# Sustainable Development Goals (SDGs) to transform our world: contributions from Economics and contradictions

Sustainable Development Goals (SDGs) are at the core of the international political agenda to guide the transitions toward a more socially just and ecologically sustainable system. The SDGs are a multi-dimensional construct of economic, social and environmental indicators that are difficult to measure, monitor, prioritise and achieve. Here, we try to shed light on how they are built, their interconnections, and possible inconsistencies by providing examples of specific issues.

## Outline

1. Sustainable development and future generations … the fairy tale we have been told.
2. Introduction to Agenda 2030 and its goals.
3. Agenda 2030: its systemic perspective, the interconnections of the goals with evidence of potential inconsistencies.
4. Geographical scales: interconnections among SDGs at different scales and examples from the Nexus approach.
5. Other fairy tales on SDG 8 and 12.

# Sustainable development and future generations: the fairy tale we have been told

# Sustainable development?

Welcome to the United Nations

The Folkets Hus building (center) in Stockholm, Sweden, which hosted the United Nations Conference on the Human Environment, 16 May 1972. UN Photo/Yutaka Nagata

# United Nations Conference on the Human Environment, 5-16 June 1972, Stockholm

Need for a common outlook and principles

«to inspire and guide the people of the world

for the preservation and enhancement of the human environment»

Establishment of the **United Nations Environment Programme (UNEP)**

«to provide continued leadership and coordination of environmental action»

World Commission on Environment and Development (UN)

## The «Brundtland Commission», 1983-1986

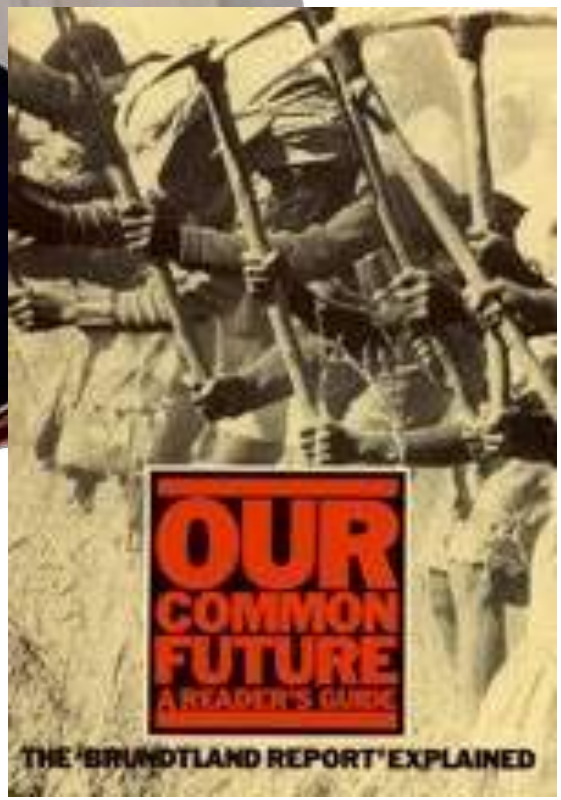
## The 1992 RIO Earth Summit

The United Nations Conference on Environment and Development, also known as the Earth
Summit was held in Rio de Janeiro, Brazil from June 3 to June 14, 1992.

**2002:** World Summit on Sustainable Development (WSSD) held in **Johannesburg**, South Africa from 26 August to 4 September.

**2012: RIO +30**


*Norwegian Prime Minister*



The **World Commission on Environment and Development** (WCED) was convened by the United Nations in 1983

Chaired by Ms. Gro Harlem Brundtland (NOR prime minister)
to address the growing concern
"about the **accelerating deterioration** of
the human environment and natural resources
and the **consequences** of that deterioration
for **economic and social development**."

The UN General Assembly recognized
that environmental problems were **global** in nature and
determined that it was in the
**common interest of all nations**
to establish policies for sustainable development

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Or use QR code

RESULTS TO BE ADDED AFTER ANSWERING

# *Reading Our Common Future*

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs"

(WCED 1987, p. 40)

much MORE than that

# http://www.un-documents.net/ocf-02.htm



## Our Common Future, Chapter 2: Towards Sustainable Development

From *A/42/427. Our Common Future: Report of the World Commission on Environment and Development*



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- the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and
- the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs.

2.Thus the goals of economic and social development must be defined in terms of sustainability in all countries - developed or developing, market-oriented or centrally planned. Interpretations will vary, but must share certain general features and must flow from a consensus on the basic concept of sustainable development and on a broad strategic framework for achieving it.

3.Development involves a progressive transformation of economy and society. A development path that is sustainable in a physical sense could theoretically be pursued even in a rigid social and political setting. But physical
sustainability cannot be secured unless development policies pay attention to such considerations as changes in access to resources and in the distribution of costs and benefits. Even the narrow notion of physical sustainability implies concern for social equity between generations, a concern that must logically be extended to equity within each generation.

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4 The satisfaction of human needs and aspirations in the major objective of development. The essential needs of vast numbers of people in developing countries for food, clothing, shelter, jobs - are not being met, and beyond their basic needs these people have legitimate aspirations for an improved quality of life.

A world in which poverty and inequity are endemic will always be prone to ecological and other crises. Sustainable development requires meeting the basic needs of all and extending to all the opportunity to satisfy their aspirations for a better life.

5. Living standards that go beyond the basic minimum are sustainable only if consumption standards everywhere have regard for long-term sustainability.

Yet many of us live beyond the world's ecological means, for instance in our patterns of energy use. Perceived needs are socially and culturally determined, and sustainable development requires the promotion of values that encourage consumption standards that are within the bounds of the ecological possible and to which all can reasonably aspire.

6.Meeting essential needs depends in part on achieving full growth potential, and sustainable development clearly requires economic growth in places where such needs are not being met. Elsewhere, it can be consistent with economic growth, provided the content of growth reflects the broad principles of sustainability and non-exploitation of others.

But growth by itself is not enough. High levels of productive activity and widespread poverty can coexist, and can endanger the environment. Hence sustainable development requires that societies meet human needs both by increasing productive potential and by ensuring equitable opportunities for all.

7. An expansion in numbers **can** increase the pressure on resources and slow the rise in living standards in areas where deprivation is widespread.

**Though the issue is not merely one of population size but of the distribution of resources**, sustainable development can only be pursued if demographic developments are in harmony with the changing productive potential of the ecosystem.

8. A society may in many ways compromise its ability to meet the essential needs of its people in the future - by overexploiting resources, for example.

The direction of **technological developments may solve some immediate problems** but lead to even greater ones. Large sections of the population may be marginalized by ill-considered development.

9. Settled agriculture, the diversion of watercourses, the extraction of minerals, the emission of heat and noxious gases into the atmosphere, commercial forests, and genetic manipulation are all examples or human intervention in natural systems during the course of development.

Until recently, such interventions were small in scale and their impact limited. **Today's** interventions **are more drastic in scale and impact, and more threatening to life-support systems** both locally and globally. This need not happen.

At a minimum, sustainable development must not endanger the natural systems that support life on Earth: the atmosphere, the waters, the soils, and the living beings.

10. Growth has no set limits in terms of population or resource use beyond which lies ecological disaster. Different limits hold for the use of energy, materials, water, and land. Many of these will manifest themselves in the form **of rising costs and diminishing returns, rather than in the form of any sudden loss of a resource base.** The accumulation of knowledge and the development of technology can enhance the carrying capacity of the resource base.
But **ultimate limits there are**, and sustainability requires that long before these are reached, the world must ensure equitable access to the constrained resource and reorient technological efforts to relieve the presume.

11. Economic growth and development obviously involve changes in the physical ecosystem.

Every ecosystem everywhere cannot be preserved intact.
A forest may be depleted in one part of a watershed and extended elsewhere, which is not a bad thing if the exploitation has been planned and the effects on soil erosion rates, water regimes, and genetic losses have been taken into account.
In general, renewable resources like forests and fish stocks need not be depleted provided **the rate of use is within the limits of regeneration and natural growth**.
But most renewable resources are part of a **complex and interlinked ecosystem**, and maximum sustainable yield must be defined after taking into account **system-wide effects** of exploitation.

## CONCERN FOR NON-RENEWABLE OR RENEWABLE?

12. As for non-renewable resources, like fossil fuels and minerals, their use reduces the stock available for future generations.

But this does not mean that such resources should not be used. In general the rate of depletion should take into account the criticality of that resource, the availability of technologies tor minimizing depletion, and the likelihood of substitutes being available.

Thus, land should not be degraded beyond reasonable recovery. With minerals and fossil fuels, the rate of depletion and the emphasis on recycling and economy of use **should be calibrated to ensure that the resource does not run out before acceptable substitutes are available.** Sustainable development requires that the rate of depletion of **non renewable** resources should foreclose as few future options as possible.

13. Development tends to simplify ecosystems and to reduce their diversity of species. And species, once extinct, are not renewable. The loss of plant and animal species can greatly limit the options of future generations; so sustainable development requires the conservation of plant and animal species.

14.So-called free goods like air and water are also resources. **The raw materials and energy of production processes are only partly converted to useful products. The rest comes out as wastes.** Sustainable development requires that the adverse impacts on the quality of air, water, and other natural elements are minimized so as to sustain the ecosystem's overall integrity. *(See GEORGESCU ROEGEN, 1971)*

15.In essence, sustainable development is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development; and institutional change are all in harmony and enhance both current and future potential to meet human **needs and aspirations**.

**II. Equity and the Common Interest**

16. Sustainable development has been described here in general terms. How are individuals in the real world to be persuaded or made to act in the common interest? The answer lies partly in education, institutional development, and law enforcement. **But** many problems of resource depletion and environmental stress arise from disparities in **economic and political power**.

An industry may get away with unacceptable levels or air and water pollution because the people who bear the brunt of it are poor and unable to complain effectively.

A forest may be destroyed by excessive felling because the people living there have no alternatives or because timber contractors generally have more influence than forest dwellers. *(ENVIRONMENTAL JUSTICE and CONFLICTS)*

17.Ecological interactions do not respect the **boundaries** of individual ownership and political jurisdiction. Thus:

In a watershed, the ways in which a farmer up the slope uses land directly affect run-off on farms downstream.

the irrigation practices, pesticides, and fertilizers used on one farm affect the productivity of neighbouring ones, especially among small farms.

The efficiency of a factory boiler determines its rate of emission of soot and noxious chemicals and affects all who live and work around it.

The hot water discharged by a thermal power plant into a river or a local sea affects the catch of all who fish locally. *(ECONOMICS→ ….?)*

**18.Traditional social systems** recognized some aspects of this interdependence and enforced community control over agricultural practices and traditional rights relating to water, forests, and land. This enforcement of the 'common interest' did not necessarily impede growth and expansion though it may have limited the acceptance and diffusion of technical innovations. *(Elinor OSTROM, Managing the commons))*

19.Local interdependence has, if anything, increased because of the technology used in modern agriculture and manufacturing. Yet with this surge of technical progress, the growing 'enclosure' of common lands, the erosion of common rights in forests and other resources, and the spread of commerce and production for the market, **the responsibilities for decision making are being taken away from both groups and individuals.** This shift is still under way in many developing countries.

20.It is not that there is one set of villains and another of victims. **All would be better off if each person took into account the effect of his or her acts upon others.** But each is unwilling to assume that others will behave in this socially desirable fashion, and hence all continue to pursue narrow self-interest. Communities or governments can compensate for this isolation through laws, education, taxes, subsidies, and other methods. Well-enforced laws and strict liability legislation can control harmful side effects. Most important, effective participation in decision-making processes by local communities can help them articulate and effectively enforce their common interest.
(*Game theory?)*

**21.Interdependence is not simply a local phenomenon.** Rapid growth in production has extended it to the **international plane**, with both physical and economic manifestations. There are growing global and regional pollution effects, such as in the more than 200 international river basins and the large number of shared seas.

22.The enforcement of common interest often suffers because areas of political jurisdiction and areas of impact do not coincide. **Energy policies in one jurisdiction cause acid precipitation in another. The fishing policies of one state affect the fish catch of another.** No supranational authority exists to resolve such issues, and the common interest can only be articulated through international cooperation.

23. **In the same way, the ability of a government to control its national economy is reduced by growing international economic interactions**. For example, foreign trade in commodities makes issues of carrying capacities and resource scarcities an international concern. (See Chapter 3.) If economic power and the benefits of trade were more equally distributed, common interests would be generally recognized. But the gains from trade **are unequally distributed**, and patterns of trade in, say, sugar affect not merely a local sugar-producing sector, but the economies and ecologies of the many developing countries that depend heavily on this product. *(Economics: POWER?)*

24. The search for common interest would be less difficult if all development and environment problems had solutions that would leave everyone better off. **This is seldom the case, and there are usually winners and losers**. Many problems arise from inequalities in access to resources. An inequitable landowner ship structure can lead to overexploitation of resources in the smallest holdings, with harmful effects on both environment and development. Internationally, monopolistic control over resources can drive those who do not share in them to excessive exploitation of marginal resources. The differing capacities of exploiters to commandeer 'free' goods - locally, nationally, and internationally - is another manifestation of unequal access to resources. 'Losers' in environment/development conflicts include those who suffer more than their fair share of the health, property, and ecosystem damage costs of pollution.

26. Hence, our inability to promote the common interest in sustainable development is often a product of the relative **neglect of economic and social justice within and amongst nations**.

# III. Strategic Imperatives

27.The world must quickly design strategies that will allow nations to move from their present, often destructive, processes of growth and development onto sustainable development paths. This will require policy changes in all countries, with respect both to their own development and to their impacts on other nations' development possibilities. (This chapter concerns itself with national strategies. The required reorientation in international economic relations is dealt with in Chapter 3.)

28.Critical objectives for environment and development policies that follow from the concept of sustainable development include:

- reviving growth;
- changing the quality of growth;
- meeting essential needs for jobs, food, energy, water, and sanitation;
- ensuring a sustainable level of population;
- conserving and enhancing the resource base:
- reorienting technology and managing risk; and
- merging environment and economics in decision making.

