Why care about biodiversity?

SWESIF Webinar on Biodiversity and Finance

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GLOBAL ECONOMIC DYNAMICS AND THE BIOSPHERE
THE ROYAL SWEDISH ACADEMY OF SCIENCES

Stockholm Resilience Centre
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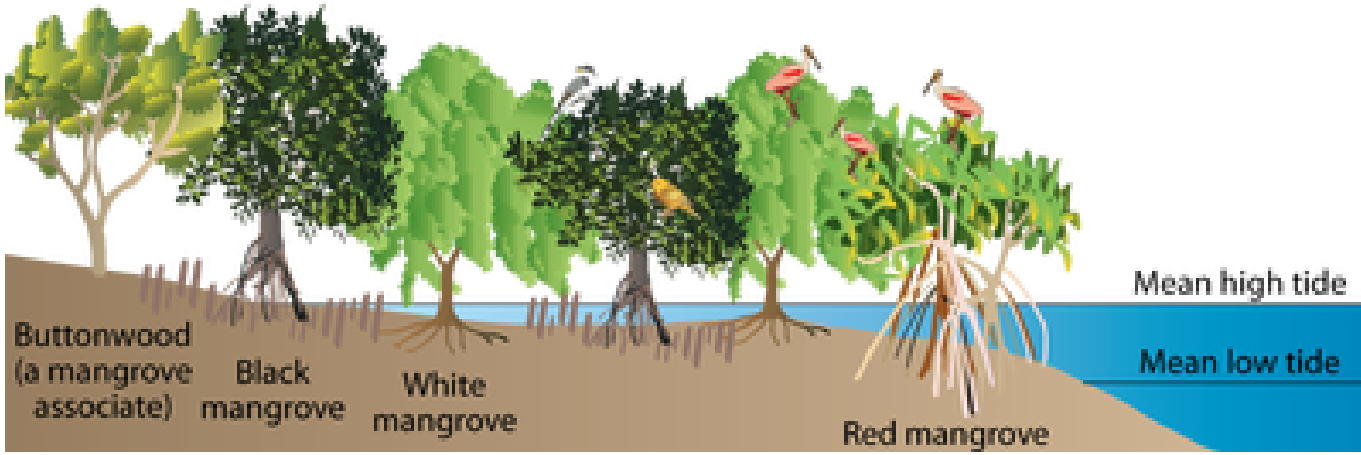
The Economics of Biodiversity: The Dasgupta Review
IPBES-IPCC CO-SPONSORED WORKSHOP
BIODIVERSITY AND CLIMATE CHANGE
Scientific outcome

Diversity within species

Diversity between species



Diversity between (types of) ecosystems

What is the problem with having a few high-performing species in a system?

Or similar ecosystems across an entire region?

Main reason: homogenization (low diversity)

712mSEK in costs
>100mSEK above 10 year average
(610mSEK)

Länsförsäkringar

news.cision.com / Länsförsäkringar / Skogsbränder slår rekord i kostnader

Skogsbränder slår rekord i kostnader

TOR, FEB 21, 2019 06:30 CET

När Länsförsäkringar summerar 2018 års kostnader för naturskador sticker sommarens skogsbränder ut. Normalt står stormskador, översvämningar, åska, snötryck och frysskador för de största kostnaderna.
– 2018 års nota för extrema väderhändelser landar på 712 miljoner, att jämföra med ett snitt på 610 miljoner för de senaste tio åren, säger Johan Litsmark, naturskadespecialist på Länsförsäkringar.

Samhällets totala kostnader för skogsbränderna 2018 är ännu inte sammanställda. Bränderna i Västmanland 2014 där drygt 14 000 hektar eldhärjades slutade på en miljardnota, sommaren 2018 brann 25 000 hektar. En större andel skog var försäkrad i Länsförsäkringar i de områden som brann 2014 och kostnaderna för länsförsäkringsgruppen var därför större än för 2018 års skogsbränder.

