Harmony with the World: Bold Insurance & Actuarial Pathways for Environmental Sustainability

Gustavo Cabrera, ASA, CERA

Suramericana - SOA - University of Oxford

5th European
Congress of Actuaries
www.eca2024.org

About the speaker

Gustavo Cabrera, ASA, CERA - Actuarial Director in Suramericana

Gustavo was born and raised in the Dominican Republic. Studied Mathematics with a concentration in Statistics and Actuarial Sciences in Santo Domingo. He moved to Medellin, Colombia in 2015, to work in the Corporate Office in Suramericana. Nowadays, he is a candidate for the MSc in Biodiversity, Conservation and Management at the University of Oxford.

Suramericana is one of the largest Latin American Insurance companies, with a presence in 7 countries in the region and a Reinsurer / Captive facility in Bermuda.

USD 6.6 billion GWP (2023) **+ 20k clients** **+20k Employees**

Today‘s Agenda

- Historical Relationship between the Economy and Insurance Industry
  - Importance of Nature for Society and the Economy
- Economics for the Environment - Different Strands in Economics
- Environmental Economics
  - Specific Application Cases from the Insurance Industry Perspective
- Ecological Economics
  - Rethinking the Insurance Industry within Ecological Economics

Historical Insurance Industry and Economy Nexus

In ancient **Babylon and China**, merchants mitigated risks by distributing goods across **multiple ships** (Harford, 2017).

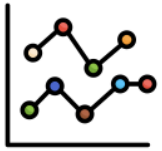
The **Hammurabi Code in 1750 BC** introduced methods to limit losses by allocating additional funds in instances of theft or cancellation (Thompson, 2022).

First independent insurance policy documented in **Genoa, 1347** (Harford, 2017).

The **United Kingdom** introduced its **first insurance legislation** in 1601 (Brazda, 2020).

Global **GWP** now **exceed** the **combined GDP** of countries like Spain, France, and Italy (Hernandez, Joaquin, 2022).

While research on the **relationship** between insurance and economic growth is, studies have shown varying results (Kugler & Ofoghi,2005; Ward & Zurbruegg, 2000), highlighting the need for more **nuanced analysis** (Ege & Saraç, 2011).



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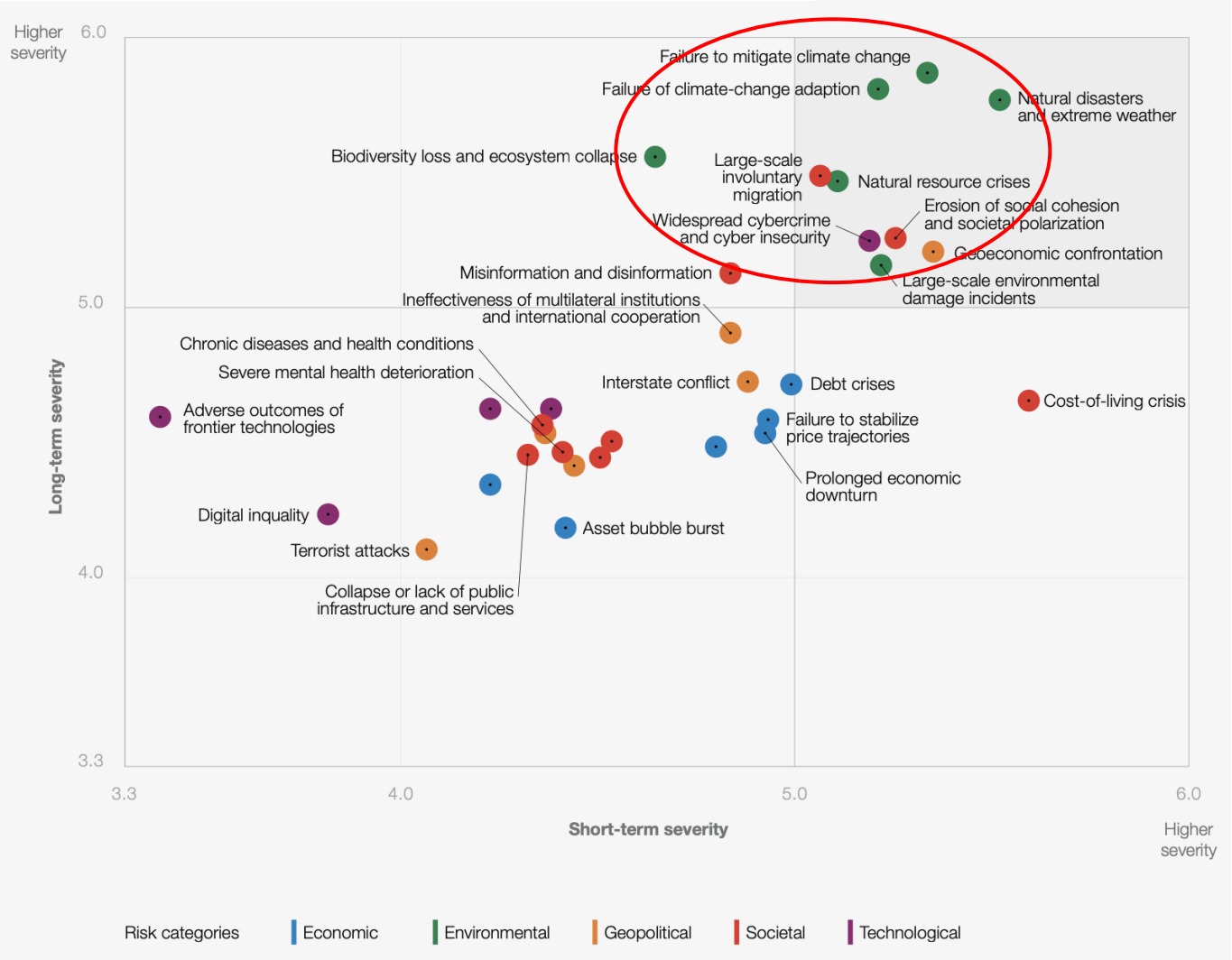
THE NEXUS BETWEEN INSURANCE AND ECONOMIC ACTIVITY IS EVIDENT