# Transforming Our World:
# 2030 Agenda for Sustainable Development

Department of Public Information
United Nations

# Sustainable Development Summit 2015

# Sustainable Development Summit
# Septemper 2015

# A recap of Agenda 2030 and its goals

**1 January, 2016 officially into force**

# SDGs: Universal

# SDGs: Indivisible

# SDGs: Transformative


- Eradicate poverty and hunger, guaranteeing a **healthy** life
- Universalize access to basic services such as **water, sanitation and sustainable energy**
- Support the generation of development opportunities through inclusive **education and decent work**
- Foster innovation and **resilient infrastructure**, creating **communities and cities** able to **produce and consume sustainably**
- Reduce **inequality** in the world, especially that concerning **gender**
- Care for the environmental integrity through combatting **climate change and protecting the oceans and land ecosystems**
- Promote **collaboration** between different social agents to create an environment of **peace** and ensure responsible consumption and production


Copyleft: Tommaso Luz

# Goal 1: End poverty in all its forms everywhere

# Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture

# Goal 3: Ensure healthy lives and promote well-being for all at all ages

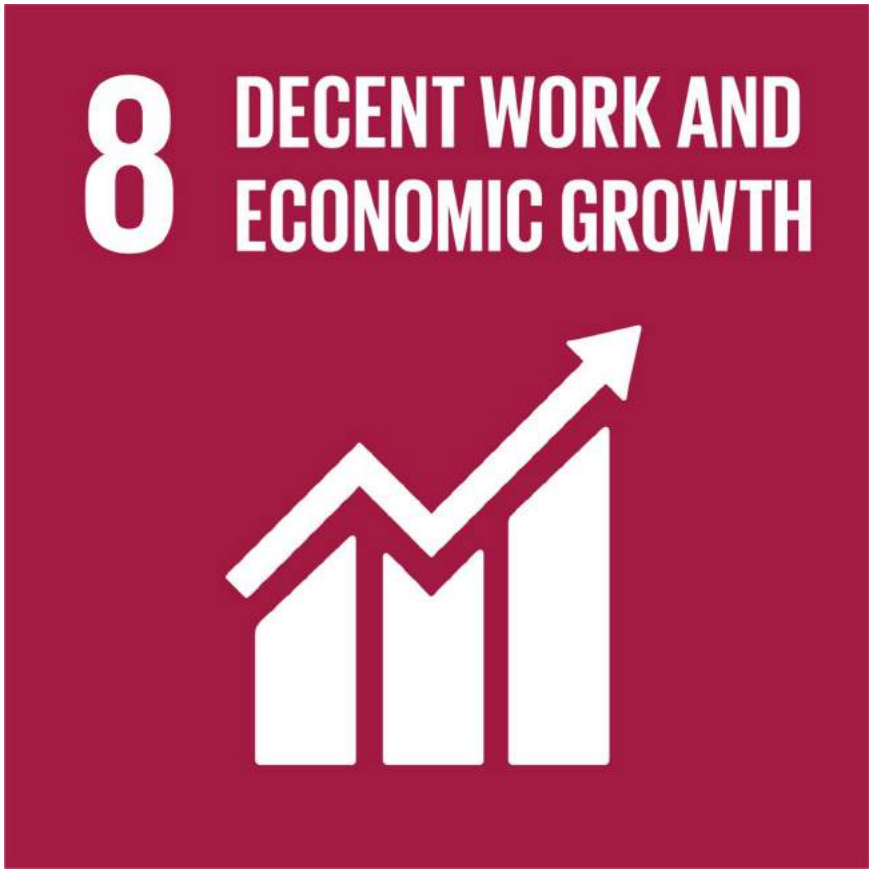
# Goal 4: Ensure inclusive and quality education for all and promote lifelong learning

# Goal 5: Achieve gender equality and empower all women and girls

# Goal 6: Ensure access to water and sanitation for all

# Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all

# Goal 8: Promote inclusive and sustainable economic growth, employment and decent work for all



# Goal 9: Build resilient infrastructure, promote sustainable industrialization and foster innovation

# Goal 10: Reduce inequality within and among countries

# Goal 11: Make cities inclusive, safe, resilient and sustainable

# Goal 12: Ensure sustainable consumption and production patterns

# Goal 13: Take urgent action to combat climate change and its impacts

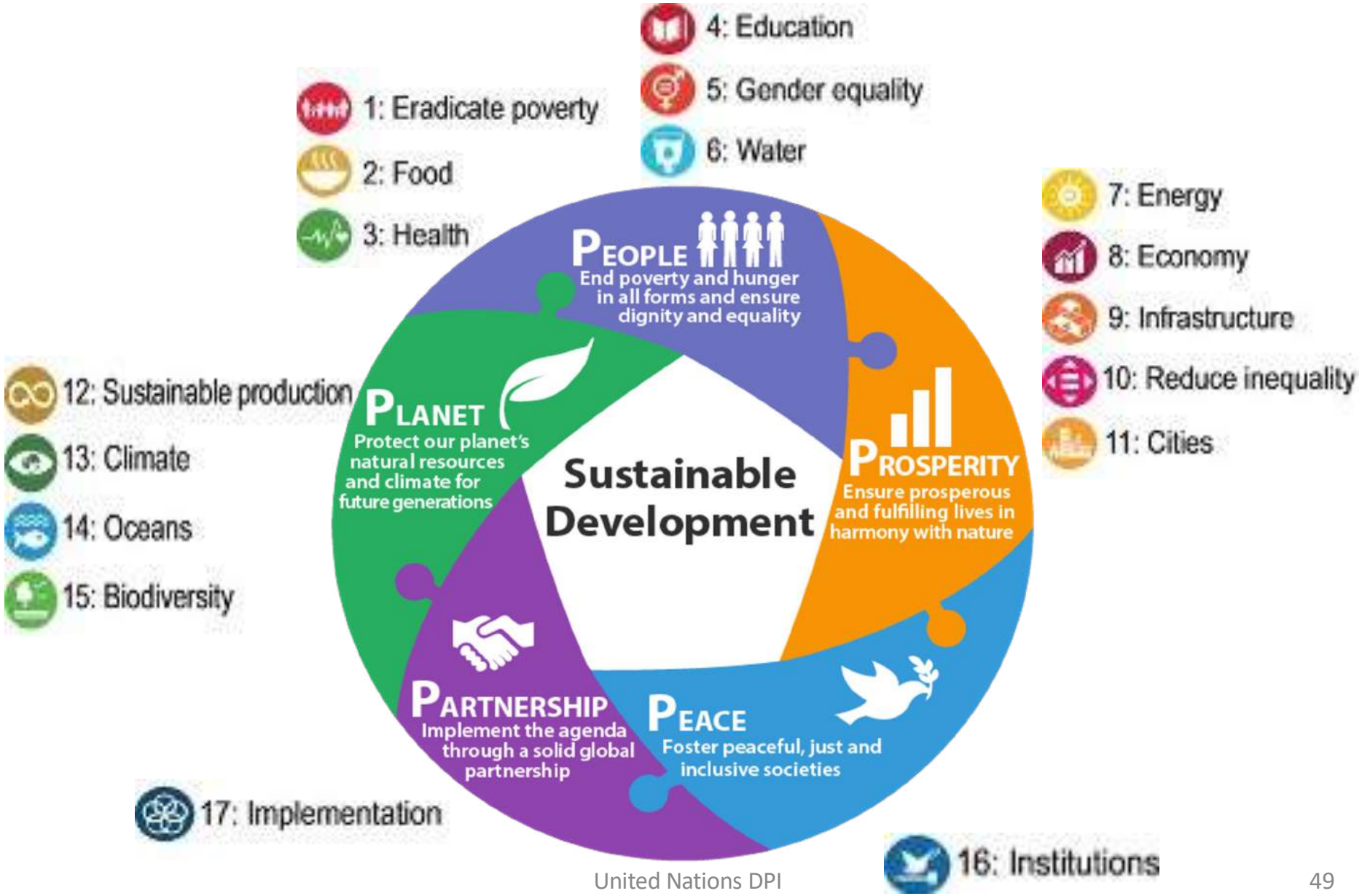
# Goal 14: Conserve and sustainably use the oceans, seas and marine resources

Goal 15: Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss

# Goal 16: Promote just, peaceful and inclusive societies

# Goal 17: Revitalize the global partnership for sustainable development

# The Five Ps


4: Education
5: Gender equality
6: Water
1: Eradicate poverty
2: Food
3: Health
7: Energy
8: Economy
9: Infrastructure
10: Reduce inequality
11: Cities
12: Sustainable production
13: Climate
14: Oceans
15: Biodiversity
PEOPLE
End poverty and hunger in all forms and ensure dignity and equality
PLANET
Protect our planet's natural resources and climate for future generations
Sustainable Development
PROSPERITY
Ensure prosperous and fulfilling lives in harmony with nature
PARTNERSHIP
Implement the agenda through a solid global partnership
PEACE
Foster peaceful, just and inclusive societies
17: Implementation
16: Institutions

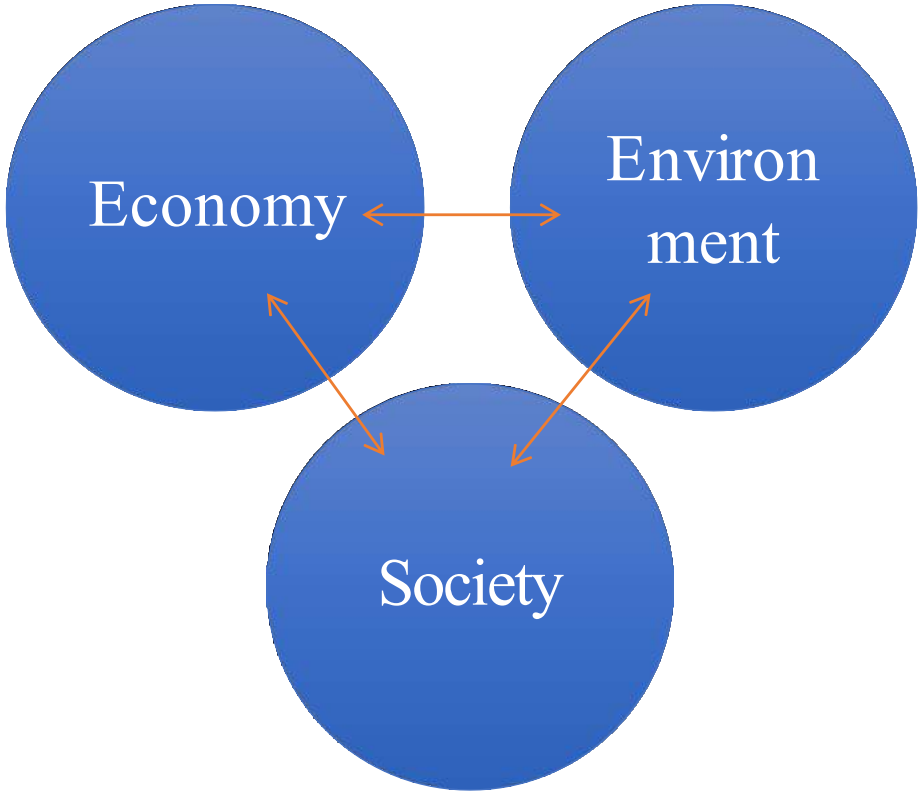
# Three Dimensions of Sustainable Development

- For sustainable development to be achieved, it is crucial to harmonize three core elements: **economic** growth, **social** inclusion and **environmental** protection.

**POLICY GOALS!!!!!**



# Conventional View

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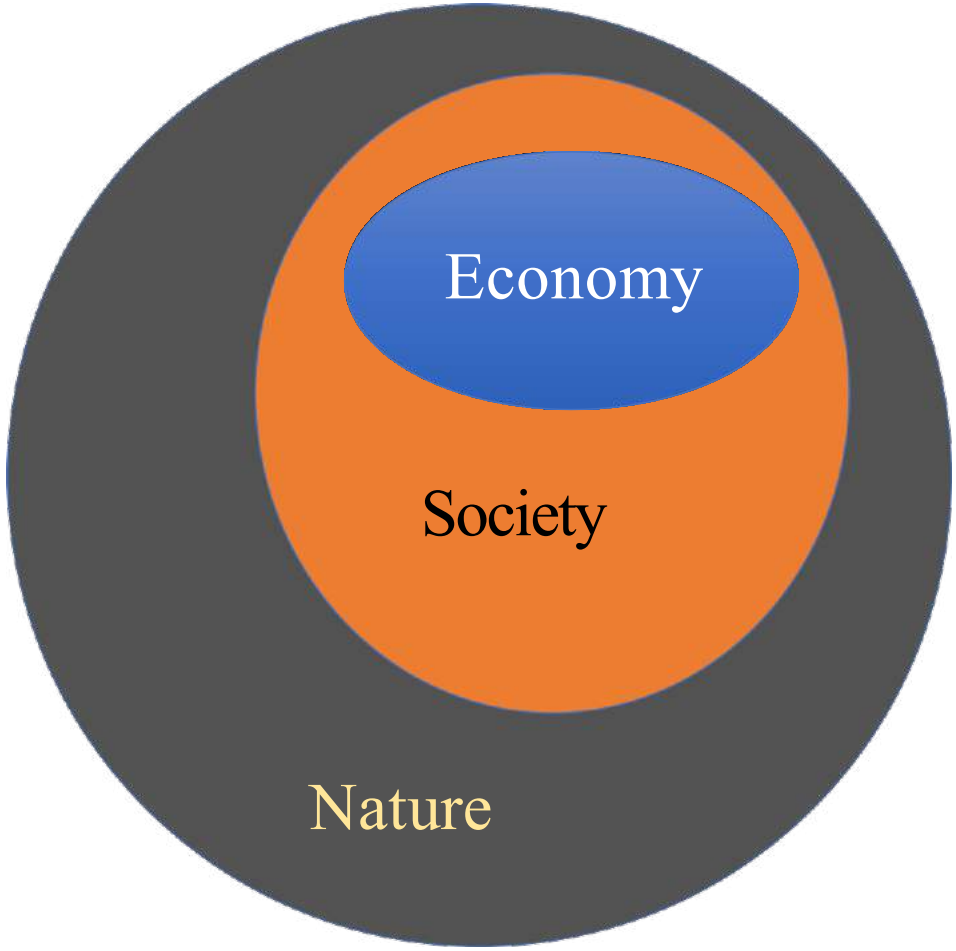
# Ecological Economics View

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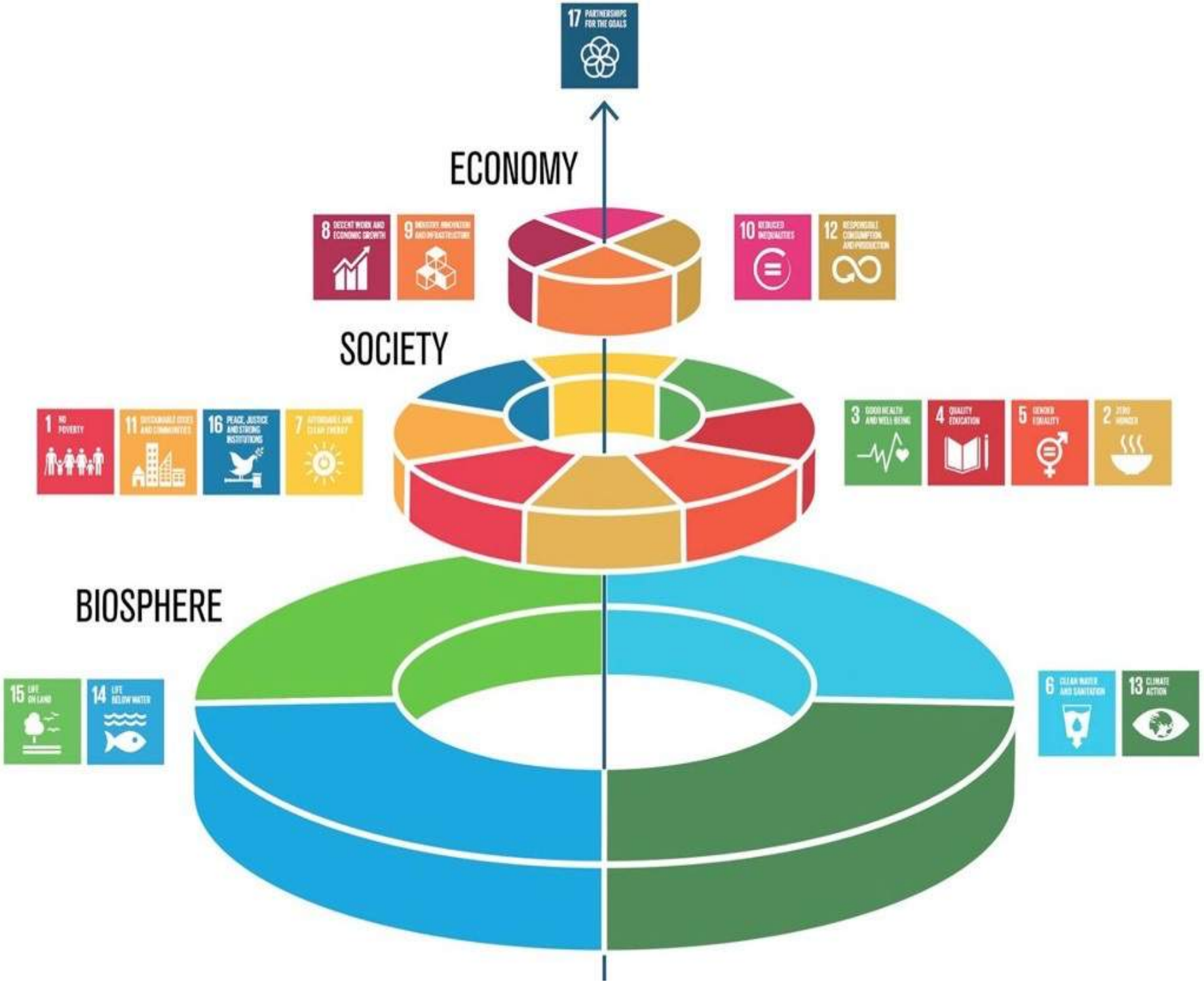
17 PARTNERSHIPS FOR THE GOALS
ECONOMY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
SOCIETY
1 NO POVERTY
11 SUSTAINABLE CITIES AND COMMUNITIES
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
7 AFFORDABLE AND CLEAN ENERGY
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
2 ZERO HUNGER
BIOSPHERE
15 LIFE ON LAND
14 LIFE BELOW WATER
6 CLEAN WATER AND SANITATION
13 CLIMATE ACTION