USDA
United States Department of Agriculture
U.S. FOREST SERVICE
Caring for the land and serving people
CLIMATE CHANGE RESOURCE CENTER

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EDUCATION TOPICS ADAPTATION TOOLS LIBRARY

Establish natural or artificial fuel breaks to slow the spread of catastrophic fire

Approach

Increased warming and drying driven by climate change has increased fire-season fuel aridity to accelerate forest fire activity in many parts of the U.S. (Abatzoglou & Williams 2016; Westerling et al. 2006). Under these conditions, wildfire can expand quickly affecting large areas in a short duration of time. Establishing fuel breaks can constrain fire spread or reduce fire intensity by reducing flame lengths, which may enhance fire suppression efforts and limit the extent of carbon losses during wildfire. Establishing fuel breaks are often complimentary to management actions that reduce fuel loads (Agee et al. 2000).

Tactics

Search CCRC

RELATED TO THIS APPROACH:

Regions

Midwest
Northeast

REDUNDANCY IN FUNTION

Birch

Fire resistant
Susceptible to drought

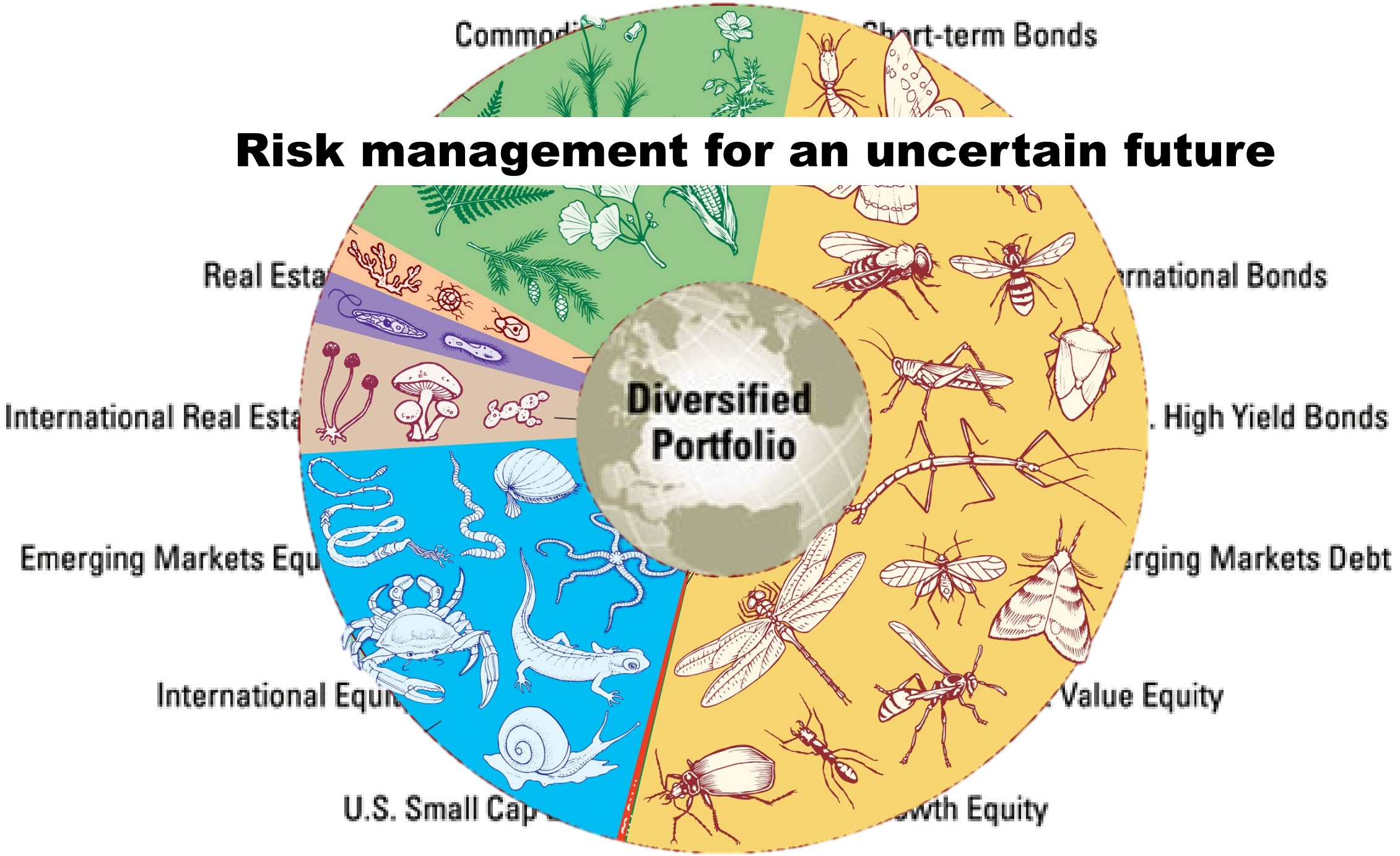
Spruce

Burns easily
Susceptible to bark beetles
Susceptible to storms + drought

Pine

Fire resistant
Resilient to storms
Susceptible to moose grazing

Risk management for an uncertain future



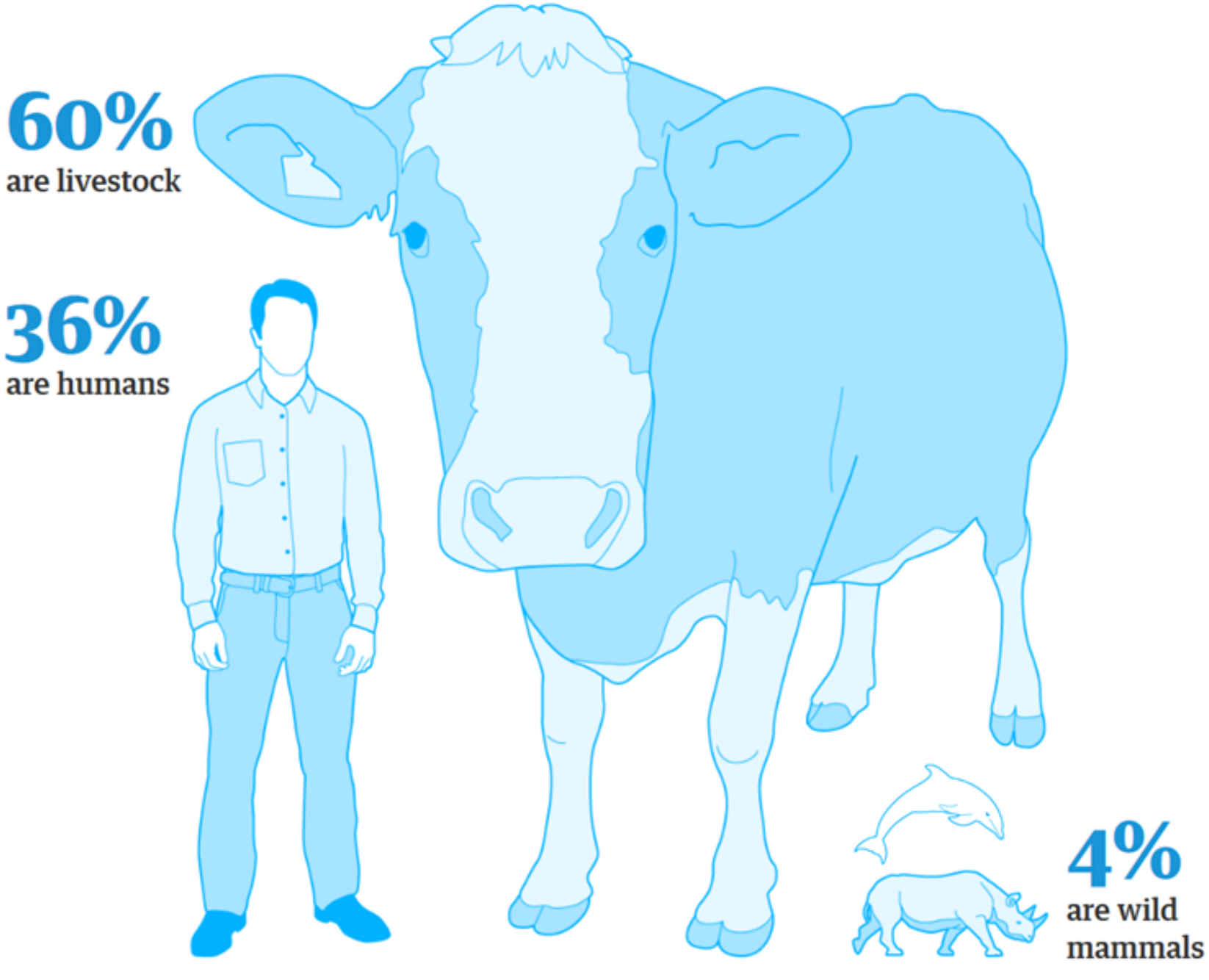
CURRENT TRENDS

- ~1 million species (animals/plants/fungi) are currently threatened with extinction – on land and in water
- Across species groups and habitats – ~25% of species are threatened

- The biomass of the world's vegetation has declined by 50%
- Forests span only 68% of preindustrial extent
- Global biomass of wild mammals <25% of numbers before latest mass extinction

IPBES 2019, Diaz et al 2019



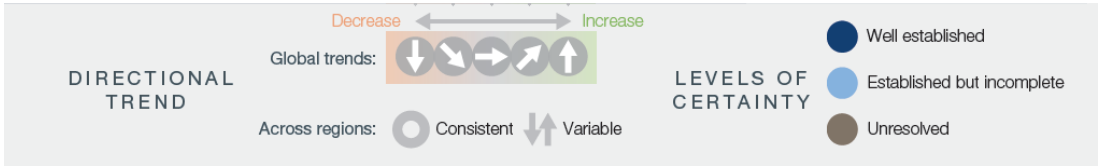
Bar-On et al. 2018 PNAS

Nature's contribution to people

- Materials and assistance
- Regulation of environmental processes
- Non-material contributions

