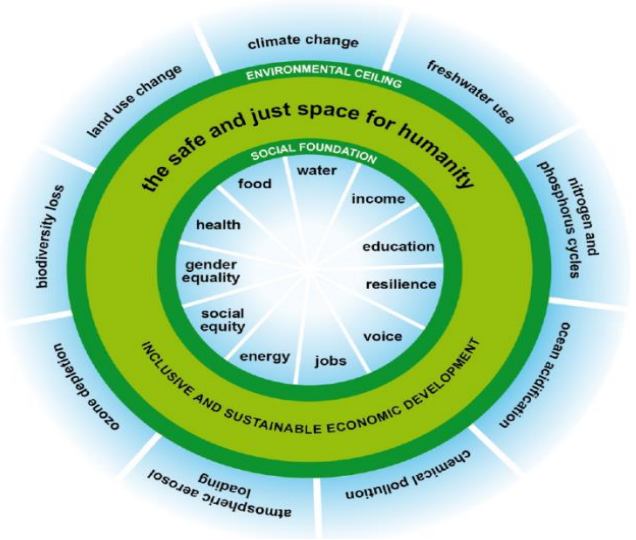
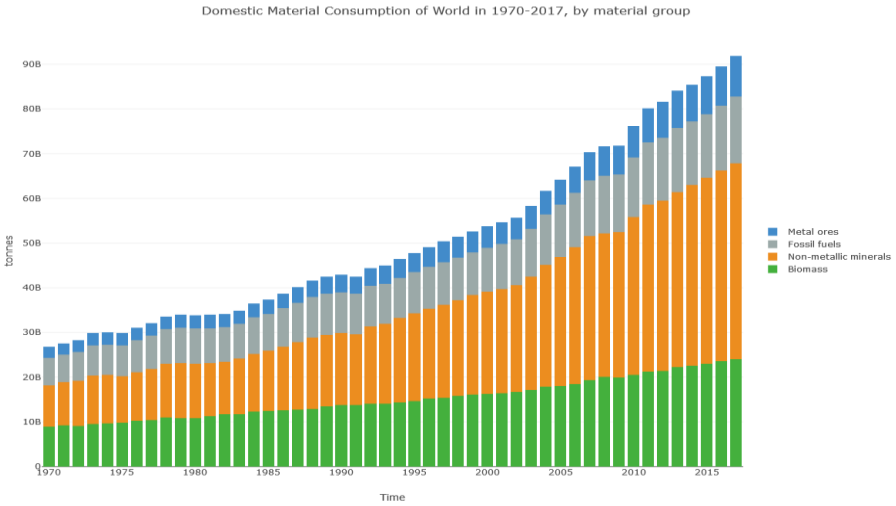


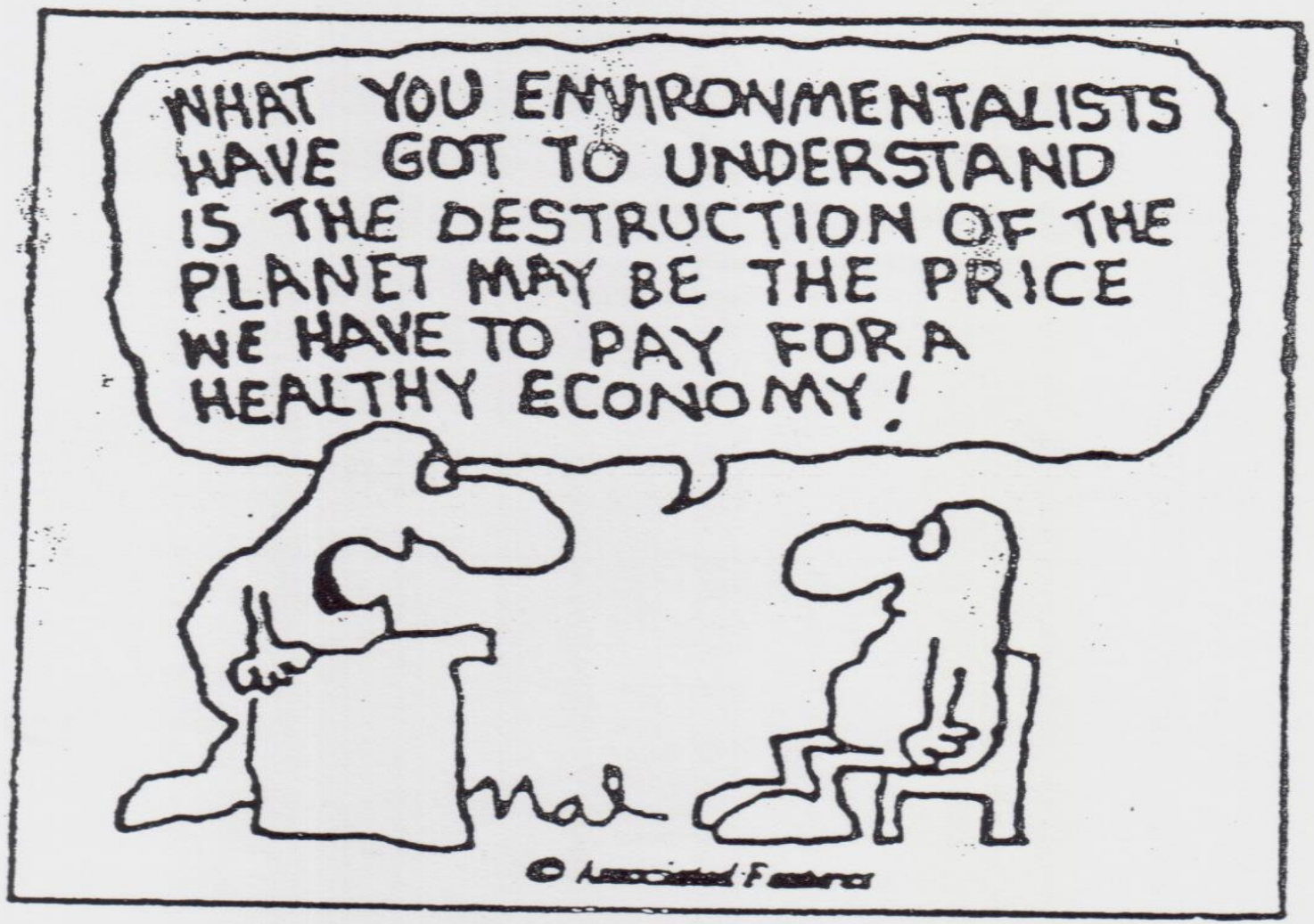


A. Ecological Economics, Green growth, A-growth or Degrowth?
B. Payments for Ecosystem Services – a step towards commodification?

Thomas Hahn, Uppsala/Cemus, 3 October 2019

Outline part A

1. Ecological Economics = interdisciplinary research area
2. World Economic Forum
3. A new macroeconomic model
4. Rebound effect and taxation
5. BAU, Green growth, A-growth or De-growth?
6. Sustainability transformation
7. Four economic principles



Wall et economists

School I: Neoclassical economics

microeconomics

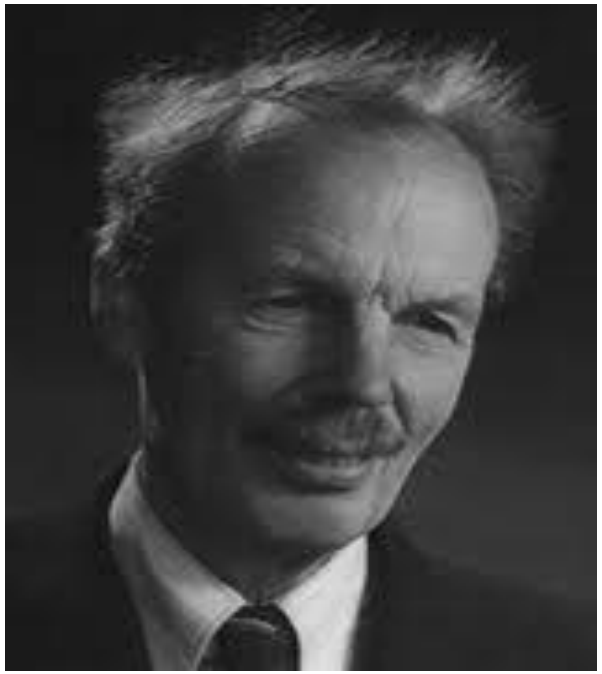
macroeconomics

welfare economics

natural resource and environmental economics

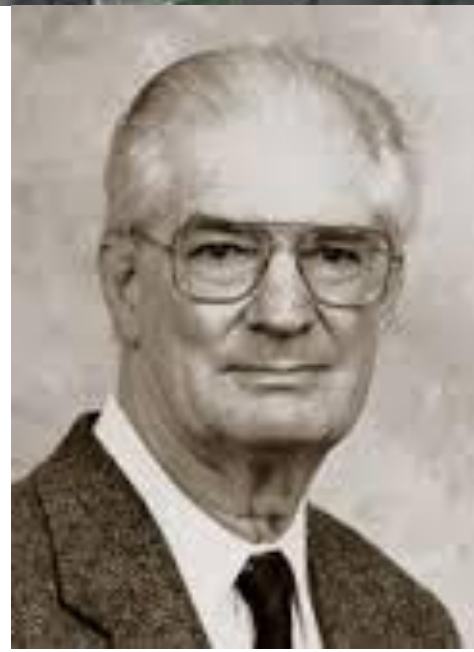
Formalised by Arthur Pigou (1920) →

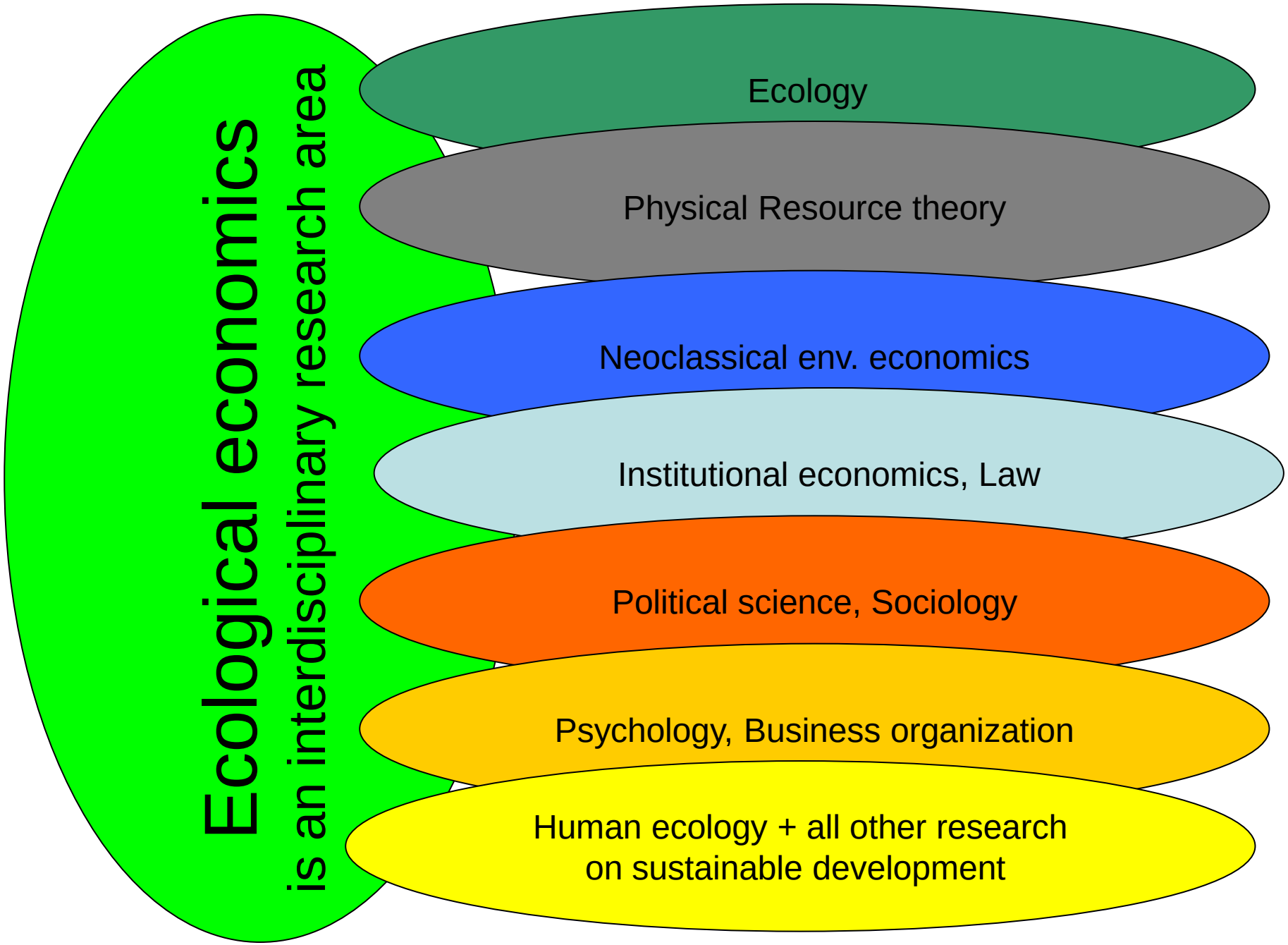
Aim: to achieve economic efficiency



School II: Ecological Economics

- is an inter-disciplinary research *area*
- Origins from 1970 (Kennet Boulding, Herman Daly, Bob Costanza, Ann-Mari Jansson)
- = core of the theory of *ecosystem services*
- Builds to a large extent on environmental economics but rejects notions of
  - Fixed preferences as basis for valuation (Amartya Sen)
  - Optimal pollution
  - Discounting the future




Ecological economics
is an interdisciplinary research area
Ecology
Physical Resource theory
Neoclassical env. economics
Institutional economics, Law
Political science, Sociology
Psychology, Business organization
Human ecology + all other research
on sustainable development