# READING «AGENDA 2030»


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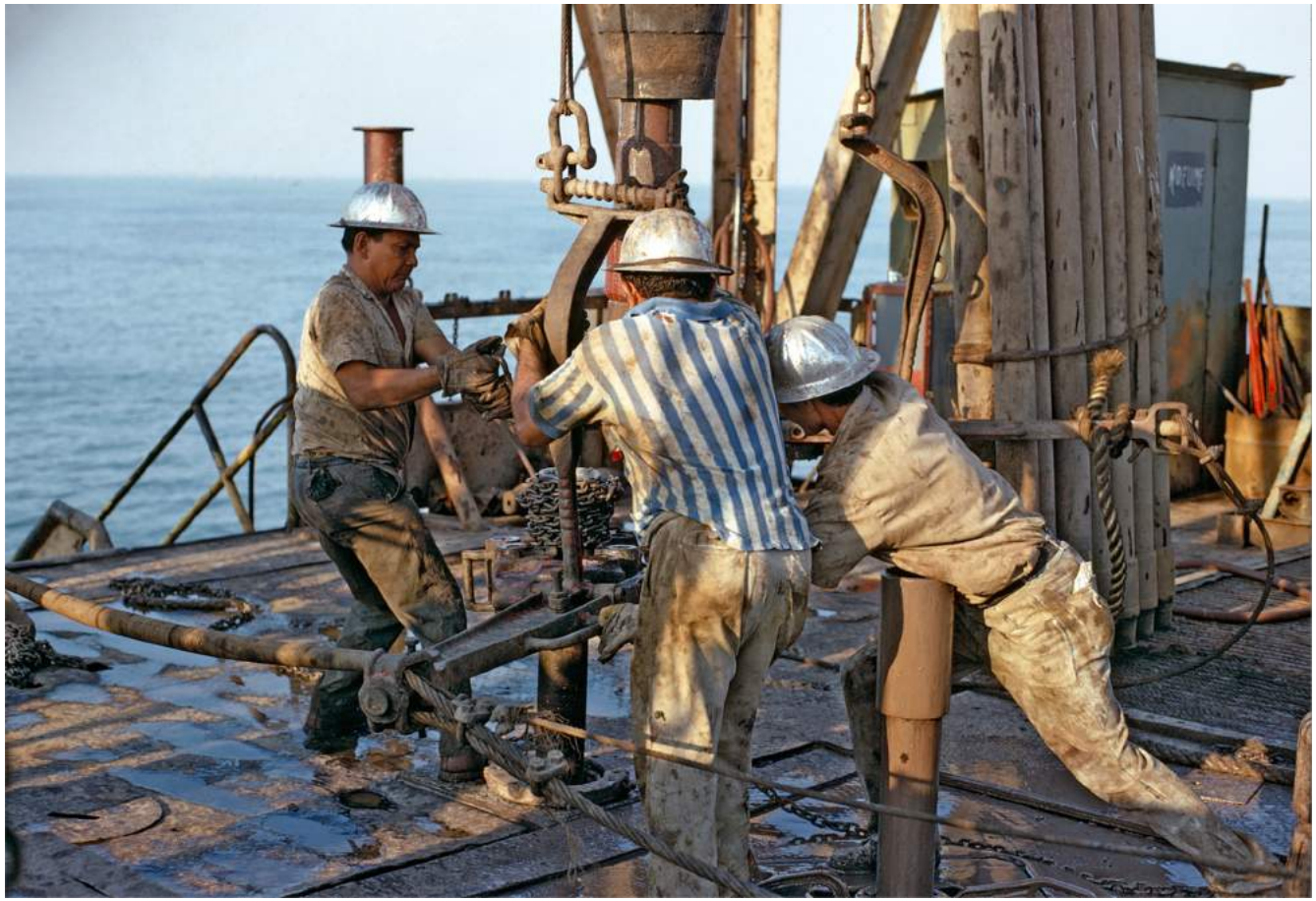
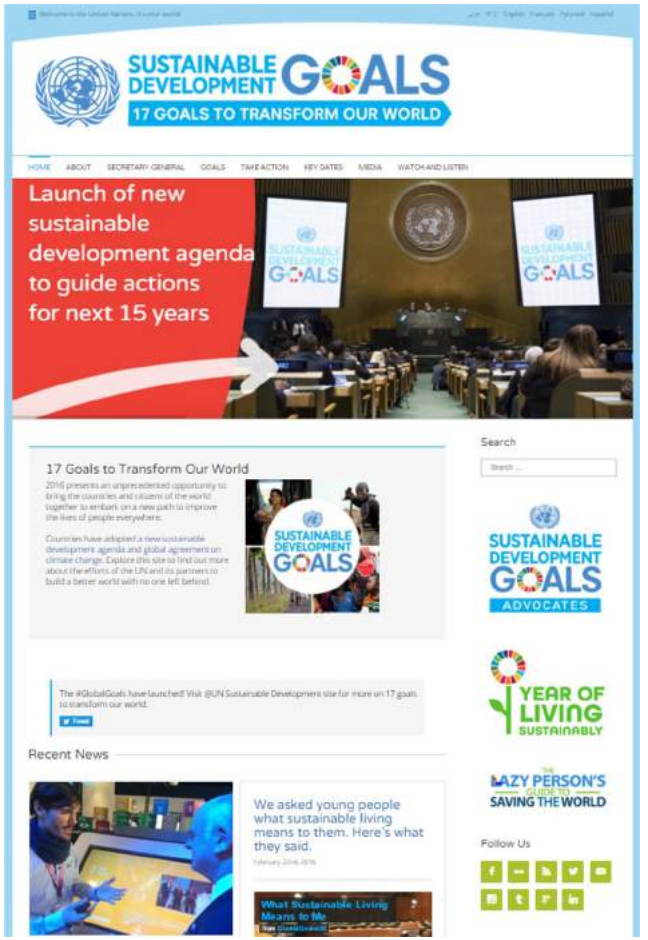
# So now it is about implementation



# UN DPI Communications Campaign 2016

- SDGs: 17 Goals to Transform Our World
- Key Goals: Popularise SDGs, Spur Action and Leverage and Scale Up Partnerships
- Comprehensive communications materials in all 6 official UN languages, including the SDG icons, press releases
- Website:[www.un.org/sustainabledevelopment](www.un.org/sustainabledevelopment)
- Social media

**@GlobalGoalsUN** **#GlobalGoals**



# Resources


- Transforming Our World: The 2030 Agenda for Sustainable Development
- Available in all UN official languages

# Transforming our world: the 2030 Agenda for Sustainable Development

This Agenda is a plan of action for people, planet and prosperity. It also seeks to strengthen universal peace in larger freedom […]

[…] We are determined to take the bold and transformative steps which are urgently needed to shift the world on to a sustainable and resilient path. […]

The 17 Sustainable Development Goals and 169 targets which we are announcing today demonstrate the scale and ambition of this new universal Agenda.

They seek to build on the Millennium Development Goals and complete what they did not achieve.

They seek to realize the human rights of all and to achieve gender equality and the empowerment of all women and girls.

They are integrated and indivisible and balance the three dimensions of sustainable development: the economic, social and environmental. […]

Complementarities and synergies
BUT ALSO trade-offs and tensions
→ winners and losers, at least in the short term
WIN-WIN???

SYNERGIEs …

The floor to Dr. TIZIANO DISTEFANO!

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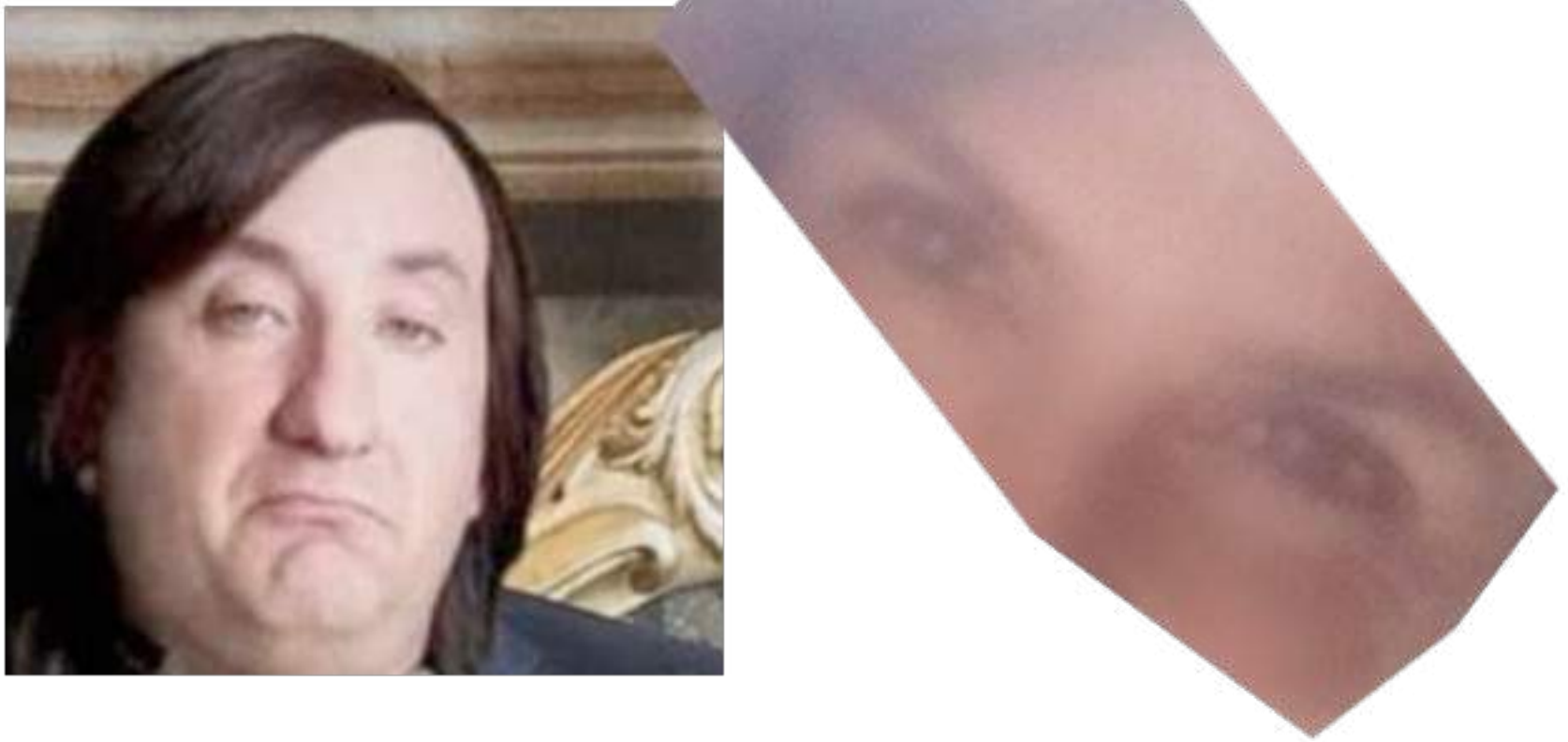
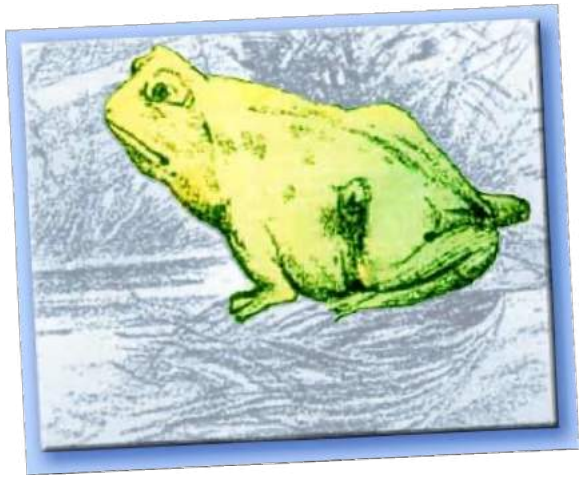
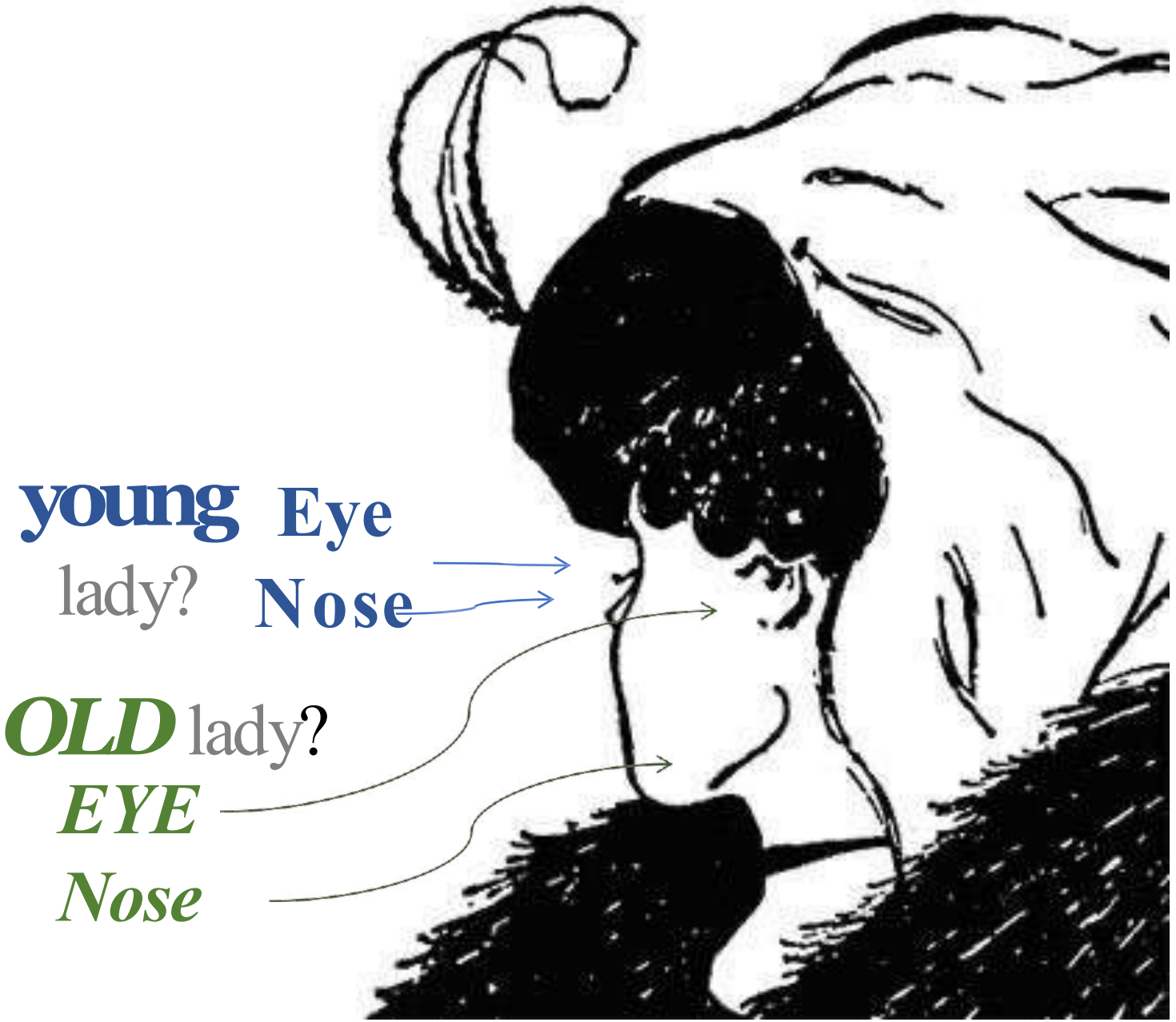
# Other fairy tales on SDG 8 and SDG 12