Since 1970, production of bioenergy, food, feed, fiber, and other materials have increased

~80% of these other contributions nature makes to humans have declined



IPBES Global Assessment 2019

>75% of global food crop types rely on animal pollination

Insects are also fundamental to crop pest control

More than 75% decline in total flying insect biomass over the last ~30 years

“Windshield phenomenon”

$235 – $577 billion in annual global crop output is at risk as a result of pollinator loss (*IPBES 2019*)

Hallman et al (2017) More than 75 percent decline over 27 years in total flying insect biomass in protected areas. *PLoS One*

DRIVERS OF BIODIVERSITY DECLINE

- Lack of internalization of externalities

Manufacturing and service sectors have embedded biodiversity loss in their supply chains – because of the resources used in input technology or material

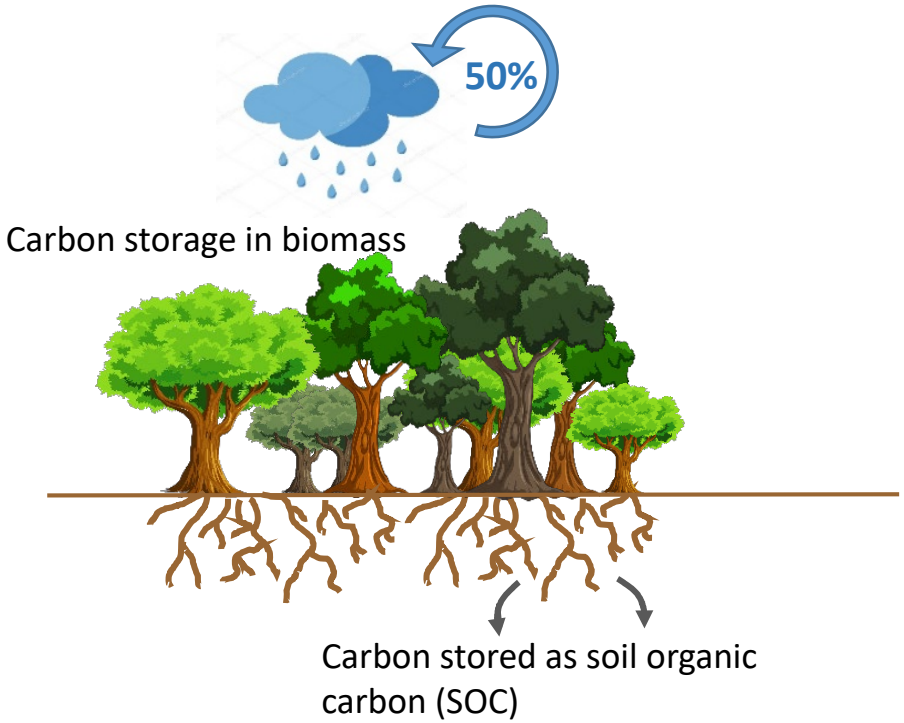
As investors, what are the risks of large-scale biodiversity loss?