WORLD ECONOMIC FORUM

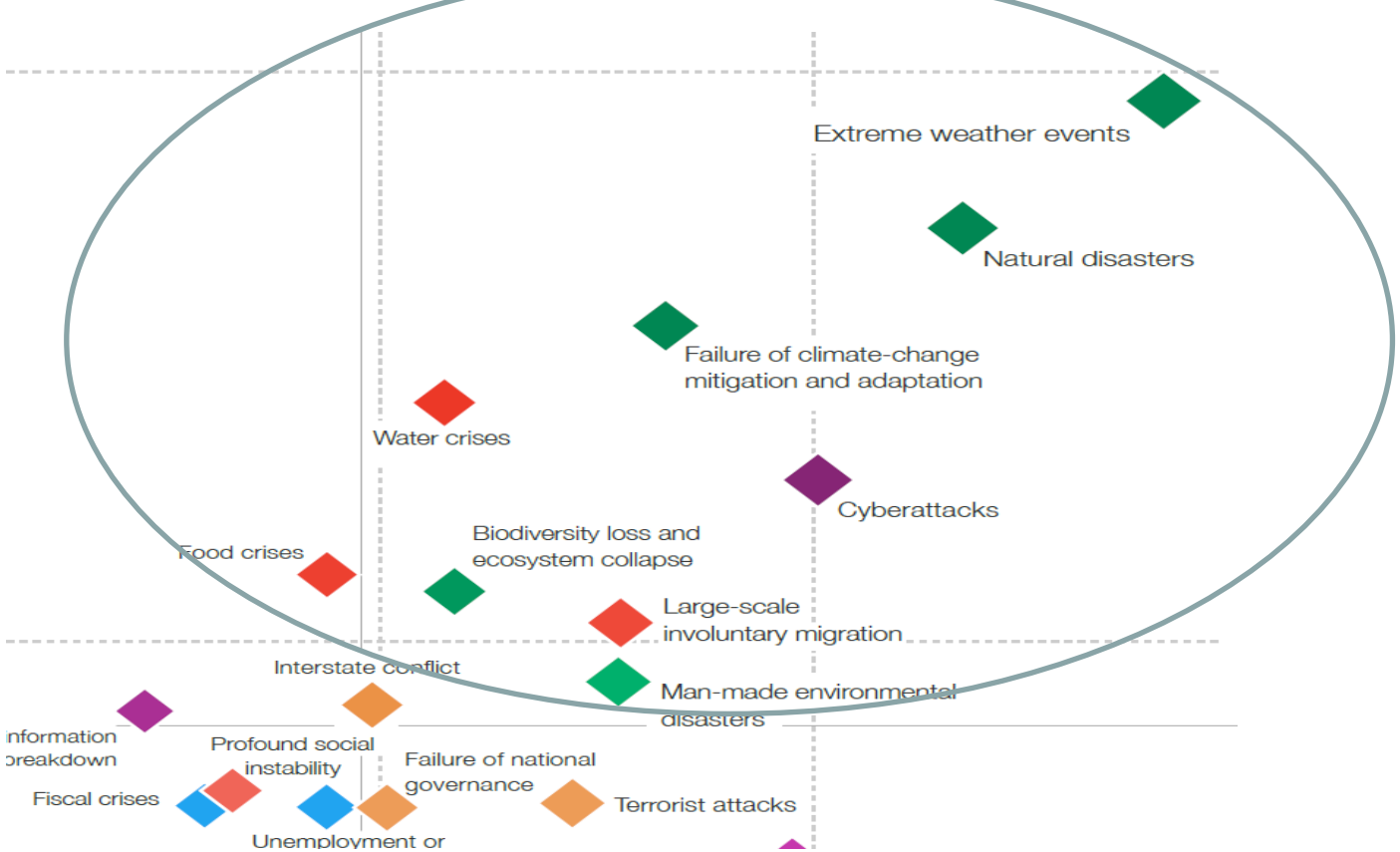
Global Risks 2018

Based on a survey of over 1,000 experts from industry, government, academia and civil society

Figure I: The Global Risks Landscape 2018

WORLD ECONOMIC FORUM

Global Risks 2018



7 of the 9 worst Global Risks are ecosystem-based (2018)

1. Extreme weather events
2. Natural disasters
3. Failure of climate change mitig + adapt
4. Water crises
5. Biodiversity loss + collapse
6. Man-made environmental disasters
7. Food crises

Non-ecosystem-based risks:

1. Cyber attacks
2. Large-scale involuntary migration

- Economic
- Environmental
- Geopolitical
- Societal
- Technological

2010 = end of the neoliberal era?

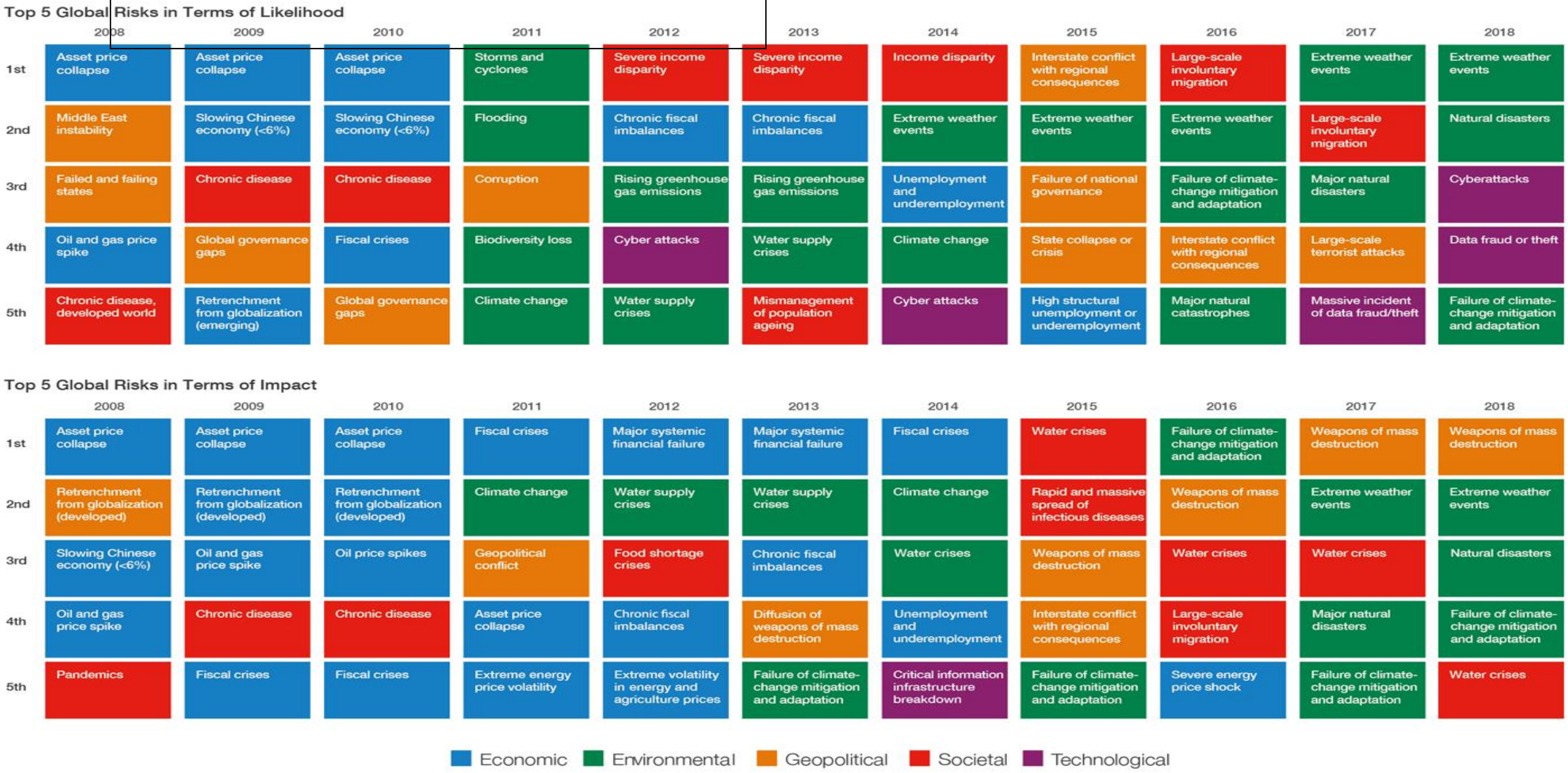
Top 5 Global Risks in Terms of Likelihood

	2007	2008	2009	2010	2011	2012*	2013*
1st	Breakdown of critical information infrastructure	Asset price collapse	Asset price collapse	Asset price collapse	Meteorological catastrophes	Severe income disparity	Severe income disparity
2nd	Chronic disease in developed countries	Middle East instability	Slowing Chinese economy (<6%)	Slowing Chinese economy (<6%)	Hydrological catastrophes	Chronic fiscal imbalances	Chronic fiscal imbalances
3rd	Oil price shock	Failed and failing states	Chronic disease	Chronic disease	Corruption	Rising greenhouse gas emissions	Rising greenhouse gas emissions
4th	China economic hard landing	Oil and gas price spike	Global governance gaps	Fiscal crises	Biodiversity loss	Cyber attacks	Water supply crises
5th	Asset price collapse	Chronic disease, developed world	Retrenchment from globalization (emerging)	Global governance gaps	Climatological catastrophes	Water supply crises	Mismanagement of population ageing

= beginning of the biosphere era?

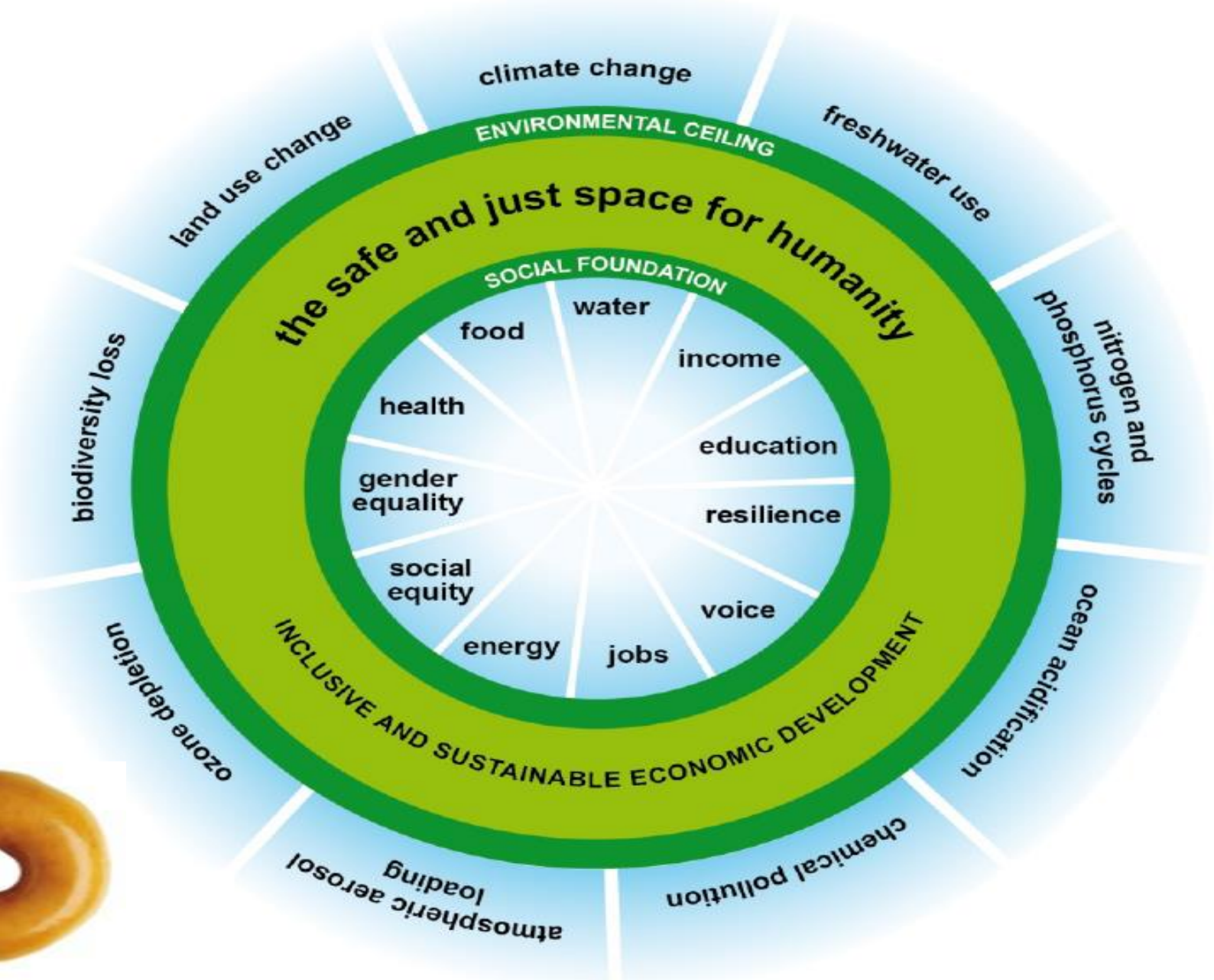
Climate change, water shortage and biodiversity loss dominate Global Risks 2011-2018

The Global elite shift in 2011



Economics for the Biosphere + Anthropocene

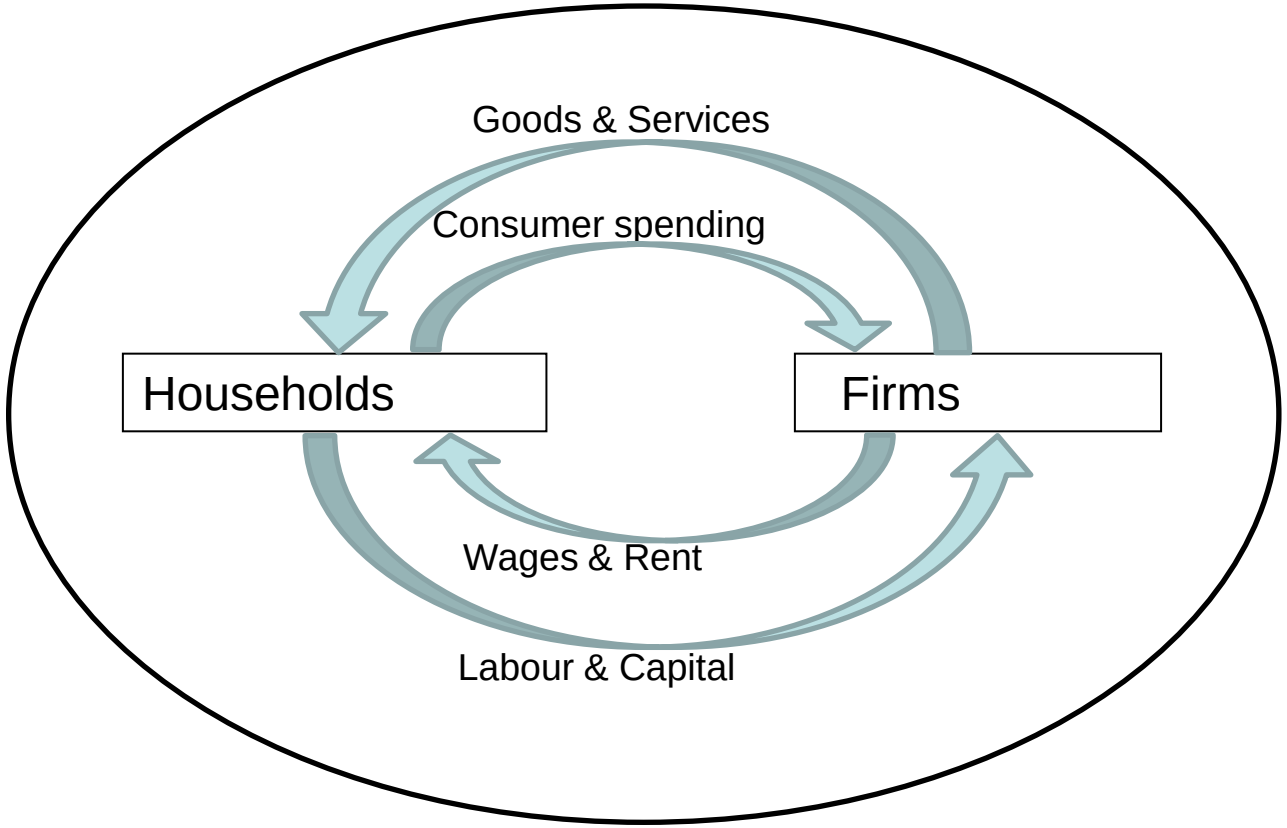
- A macroeconomic model for sustainable development
- Human wellbeing is the goal, economics provides tools, the biosphere is a foundation
- Should be Chapter 1 in Economics!

