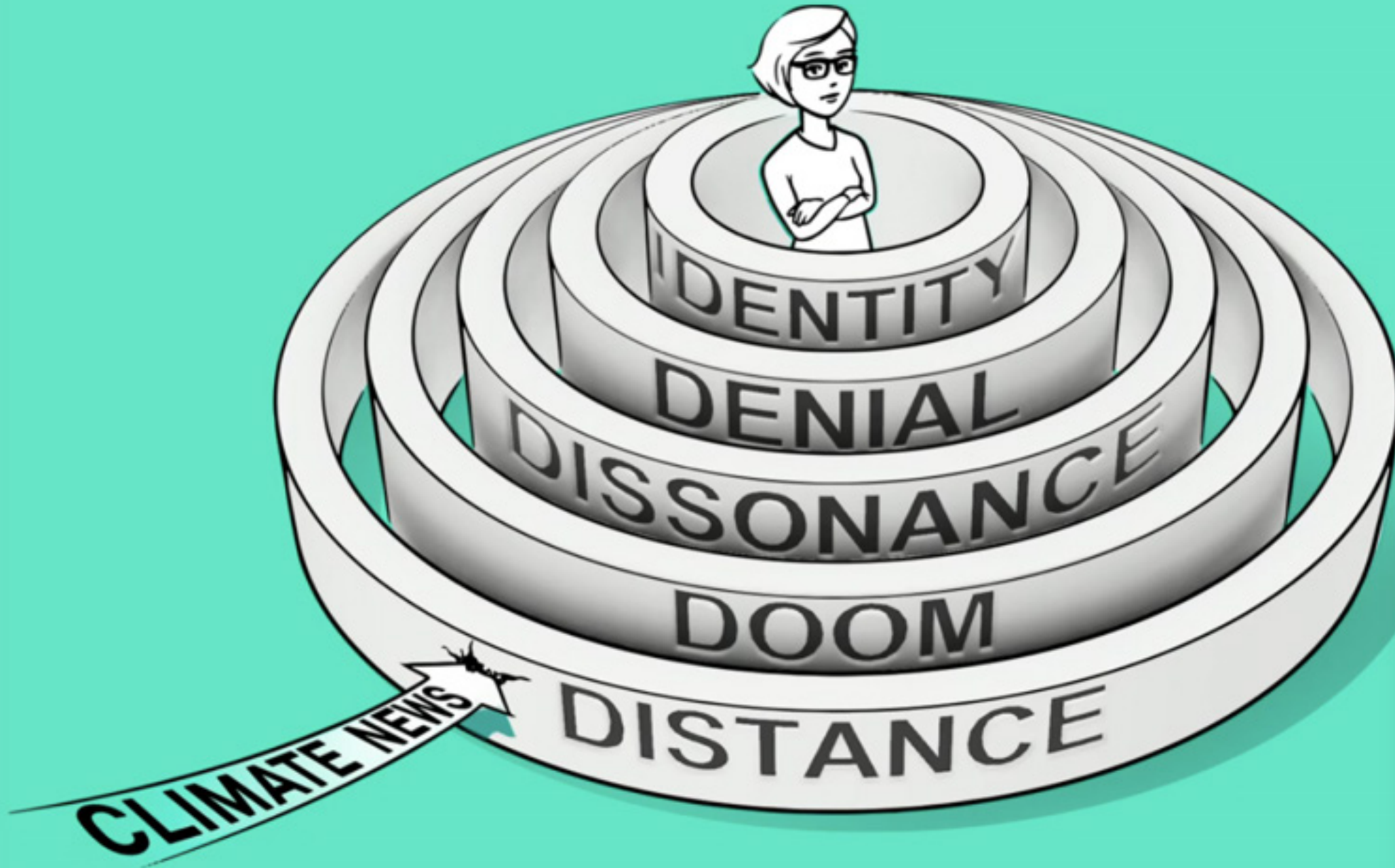
Gullspång invest
H&M
Handelsbanken
Handelsbanken fonder
Hemköp
HMS
Husqvarna
IK Partners
Industrivärden
Investor
Interflora
IPCO
John Mattson Fastigheter
Kicks
Kinnevik
KPA Pension
Latour investment
Lindéngruppen
Martin & Servera
Munters
NCC
Nefab
Nobel Prize Outreach

Nobia
NYK
OKQ8
Patricia industries
Postnord
Saab
Scania
SEB
Semcon
Sia Glass
Skanska
Slättö
Sonae Group
Stena Line
Stena Metall
Stena Recycling
Stora Enso
Swedbank
Systembolaget
Tempo
Volvo
Wärtsilä
XANO Industri