Nature‘s relevance in current socio-economic wellbeing

Relative severity of risks over a 2 and 10-year period

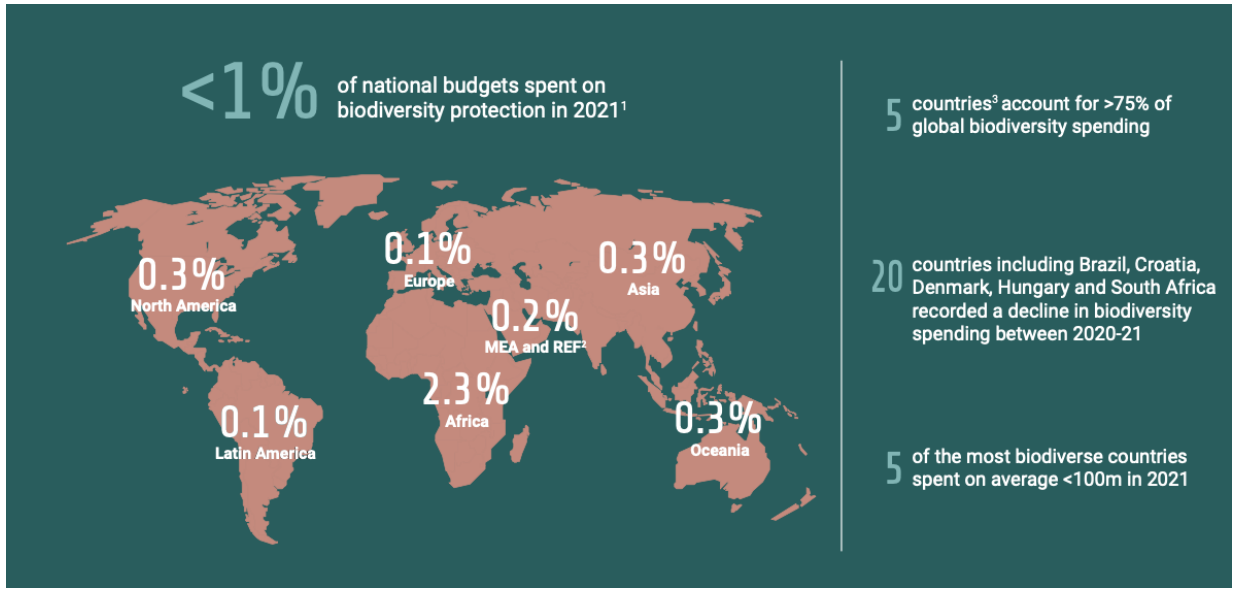


World Economic Forum, 2023

Nature‘s relevance in current socio-economic wellbeing

	Nature's contribution to people	50-year global trend	Directional trend across regions	Selected indicator
REGULATION OF ENVIRONMENTAL PROCESSES	1 Habitat creation and maintenance	↓ ↓	○ ○	• Extent of suitable habitat • Biodiversity intactness
	2 Pollination and dispersal of seeds and other propagules	↓ ↓	○ ○	• Pollinator diversity • Extent of natural habitat in agricultural areas
	3 Regulation of air quality	↘	↑↓	• Retention and prevented emissions of air pollutants by ecosystems
	4 Regulation of climate	↘	↑↓	• Prevented emissions and uptake of greenhouse gases by ecosystems
	5 Regulation of ocean acidification	→	↑↓	• Capacity to sequester carbon by marine and terrestrial environments
	6 Regulation of freshwater quantity, location and timing	↘	↑↓	• Ecosystem impact on air-surface-ground water partitioning
	7 Regulation of freshwater and coastal water quality	↘	○	• Extent of ecosystems that filter or add constituent components to water
	8 Formation, protection and decontamination of soils and sediments	↘	↑↓	• Soil organic carbon
	9 Regulation of hazards and extreme events	↘	↑↓	• Ability of ecosystems to absorb and buffer hazards
	10 Regulation of detrimental organisms and biological processes	↓ ↘	○ ○	• Extent of natural habitat in agricultural areas • Diversity of competent hosts of vector-borne diseases
MATERIALS AND ASSISTANCE	11 Energy	↗ ↘	↑↓ ↑↓	• Extent of agricultural land—potential land for bioenergy production • Extent of forested land
	12 Food and feed	↗ ↓	↑↓ ↑↓	• Extent of agricultural land—potential land for food and feed production • Abundance of marine fish stocks
	13 Materials and assistance	↗ ↘	↑↓ ↑↓	• Extent of agricultural land—potential land for material production • Extent of forested land
	14 Medicinal, biochemical and genetic resources	↘ ↓	○ ○	• Fraction of species locally known and used medicinally • Phylogenetic diversity
NON-MATERIAL	15 Learning and inspiration	↓ ↓	○ ○	• Number of people in close proximity to nature • Diversity of life from which to learn
	16 Physical and psychological experiences	↘	○	• Area of natural and traditional landscapes and seascapes
	17 Supporting identities	↘	○	• Stability of land use and land cover
	18 Maintenance of options	↓ ↓	○ ○	• Species' survival probability • Phylogenetic diversity

IPBES, 2019



UNEP, 2023

WEF, 2020:

- 50% modern drugs developed from natural products
- Insects are also the world's top pollinators: 75% of the 115 top food crops rely on animal pollination
- 50% of the GVA of supply chains is highly or moderately dependent on nature

Economics for the Environment

Different Strands in Economics

Neo-Classical Economics

- The economy as an **isolated system** in which abstract exchange value circulates between firms and households
- **No opportunity cost** of economic growth
- Technology could **substitute** the destruction of nature
- Rational decision-making to maximize profit or utility
- Traditionally uses monetary measures (**GDP**) to assess economic performance without considering environmental or social factors comprehensively

Environmental Economics

- Focuses on the relationship between the economy and the environment, **considering the impact** of economic activities in the ecosystems and natural resources
- Incorporates **valuing** natural resources, pollution and ecosystem services
- Seeks to **internalize** externalities
- **Decoupling** between increasing growth and environmental impact

Ecological Economics

- Recognizes the human economy as a **subsystem of the biosphere**, subject to **biophysical constraints** – Supported by the **laws of Thermodynamics.**
- Recognizes the **finite nature of natural resources** and the importance of maintaining ecological resilience and biodiversity for long-term sustainability
- **Challenges the growth-oriented paradigm** of neo-classical economics and advocates for **alternative measures of well-being** beyond GDP, such as GPI and ecological footprint analysis.

Economics for the Environment

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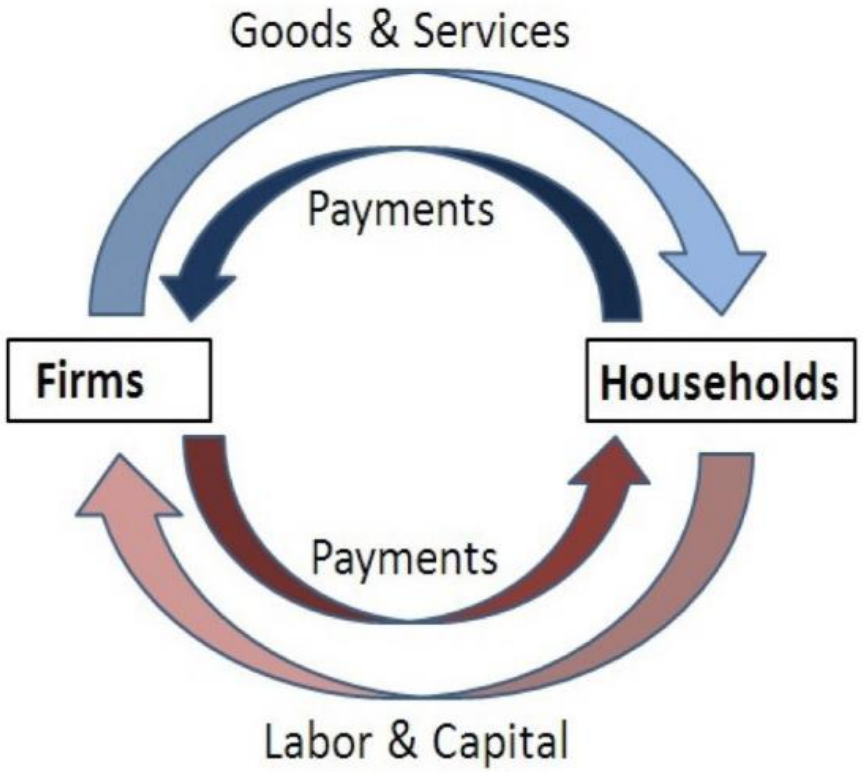

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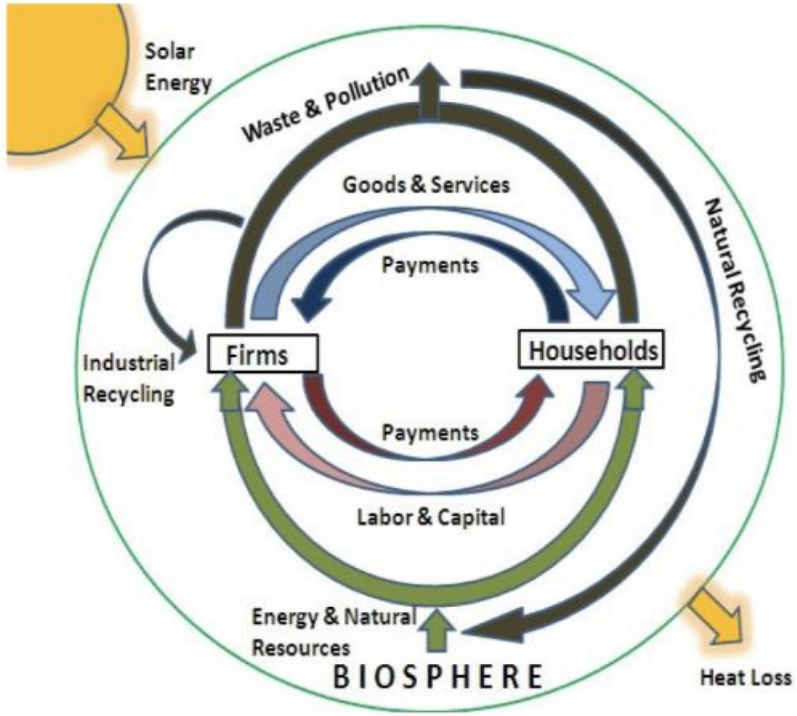
Ecological Economics



'Monetary and Fiscal Policies for a Finite Planet' (Farley, et al., 2013)

Landmarks in the History of Economics

17th/ 18th C

- French Physiocrats considered Land as the main source of wealth
- W. Petty (1667): Labor and Land as mother and father of value, respectively.