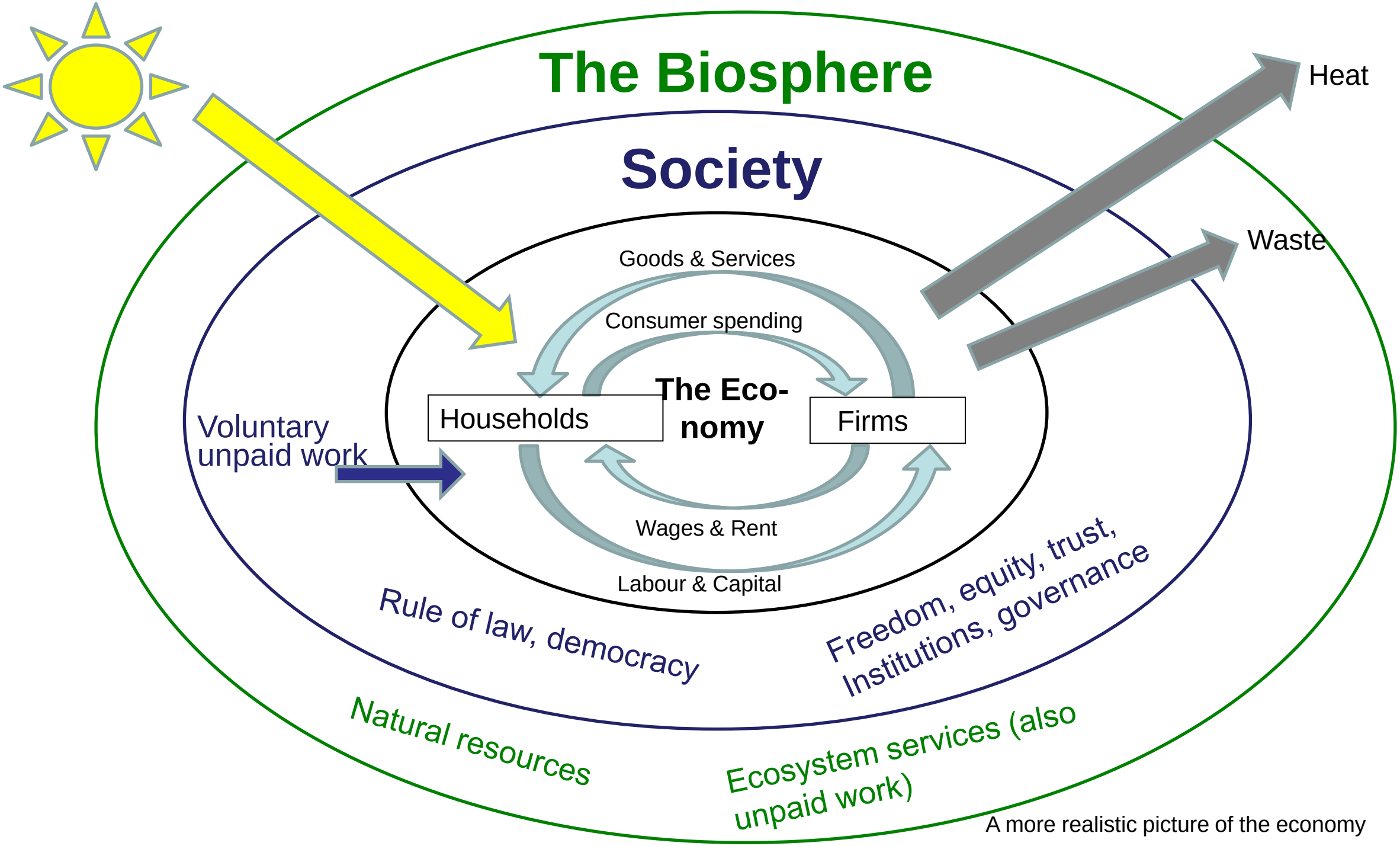


CAN WE LIVE WITHIN THE DOUGHNUT?

Oxfam Discussion Papers 2012
Kate Raworth

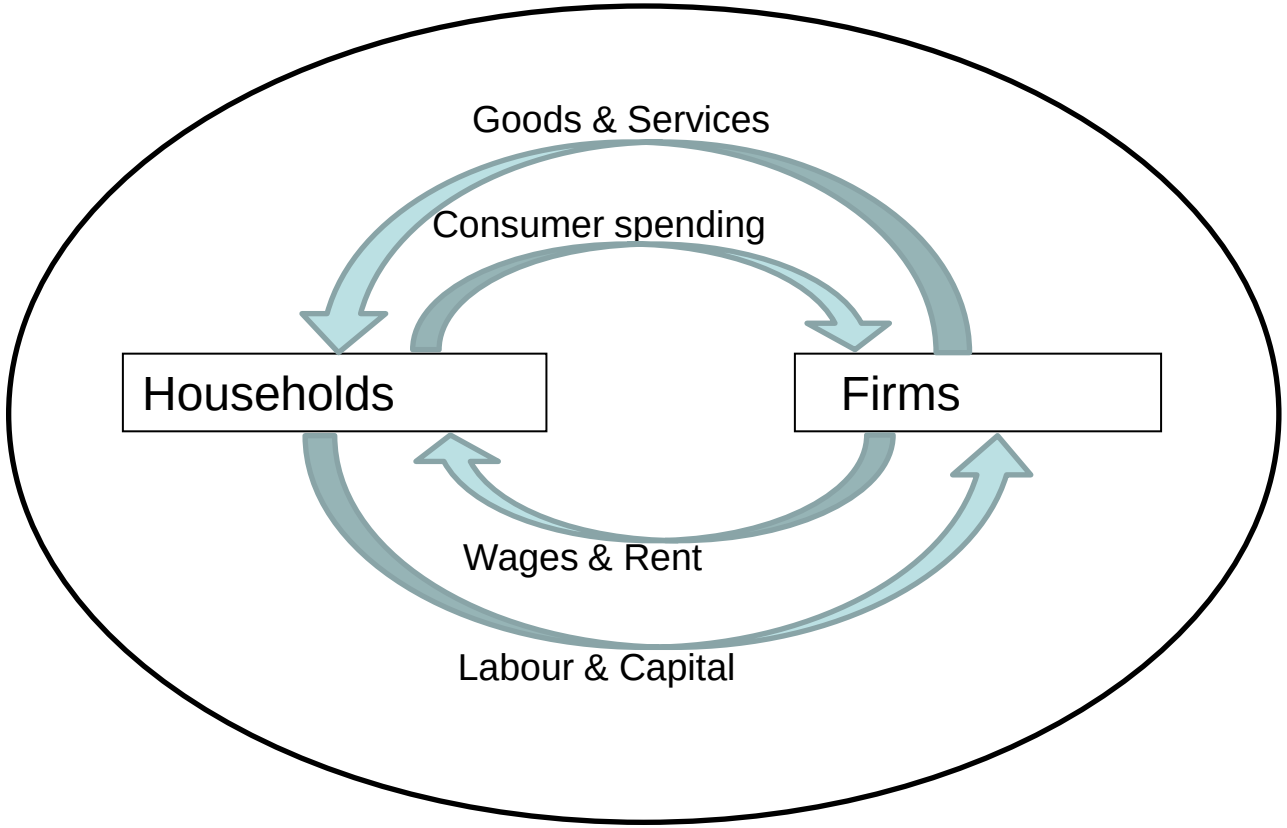
The macroeconomic model (a model of "the economy") according to text-books 1955



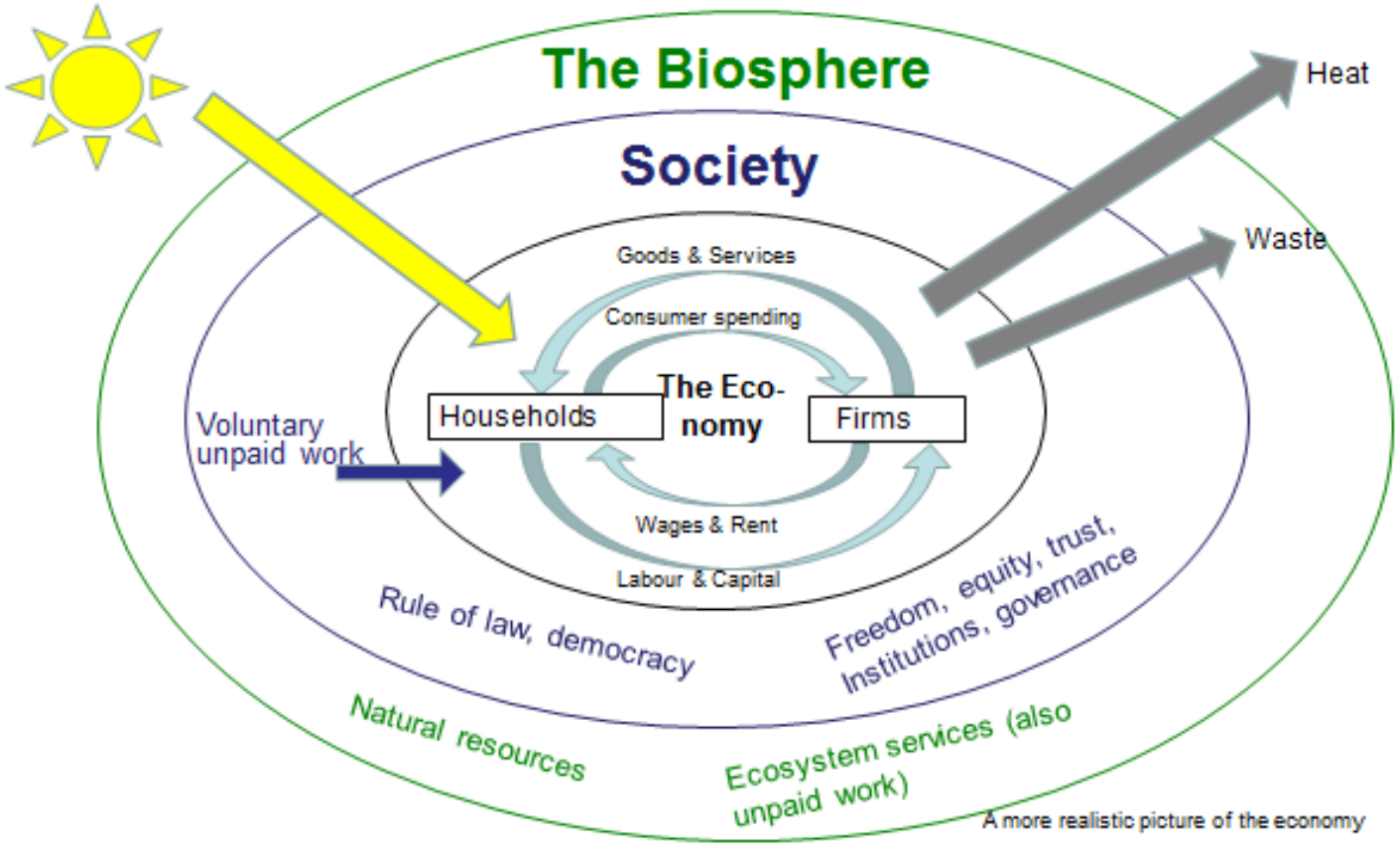


A more realistic picture of the economy

The Economy according to text-books 2019



Tomorrow's economists do not get adequate training to handle Global Risks or address the real economic issues



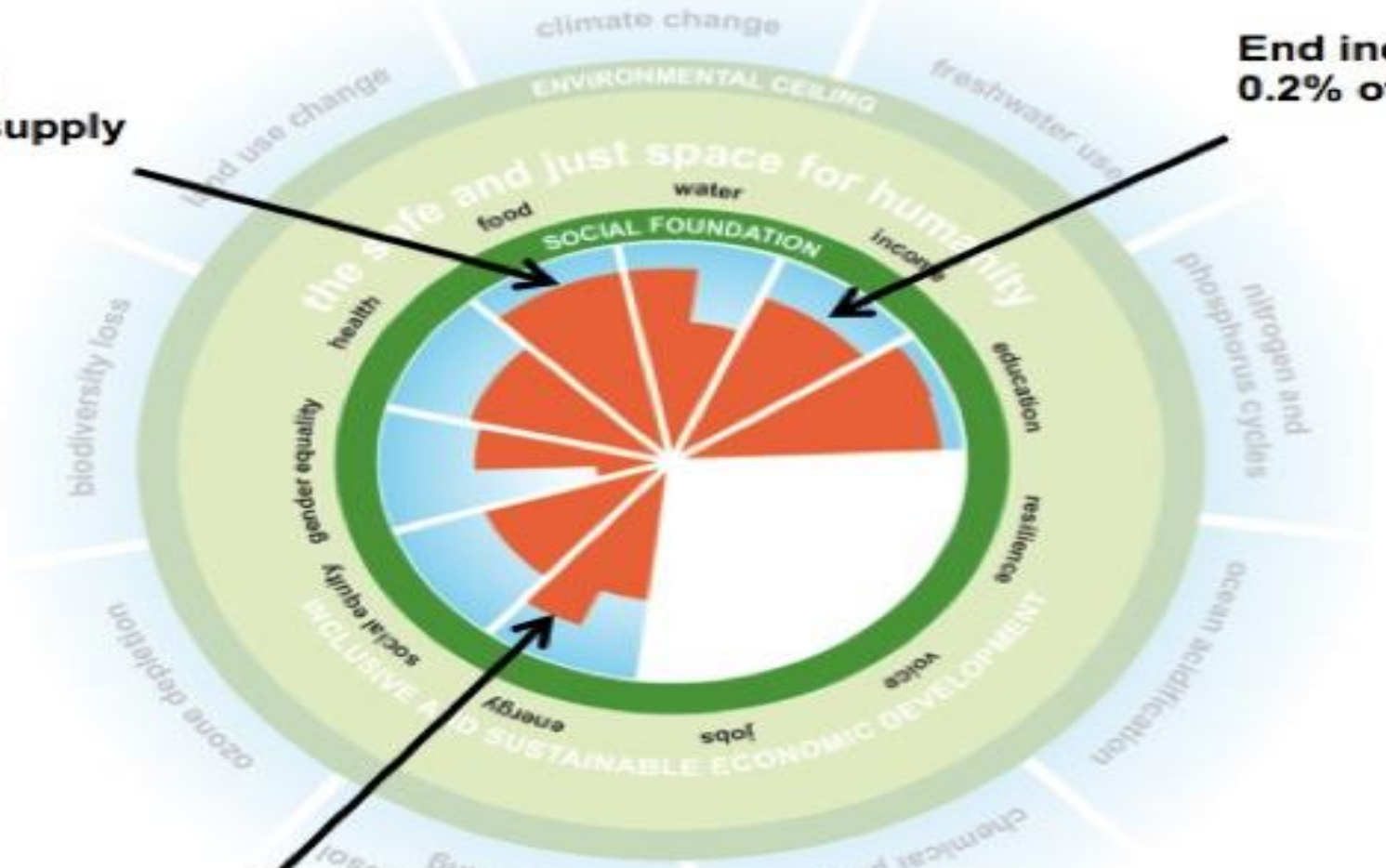
Ecological Econ: Human wellbeing depend on the Biosphere regardless whether we understand it or not.

Neoclassical Env.Econ: The value of nature depends on human preferences.

The choice is NOT between environment OR poverty alleviation: we can reach BOTH goals!