# What do we see

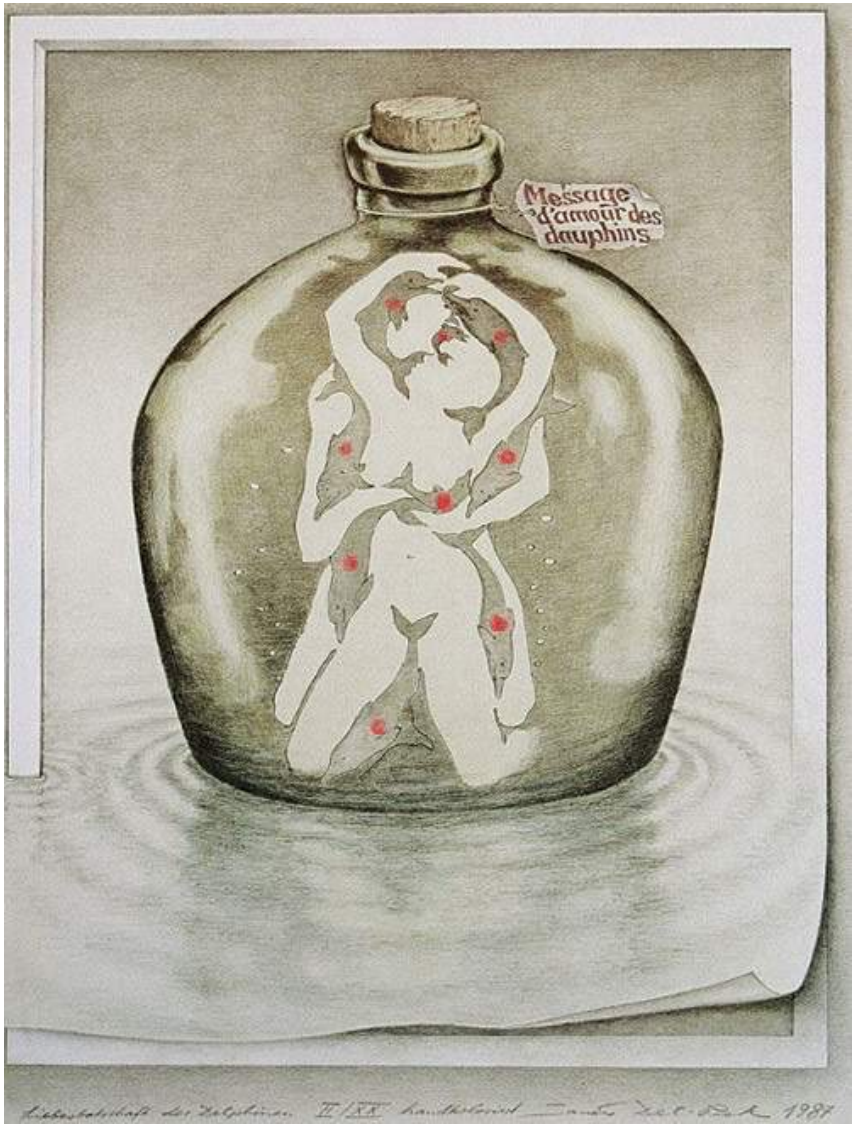





young
Eye
lady?
Nose
OLD lady?
EYE
Nose


How many dolphi n s can you see?

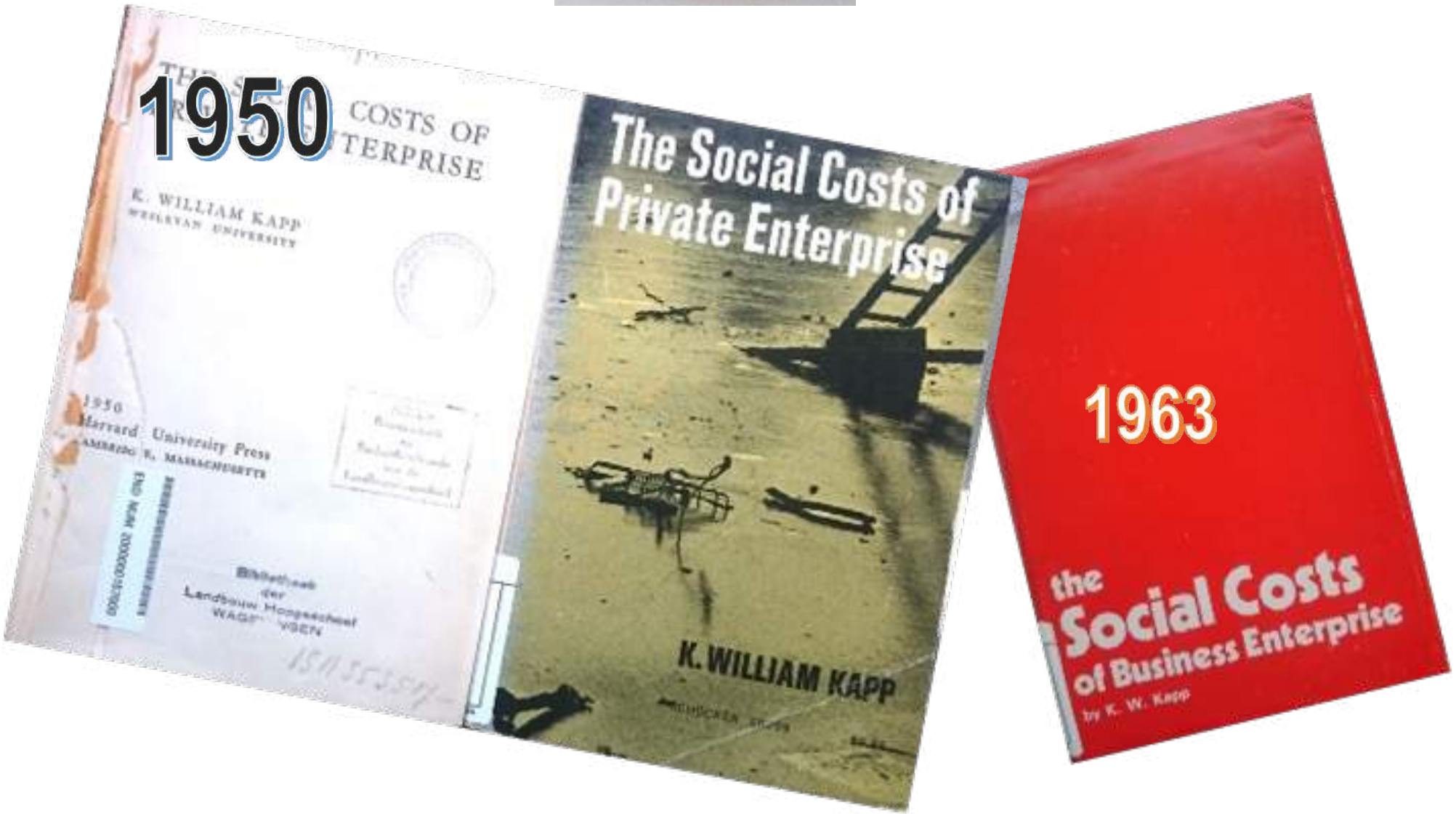
nine




nine

# Karl William Kapp

(1910-1976)


1950
COSTS OF
TERPRISE
K. WILLIAM KAPP
1950
Harvard University Press
The Social Costs of Private Enterprise
K. WILLIAM KAPP
1963
the Social Costs of Business Enterprise
by K. W. Kapp

# GDP p.c.

SIZE of the **market**
+
**Public Administration** COSTS

PER CAPITA

**INCOME DISTRIBUTION?**

Both average and variability

**TRILUSSA**
**(1871-1950)**
https://youtu.be/a0jCASdgQOE

Me spiego: da li conti che se fanno
seconno le statistiche d'adesso
**risurta che te tocca un pollo all'anno**:

**e, se nun entra nelle spese tue**,
t'entra ne la statistica lo stesso
**perch'è c'è un antro che ne magna due.**

Economic GROWTH?

- →EXPONENTIAL …

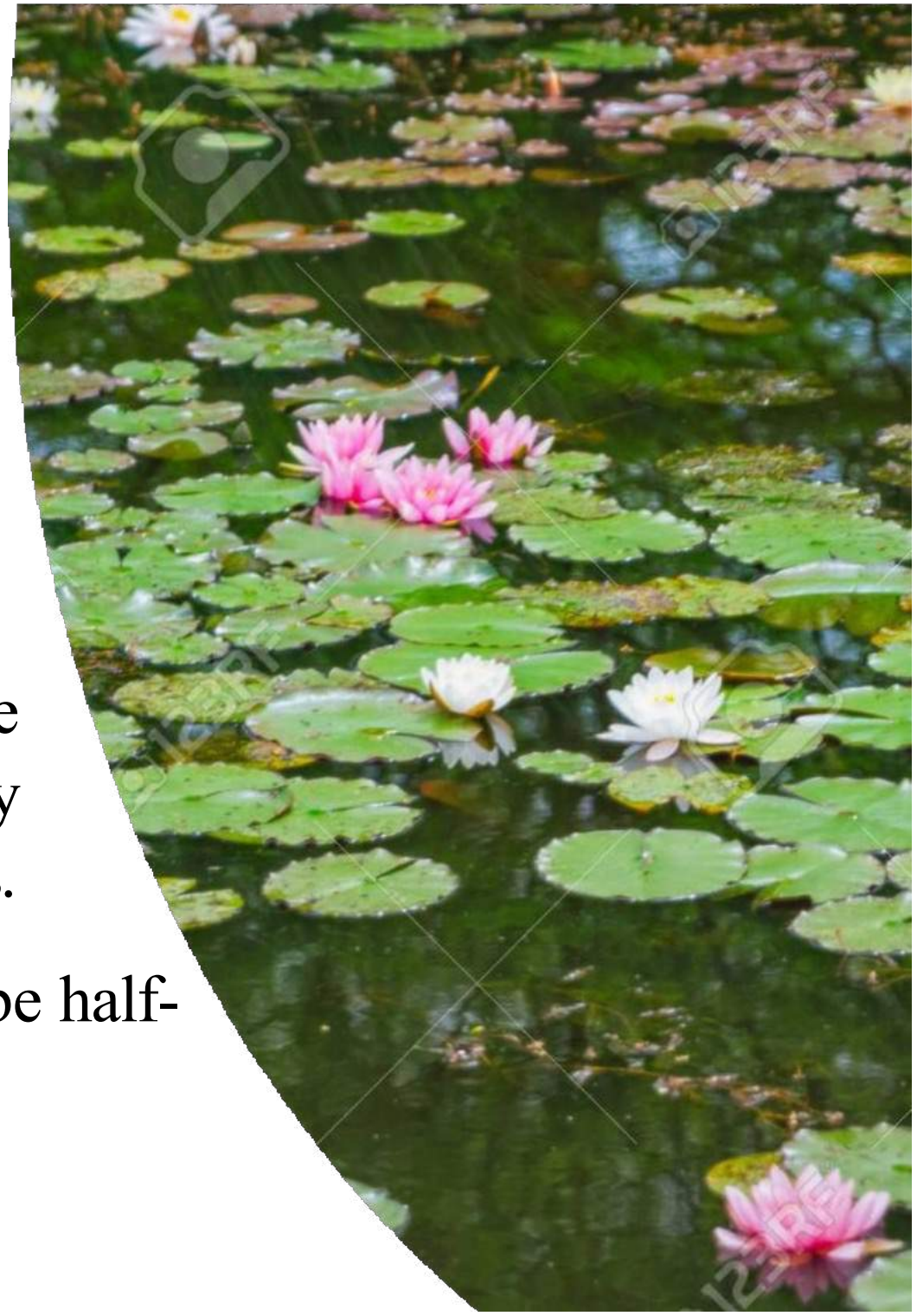
# *Water lilies*

There is a pond in which water lilies grow.

The lilies double in size each day.

At this rate of growth the water lilies will completely cover the pond in 30 days.

On what day will the pond be half-full of water lilies?