19th C

- D. Ricardo (1817): Land as a constraint
- Malthus (1820): Labor commanded theory of value

20th C

- Pigou (1920s): Taxes solve externalities
- Kuznets (1937): Presents the GDP formulation
- R. Sollow (1956): Land is not considered in the production function

1970s

- Georgescu Roegen (1971): Entropy Law and economy
- Stockholm conference (1972)
- Meadows (1972): Limits to growth
- I. Sachs (1974: Development Concept
- Solow (1974): 'Technology can overcome scarcity'
- Daly (1977): Steady State Economics

1980s

- Costanza (1980) Embodied energy of services
- WCED report 'Our Common Future' (1987)
- Martinez-Alier (1987): Ecological Economics
- Foundation of the ISEE (1989)

1990s

- Costanza &Daly (1992) Natural Capital
- Daly (1997) Nature's services
- Costanza (1997): Valuation of ES
- PES launched in Costa Rica (1997)

Adapted from: Gómez-Baggethun, et al., 2009

Environmental Economics Strand

Nature-based solutions (NbS): actions that involve working with and enhancing nature to address societal goals, while producing local benefits for biodiversity and human wellbeing (Seddon et al., 2009). Include **protection, restoration, management, creation**

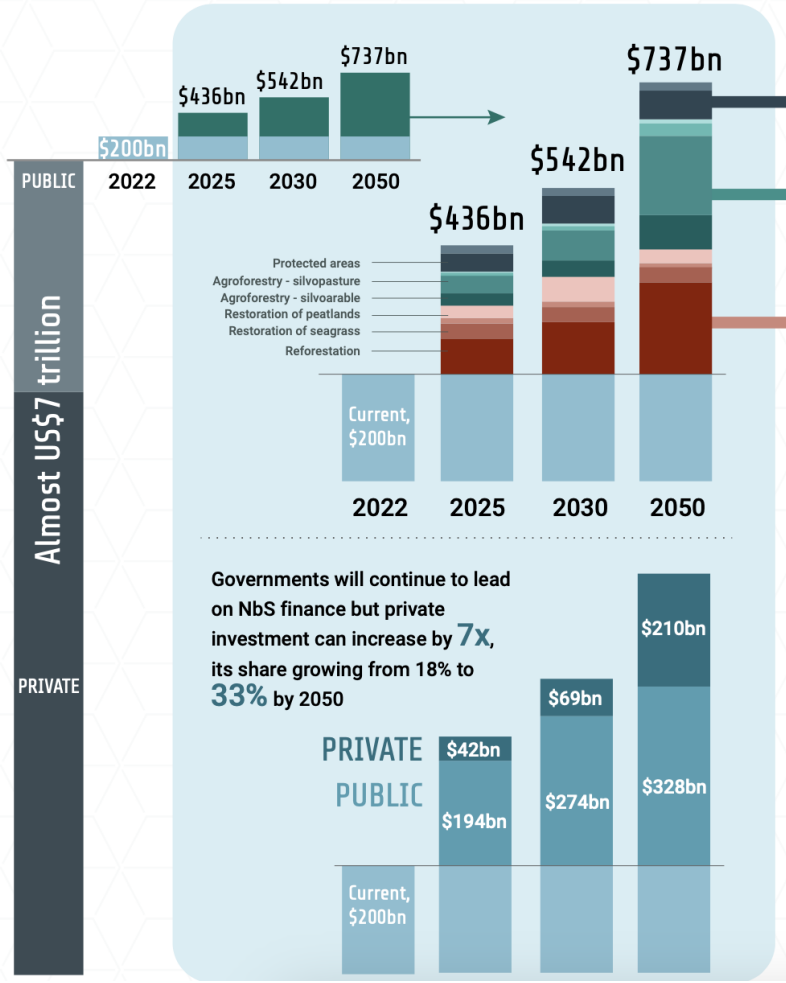
(2008)

Eco-Modernist Manifesto: 'A good Anthropocene demands that humans use their growing social, economic, and technological powers to make life better for people, stabilize the climate, and protect the natural world '.

(2015)

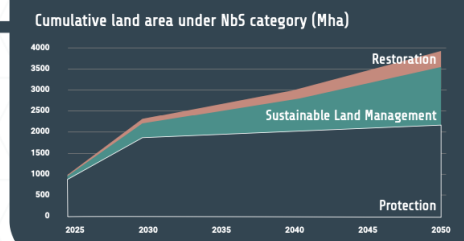
Environmental Economics Strand

Annual NbS investment to meet Rio targets needs to almost triple from US$200 billion to US$542 billion by 2030



NbS provide cost-effective opportunities to deliver on Rio targets

Protection



Protection represents 80% of additional land area needed for NbS due to its cost-effectiveness while absorbing only 20% of additional NbS finance by 2030

Sustainable Land Management

Investment in sustainable land management with revenue streams to increase 4x from US$63 billion in 2025 to US$241 billion in 2050 providing big opportunities to scale private investment

Restoration

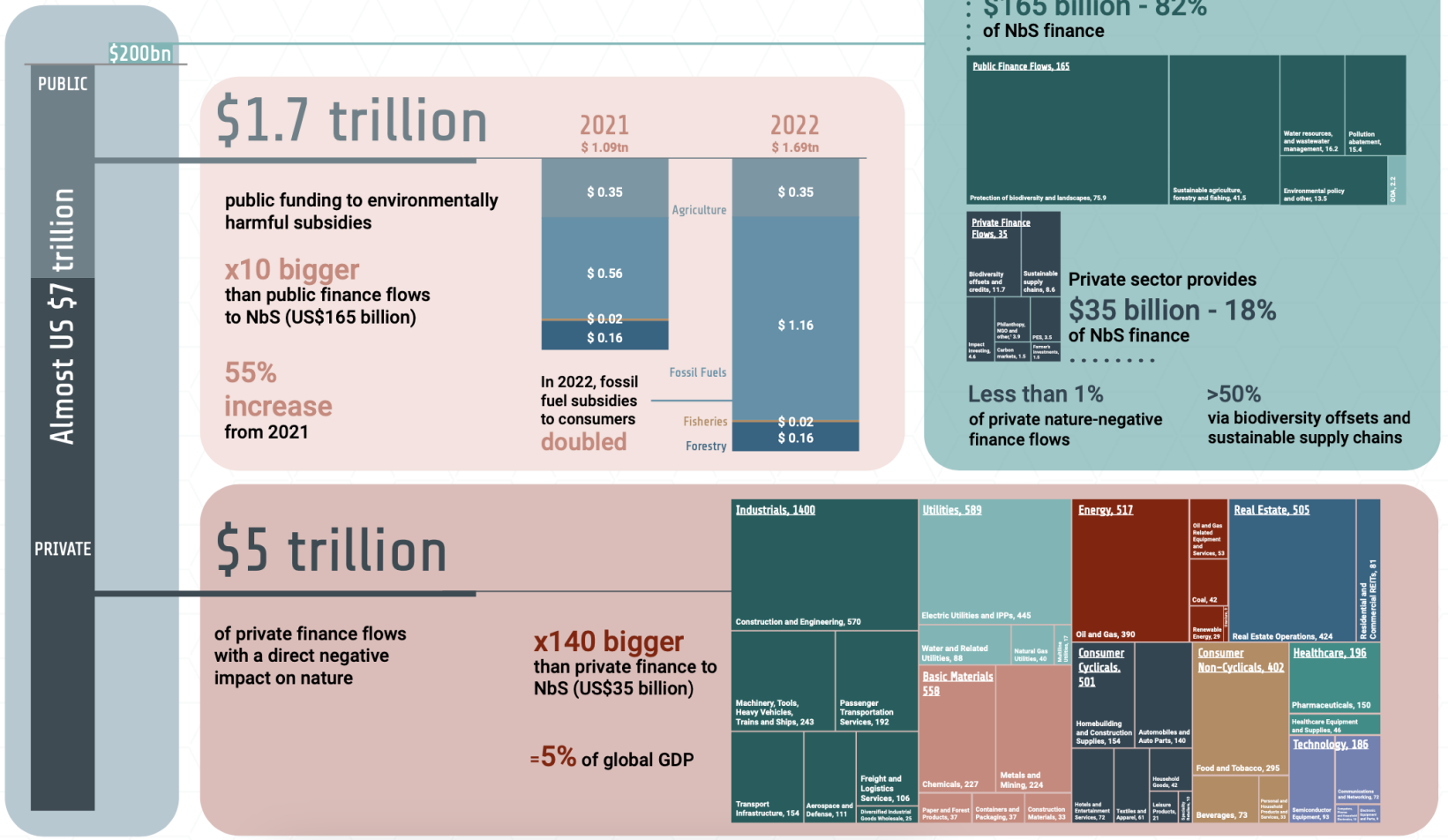
Investment needs for restoration double from US$125 billion in 2025 to US$227 billion in 2050 due to extent of land degradation