End hunger for all:
3% of global food supply

End income poverty for all:
0.2% of global income



Ensure electricity for all:
1% of global CO_2 emissions

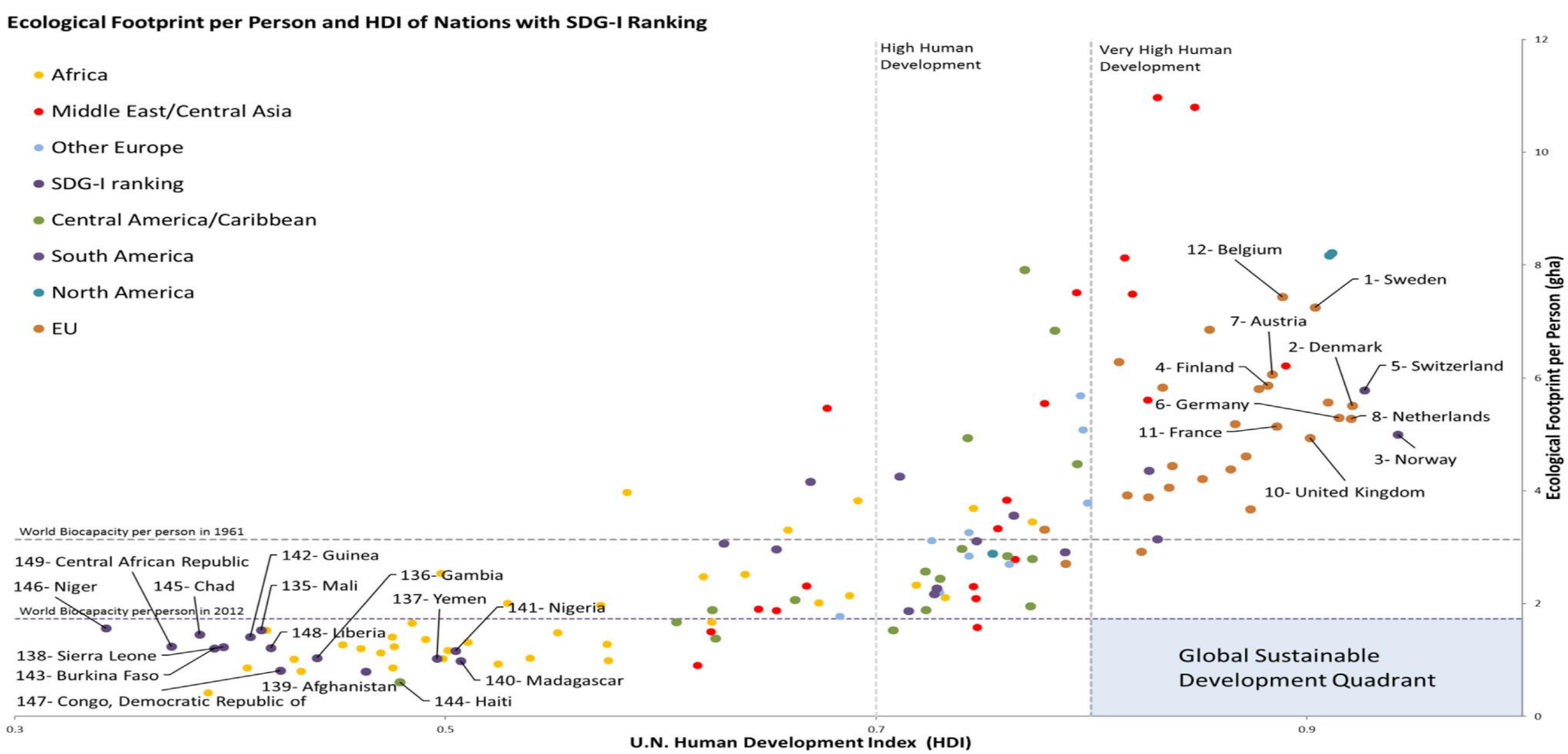
Hence, we need to reduce emissions with 81%, not only 80%

http://www.kateraworth.com/2014/10/16/doughnut-inequality/

The SDGs

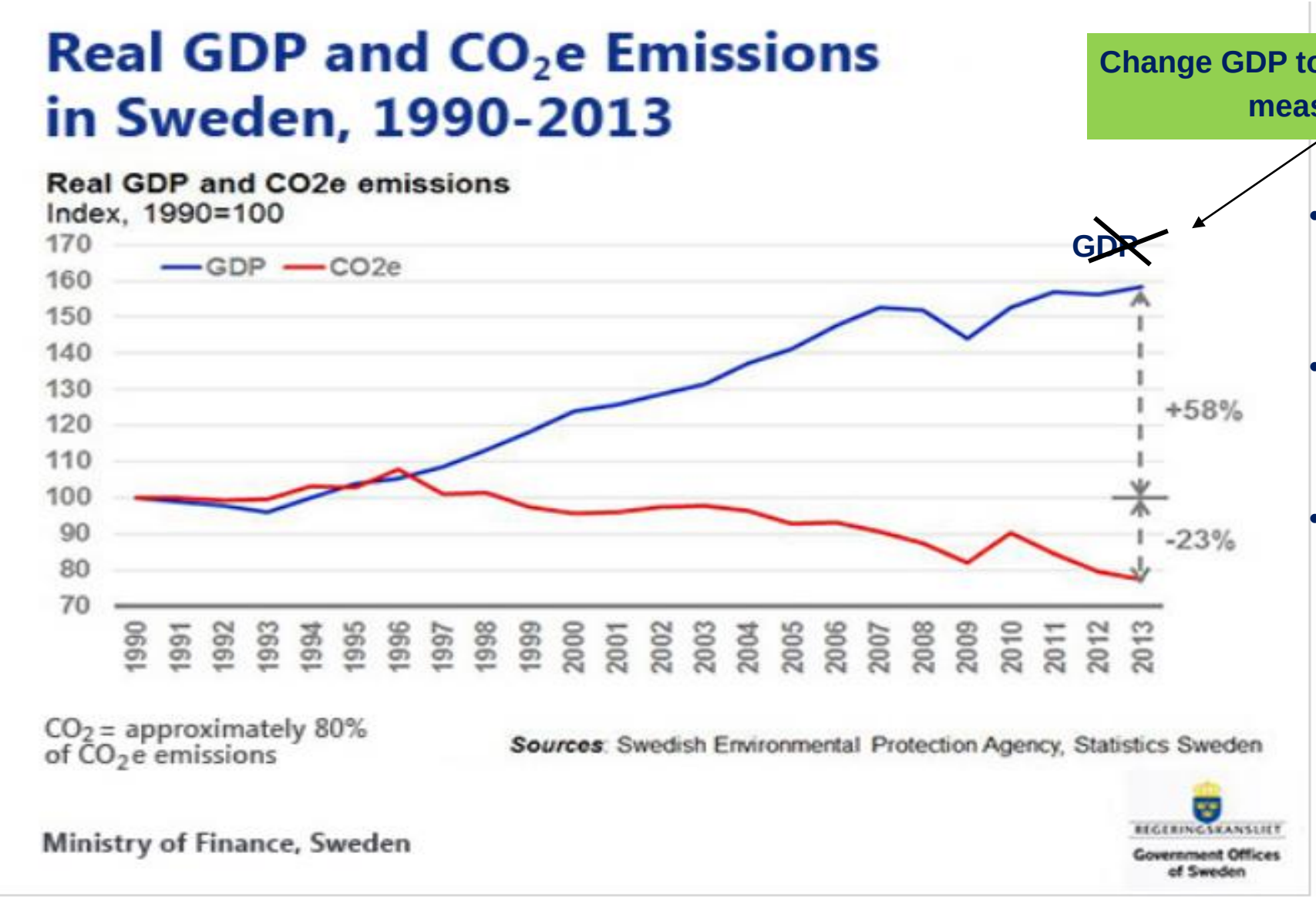
The unnecessary (or even contra-productive) goal

https://sustainabledevelopment.un.org/sdgs



Achieving SDGs is not sufficient for environmental sustainability: only 14 % of SDG indicators measure natural resource security (Wackernagel et al. 2017)

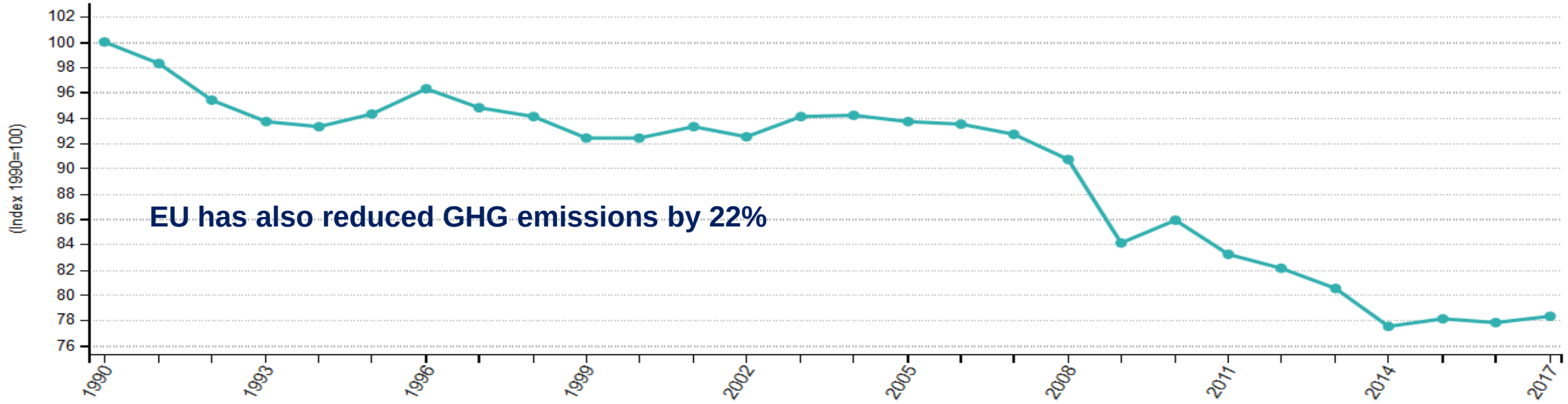
Decoupling is required for Green growth



Change GDP to a real Welfare measure!

- 23% reduction in fossil CO2 is good! But it excludes imported goods and international transports
- The Decoupling concept reinforces GDP-obsession. Welfare should be increased!
- “Be agnostic about GDP growth” (van den Bergh, Kate Raworth) (“a-growth”)

Greenhouse gas emission trends, EU-28, 1990 - 2017 (Index 1990=100)



Note: Greenhouse gas emissions (including international aviation, indirect CO2 and excluding LULUCF)

Source: European Environment Agency (online data code: env_air_gge)

eurostat

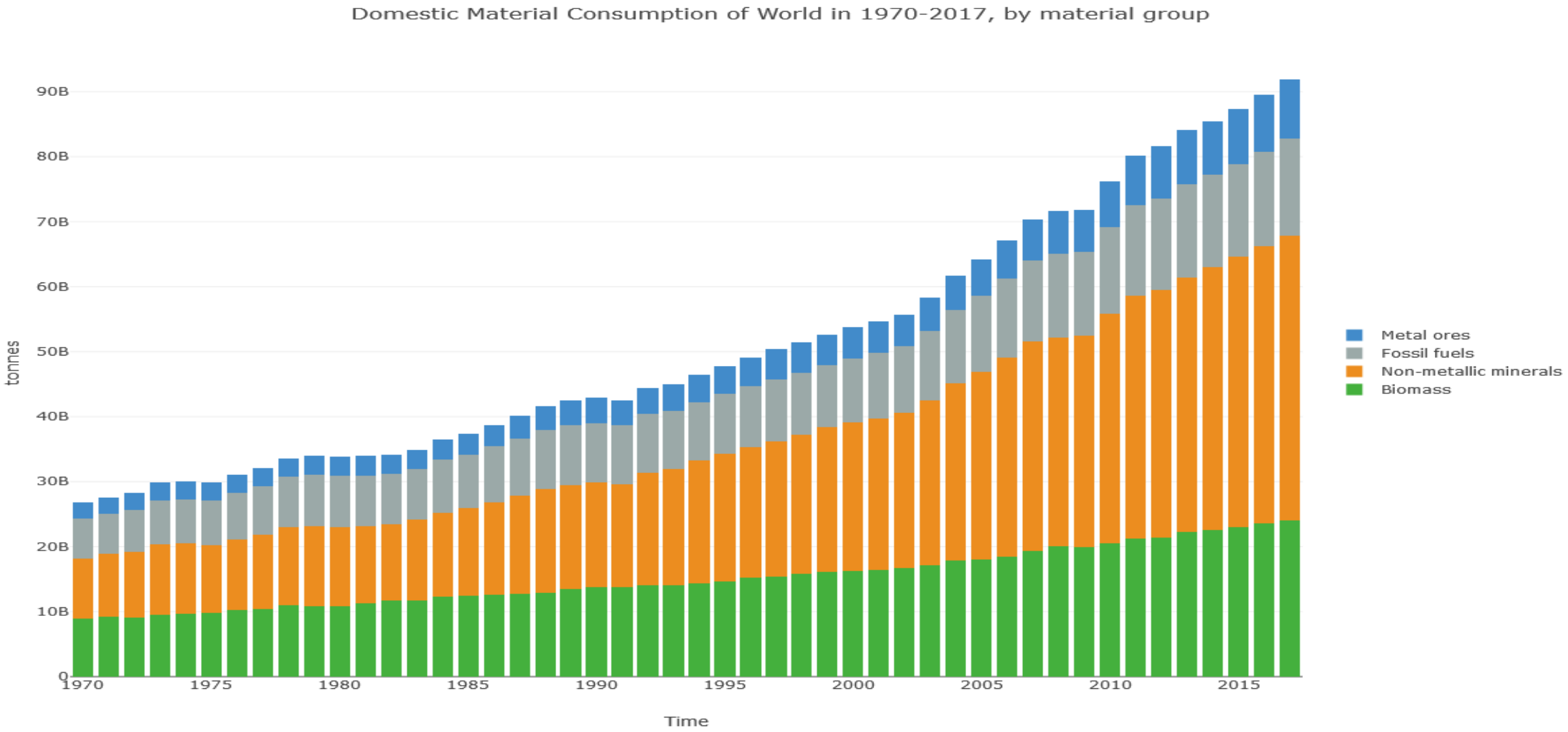
This article is about emissions of greenhouse gases (GHG emissions) classified by technical processes. These are recorded in GHG emission inventories submitted to the United Nations Framework Convention on Climate Change (UNFCCC) and form the official data for international climate policies.

In addition, Eurostat disseminates GHG emissions classified by emitting economic activities. Those are recorded in air emissions accounts (AEA). Furthermore, Eurostat estimates and disseminates so-called 'footprints' which are GHG emissions classified by products that are finally demanded by households or government, or that are invested in or exported.