Would you prefer

A) 10 millions euro today

B) One cent today, tomorrow the double, and so on for 30 days

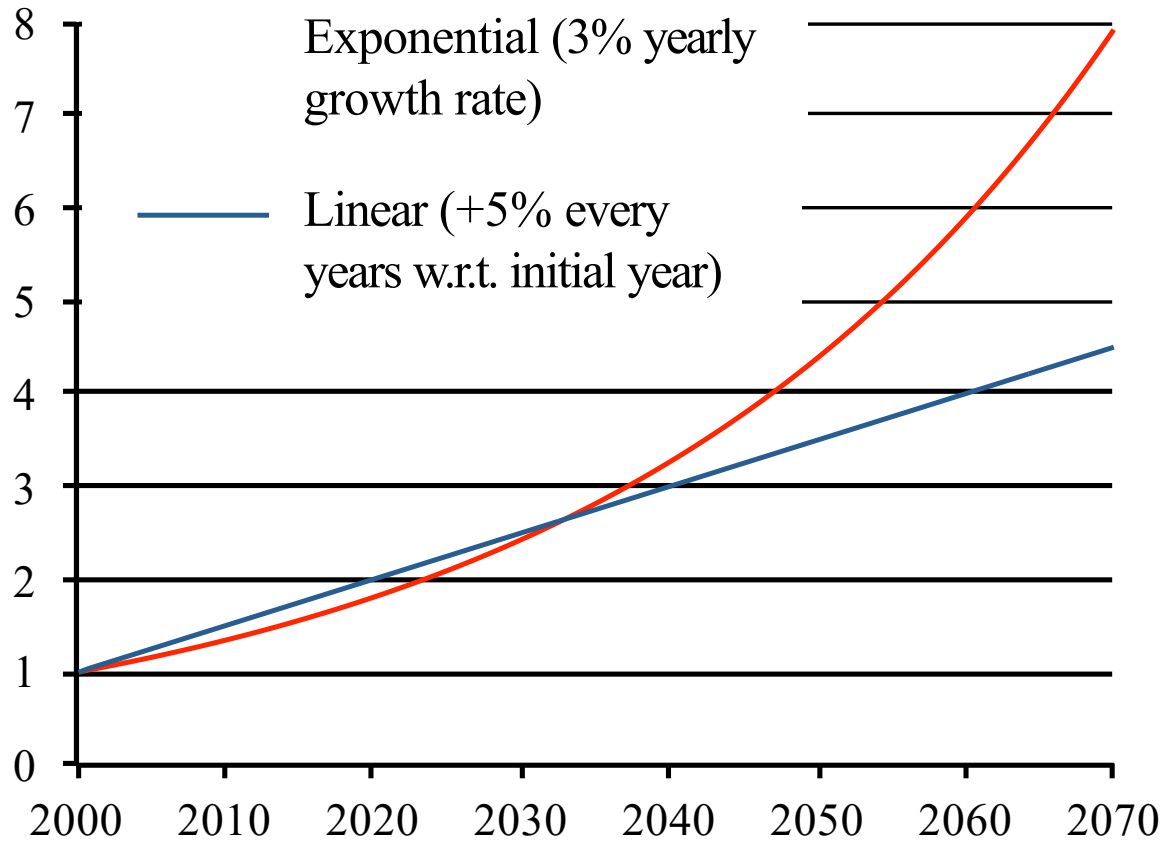
$$sum = 0.01 * 2^{30} - 1 =$$

€ 10 737 418.23

Linear VS exponential growth

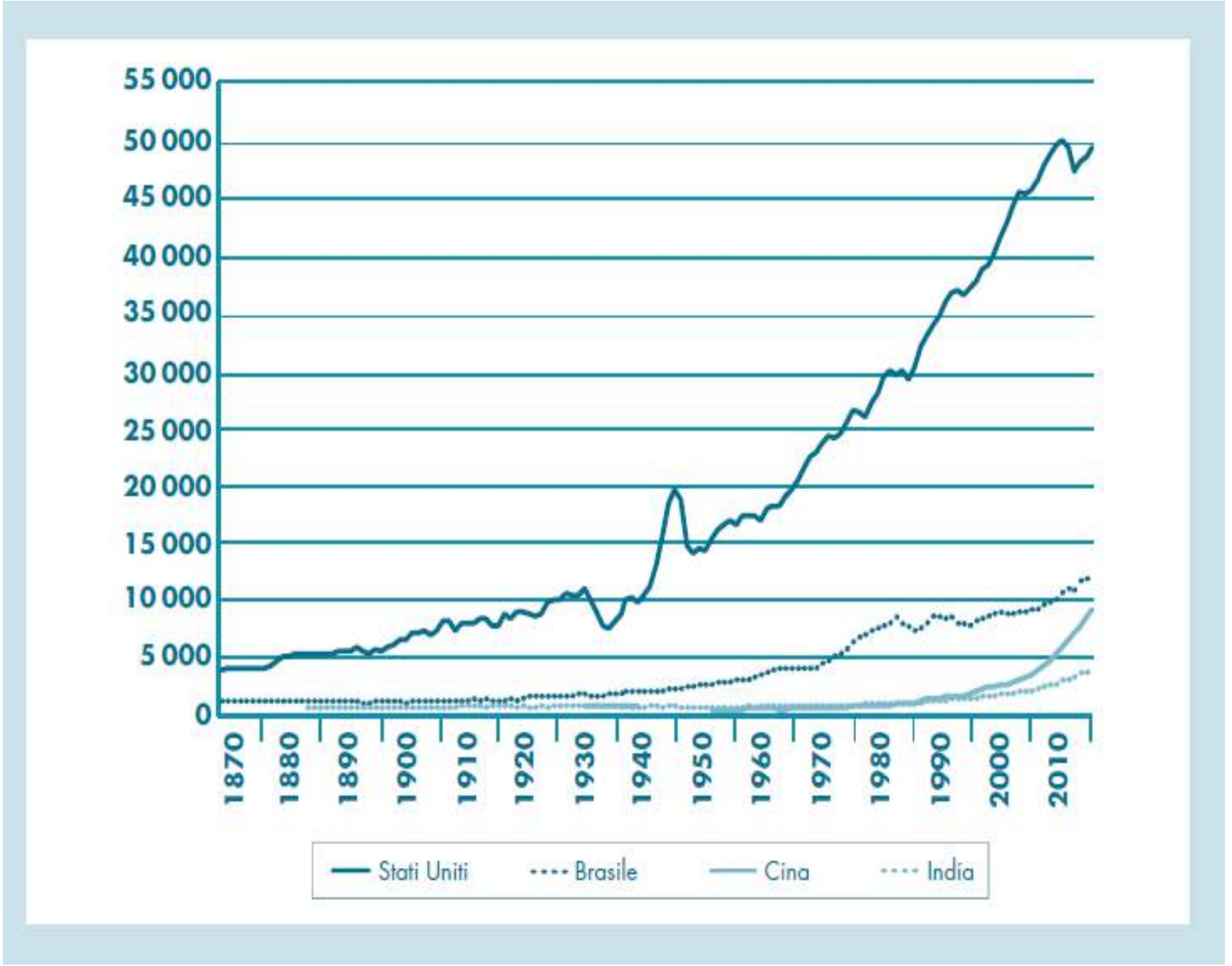
https://demonstrations.wolfram.com/ExponentialAllowanceRiddle/

# EXPONENTIAL vs LINEAR GROWTH



# US, South Korea, Japan, Italy

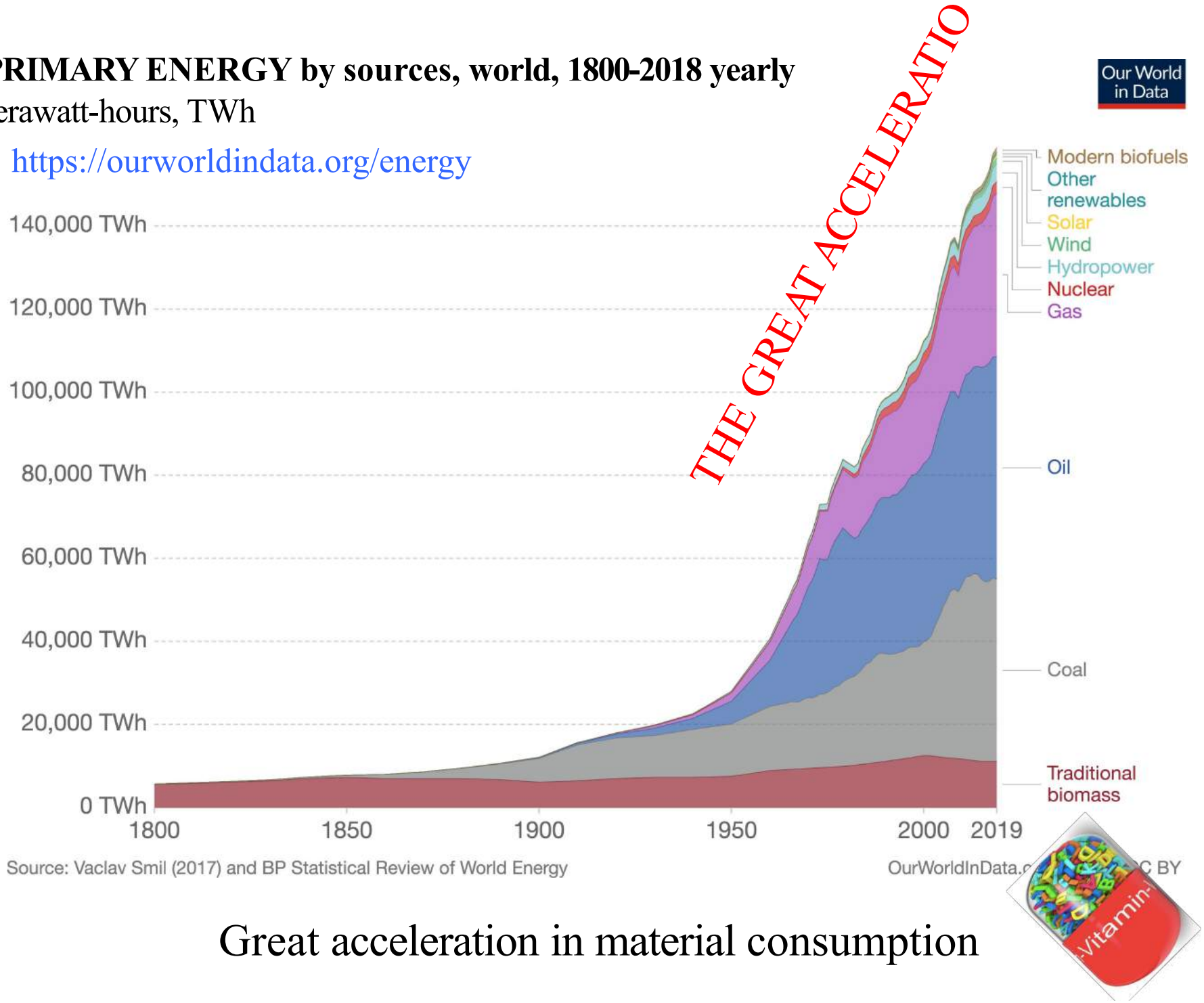
# US and emerging economies …



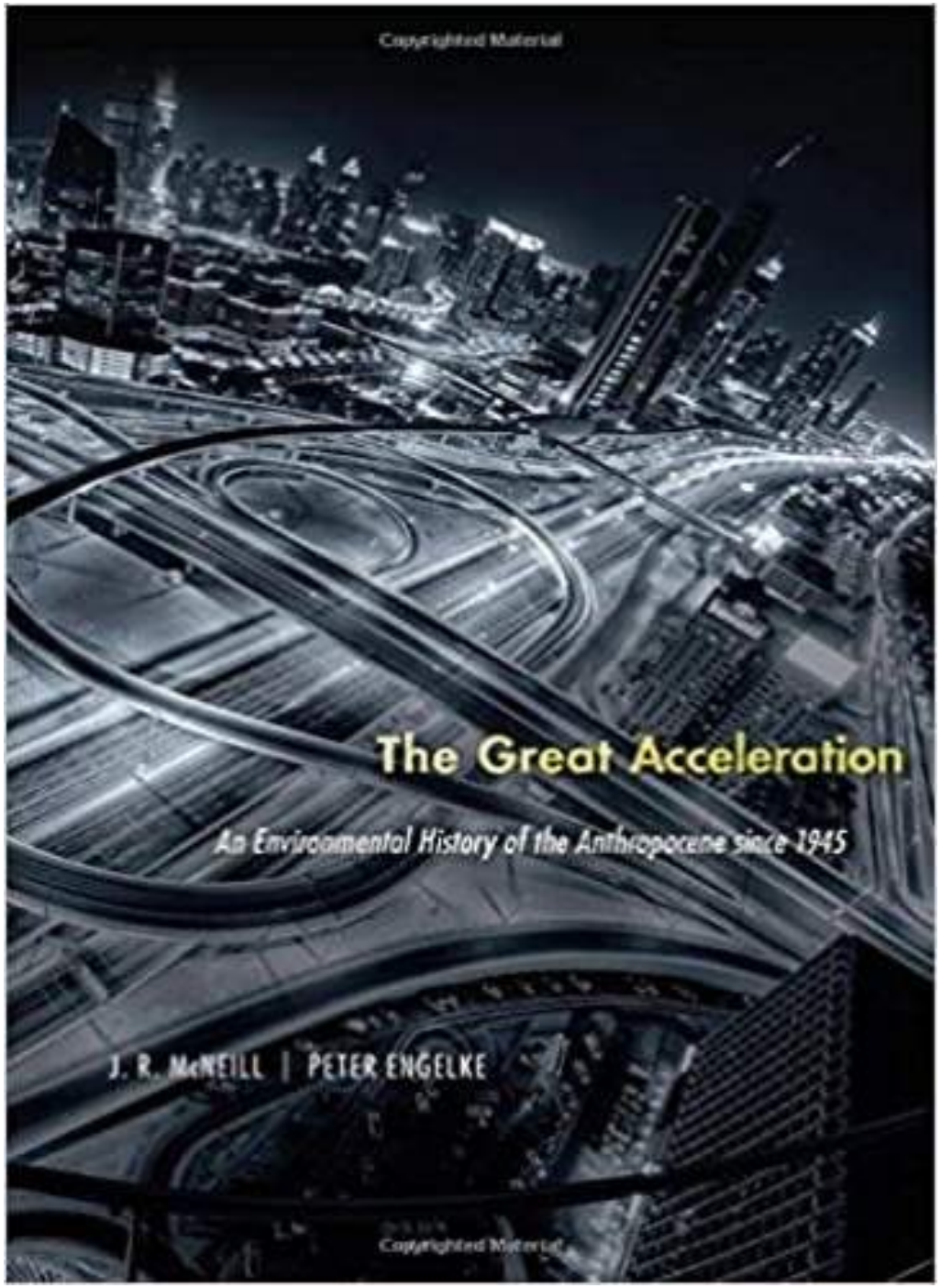
# Economic Growth: why?
# Human ingenuity?