But without a big turnaround on nature-negative finance flows, increased finance for NbS will have limited impact

UNEP, 2023

Environmental Economics Strand

Current finance flows to NbS of US$200 billion are massively outweighed by finance flows with direct negative impacts on nature of almost US$7 trillion



$200 billion Total finance flows to NbS

Governments provide
$165 billion - 82%
of NbS finance

Private sector provides
$35 billion - 18%
of NbS finance

Less than 1%
of private nature-negative finance flows

>50%
via biodiversity offsets and sustainable supply chains

Conservation funding gap

USD 700 Bn annually

(Targets 18 and 19-GBF, 2022)

UNEP, 2023

Environmental Economics Strand

Challenges for Nature-based solutions

Misalignment of social and commercial returns: beneficiaries of investments different from those who pay; how to capture the positive externality created by investing in resilience?

Difficult to monetize commercial returns in some cases

Novelty

Long timescales pf projects

Policy and regulatory environment

Difficulties quantifying and validating results

Smaller project size, high risk

High upfront transaction cost

Local specificity

Van Raalte & Ranger, 2023

Environmental Economics Strand

Specific Case – Carbon Credits

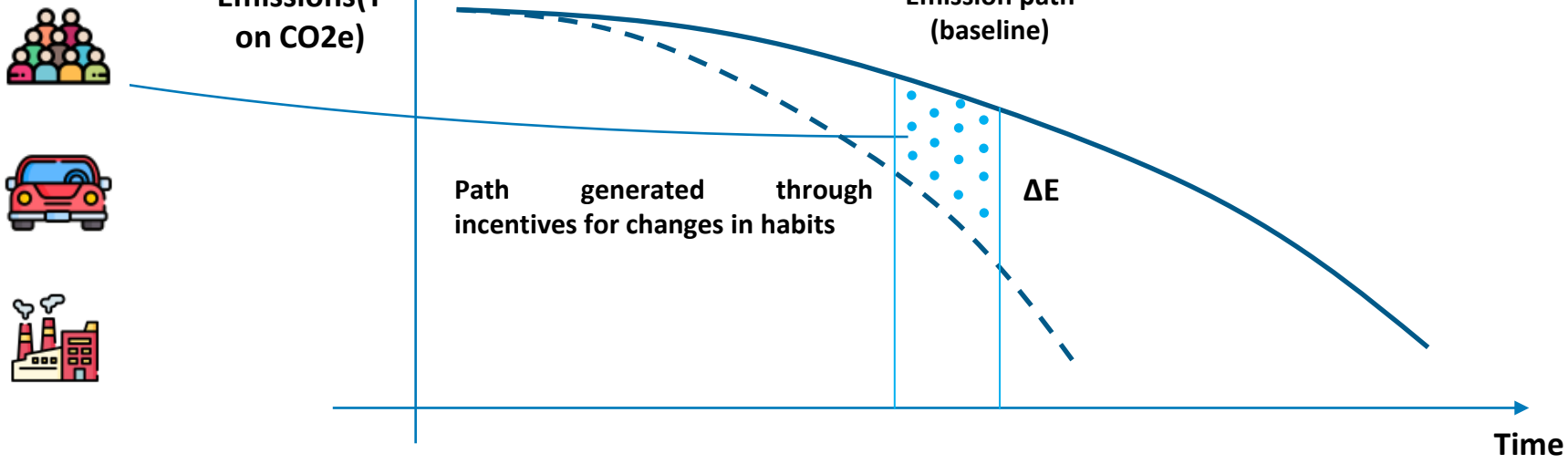
Product : Carbon Credits

1. **ΔE: Emissions reduction**
2. **ΔE: Emissions capture**

Product

1. Emission Allowances (RM)
2. **Carbon Credits(VM)**

ΔE: Unit of measurement of the decrease in carbon emissions that a company or person decreases with respect to its baseline of carbon emissions for a given time. Also, the unit of measurement of the capture of carbon emissions



Environmental Economics Strand

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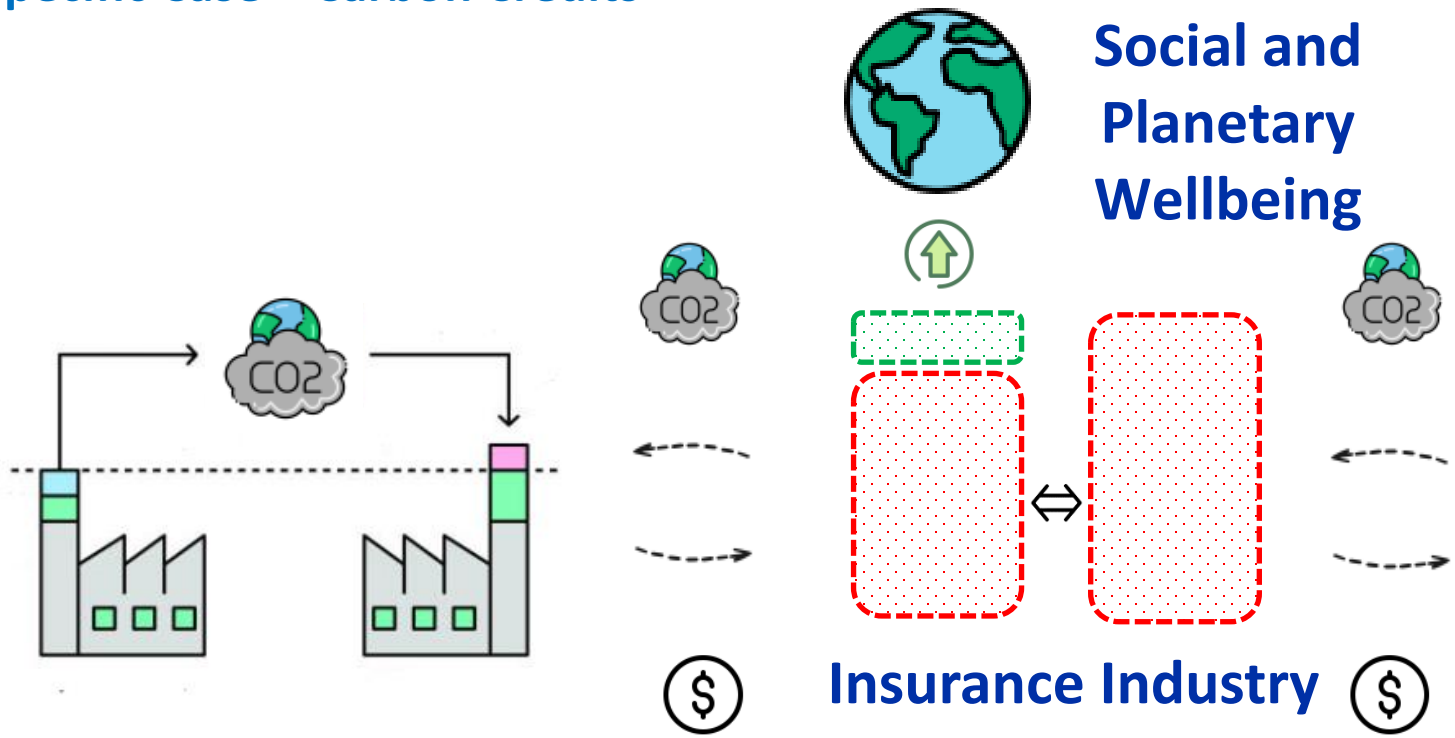