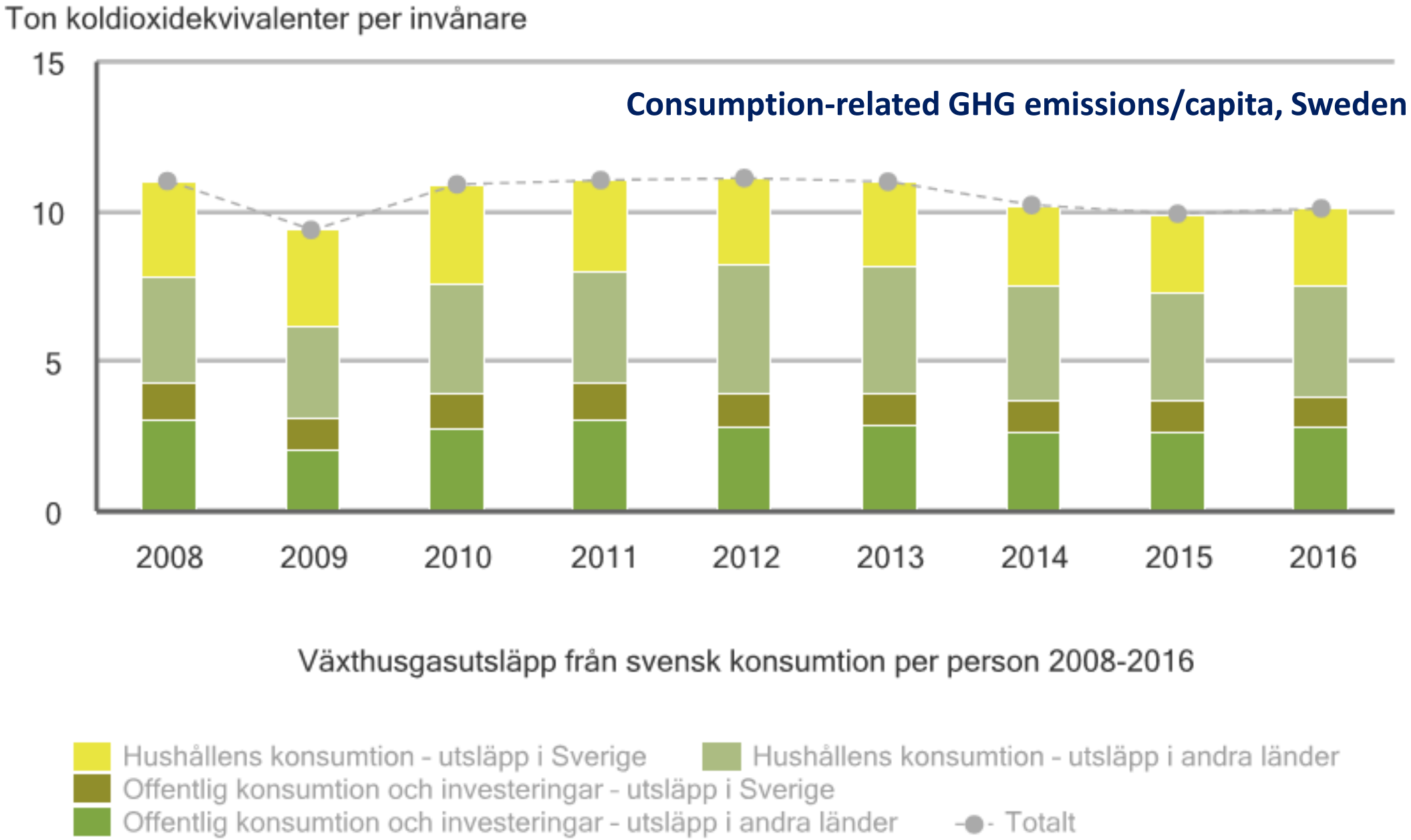
Full article +

No global decoupling between GDP and Natural resource use

* Now 90 Billion tonnes/year.
* In many EU countries it was reduced during the financial crisis, which inspired the degrowth movement



Consumption-related GHG emissions/capita, Sweden



Källa: Naturvårdsverket

Sweden’s territorial emissions/capita =4,25 ton CO2 (5,3 ton GHG)

(42,5 billion tonnes/10 Million people)

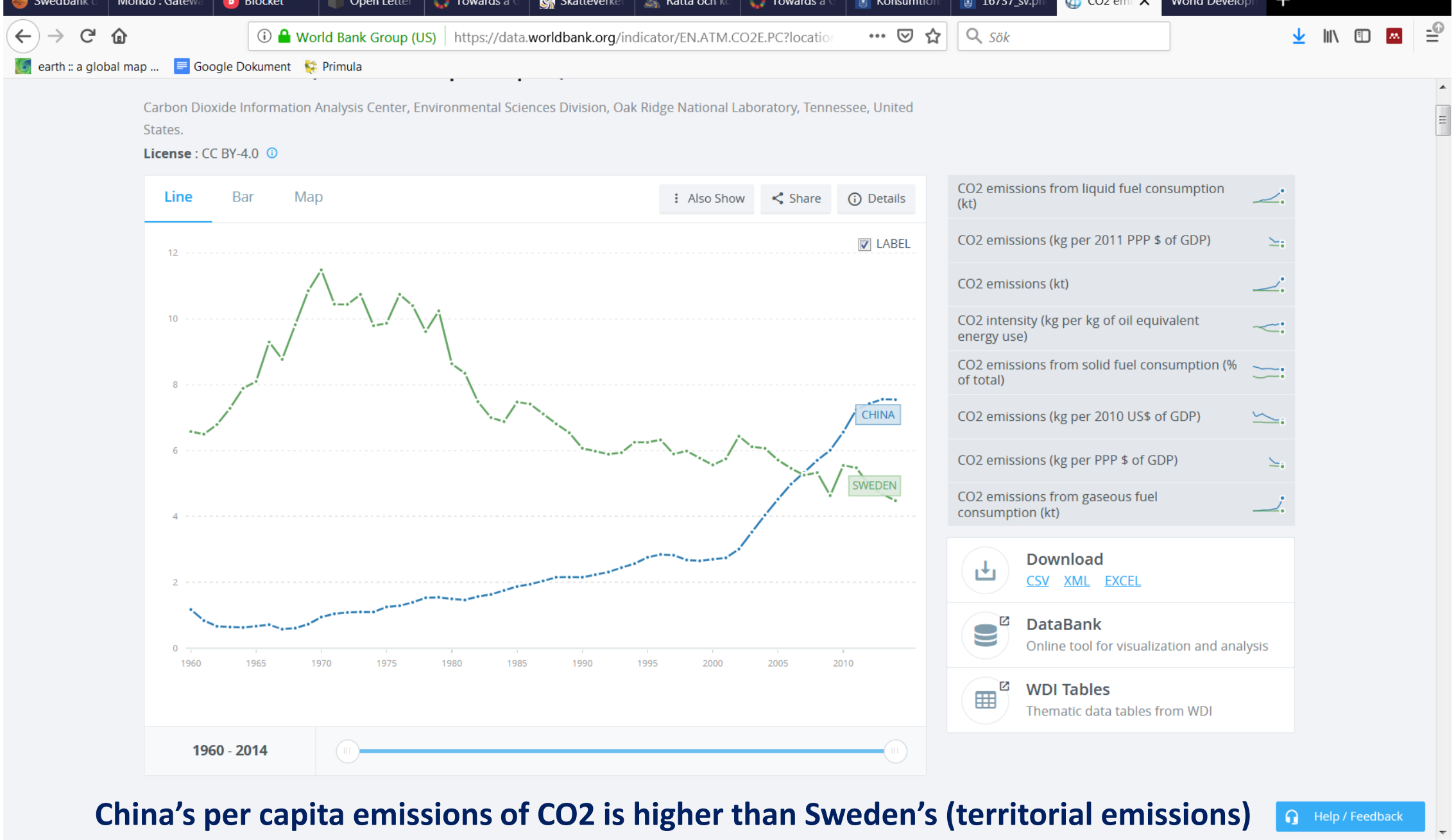
This is only half of consumption-related emissions (10 tonnes GHG/capita)

United Nations
Framework Convention on
Climate Change

Summary of GHG Emissions for Sweden

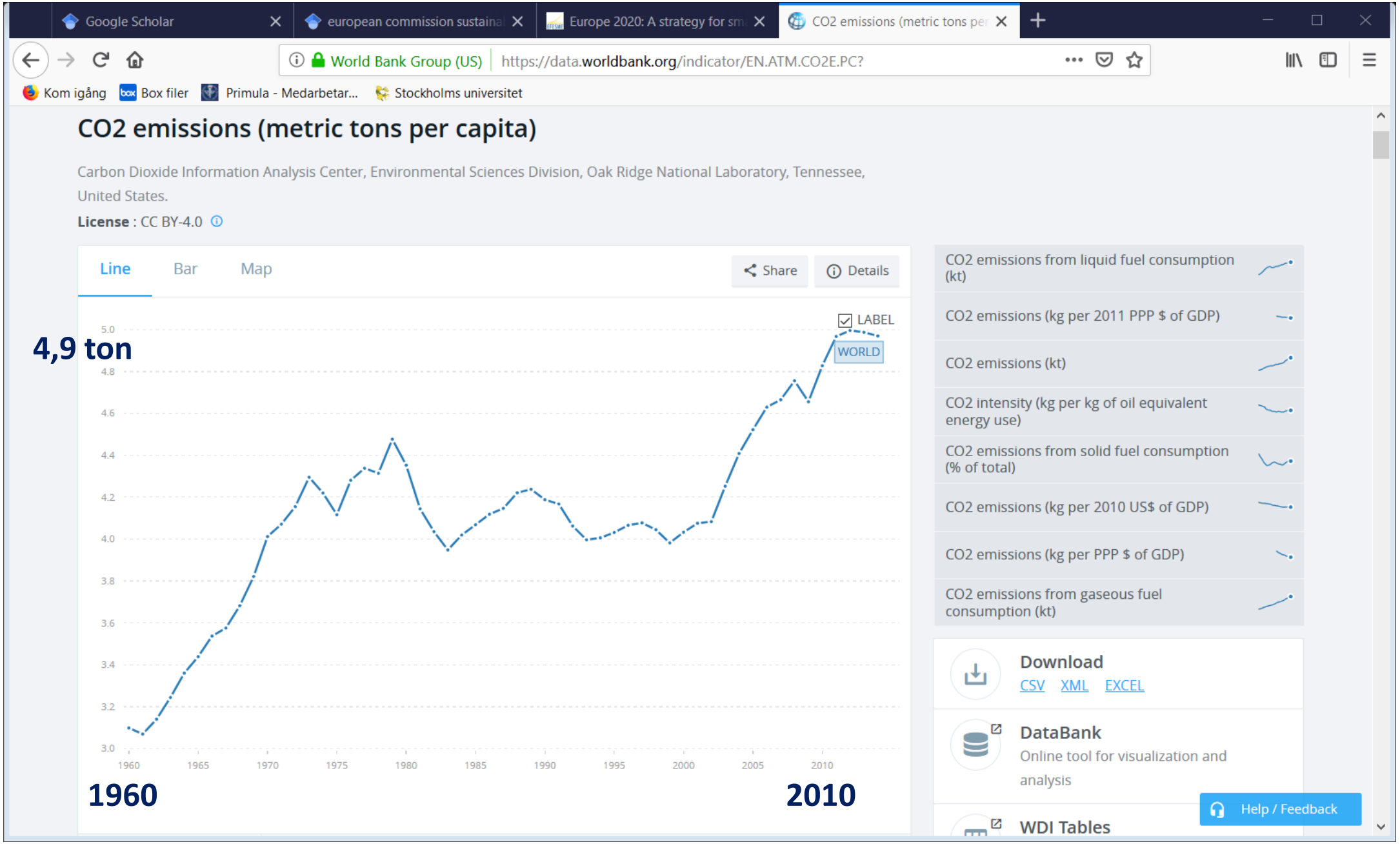
Base year (Convention) = 1990

	Emissions, in kt CO_2 equivalent		
	Base year	2000	Last Inventory Year (2016)
CO_2 emissions without LULUCF	57,506.3	54,725.0	42,568.0
CO_2 net emissions/removals by LULUCF	-37,673.8	-39,764.5	-44,619.9
CO_2 net emissions/removals with LULUCF	19,832.5	14,960.5	-2,051.8
GHG emissions without LULUCF	71,515.0	68,649.0	52,892.7
GHG net emissions/removals by LULUCF	-35,925.6	-37,983.3	-42,969.3
GHG net emissions/removals with LULUCF	35,589.4	30,665.6	9,923.4
Indirect CO_2	NO	NO	NO



China's per capita emissions of CO2 is higher than Sweden's (territorial emissions)

Sweden's territorial CO2-emissions/capita is lower than the global average



https://data.worldbank.org/indicator/EN.ATM.CO2E.PC?

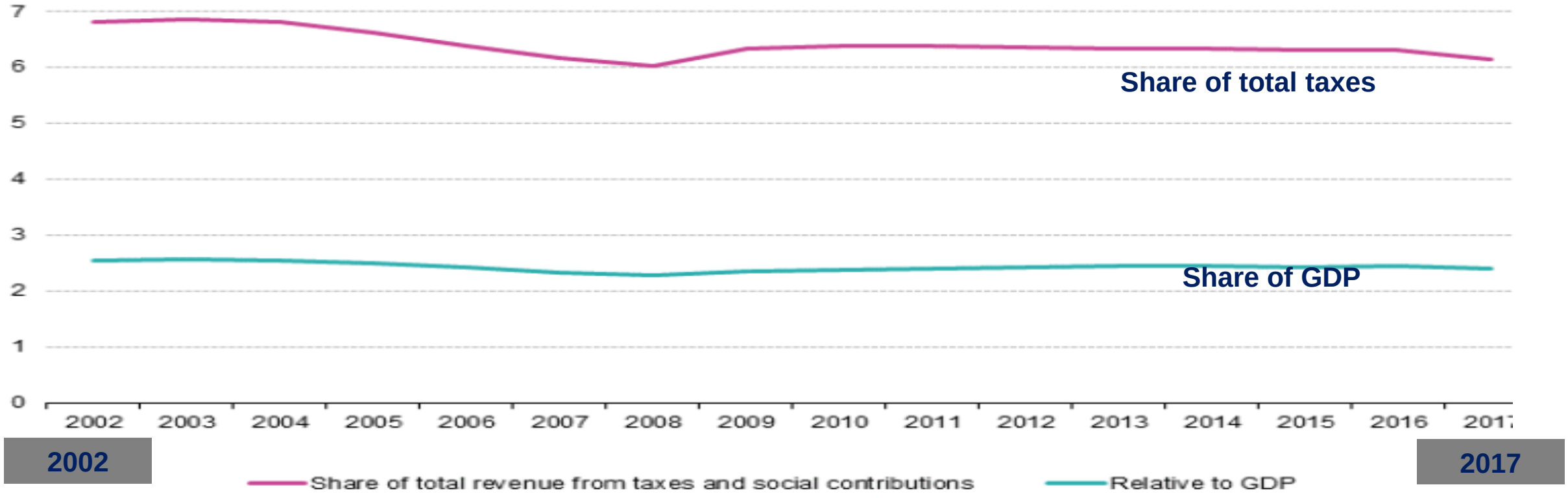
Rebound effect

- = Jevons' paradox (1865)
- Technical innovation -> energy efficiency -> energy price decreases and demand increases
- How can the rebound effect be stopped?

- Carbon tax! And similar tax reforms!