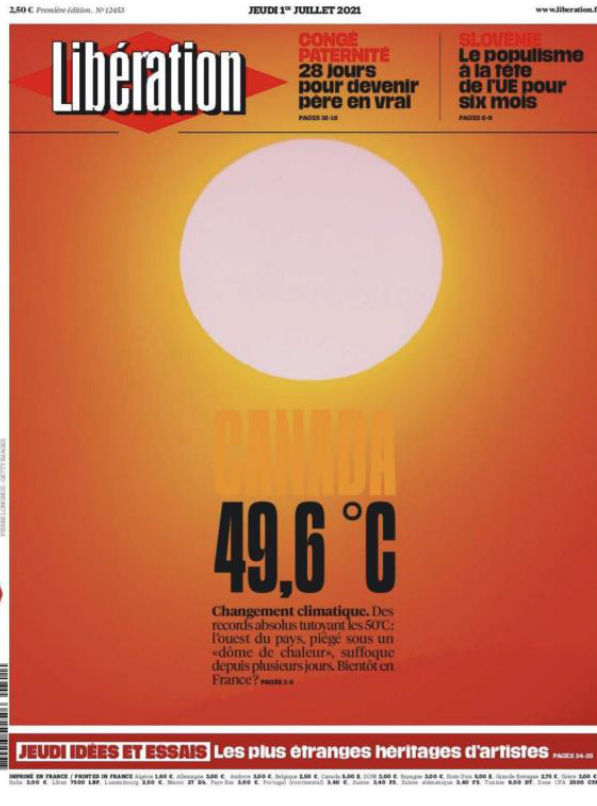


Executive Programme in
Resilience Thinking

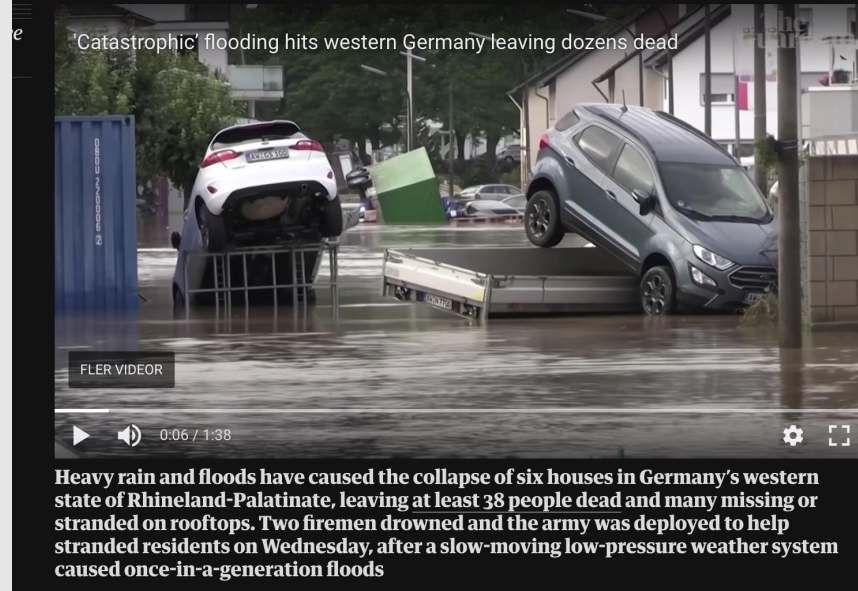
Addressing barriers to climate action



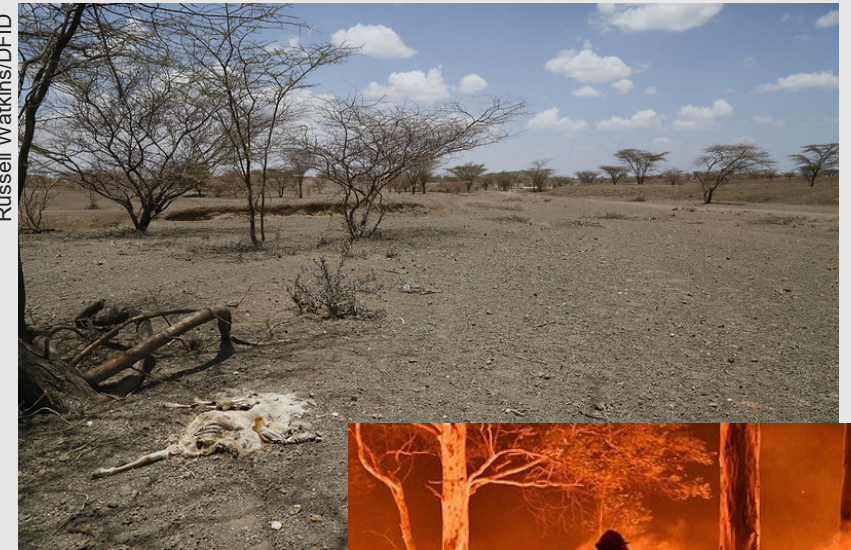
Addressing Distance: Consequences here and now