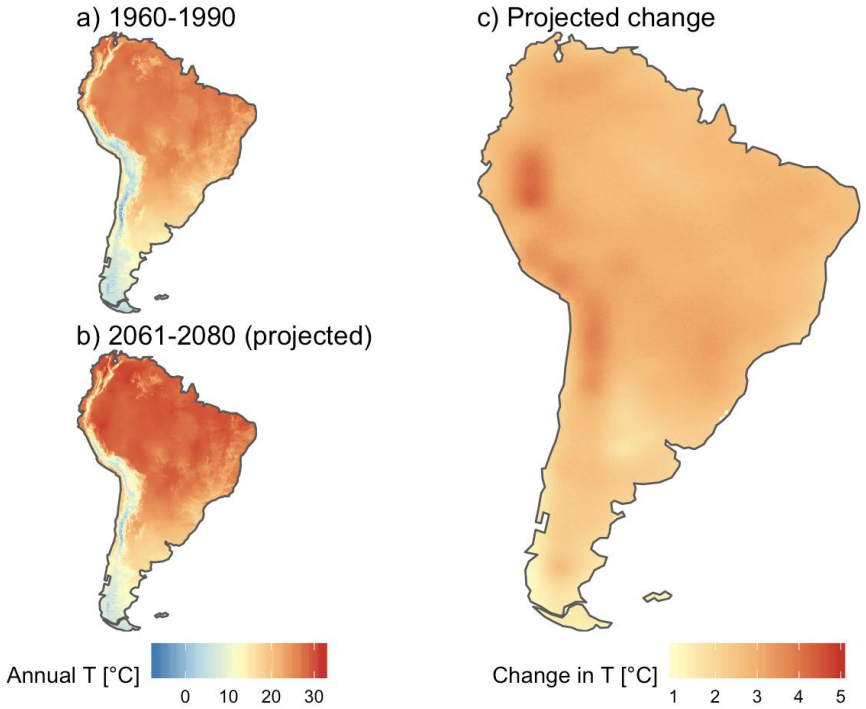
Regulated Market

Voluntary Market

Environmental Economics Strand

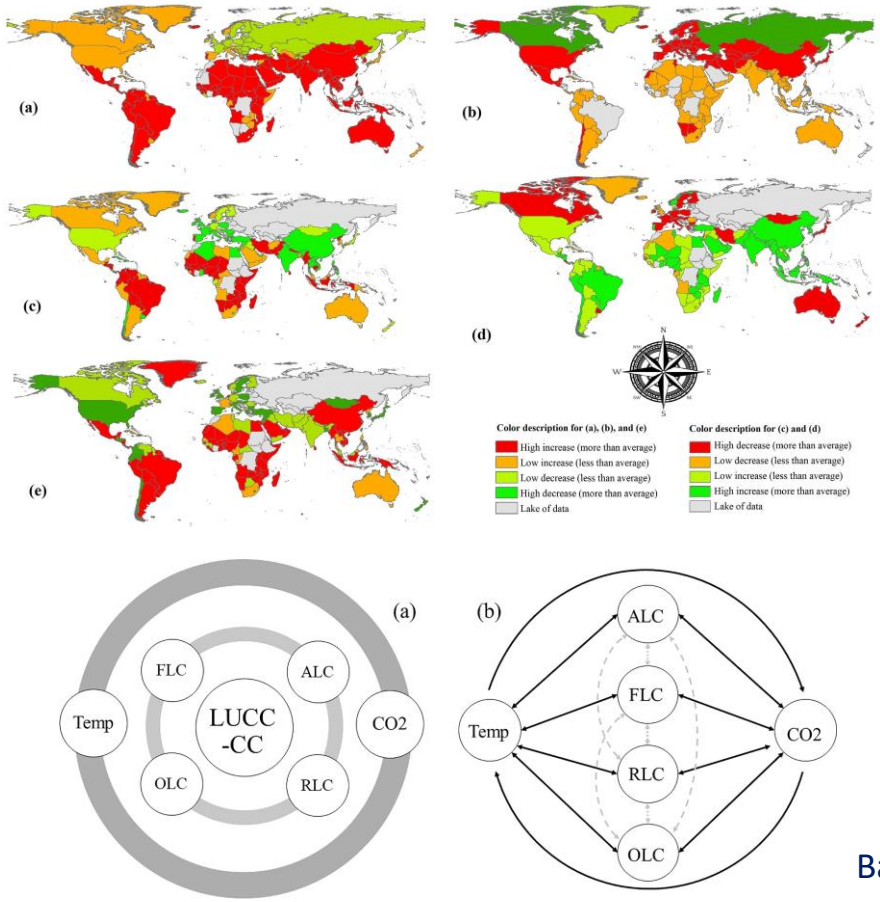
Specific Case – Pollinator Risk Transfer

1 Climate Change Projected Scenarios



By Urs Kalbizer using WorldClim data, 2020

2 Interactions of Land-Use Cover and Climate Change



Barati, et al., 2023

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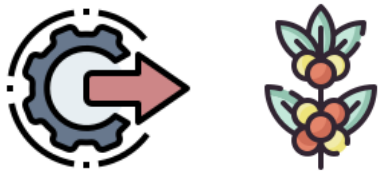
Specific Case – Pollinator Risk Transfer

3 InVEST model (or similar)

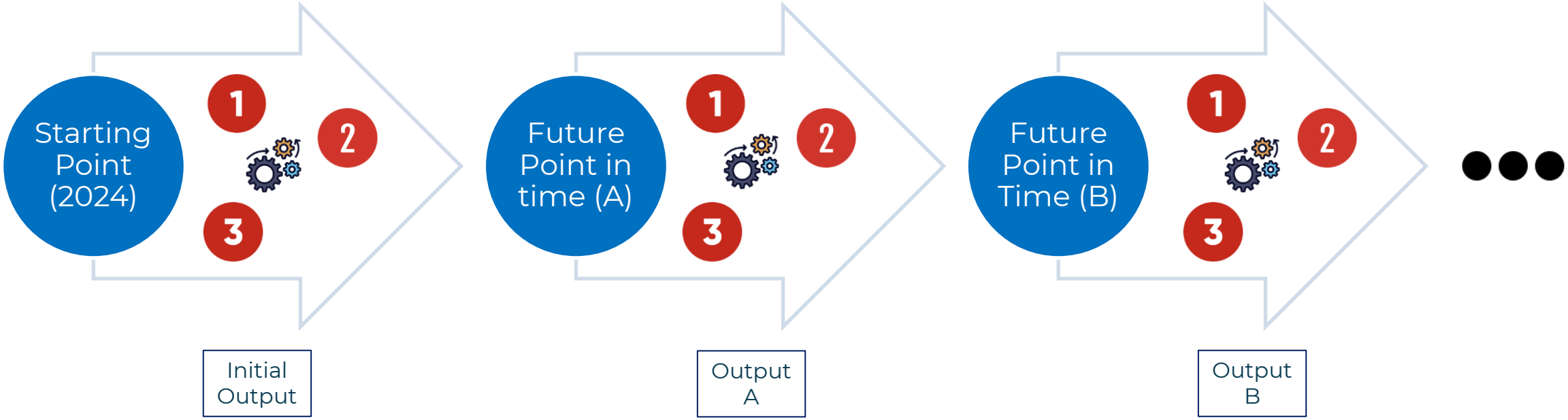
LULC maps → Biophysical Table → Pollinator Guild table → Farm Shapefile