Total environmental tax revenue, EU-28, 2002–17 (%)

The total revenue from environmental taxes in the EU-28 in 2017 was EUR 368.8 billion; this figure equates to 2.4 % of gross domestic product (GDP) and to 6.1 % of the total revenues derived from all taxes and social contributions. **Despite all talking, no tax shifting has occurred since 2002! It's a scandal!**



Source: Eurostat (online data code: env_ac_tax)

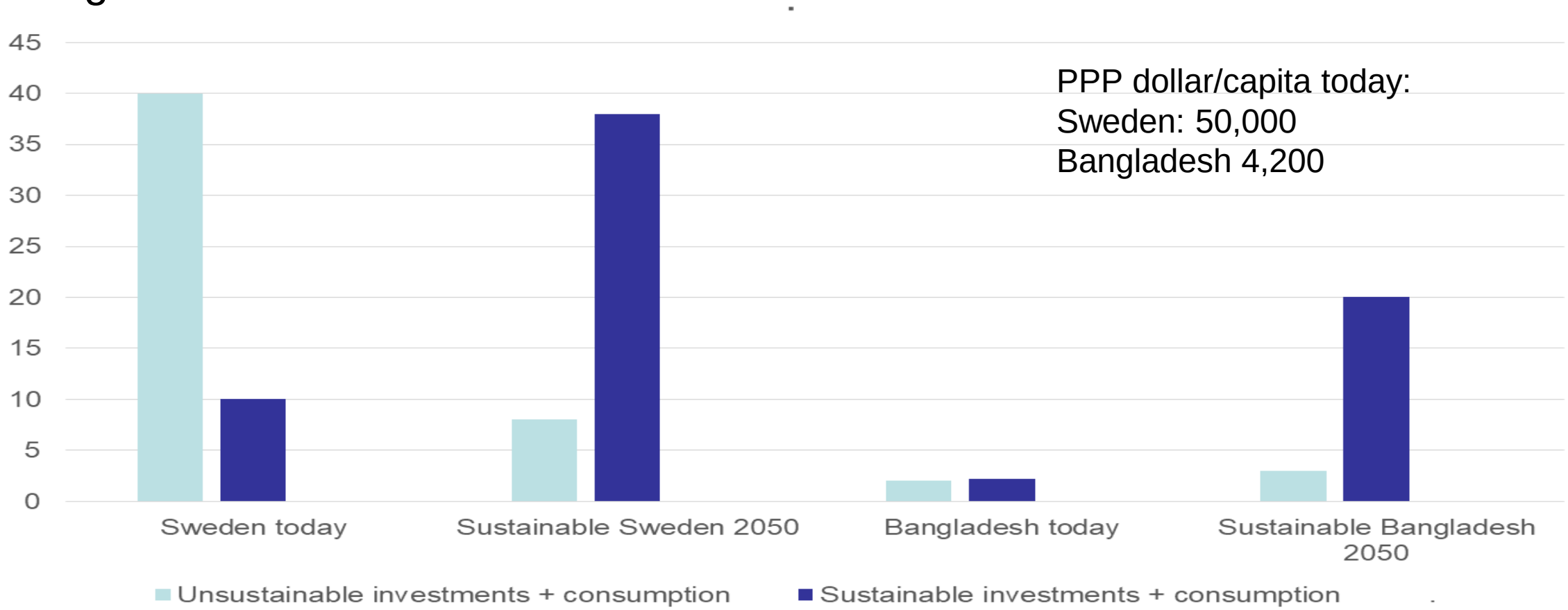
https://ec.europa.eu/eurostat/statistics-explained/index.php/Environmental_tax_statistics https://ec.europa.eu/eurostat/statistics-explained/index.php/Environmental_tax_statistics#Environmental_taxes_in_the_EU

Four strategies concerning GDP growth

- Business As Usual (BAU): No major regulations needed, focus on innovation and decoupling will follow
- Green/Sustainable growth: Green tax reform and other regulations will incentivize innovation and decoupling will follow
- A-growth: Focus should be sustainability transformations, invest in sustainable tech and divest in fossil. GDP growth should not be a goal but GDP might increase during the transformation.
- De-growth: Sustainable tech must increase but fossil sectors must decrease faster, even during the transformation.

Sustainability transformation

Probably results in slightly smaller GDP/capita in Sweden, a lot higher in Bangladesh



PPP dollar/capita today:
Sweden: 50,000
Bangladesh 4,200

Save the climate system? Yes please, but only as long as GDP increases!

Beslut
Sverige får ett klimatpolitiskt ramverk och en klimatlag (MJU24)
Riksdagen sa ja till regeringens förslag om ett klimatpolitiskt ramverk för Sverige. Det klimatpolitiska arbetet bör utgå från ett långsiktigt, tidssatt utsläppsmål som riksdagen fastställer. Målet ska vara att Sverige senast 2045 inte ska ha några nettoutsläpp av växthusgaser till atmosfären. Efter det ska negativa utsläpp uppnås. Riksdagen sa också ja till ett etappmål för utsläpp av växthusgaser till 2030 och 2040 och ett etappmål för utsläpp från inrikes transporter. Delar av det klimatpolitiska ramverket regleras i lag genom den nya klimatlagen. Lagen innehåller grundläggande bestämmelser om regeringens klimatpolitiska arbete. Klimatlagen börjar gälla den 1 januari 2018.
Riksdagen riktade ett tillkännagivande till regeringen om att klimatpolitiken ska vara långsiktigt effektiv och bedrivas så att minskade utsläpp av växthusgaser förenas med tillväxt.
Utskottets förslag till beslut: Bifall till propositionen. Utskottet föreslår med bifall till motionerna 2016/17:2670 yrkande 1 i denna del och 2016/17:3167 yrkande 1 ett tillkännagivande om att klimatpolitik ska vara långsiktigt effektiv och bedrivas så att minskade utsläpp av växthusgaser förenas med tillväxt. Avslag på övriga motionsyrkanden.
Riksdagens beslut: Kammaren biföll utskottets förslag.

https://www.riksdagen.se/sv/dokument-lagar/arende/betankande/ett-klimatpolitiskt-ramverk-for-sverige_H401MJU24

- This means, in plain English, that climate politics should be ”efficient” and that ”reduced emissions of GHG should be combined with economic growth”

- The Swedish ”Climate law” cannot challenge GDP growth
- (mix between BAU and Green growth)

Svenska Dagbladet 7 September, 2019

Johan Rockström: Önsketänkande med grön tillväxt – vi måste agera

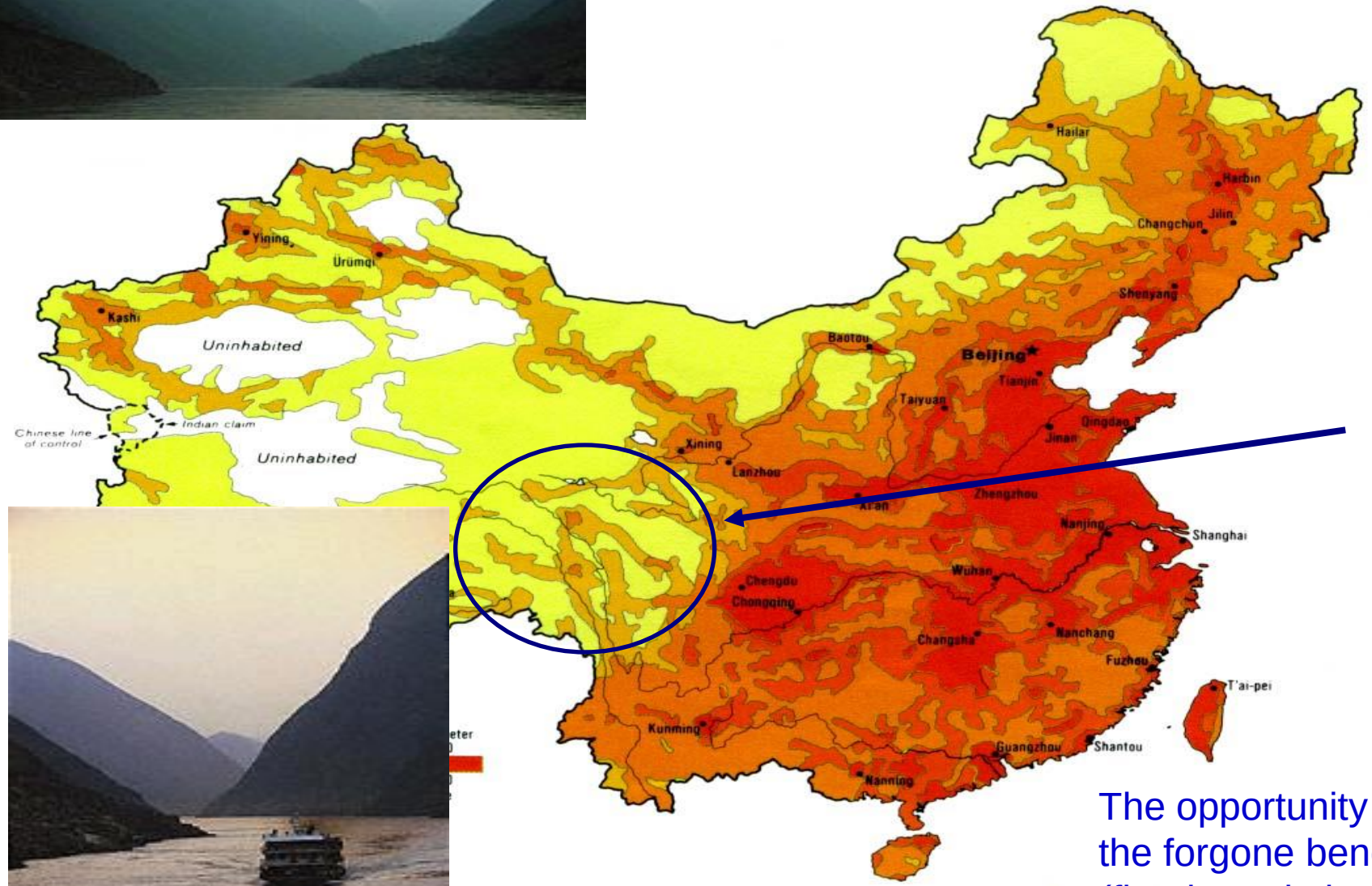
Jag vill vara tydlig från start, detta är en pessimistisk krönika. Jag kommer att sätta frågetecken kring två grundläggande utgångspunkter som jag själv alltid försvarat, nämligen (1) att det är möjligt att stoppa den globala uppvärmningen vid 1.5 grader, och (2) att det är möjligt att uppnå "grön tillväxt” dvs frikoppling (decoupling)

https://www.svd.se/onsketankande-med-gron-tillvaxt--vi-maste-agera

Four important economic principles

1. Opportunity cost (basis for all costs)
   - The cost of a particular choice (resource use) is the forgone net benefit of the best alternative choice, e.g. Yangtzi River.
2. External cost
   - Market price does not include all costs
3. Incentives
   - The expected awards or punishment (“disincentive”) of a particular action
4. Cost effectiveness
   - To reach an environmental target at least cost

Example of opportunity cost



The forests in Upper Yangtzi River regulates water flows: this value is estimated to be ten times higher than the timber value!

The opportunity cost of cutting the trees is the forgone benefits of keeping the forests (flood regulation, biodiversity, recreation…)

External costs

- Sir Nicholas Stern, former Chief Economist of the World Bank, released his Report on the Economics of Climate Change in November 2006. It was requested by the UK Government and has been endorsed and supported by Nobel Prize winners, the World Bank, and other leading institutes. Its main messages:
- “Climate change is the biggest market failure in human history” (Emissions of GHG give rise to external costs)
- “The benefits of strong, early action on climate change outweigh the costs of action” (CBA framework)
- “We can manage the transition to a low carbon economy! It will only cost 1% of the global GNP every year.

The Stern Report

- Its main messages:
- “Mitigation – taking strong action to reduce emissions – must be viewed as an investment”
- “If these investments are made wisely, the costs will be manageable (1% of GNP), and there will be a wide range of opportunities for growth and development along the way”
- If we continue “business as usual”, we risk major social and economic disruption (5-20% of GNP), similar to the economic depression of 1930s
- Strong global regulations need to be implemented within the next 5-10 years

Prisoners' dilemma = incentives to fish too much

Revenue	5, 5	2, 10	7, 7
Cost	1, 1	1, 5	5, 5
Net	4, 4	1, 5	2, 2

Neighbour (N)

Myself (M)

Outcome (M, N)	Fishing moderately	Fishing too much
Fishing moderately	4, 4	1, 5
Fishing too much	5, 1	2, 2 Nash equilibrium

Prisoners' dilemma

Revenue	5, 5	10, 5	2, 7
Cost	1, 1	2, 1	1, 5
Net	4, 4	8, 4	1, 2

7, 7
5, 5
2, 2

50 other villagers (V)

Elinor Ostrom

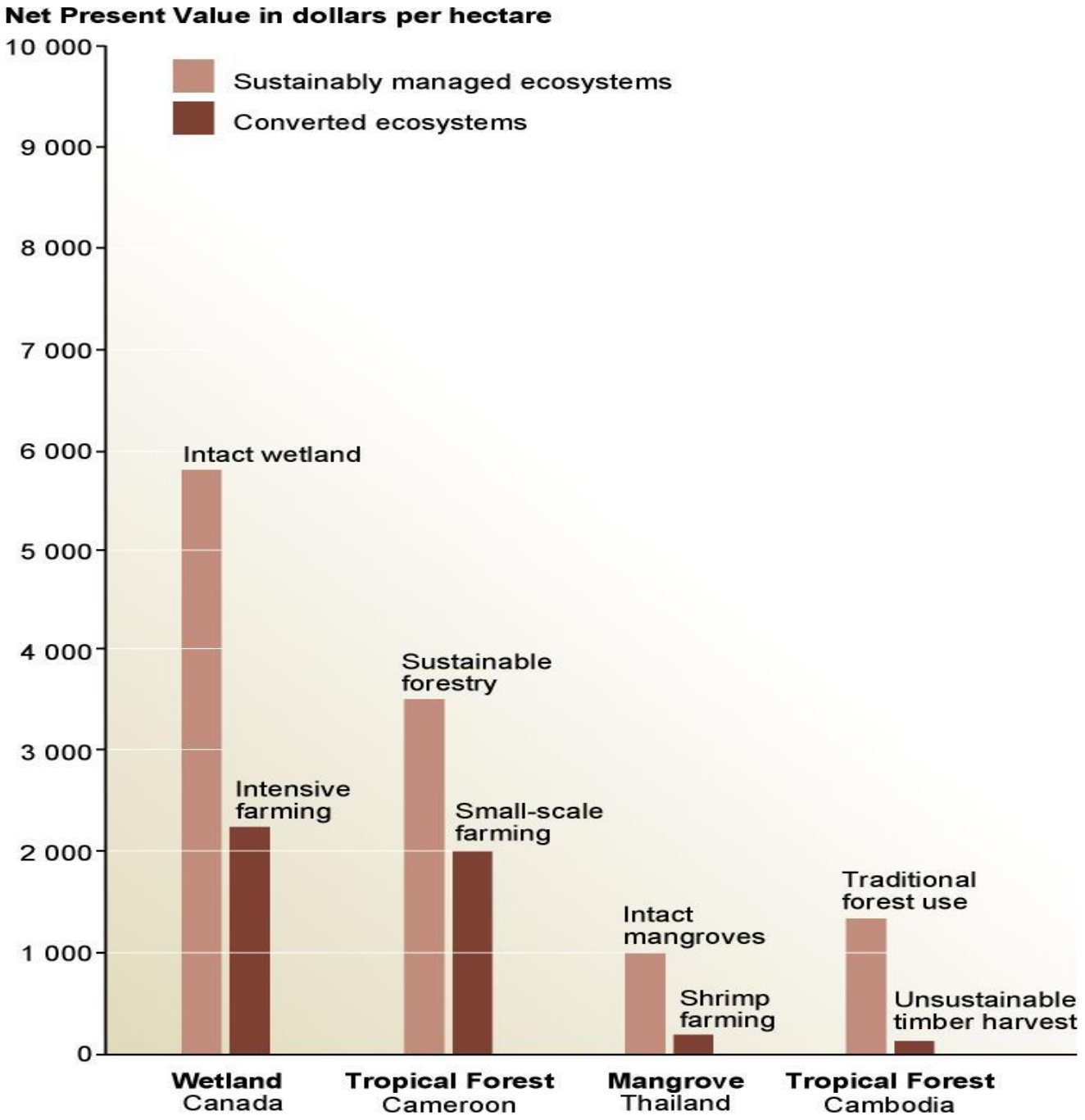
My action is "a drop in the ocean"

Myself (M)	Outcome (M, V)	Fishing moderately	Fishing too much
	Fishing moderately	4, 4	1, 2
*3,92	Fishing too much	8, 4*	2, 2 Nash equilibr. Tragedy of open access

Degradation of ecosystem services often causes significant harm to human well-being

Economics is not equal to money!