'Catastrophic' flooding hits western Germany leaving dozens dead - video report



Russell Watkins/DFID



Ninian Rade



“Human-induced climate change, including more frequent and intense extreme events, has caused widespread adverse impacts and related **losses and damages to nature and people**, beyond natural climate variability (high confidence).” IPCC, 2022

“157 of top 200 economic entities by revenue are **corporations** not countries”
Global Justice Now 2018

Addressing Doom: It is not too late, and we know what it takes

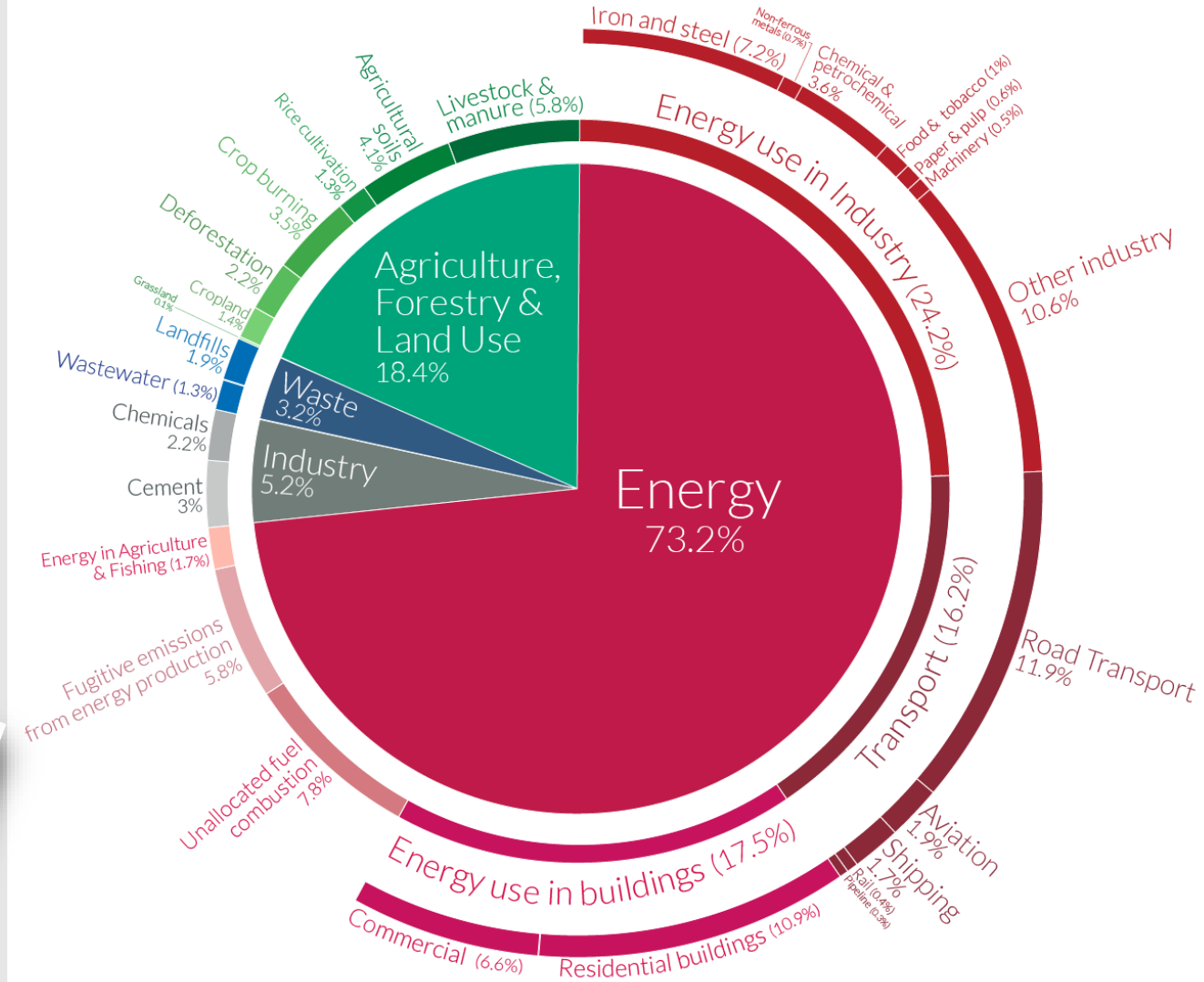
- From fossil fuels to renewable energy
- From a linear to a circular economy
- From exploitation to regeneration of nature and society



Global greenhouse gas emissions by sector

This is shown for the year 2016 – global greenhouse gas emissions were 49.4 billion tonnes CO₂eq.