Estimated Coffee production

Environmental Economics Strand

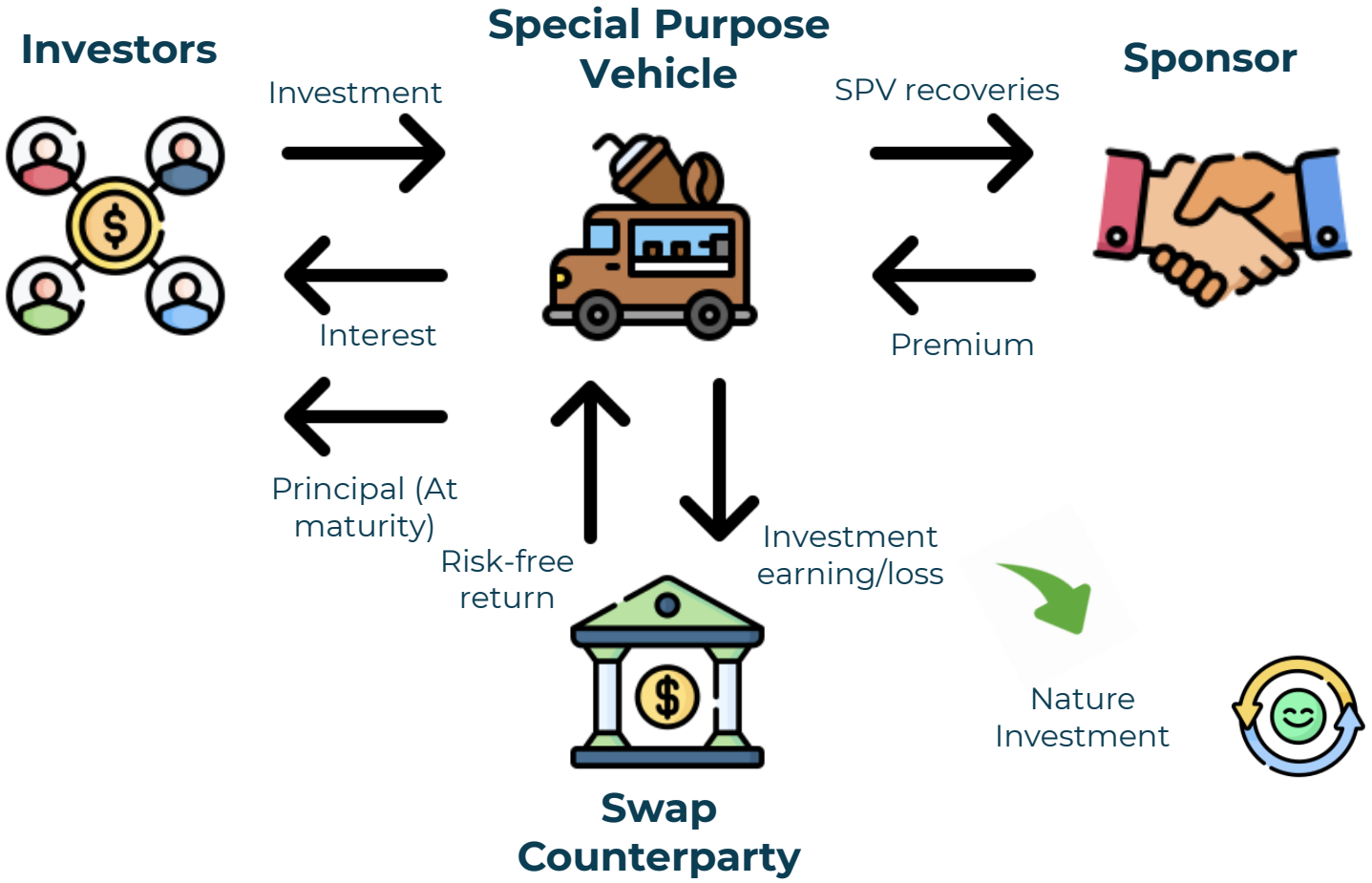
Specific Case – Pollinator Risk Transfer



Then one calculate the crop-yield differentials due to pollinator risk at any future point in time:
(Initial Output – Output A), (Initial Output – Output B), …

Environmental Economics Strand

Specific Case – Pollinator Risk Transfer



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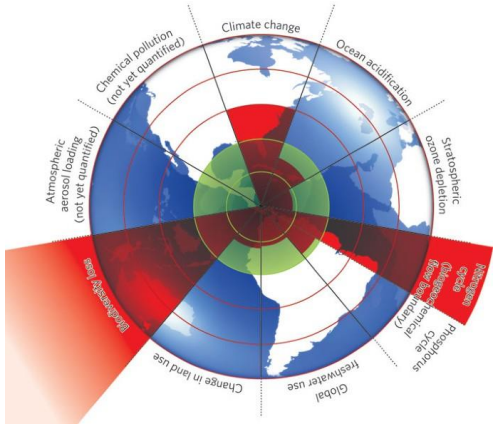
The Diagnosis of the Anthropocene

‘It seems to us more than appropriate to emphasize the central role of mankind in geology and ecology by proposing to use the term “Anthropocene” for the current geological epoch’ (Crutzen & Stoermer, 2000)

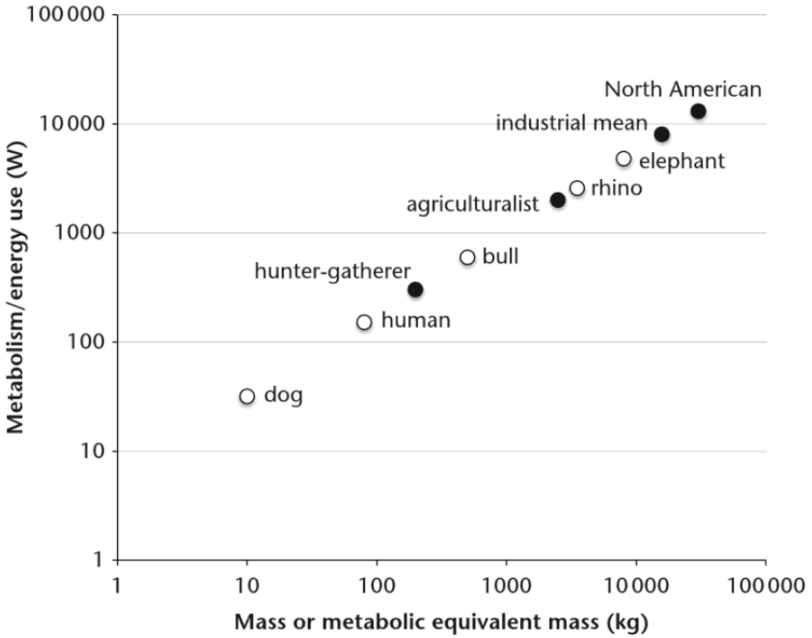
Planetary Boundaries definition

‘A Safe Operating Space for Humanity’.
(Rockström, Steffen, et al., 2009)