**PRIMARY ENERGY by sources, world, 1800-2018 yearly**
terawatt-hours, TWh

https://ourworldindata.org/energy




Great acceleration in material consumption




# The Great Acceleration:

## An Environmental History of the Anthropocene since 1945

by J. R. McNeill, Peter Engelke

Let us see the video

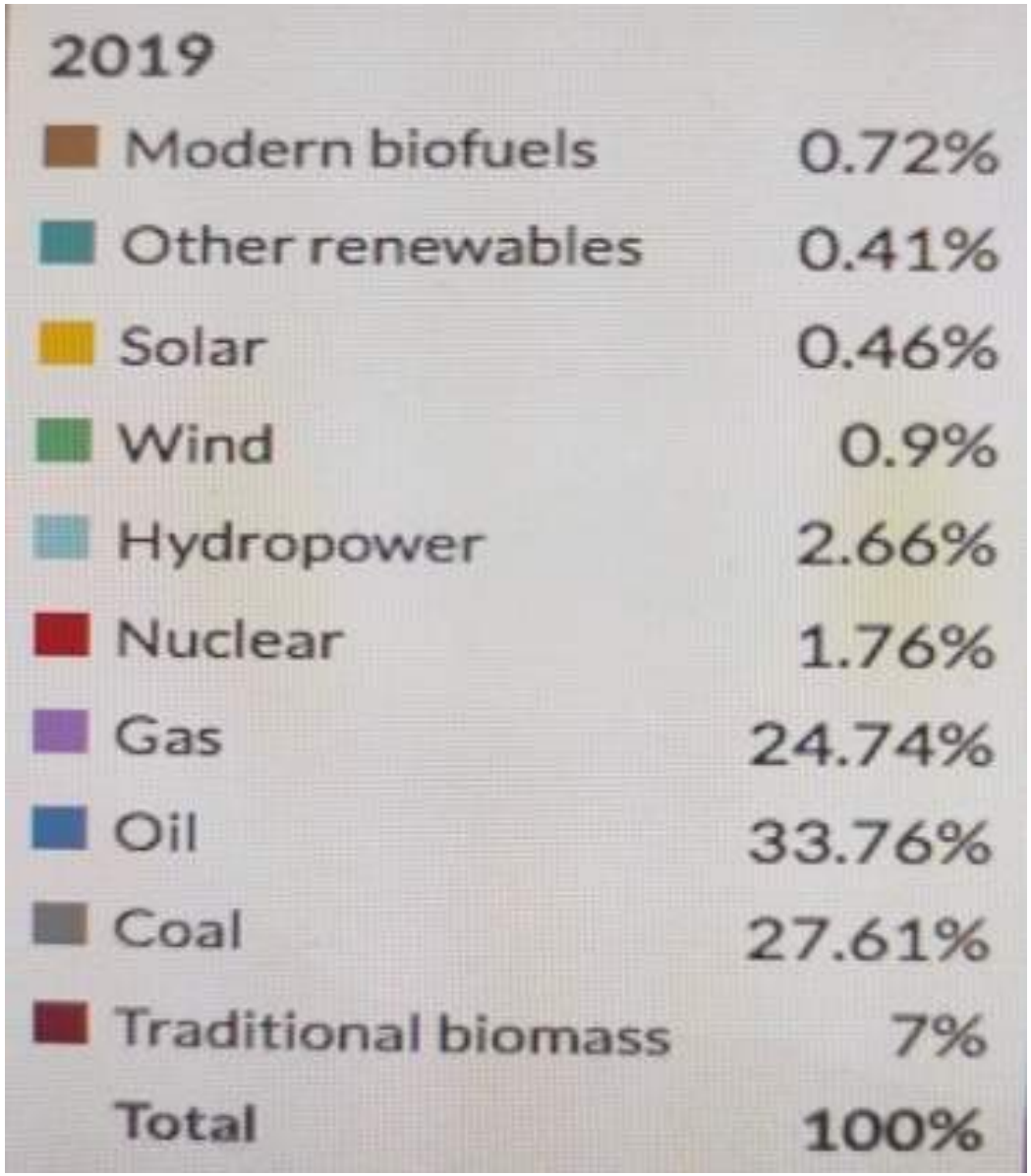
**The great acceleration**

**https://www.youtube.com/watch?v=1JAOXTOwjdY**

History of oil in 300 seconds

https://www.youtube.com/watch?v=moDywhhWwls

Primary energy (world)



ECONOMY

+

ENERGY + EXTRACTION and movement of MATTER

-

ECOSYSTEMS

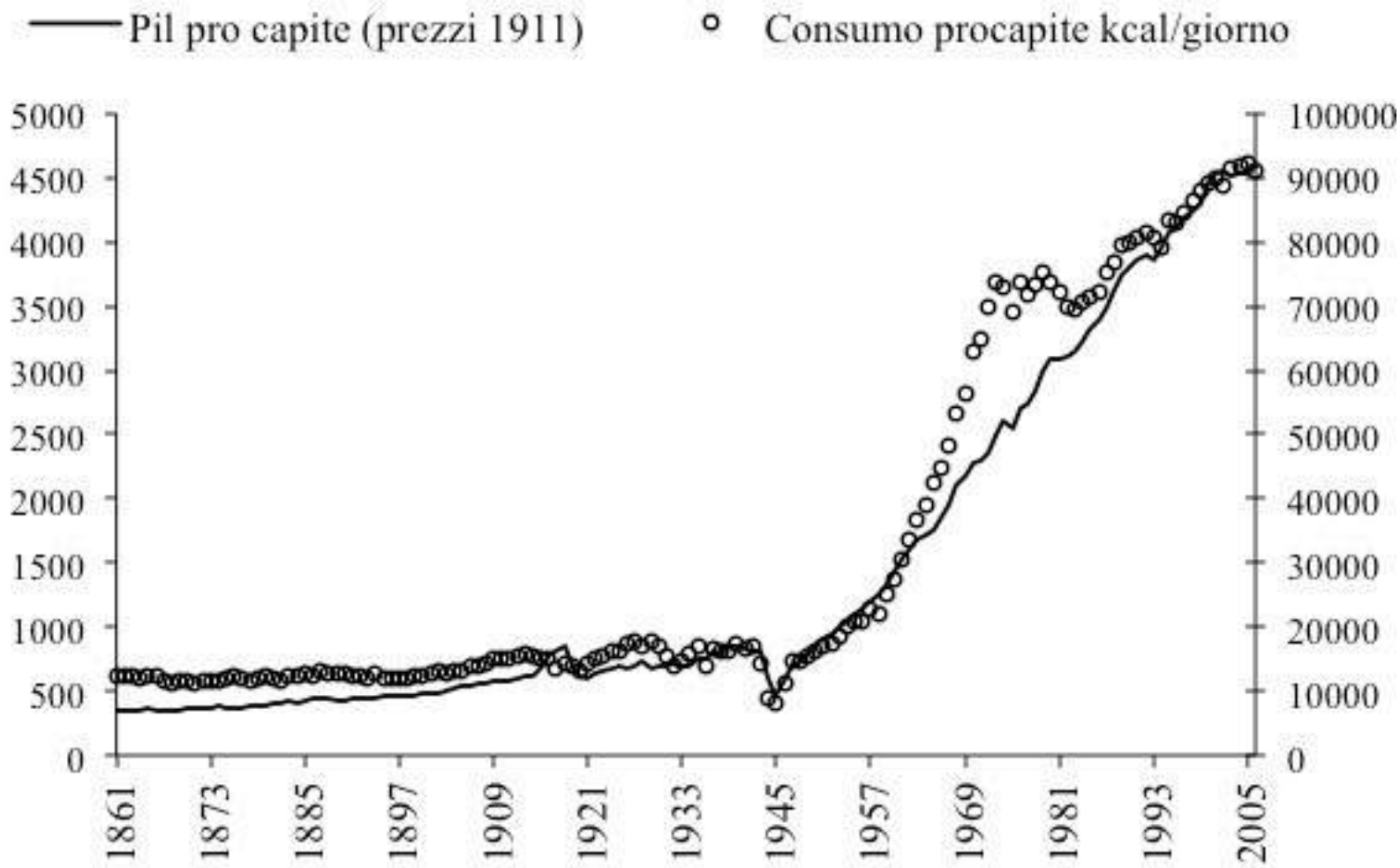
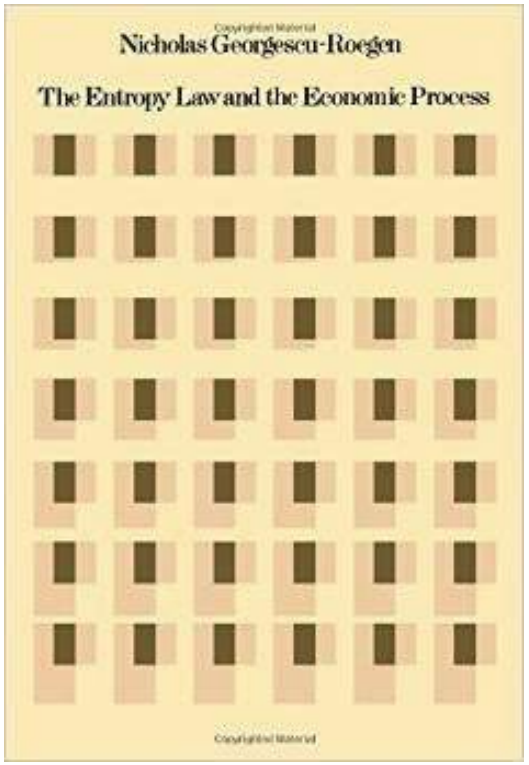



**Figura 1.2. Pil e consumi energetici per l'Italia, 1861-2006**
Fonte: Malanima (2013)

# Nicholas Georgescu-Roegen

Costanza, Romania, 1906 – Nashville, Tennessee,1994

*The Entropy Law and the Economic Process*
(1971)

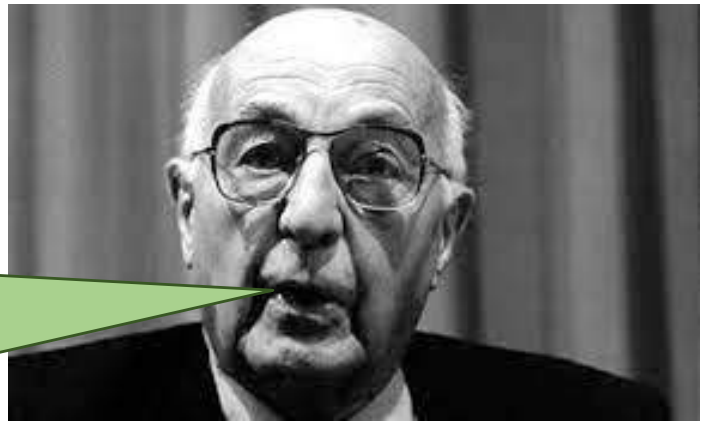


**An important prerequisite for a good life is a substantial amount of leisure in an intelligent manner**

It would be foolish to propose a complete renunciation of the industrial comfort of the exosomatic evolution

MINIMAL BIOECONOMIC PROGRAM!

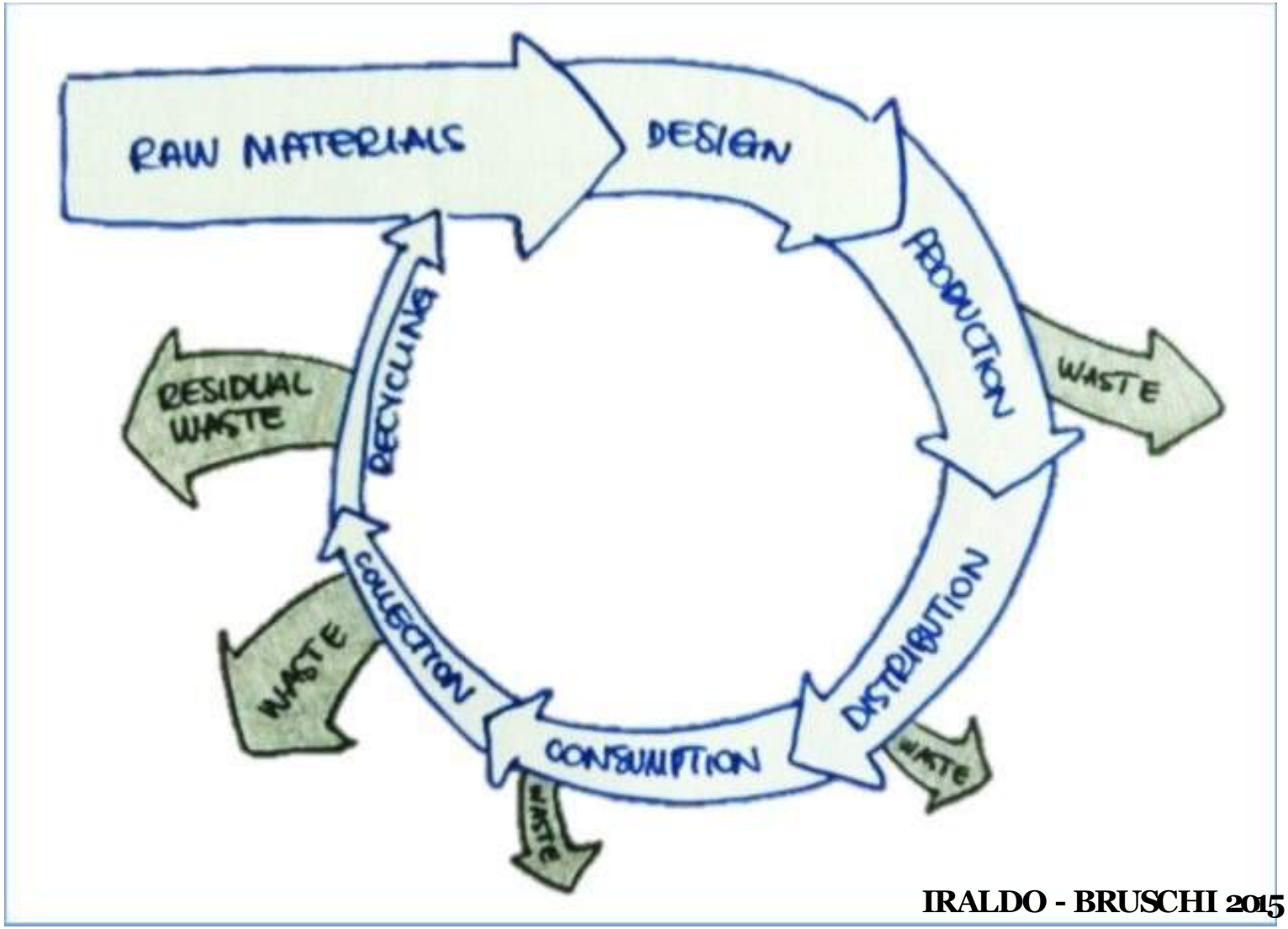
all WASTE of Energy
- by OVERheating,
OVERcooling, OVERspeeding,
OVERlighting, etc.
should be carefully avoided