Our World
in Data

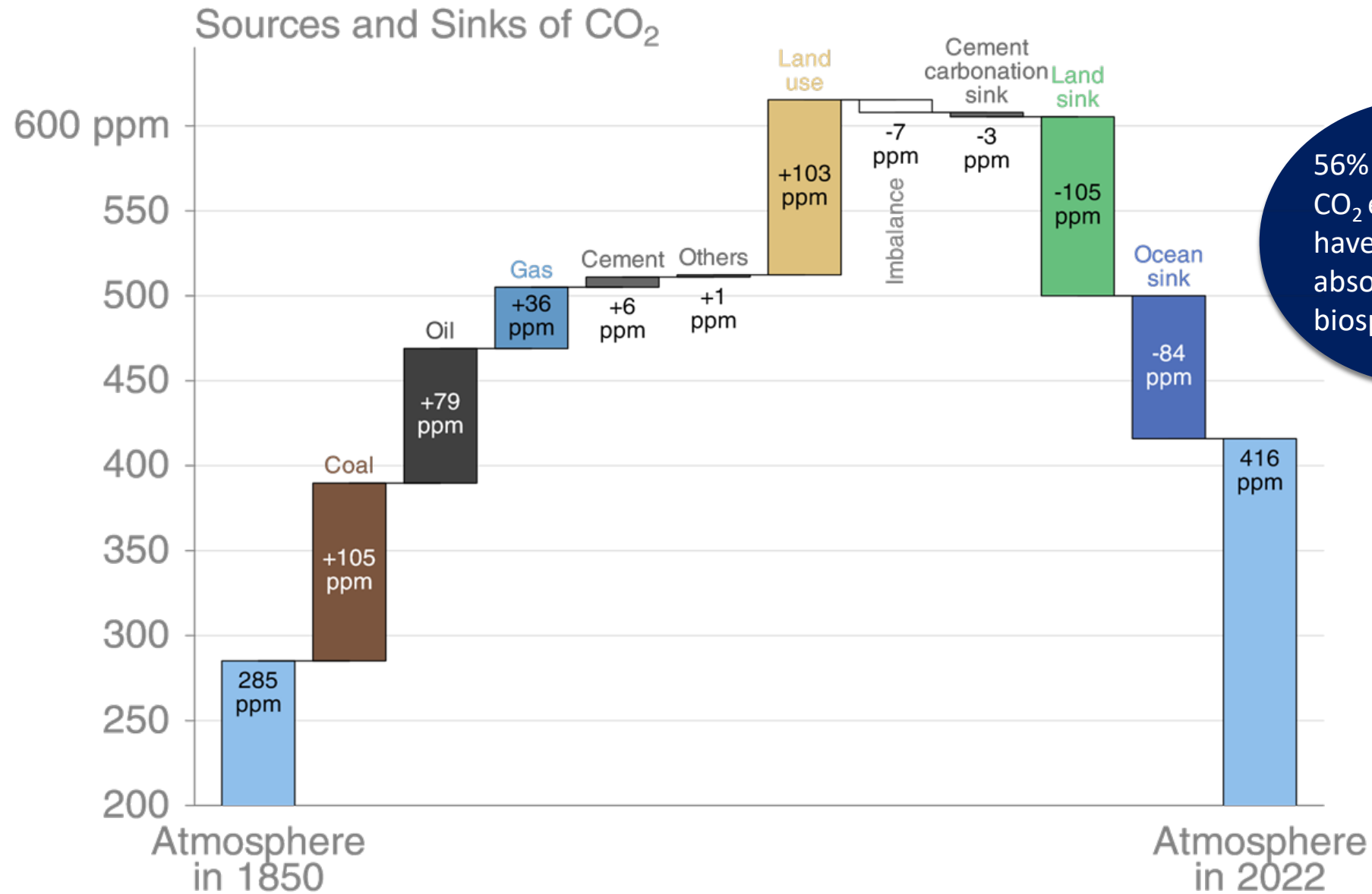


OurWorldinData.org – Research and data to make progress against the world's largest problems.

Source: Climate Watch, the World Resources Institute (2020).