Social Metabolism

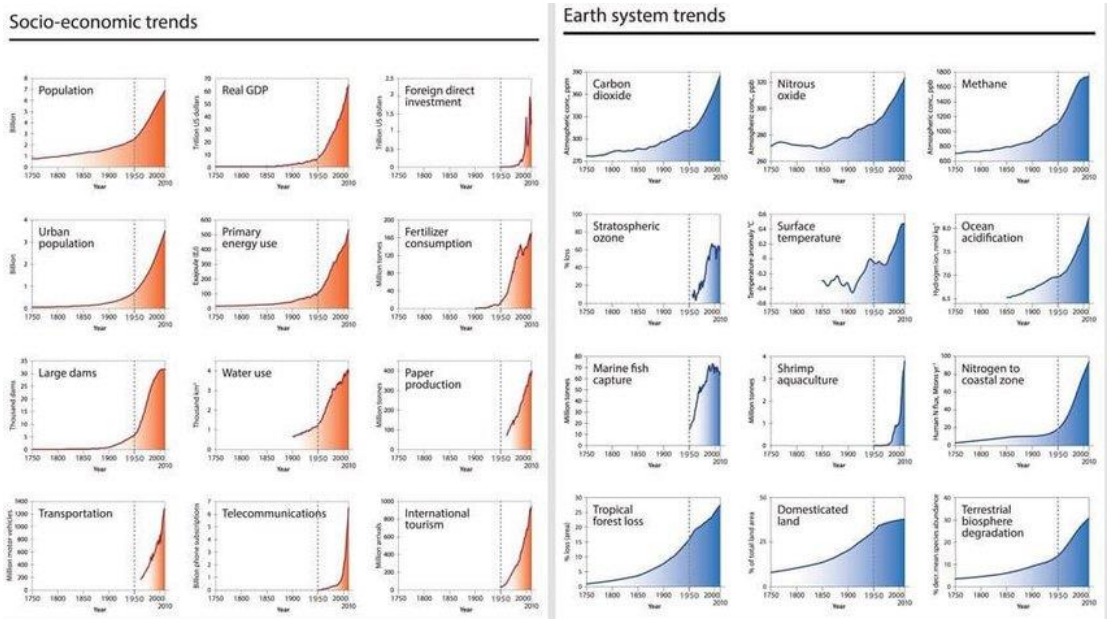
‘The Metabolism of a Human-dominated Planet’. (Malhi, 2014)



Ecological Economics Strand

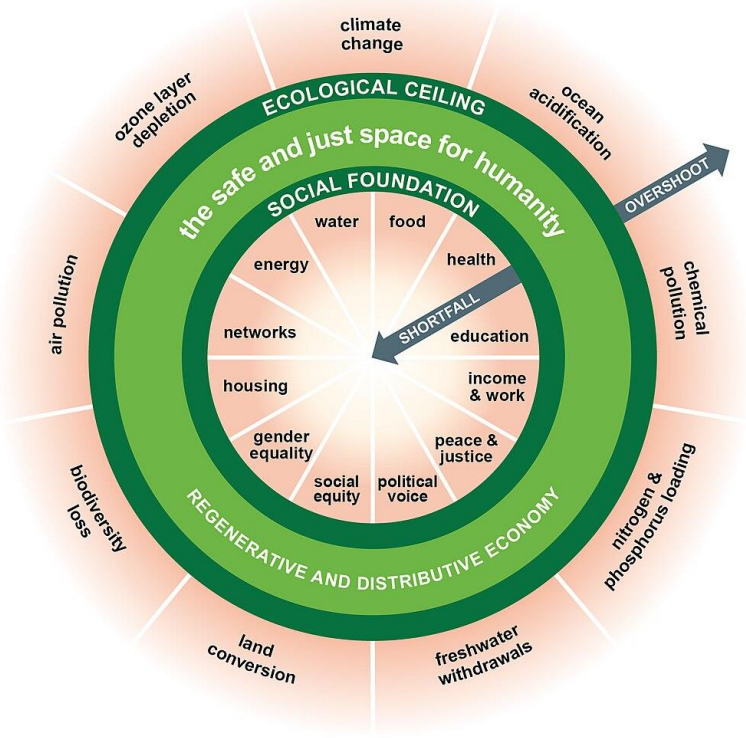
The Great Acceleration

‘The Trajectory of the Anthropocene: The Great Acceleration’. (Steffen, et al., 2015)



Doughnut Economics

‘Doughnut Economics. Safe and Just Operating Space for Humanity’. (Raworth, 2017)



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The Economics of Biodiversity

‘Dasgupta Review’ – UK Treasury. (Dasgupta, 2021)

Supply: G(S)

G Rate at which the biosphere regenerates

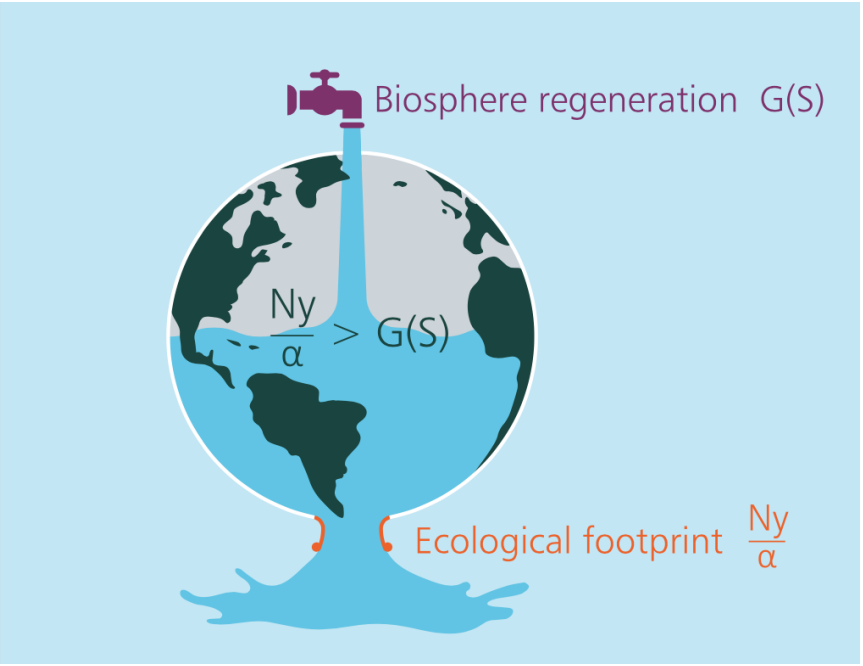
S Stock of the biosphere

Demand: $\frac{Ny}{\alpha}$

N Human population

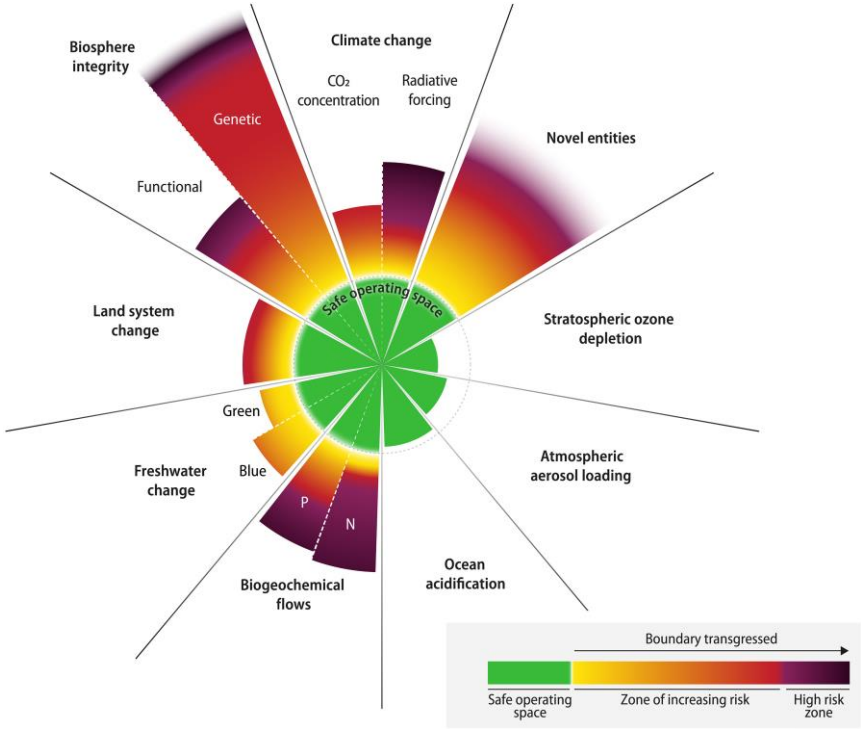
y Human economic activity per capita

α Efficiency with which the biosphere’s goods and services are converted into GDP and the extent to which the biosphere is transformed by our waste products