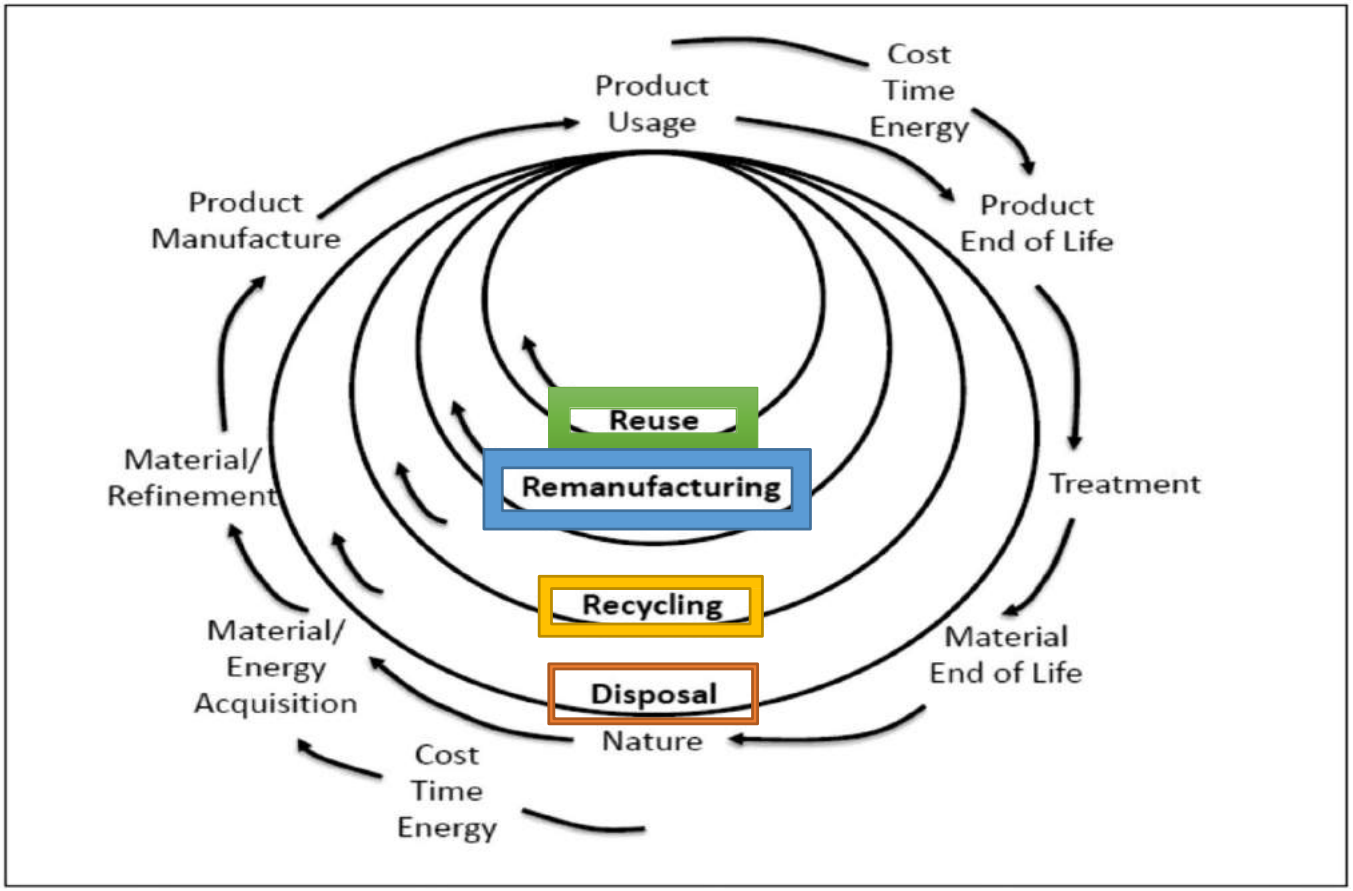
## LINEAR ECONOMY


## CIRCULAR ECONOMY


**Image: European Parliament**



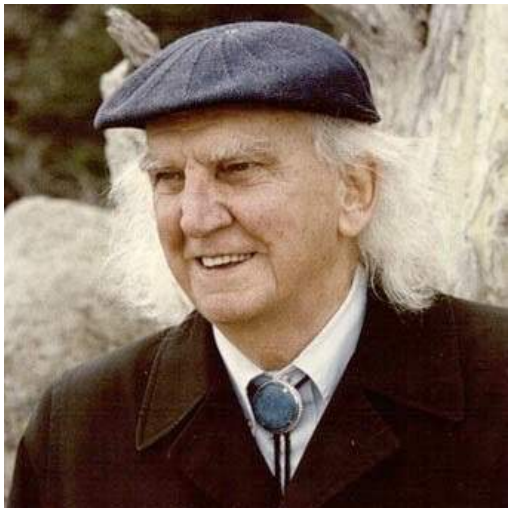

IRALDO - BRUSCHI 2015




Korhonen, J., Honkasalo, A., & Seppälä, J. (2018). Circular economy: the concept and its limitations. *Ecological economics*, *143*, 37-46.

K. E. Boulding (1910-1993)

1966: **The economics of coming Spaceship Earth**



"The closed economy of the future might similarly be called the 'spaceman' economy,
in which the earth has become a single spaceship,
without unlimited reservoirs of anything,
either for ***extraction*** or for ***pollution***,
and in which, therefore,
man must find his place in a **cyclical ecological system**


Barry Commoner (May 28, 1917 – September 30, 2012)
was an American biologist, college professor, and politician.
He was a leading ecologist and among the founders of the modern environmental movement.

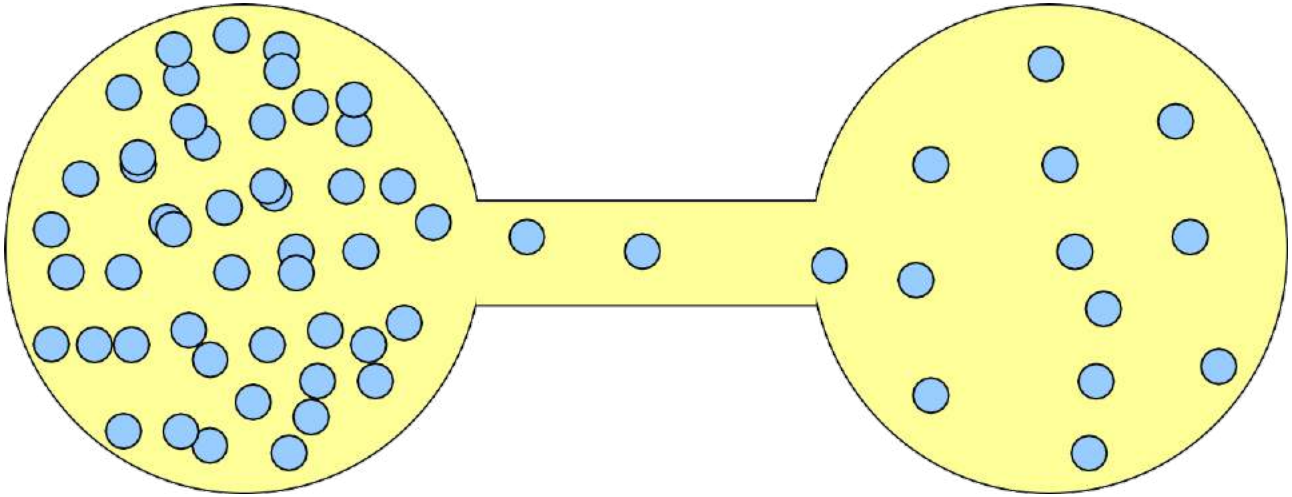
# What allows circularity in ecosystems?

# Energy is needed to close the loops!!!

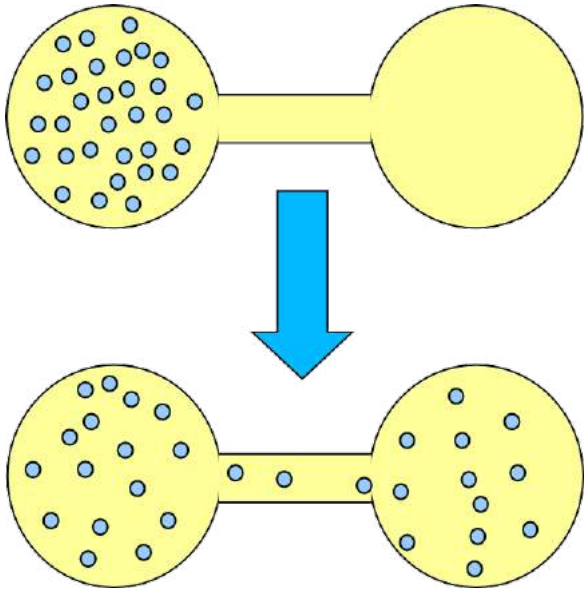
**Are perpetual motion machines possible?**
**https://www.youtube.com/watch?v=4b8ZsFszE8I**

# LIMITs to a circular economy

Gas molecules in communicating balls



From ORDER
(far from equilibrium)



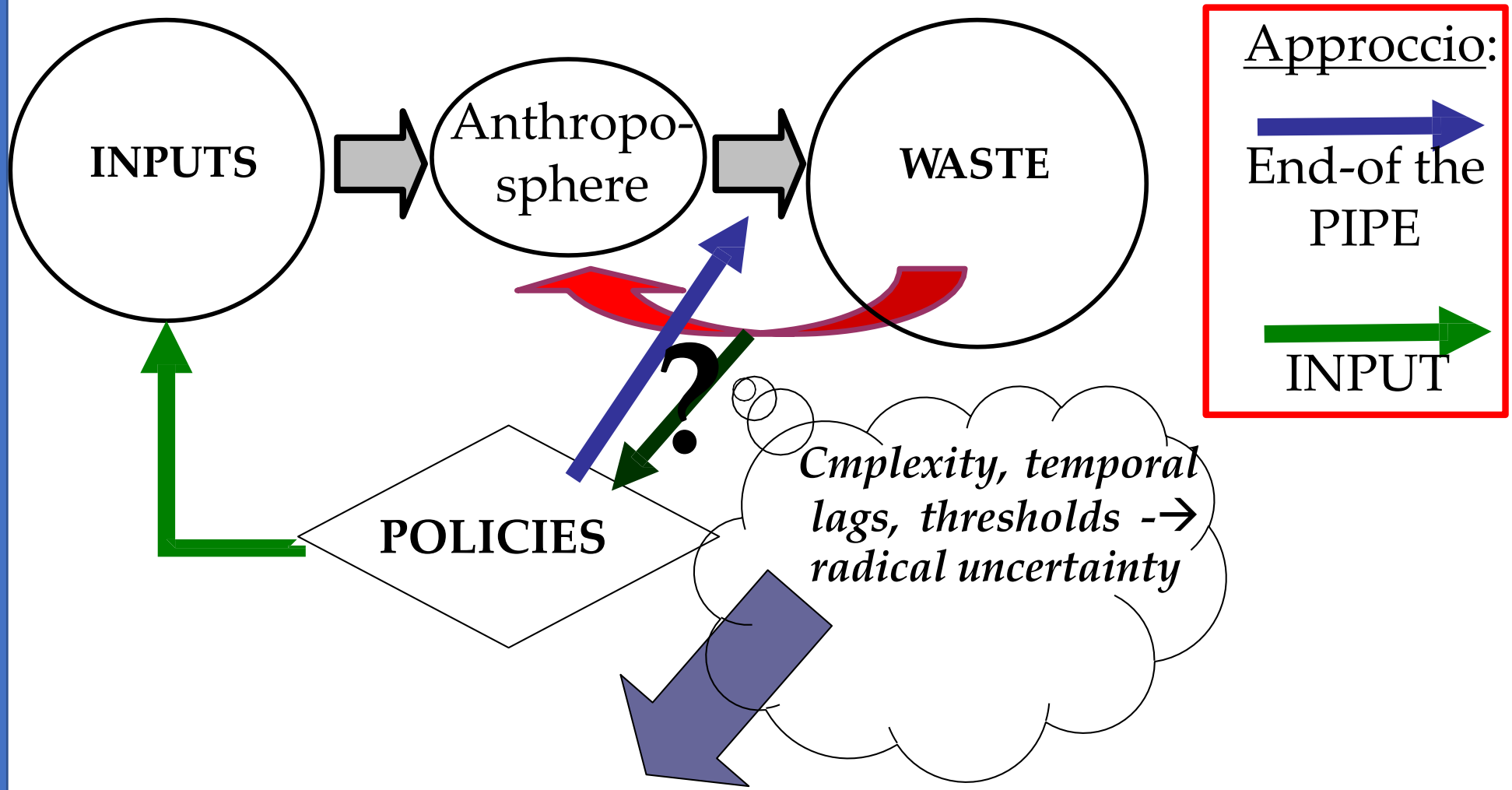
To DISORDER,
(thermodinamics equilibrium

*CIRCULARITY ...*

Rubber of the tyres?

Energy

Symbiosis vs flexibility imposed by market economy!




***Social metabolism and input oriented approach***

**HUGE MATERIAL SCALE!!!!**

**Es.: Wuppertal Institut for Climate, Environment, and Energy, - SERI,Wien**

www.wupperinst.org


feggo

# On SDGs: in search of coherence

Tiziano Distefano

Department of Economics and Management,
University of Pisa

03rd August 2022

Università di Pisa CISP Centro Interdisciplinare Scienze per la Pace
Università di Pisa Dipartimento di Economia e Management
Università di Pisa Dipartimento di Scienze Politiche
Ministero della Transizione Ecologica
SNSvS strategianazionaleperlosviluppsostenibile

# Sustainability is impossible to measure directly…

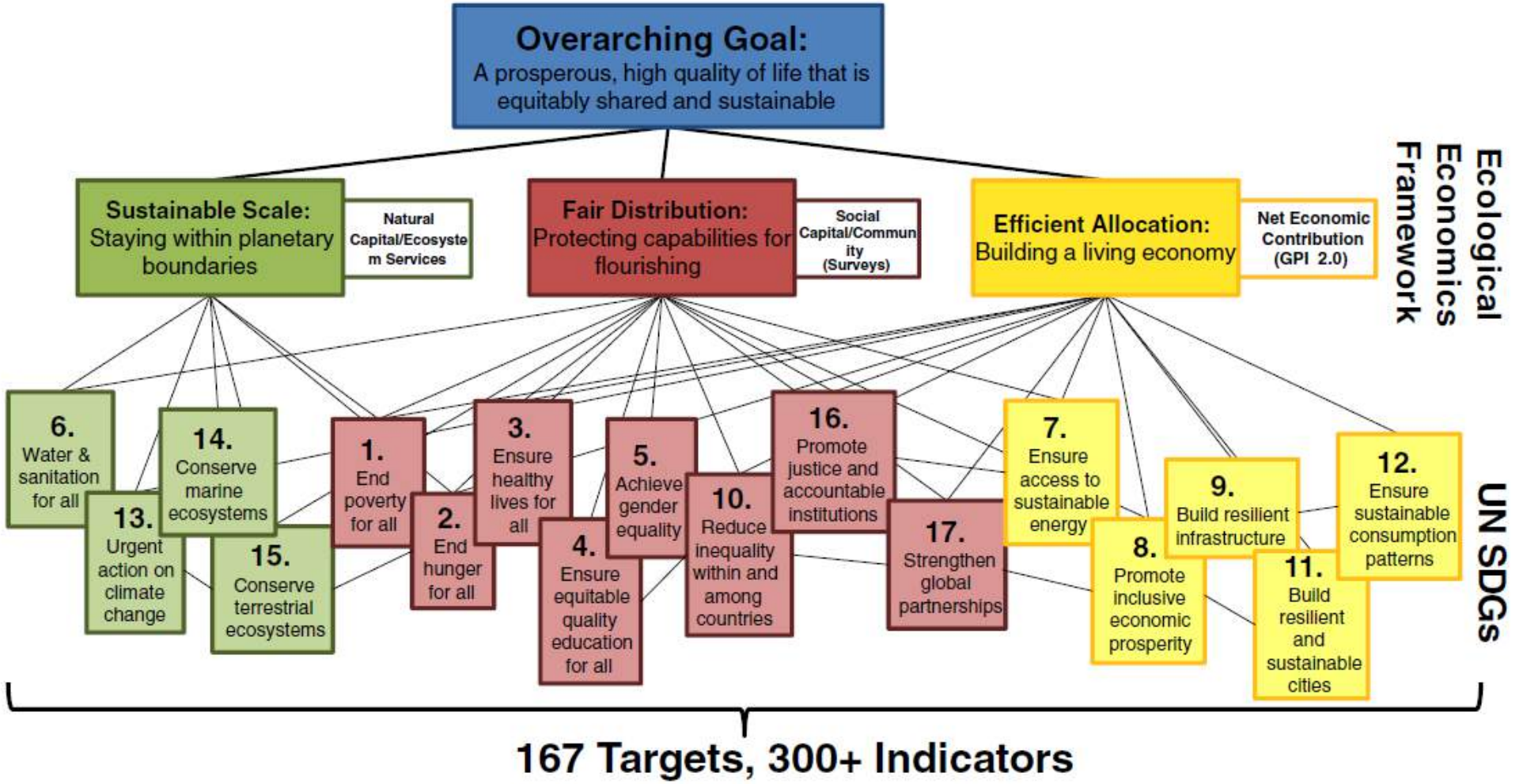
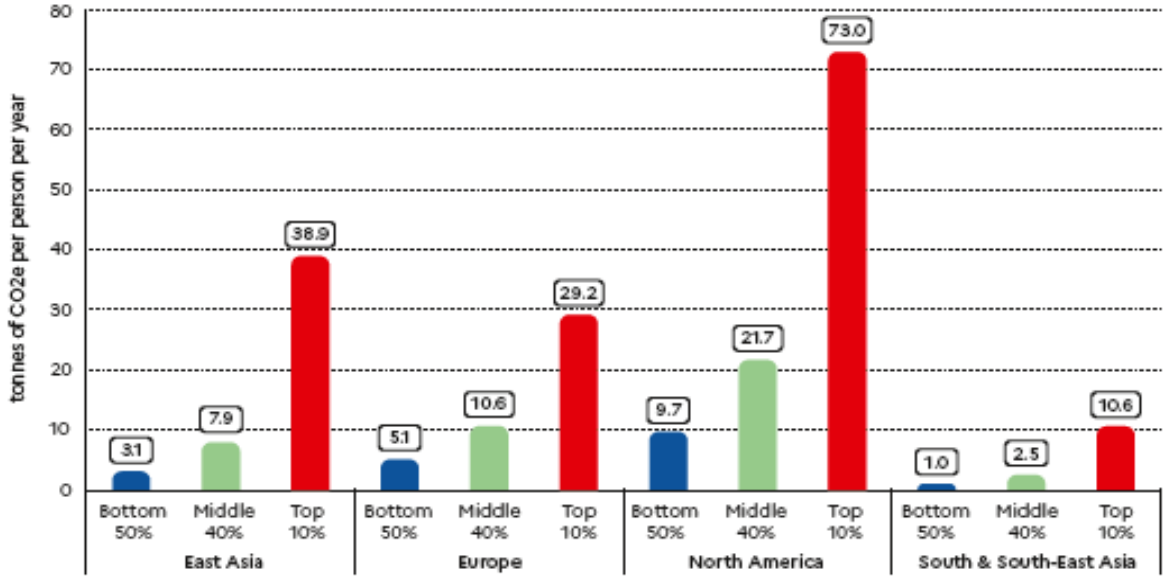



**Fig. 2.** The relationship of the 17 UN Sustainable Development Goals (SDGs) to each other, to the framework of ecological economics, and to the overarching goal of a sustainable, equitable and prosperous system of humans embedded in the rest of nature.