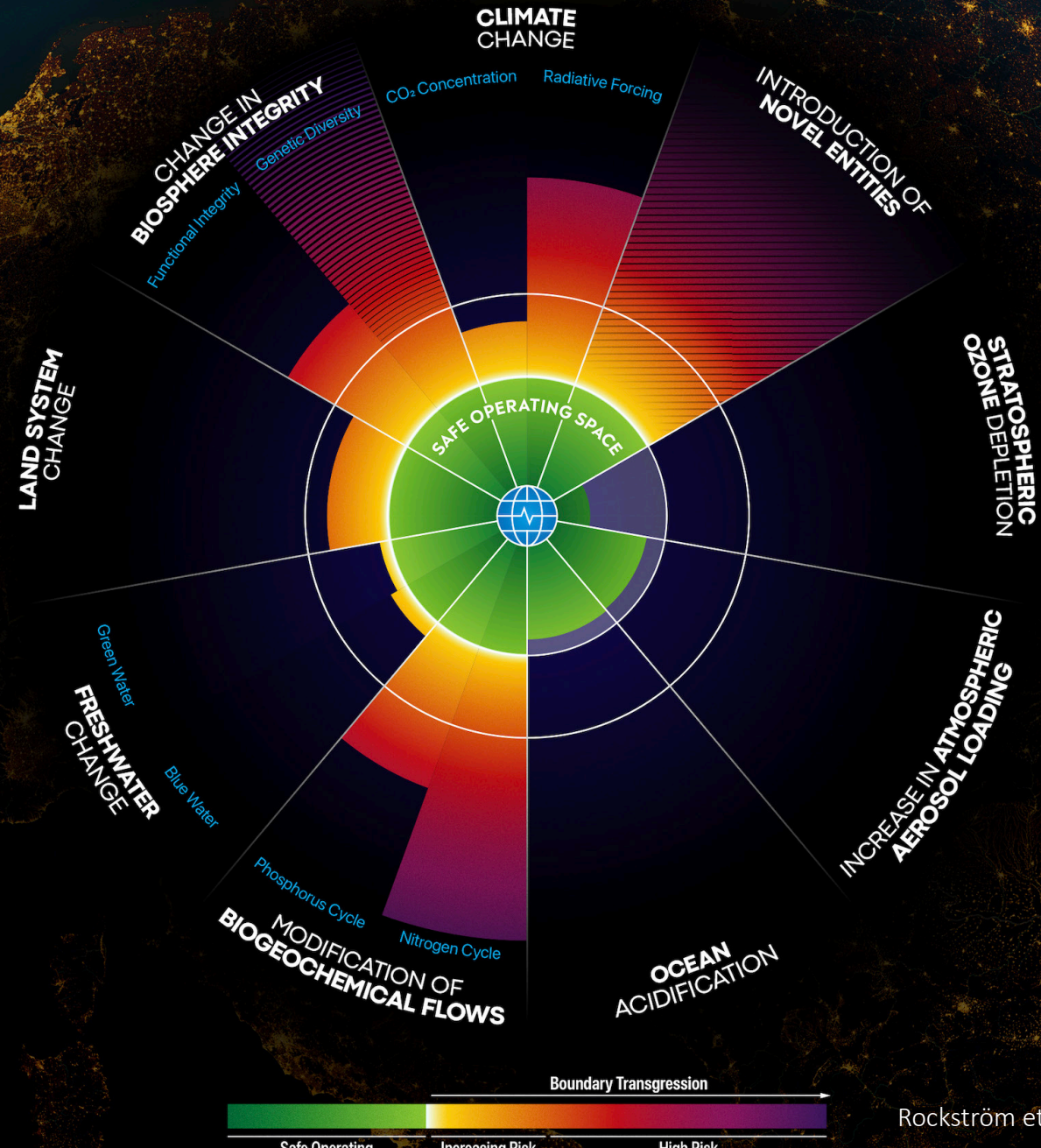
Licensed under CC-BY by the author Hannah Ritchie (2020).