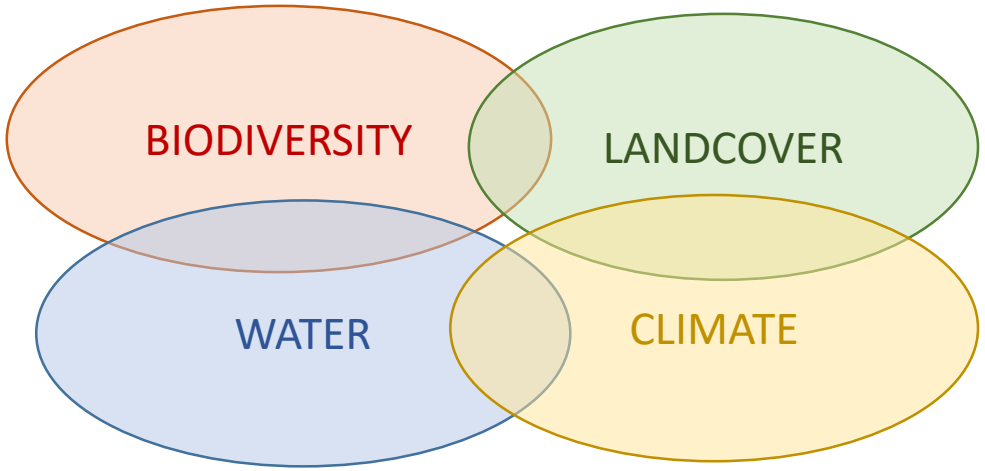
Crona et al (2021) The Anthropocene reality of financial risk. *One Earth*