- "The total economic value associated with managing ecosystems more sustainably is often higher than the value associated with conversion" *(Opportunity cost)*
- "Conversion may still occur because private economic benefits are often greater for the converted system" *(external costs)*
- "Governments should first stop subsidies to such conversions, then subsidize production of ecosystem services" *(incentives)*



Source: Millennium Ecosystem Assessment

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   - The cost of a particular choice (resource use) is the forgone net benefit of the best alternative choice, e.g. Yangtzi River.
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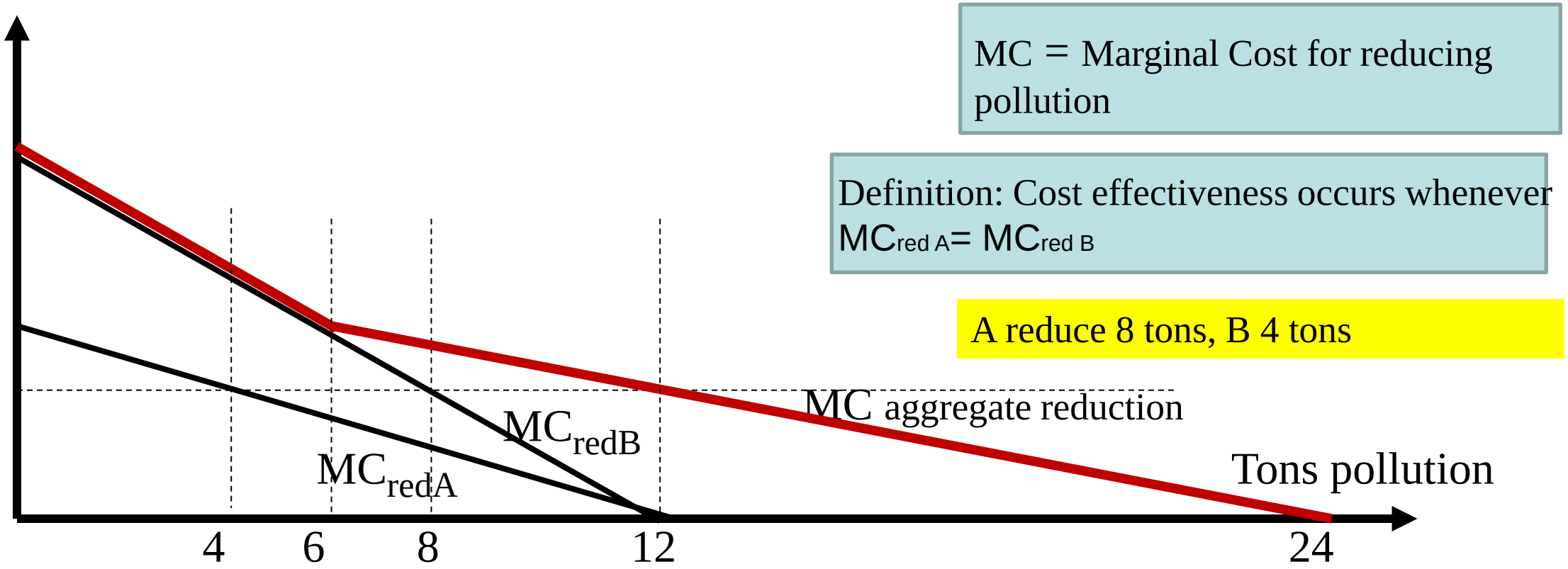
4. Cost effectiveness
   - To reach an environmental target at least cost

Cost effectiveness

What is an ‘effective’ cost? As low as possible of course!
Definition: to reach a non-monetary target at the lowest monetary cost, alternatively to get as much of the target as possible for a limited budget.
Assume there are two firms that together must reduce pllution by 50%. What is the cost effective allocation?



Cost-effectiveness including system change

- Baltic Sea Action Plan: Conventional analysis concludes that cost-effective measures to achieve the goal cost 4 billion €/year
- However, the cost can be **much smaller** if you adapt diet to what is ”Baltic Sea smart”

- Södertälje municipality received White Guide Junior Award for Best School-Food in 2014 and Sara Jervfors was awarded a personal prize.
- The transformation was a change of food system at almost zero cost: same budget as before despite 50% organic
- By changing design (”changing the system”) transformations can be achieved much easier (much cheaper)

B. Payments for Ecosystem Services

1. Public goods and other market failures
2. Payment for ecosystem services (PES)
3. Six degrees of commodification
4. Biodiversity offsets
5. Commensurability and Commodification
6. Can markets save biodiversity?
7. Transforming institutional drivers yes, but don’t forget Economic Drivers!

Public goods and other market failures

- **Pareto efficiency** = a feasible allocation is efficient if there is no other feasible allocation such that the utility of a least one person is higher and the utility of nobody is lower.
- In a free market both seller and buyer have veto right. A market transaction therefore results in increased efficiency.
- However, the classic market failures are: externalities, public goods and natural monopoly.
- Public goods are non-excludable and non-rival: people cannot be excluded from benefitting from it and the benefits enjoyed by one person does not reduce the benefits that could be enjoyed by others.
- Investments in public goods tend to be too small because the investor cannot reap the benefits. Argument for taxation.

Payments for Ecosystem Services (PES)
= popular policy for biodiversity conservation

- Payment often to a certain land-use; land-use is commodified, not outcomes
- Level of payment is NOT a valuation of biodiversity but set pragmatically to compensate for forgone net benefits of growing wheat, in other words to overcome the opportunity cost of biodiversity conservation
- Hence, rather a “compensation” than “payment”
- 97-99% paid by governments and other public sources (WB, GEF)
- Government PES uses the “price signal” (like a tax) = economic instrument
- It is NOT a market instrument, since it does not rely on the price mechanism (market mechanism), i.e.” the autonomous mechanism that determines the price in a market economy, as an equilibrium between supply and demand”
- The term “market-based instrument” is confusing! No trade!

Hahn et al. 2015

Table 1. Degrees of commodification in terms of instruments for biodiversity and ecosystem services.

Hahn et al. 2015

Degree of commodif.	Main category	Examples
0	Moral suasion and non-utilitarian regulations	Information appealing to moral responsibility. Recognising social equity and nature's intrinsic value, e.g. endangered species acts and nature reserves
1	Non-monetary regulations based on instrumental utilitarian values	Nature reserves and other land-use plans focusing on nature's instrumental value to human wellbeing
2	Non-monetary regulations based on metrics (units of nature)	Ecological compensation with no role for price signals or market transactions
3	Non-monetary regulations designed to maximise economic efficiency	City park designed and managed to maximise calculated recreation values
4	Economic instruments (not traded)	Taxes and subsidies Subsidy-like PES paid by governments
5	Economic instruments (voluntary market trade)	Market-like PES Markets for ecosystem services (MES), e.g. biodiversity offsets trading conservation credits
6	Financial instruments	Forest bonds Biodiversity derivatives

PES in Costa Rica

- Costa Rica is one of the most well-known examples of national PES, often framed as a *neoliberal market-based* conservation mechanism
- Costa Rica PES is successful because it's NOT neoliberal:
  - enabled by Forest Law (1996) that banned land-use change
  - largely financed through a carbon tax (+ water tariffs)
  - government is the only buyer (hence it's not a market)
  - government priorities high poverty areas and "biological corridors" (in accordance with CBD)
- Other countries (Ecuador, Bolivia) also explore these four criteria

Biodiversity offsets (Ecological compensation)

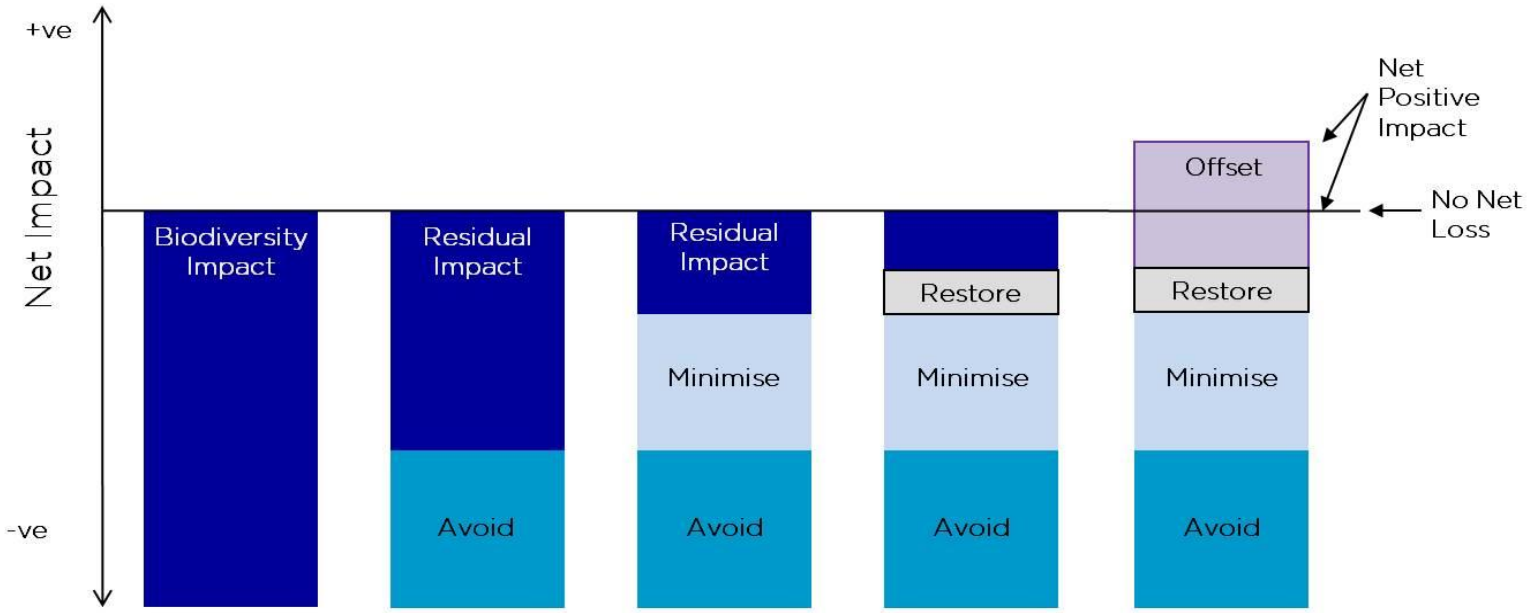
- Every year about 86,000 ha of green area is “developed” only within the EU member states.
- The EU has suggested, in its 2020 Biodiversity Strategy that these losses should be compensated for by ecological restoration:
  - “Even when every effort is made to avoid, minimize and restore, human activities can still have negative impacts on biodiversity. To avoid a net loss of biodiversity and ecosystem services, damages resulting from human activities must be balanced by at least equivalent gains.”
- The problem is how to design Biodiversity Offset programmes
- There are many controversies – can you really compensate for unique ecosystems? Does ecological restoration work? Can this new instrument actually lead to “license to trash”?

Biodiversity Offsets (B.O.) have strong proponents

- Biodiversity offsets are promoted by The CBD and The EU (2020 Biodiversity Strategy)
- The first three “steps” of the Mitigation hierarchy are the same as for Environmental Impact Assessment (EIA): Avoiding, Minimising, and Restoring on-site afterwards.
- The fourth step is Offsetting (compensation) somewhere else.

The mitigation hierarchy

http://bbop.forest-trends.org/pages/mitigation_hierarchy

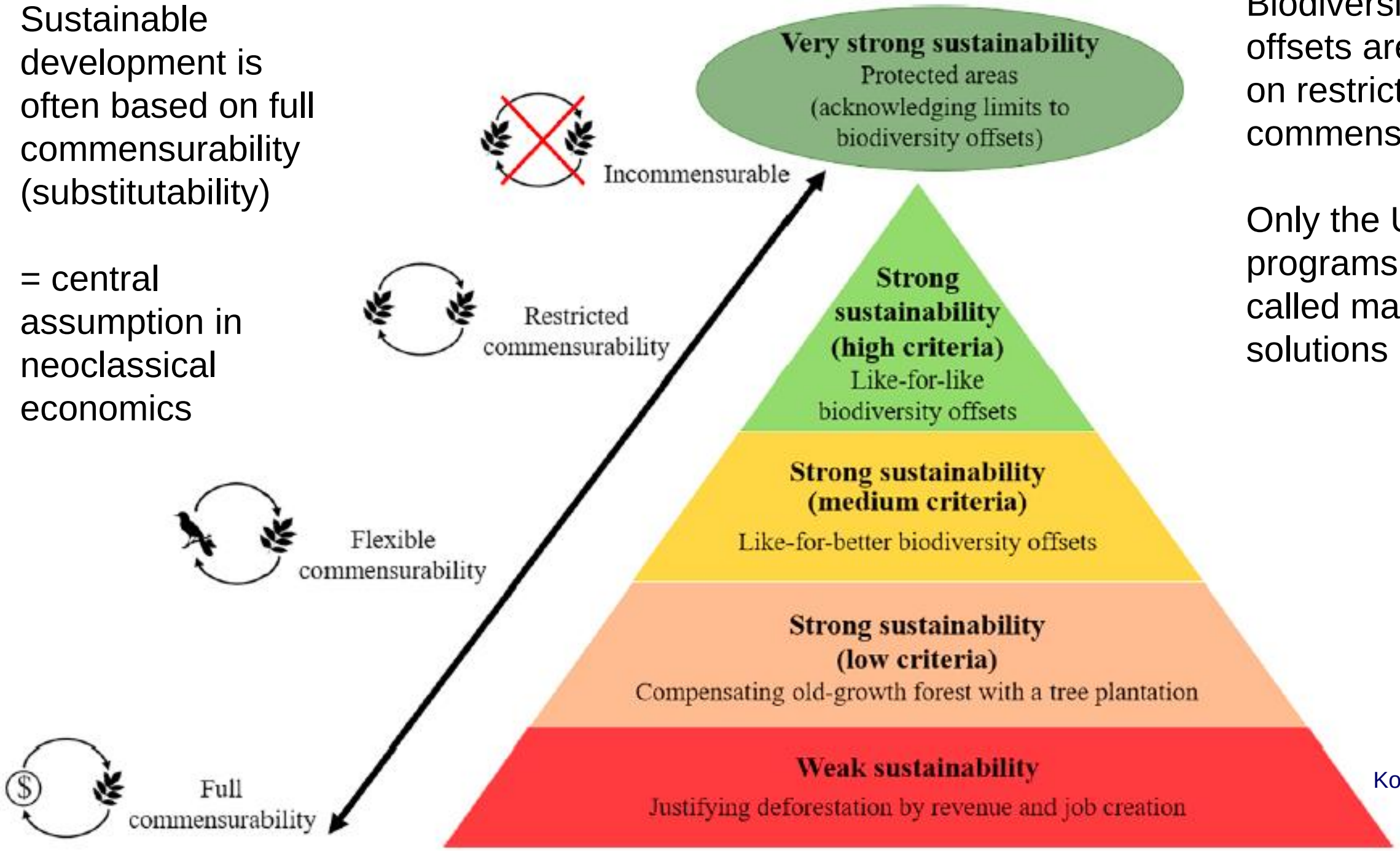


Commensurability and commodification

- Biodiversity offsets are interesting because they consist of two transactions where the first one concerns commensurability and the second commodification.
- First, a degraded area is ecologically compensated by a restored area. Here, commensurability is generally restricted to the same type of habitats or the same ecosystem services.
- Secondly, the actor providing the biodiversity offset is compensated with money. This transaction can be done according to a predefined list where one hectare of restored grassland has a fixed price (as in Germany) or acccording to market negotiations (as in the US). Hence the degree of commodification can be low or high in biodiversity offsets schemes

Sustainable development is often based on full commensurability (substitutability)

= central assumption in neoclassical economics



Biodiversity offsets are based on restricted commensurability.