Bringing ecology to the centre

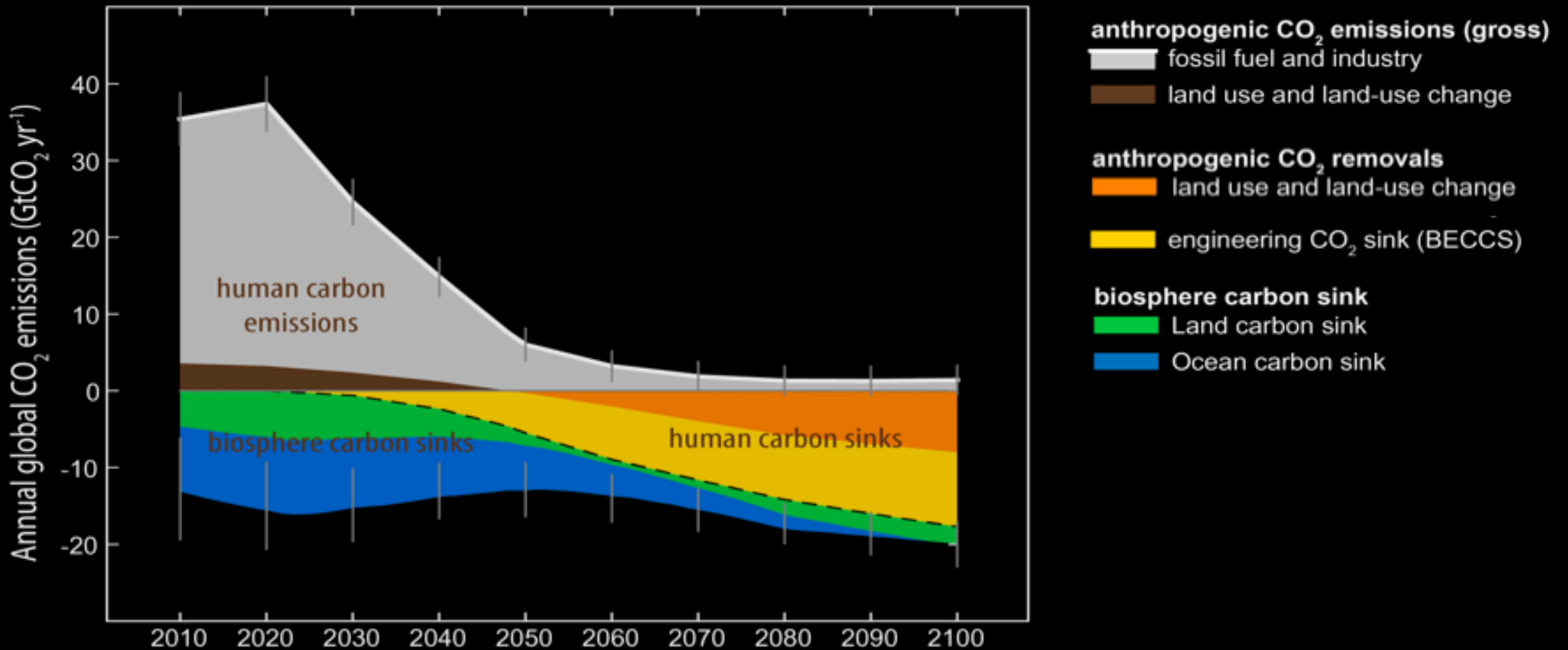


56% of human CO₂ emissions have been absorbed by the biosphere

Planetary boundaries for a safe operating space



A roadmap for rapid decarbonization, the “carbon law”



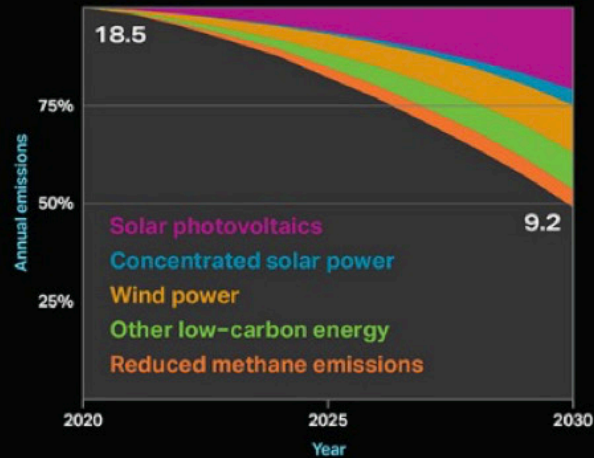
Addressing Dissonance: Solutions exist for the first halving