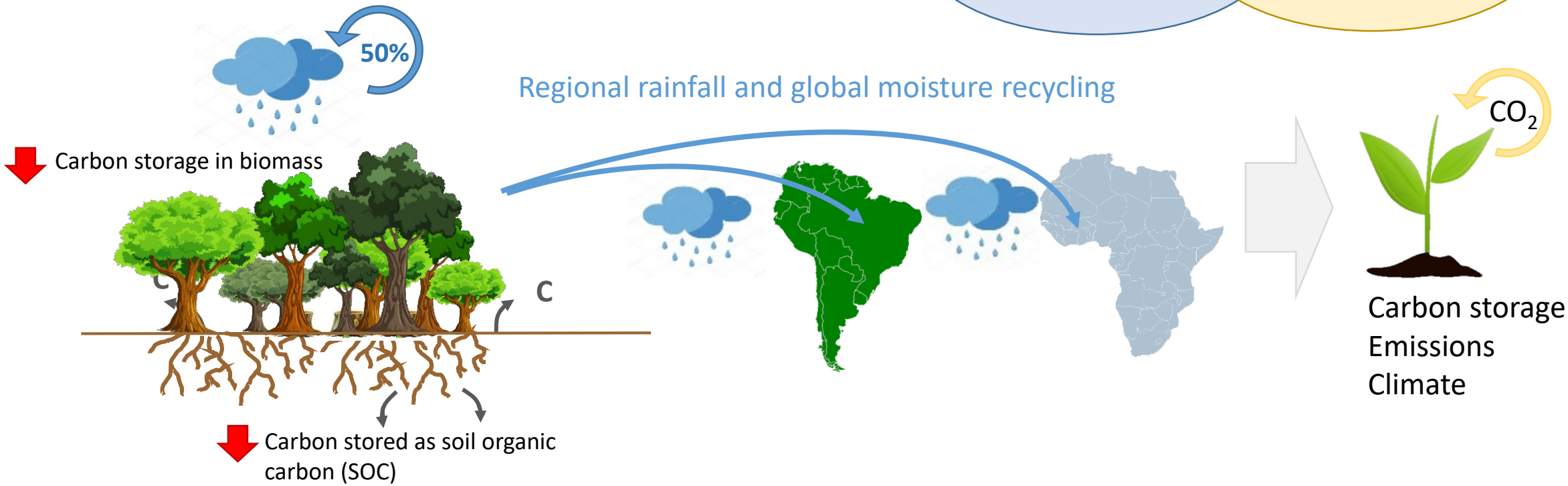
Biodiversity loss

Company X

Crona et al (2021) The Anthropocene reality of financial risk. *One Earth*


50%
Carbon storage in biomass
Carbon stored as soil organic carbon (SOC)





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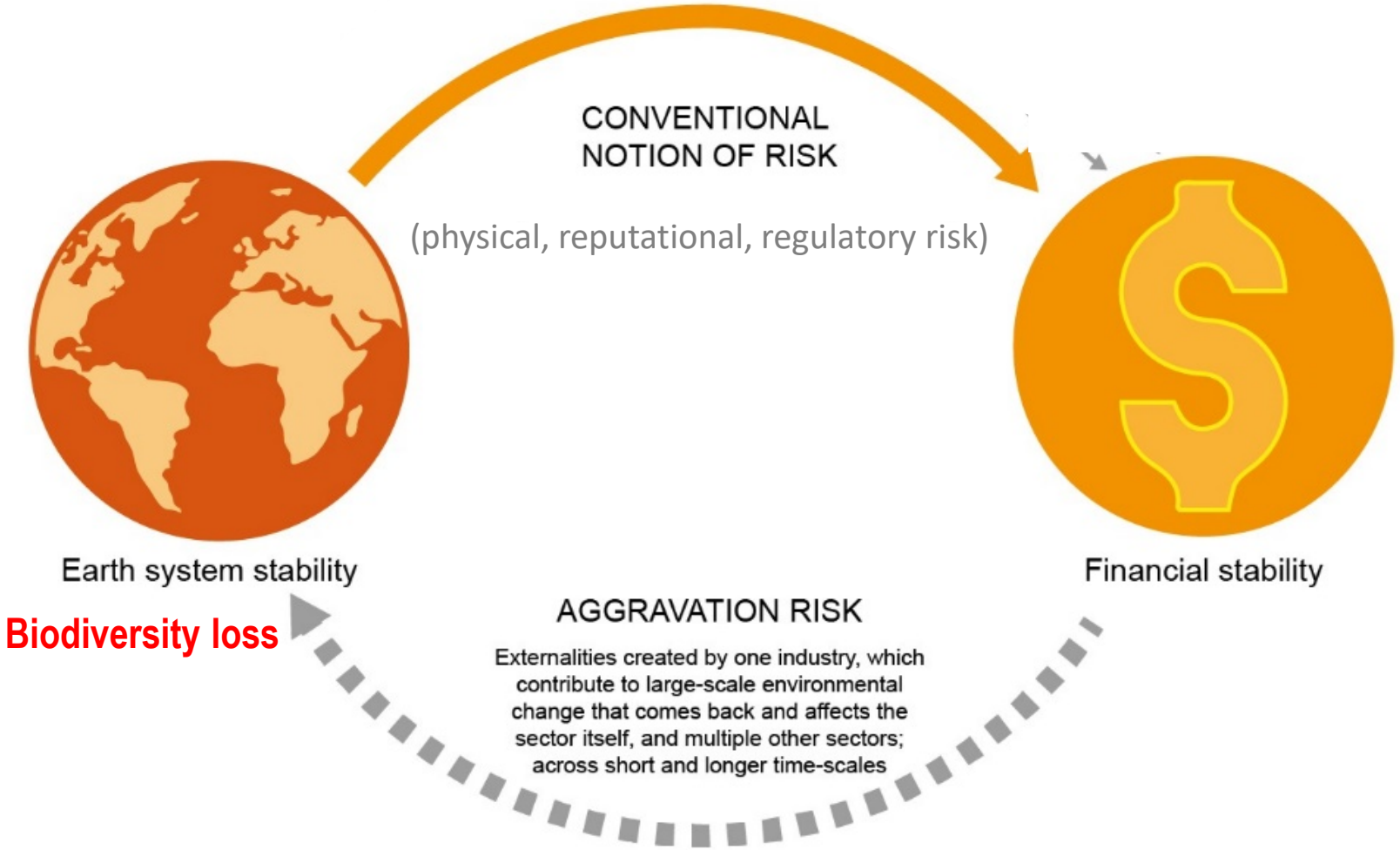