Only the US programs may be called market solutions

Koh et al. (2019)

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Valuation of ecosystem services

Methods and decision support in:	**Suitable for ecosystem services which …**
Monetary terms (Contingent valuation, Cost-benefit analysis)	**… we have sufficient knowledge about and for which monetary valuation is ethically uncontroversial e.g. timber, water purification, recreation values**
Quantitative terms (mapping, defining status and trends, statistics, multicriteria analysis)	**… can be measured but difficult to translate to money due to complex multi-functionality and tradeoffs/synergies in e.g. wetlands and forests**
Qualitative terms (stakeholder dialogue, SWOT-analysis, scenario, multicriteria analysis)	**… are difficult to measure due to sensitivity to threshold effects/irreversibility and or significant insurance values. Improved knowledge is needed to handle uncertainty**

Table 2
Framework for ES valuation and policy integration

	Information in		
	Qualitative terms	**Quantitative terms**	**Monetary terms**
Stated purpose (as observed in national legislation)	Concern for non-measurable objectives like social equity, precautionary principle and safeguarding the insurance value of biodiversity.	Concern for reaching quantitative targets in cost-effective ways without expressing targets in monetary terms.	Concern for economic efficiency expressed in monetary terms and justified as a means to internalise externalities.
Methods for describing values. Decision-support.	SWOT analysis, identification, historical assessment, narratives, stakeholder consultation, Delphi methods, multicriteria analysis.	Technical/scientific mapping and assessment of trends e.g. water flows, pollination, and species abundance, multicriteria analysis.	Cost-benefit analysis is the frame, methods for monetary valuation include replacement cost, contingent valuation, and hedonic pricing.
Policy integration by non-monetary regulation and without market trade (DC 0, 1, 2, 3)	Land use planning, protected areas, and species acts targeted to intrinsic values (DC0) or instrumental values (DC1). N/A	Land use planning, protected areas, and species acts designed to reach measurable targets (DC0 or DC1 depending on institutional design). Liability for ecological compensation, using physical metrics, e.g. German compensation pools (CD2).	Land use planning and protected areas designed to maximise economic efficiency. (DC1 or DC3 depending on institutional design). N/A
Economic instruments (no market trade). (DC 4)	Subsidy-like PES paid by governments targeted at high biodiversity, multiple ES or poverty areas, e.g. EU agri-env. and PES in Ecuador and Costa Rica.	Subsidy-like PES paid by governments targeted at well-defined measurable units, e.g. PES for carnivores in Sweden.	PES when payment is informed by the stated value of the targeted ecosystem service, not by opportunity costs, e.g. Wimmera, Australia.
Economic instruments (market trade) (DC 5)	N/A	Biodiversity offsets trading conservation credits, e.g. US habitat banking, and market-like PES financed by users, e.g. Vittel watershed in France. Monetary value set by market actors.	
Financial instruments (DC 6)	N/A	N/A	Monetary value set by markets, e.g. biodiversity derivatives.

DC=Degree of Commodification. N/A=Not applicable
The examples provided are described in text.

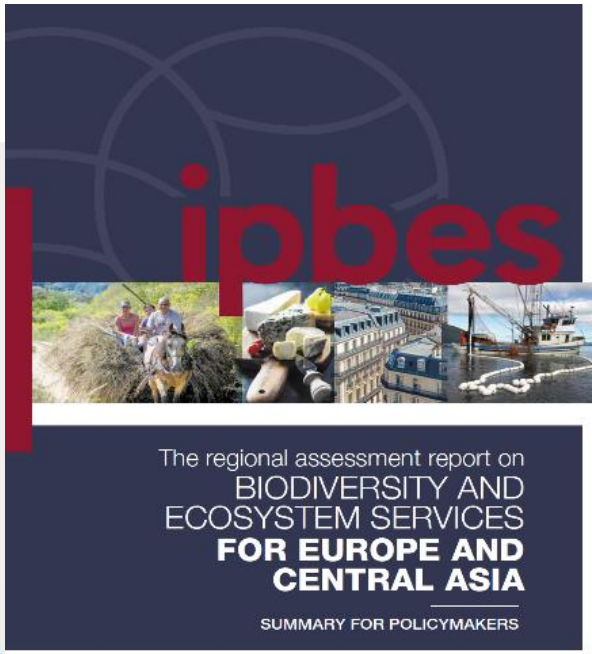
Hahn et al. 2015

Can markets save biodiversity?

- In neoliberal theory, markets are thought to be more efficient than government regulation, almost by definition (lowering transaction costs)
- The assumption is that both seller and buyer have incentives to make sure that quality is high. ”Market relations are built on trust”
- However, if the traded goods/services are public goods, both seller and buyer have incentives to compromise quality. Strong government regulation and enforcement is needed to ensure quality.
- Markets for ecosystem services (MES) therefore require MORE, not less, regulations. Hence transaction costs are likely to INCREASE when public goods are traded on market (compare school and old age health services)

Inter-governmental Platform for Biodiversity and ES (IPBES)

Regional assessment for Europe and Central Asia (ECA)



ipbes

ıes.net

Natural Earth

IPBES ECA Chapter 4 on Drivers: Complex causality

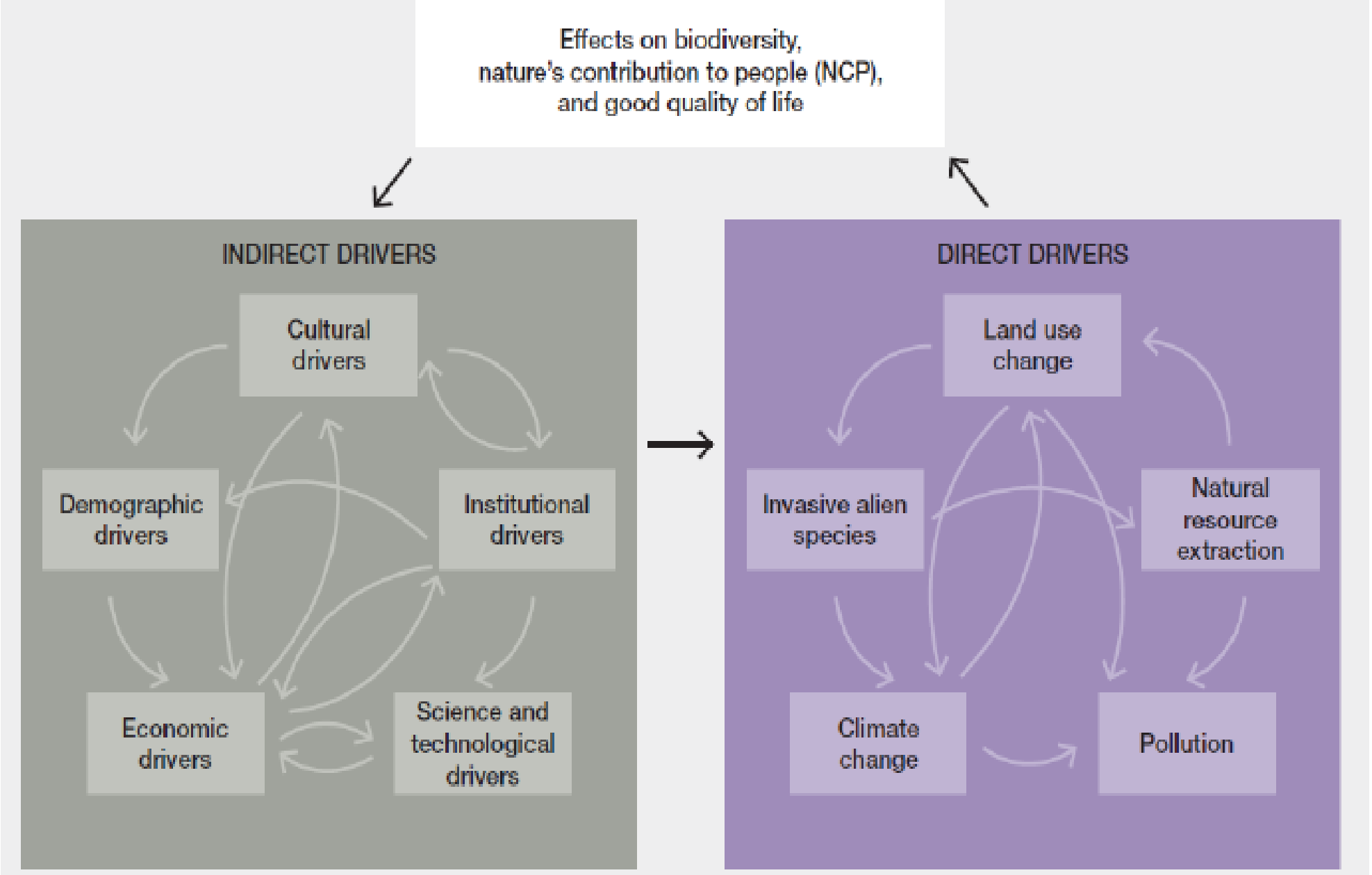
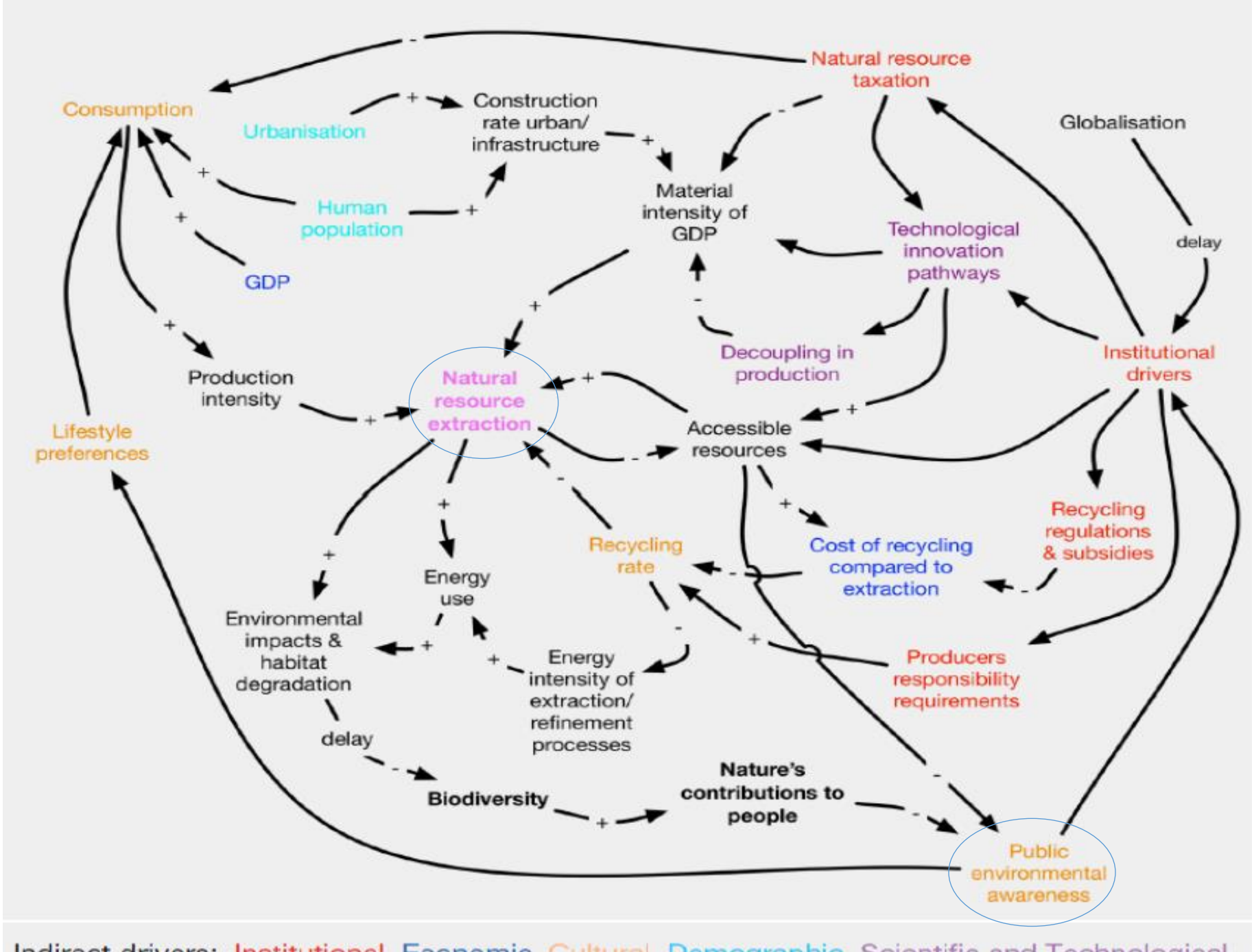


Fig. 4.7 Causal loop diagram illustrating drivers (causes) of natural resource extraction

(IPBES 2018/ Elbakidze & Hahn)



Indirect drivers to biodiversity losses

- Almost all direct drivers have been slowed down in the EU thanks to regulations/institutional divers (Environmental regulations for N, P, SO2, CO2, invasive species, Common Fishery Policies)
- However, most direct drivers have been reinforced due to economic drivers like growth, trade, and employment policies (mining and other natural resource extraction globally, pollution, CO2, invasive species, forestry, agriculture…)
- Net effect on biodiversity is often negative, due to increased GDP, lower prices of minerals (which causes less interest in circular economy) and technological change which usually respond to economic incentives. However, technology also responds to environmental regulations and taxation.
- As long as GDP growth is an overarching political goal (Cultural driver), it is difficult to halt biodiversity loss

Table SPM 2 **Impact of indirect drivers (rows) on direct drivers (columns) of biodiversity loss and nature's contributions to people in Europe and Central Asia.**

The colour shows the impact of an indirect driver on a direct driver's effect on biodiversity and nature's contributions to people along a gradient from negative to positive effects. *Abbreviations:* WE = Western Europe, CE = Central Europe, EE = Eastern Europe, CA = Central Asia

	LAND USE CHANGE															
	Agricultural land use				Forestry				Traditional land use				Protected area development			
	WE	CE	EE	CA	WE	CE	EE	CA	WE	CE	EE	CA	WE	CE	EE	CA
INSTITUTIONAL	✓	✓	✗	✗	✓	✓	✓	✓	✓	✓	~	~	✓	✓	~	~
ECONOMIC	~	~	~	~	✗	~	✗	~	✓	✓	✗	✗			✗	✗
DEMOGRAPHIC			~	~					✗	✗	✗	✗				
CULTURAL	✓	~	✗	✗	✓	✓	✓	✗	~	~	~	~	✓	✓	✗	✗
TECHNOLOGICAL	~	~	~	~												

	Climate change				Pollution				Natural resource extraction				Invasive alien species			
	WE	CE	EE	CA	WE	CE	EE	CA	WE	CE	EE	CA	WE	CE	EE	CA
INSTITUTIONAL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✗	✓	✓	~	~
ECONOMIC	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗		✗	✗	✗	✗	✗
DEMOGRAPHIC					✗	✗	✗	✗	✗	✗	✗	✗				
CULTURAL					~	~	~	~	~	~	~	~	✗	✗	✗	✗
TECHNOLOGICAL	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗	✗				

✗ Negative ~ Both ways ✓ Positive Lack of evidence

Conclusions

- Payments for Ecosystem Services and Biodiversity Offsets can be designed with more or less “market” components. The devil is in the detail! Some degree of commodification can be effective
- Good news: economic instruments have no inherent preference for “pure markets”/neoliberalism – they can fit different political cultures
- Market actors have limited incentives to ensure quality of traded public goods, hence markets cannot be entrusted to “save biodiversity”
- We need to transform both institutional drivers and economic drivers. This requires a change in the belief system (cultural driver), especially in how GDP is used as a proxy for well-being or success


Tack!

Thanks!

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