EXPONENTIAL ROADMAP

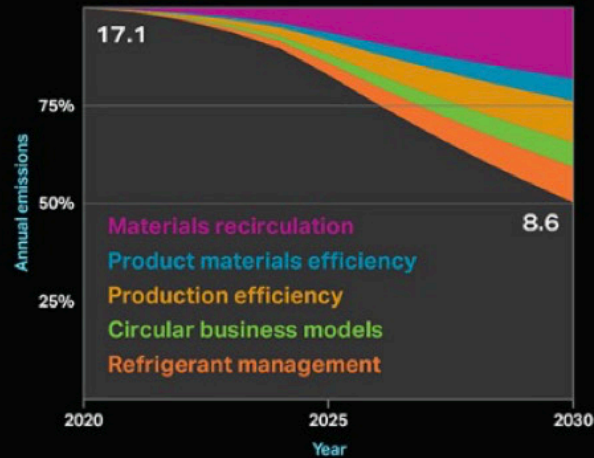
LET'S HALVE GLOBAL EMISSIONS BY

2030

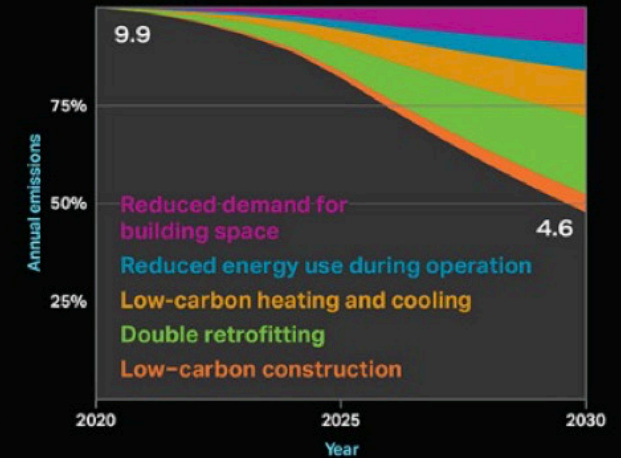
ENERGY SUPPLY



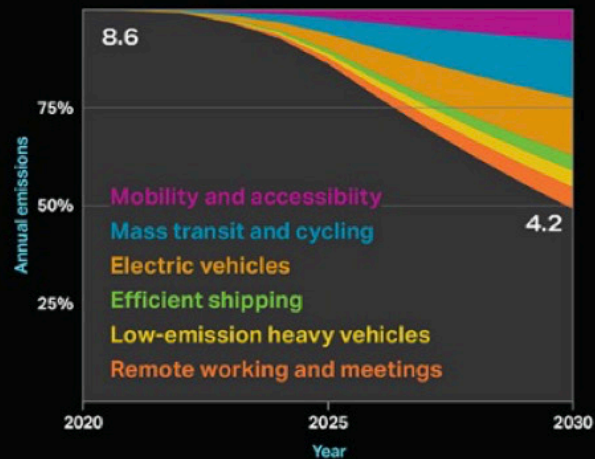
INDUSTRY



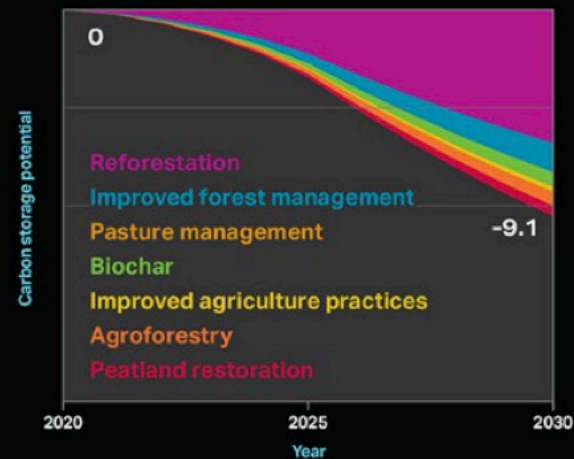
BUILDINGS



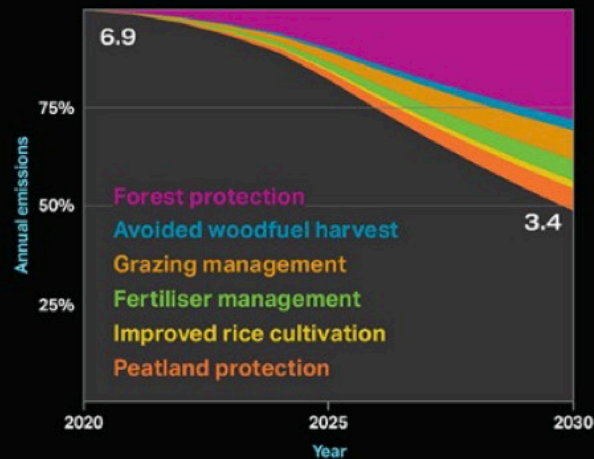
TRANSPORT



NATURE BASED SINKS



NATURE BASED SOURCES



FOOD CONSUMPTION



Addressing Denial: Co-production of knowledge

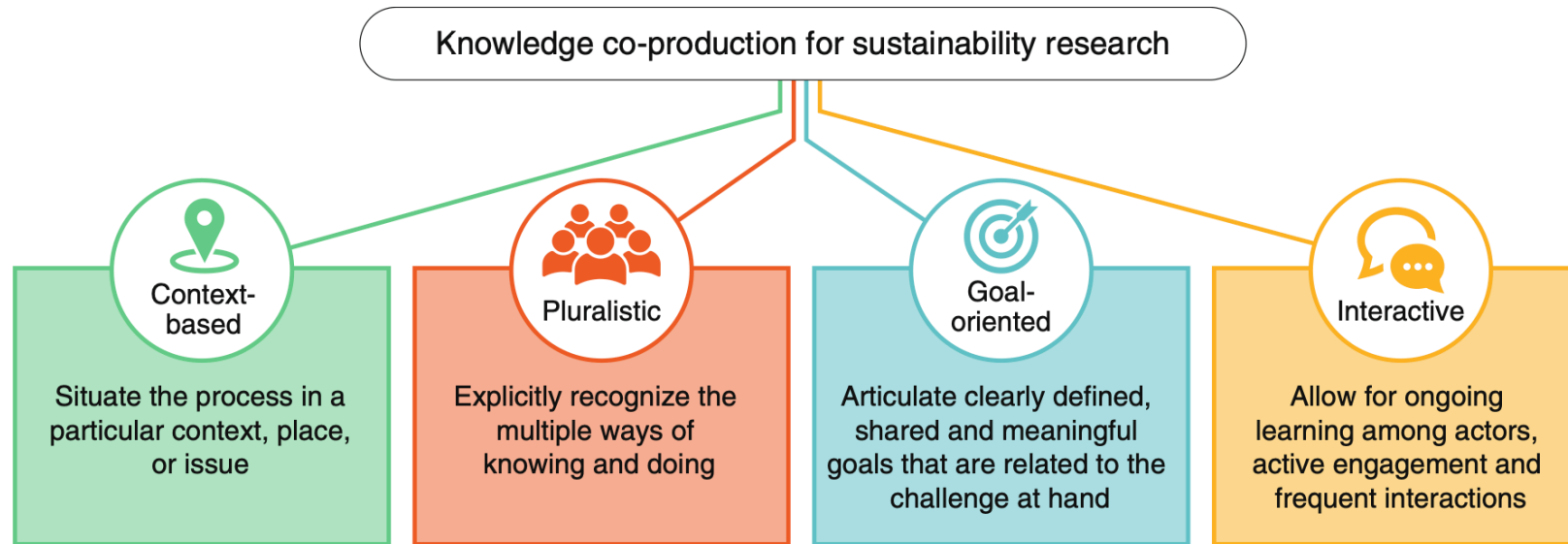


Fig. 1 | Principles for knowledge co-production in sustainability research. High-quality knowledge co-production for sustainability should be context-based, pluralistic, goal-oriented and interactive.

‘Iterative and collaborative processes involving diverse types of expertise, knowledge and actors to produce context-specific knowledge and pathways towards a sustainable future.’

Addressing Identity: Companies are stepping up to the challenge



DRIVING AMBITIOUS CORPORATE

SCIENCE

MAY 24, 2023

**THE FIRST
SCIENCE-BASED
TARGETS FOR
NATURE ARE
HERE**



SCIENCE BASED TARGETS NETWORK
GLOBAL COMMONS ALLIANCE

4264

science-
targets

7049

companies taking action

Reported effects of

- Boosts profitability
- Increases investment
- Drives innovation
- Reduces regulatory uncertainty
- Strengthens brand reputation



United Nations
Global Compact



WORLD
RESOURCES
INSTITUTE



Next step: Executive programme for a just transition



34 presidents and secretaries engaged

All three central unions attending (LO, SACO, TCO)

Together, the participants represent 3.4 million swedes



FAIRTRANS ▶

Keys to success

- **Scientific assessments** need to be credible, salient and legitimate (Cash et al. 2003)
- **Adaptive co-management** succeeds through a shared vision, trust-building, engagement from knowledgeable and diverse actors, support from institutions and a bridging organisation (Armitage et al. 2008)
- **Keystone dialogues** are still in the experimental phase, but early results indicate that they have similar requirements as adaptive co-management – quality of both process and content is key (Österblom et al. 2022)

Summary

When seeking to inform decisions, it is important to consider