Crona et al (2021) The Anthropocene reality of financial risk. *One Earth*

WALRAS

Gustav Engström (PhD)
Researchers, Beijer Institute of Ecological Economics

Johan Gars (PhD)
Researchers, Beijer Institute of Ecological Economics

Economics of global environmental problems

We are (macro) economists researching the interaction between the global economy and the environment

Typical economic modeling:

- how market forces determine the use of inputs such as labor and capital (and energy and land)
- what types of interventions can improve on the market outcome (e.g., due to external effects)

For instance, the study of climate economics gives support for implementing carbon taxes or tradable emission permits

General equilibrium modeling

The effects of any change ripples through the economy and the total effect is the net of many different changes

General equilibrium modeling is commonly used in this context (e.g. EMEC developed and used by The National Institute of Economic Research)

To make this method of analysis more accessible, we are developing a modeling and visualization tool: Walras

Here:
- analyze the issue of climate change and biodiversity
- consider an increased cost of capital in the fossil energy sector

A simplified model but the main conclusions are robust to more detailed settings

(Closely related to Engström et al. “Carbon pricing and planetary boundaries”, *Nature Communications*, 2020)

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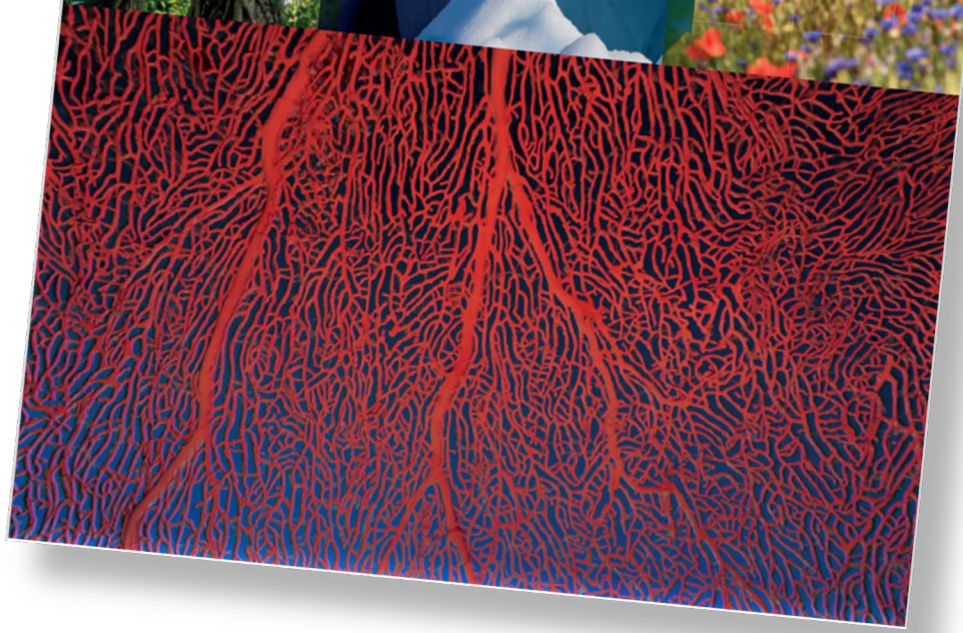
Scientific outcome



SCANNING THE HORIZON

- ESG investments are rising – $35.3 trillion in 2020
  15% increase in sustainably invested assets 2018-2020
  (compared to 34% 2016-2018)

Global Sustainable Investment Alliance (biannual report 2020)

2020 - Global Sustainable Investments reached **$35.3 trillion** (in in five major markets)

Without a clear benchmark – relative measures will not be enough to reduce the harm and shift unsustainable trajectories

(GLOBAL SUSTAINABLE INVESTEMENT ALLIANCE 2020)