Planetary Boundaries (revised)

‘Earth Beyond 6 of 9 Planetary Boundaries ’. (Richardson, et al., 2023)

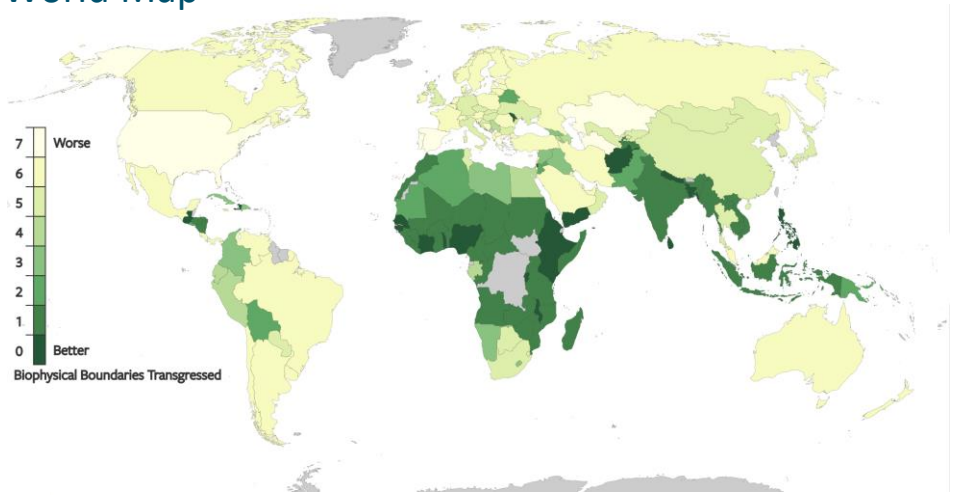


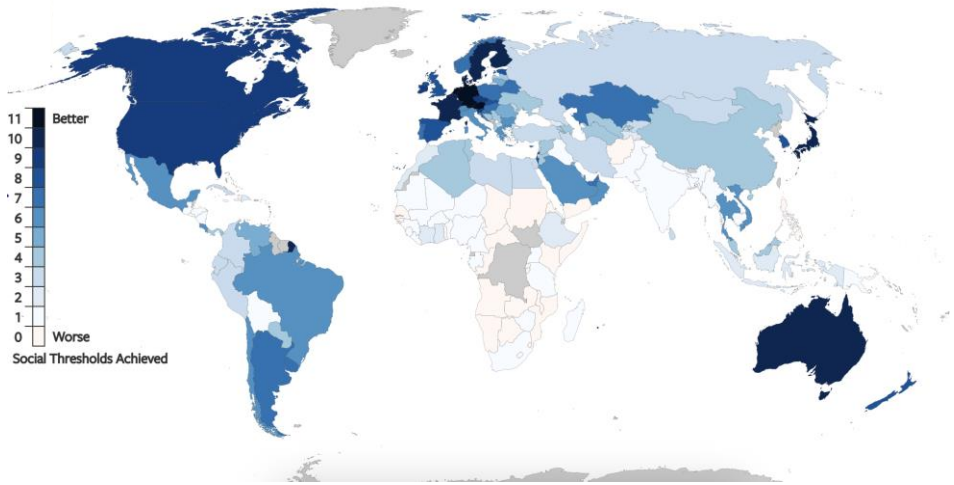
Ecological Economics Strand

Doughnut Applied to each country

(goodlife.leeds.ac.uk)

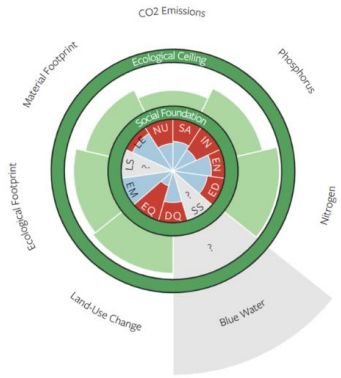
World Map



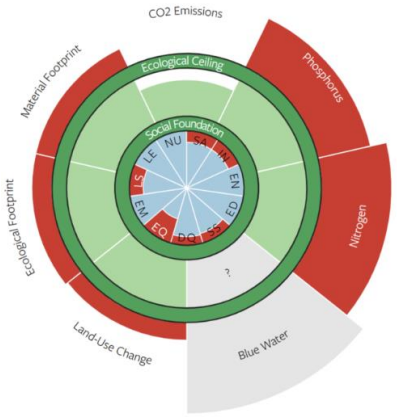


Country Trends - Peru

1992



2015



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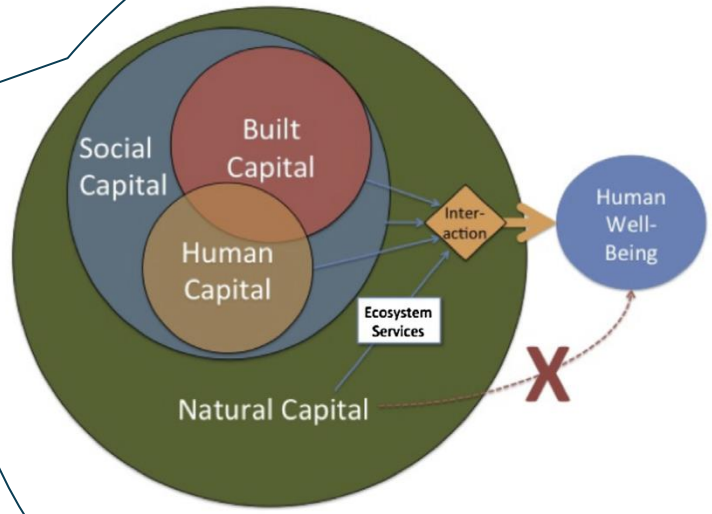
Valuation of Nature?

Robert Costanza

Estimate of Ecosystem Services:
35 tr/y (1997) vs. 145 tr/y (2014) -> Larger than global GDP



We cannot avoid valuation for Decision-making

Economics ≠ Market (Framework of production/consumption)
Valuation ≠ Privatization, commodification or trading
Expressing values in monetary terms ≠ Market Exchange

Costanza et al., 2023

Ecological Economics Strand

Valuation of Nature?

Valuation ≠ Commodification, Financialization or Privatization (Necessary but not sufficient)

Can we detach? -> 'Tragedy of the well-intentioned valuation'

Money: commodity, economic exchange, prices, trade, asset, property, payment (OED).

Natural Capital is Framed in the Western Culture:
1.Human-nature dualism
2.Anthropocentrism
3.Utilitarianism

Stages in Commodification:
1.Utilitarian and anthropocentric framing
2.Monetization
3.Appropriation
4.Sale/Trade

Erick Gómez-Baggethun

Gómez-Baggethun, 2011;2021

Ecological Economics Strand

Rethinking the Insurance Industry within Ecological Economics

Quantify Nature's impact (as a minimum). Quantify the Nature's CoC.
Interception with Environmental Economics

Use of actuarial fundamental of 'mutuality' to serve policy design for needed transformations to meet environmental targets

Use of long-term actuarial fundamentals to measure and manage long term socio-economic transformations with respect to the environment

Alternative indicators for profit/gain (ISEW, GPI, HDI, SDI, and others)

Ecological Economics Strand

Rethinking the Insurance Industry within Ecological Economics

Increase of Peer-to peer insurance and common pool/public resource management

Alternative currencies (e.g., time banks) / Job Guarantees

Reframe capital shareholder perspective / (De)centralised Insurance Management

Develop risk-transfer solutions to support a Steady-State Economy

Thank you

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