- **whose** decisions matter
- **what** information matters to those decisions
- **how** that information can be brought to decision-makers' attention

Scientific assessments, adaptive co-management, and keystone dialogues can all facilitate decisions informed by ecological knowledge, and they each come with a set of challenges, opportunities, and keys to success.



Thank you!

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References

- Armitage**, D. et al. 2008. Adaptive co-management for social–ecological complexity. *Front Ecol Environ* 7(2): 95–102, doi:10.1890/070089
- Cash**, D. et al. 2003. Knowledge systems for sustainable development. *PNAS* 100 (14) 8086-8091
<https://doi.org/10.1073/pnas.1231332100>
- Exponential Roadmap Initiative** 2023 www.exponentialroadmap.org
- Fairtrans** 2024 www.fairtrans.nu
- Folke**, C., et al. 2021. Our future in the Anthropocene biosphere. *Ambio* 50, 834–869. <https://doi.org/10.1007/s13280-021-01544-8>
- Global Carbon Project** 2023
- IPBES** 2019: Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES secretariat, Bonn, Germany. 1148 pages. <https://doi.org/10.5281/zenodo.3831673>
- Norström** A. et al 2020. Principles for knowledge co-production in sustainability research. *Nature Sustainability* 3 (1)
- Our World in Data** 2022. www.ourworldindata.org/CO2-and-greenhouse-gas-emissions
- Richardson** et al. 2023. Earth beyond six of nine Planetary Boundaries. *Science Advances*, 9, 37.
- Rockström** et al 2017. A roadmap for rapid decarbonization. *Science*, 355 (6331)
- Schultz**, L., et al. 2015. Adaptive governance, ecosystem management, and natural capital. *PNAS* 112 (24) 7369-7374
- Science-based targets initiative** 2024. www.sciencebasedtargets.org
- SeaBOS** 2023. www.seabos.org
- Swedish Biosphere Reserves Programme** 2023. www.biosfarprogrammet.se
- Österblom**, H., et al. 2022. Scientific mobilization of keystone actors for biosphere stewardship. *Sci Rep* 12, 3802. <https://doi.org/10.1038/s41598-022-07023-8>
- Österblom** H, et al. 2015. Transnational Corporations as ‘Keystone Actors’ in Marine Ecosystems. *PLoS ONE* 10(5): e0127533. <https://doi.org/10.1371/journal.pone.0127533>