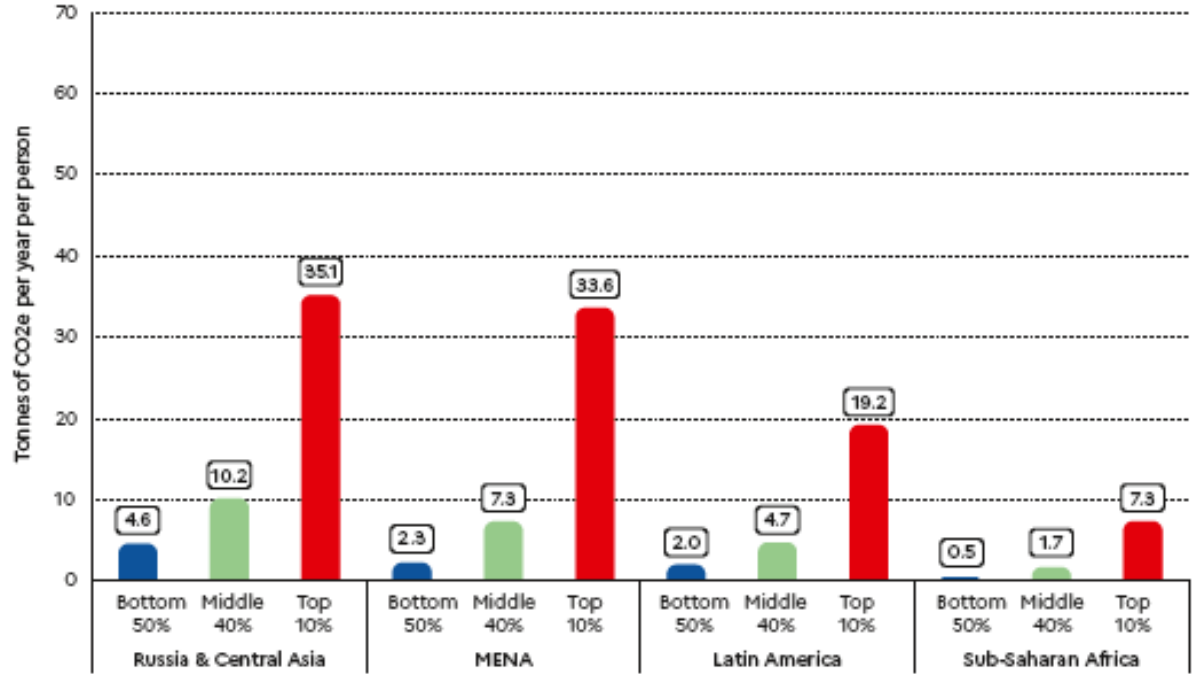
(Costanza et al., 2016, Ecological Economics)

# Interwoven inequality

**Figure 15** *Per capita emissions across the world, 2019*

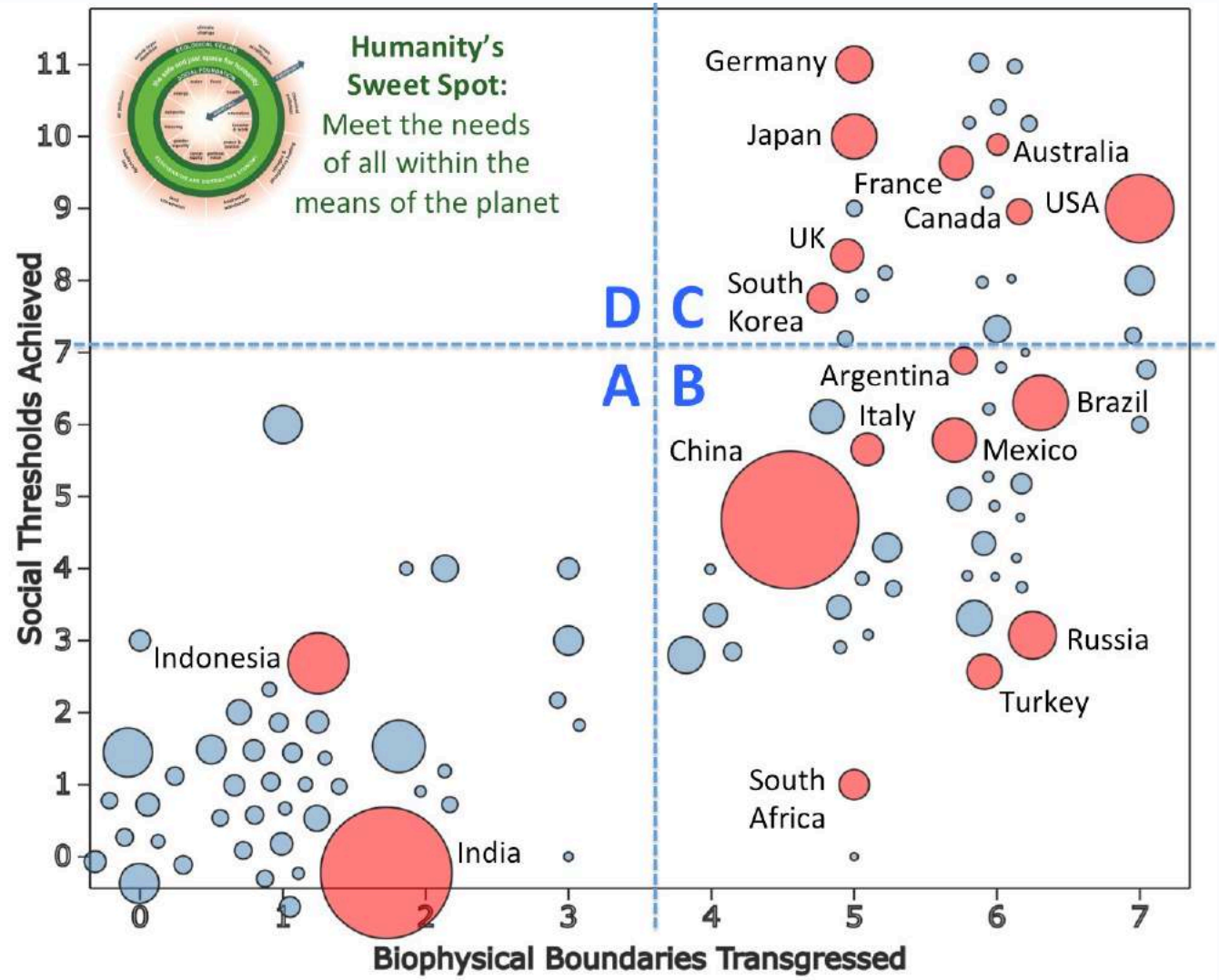



***Interpretation:*** *Personal carbon footprints include emissions from domestic consumption, public and private investments as well as imports and exports of carbon embedded in goods and services traded with the rest of the world. Modeled estimates based on the systematic combination of tax data, household surveys and input-output tables. Emissions split equally within households.* ***Sources and series:*** *wir2022.wid.world/methodology and Chancel (2021).*

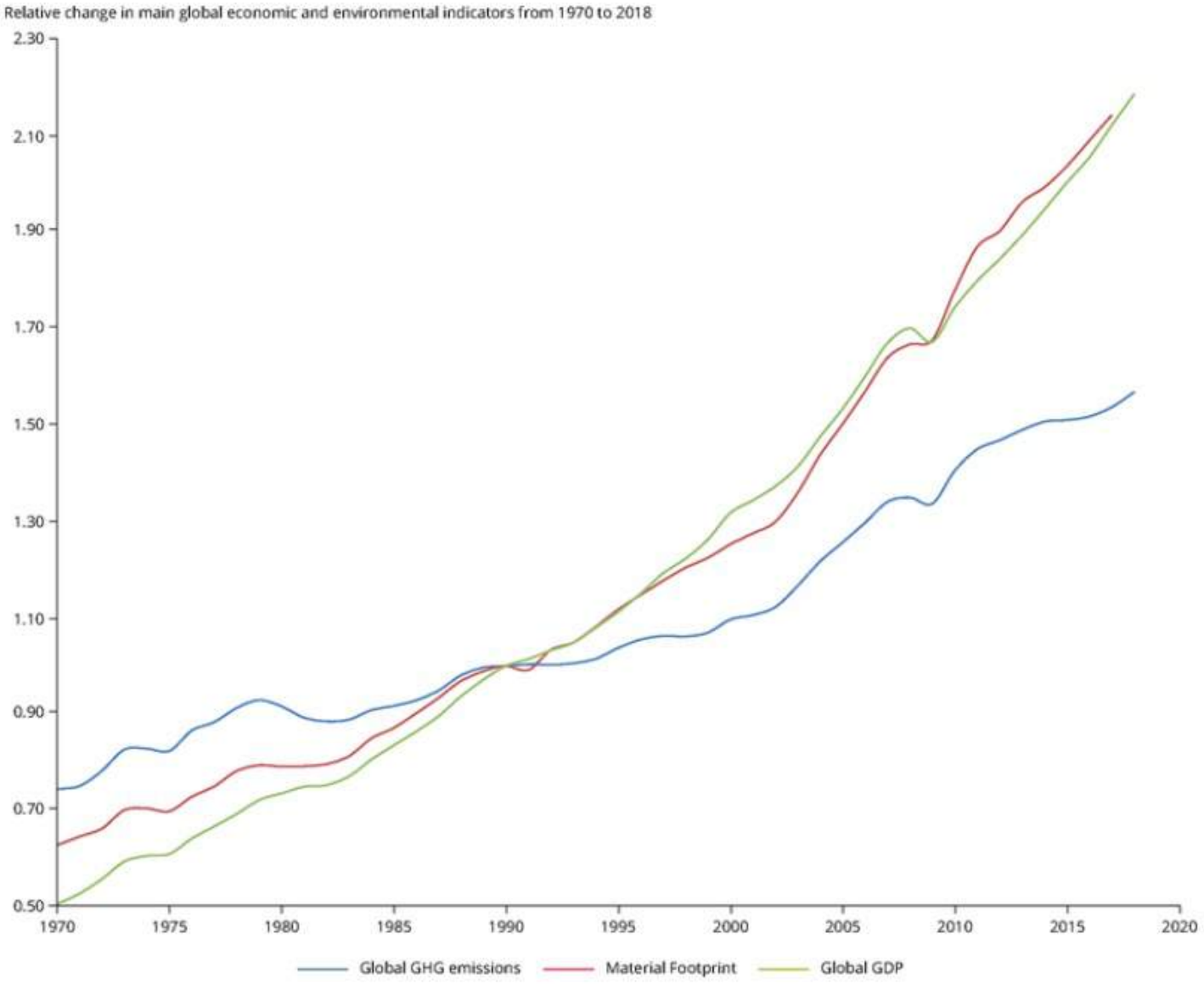



***Interpretation:*** *Personal carbon footprints include emissions from domestic consumption, public and private investments as well as imports and exports of carbon embedded in goods and services traded with the rest of the world. Modeled estimates based on the systematic combination of tax data, household surveys and input-output tables. Emissions split equally within households.* ***Sources and series:*** *wir2022.wid.world/methodology and Chancel (2021).*

O'Neill et al. (2018) Nat. Sust.



# Decoupling?




**Sources:** Modified from Wiedmann et al. (2020). Reproduced under the terms and conditions of the Creative Commons CC BY 4.0 licence (https://creativecommons.org/licenses/by/4.0/).
Data from Olivier and Peters (2020) for greenhouse gas (GHG) emissions; UNEP and IRP (2018) for material footprint; and World Bank (2020a) for GDP.

# Five key takeaways from the latest IPCC report

**1.** There is a **strong link** between sustainable economic development, climate change and vulnerability, including in crisis contexts.

**2.** Limiting emissions rapidly will require **systems change** and access to all available clean energy technologies based on innovation and sustainable resource management.

**3.** The low-carbon energy transition is an **immense economic opportunity** for all countries.

**4. Urban areas** are an excellent starting point to implement low-emission development pathways.

**5.** Innovative partnerships will be needed, and these must be rooted in expertise, experience, and the willingness to make change **for the benefit of all.**

**The window is closing rapidly, despite available solutions.**
**It is now urgent that countries step up climate action.**

# Main critics to SDGs

- new consensus does not go far enough because it does not cover key issues that are likely to concern the world in coming decades such as migration, terrorism, capital flight and democracy (see Gasper, 2018).
- In terms of coherence, Vandemoortele (2017) ‘‘warns that only 30 of the 169 ‘‘targets” formulated in [the SDGs] are clear, time specific and quantified”
- less than half of all indicators for monitoring the SDGs are classified as tier 1, i.e. conceptually clear with a standard methodology and available data for all regions (IAEG-SDGs, 2019).
- In challenging these universal frameworks, they mobilised a self-determination movement which is centred on their worldviews and priorities. support indigenous groups around the world to drive their own development agenda (Li-Ming Yap, 2019, Journal of Human Development and Capabilities)
- the on-going promotion of economic growth as development by Western governments has promoted materialism, consumerism, trade, commodification of Nature, reduction of values to monetary metrics, corporate profiteering, the military-industrial complex and cultural imperialism (Spash, 2021, Globalizaton)
- Bottom up initiaves and behavioural/cultural changes are lowly considered (Nerini et al., 2018, NatSus)
- In spite of the favorable environment for policy integration that the SDGs may create, it should be clear from past experience that policy integration will not happen automatically. Integration of thinking across sectors and policy advice represents a challenge to the way development work is usually conducted (Le Blanc, Sustainable Development)

# SDGs and Complexity: methodological implications

- High number of nodes and links lead to emerging properties not reducible to any single component: *Totality is more than the sum*
- Feedback effects and multiple causation: *system dynamics*
- Non-linearity, uncertainty and sudden changes: *numerical simulations and time asymmetry*
- Multiple scales and dimensions: *several indicators*
- No one-fits-all solutions: *multidisciplinarity*

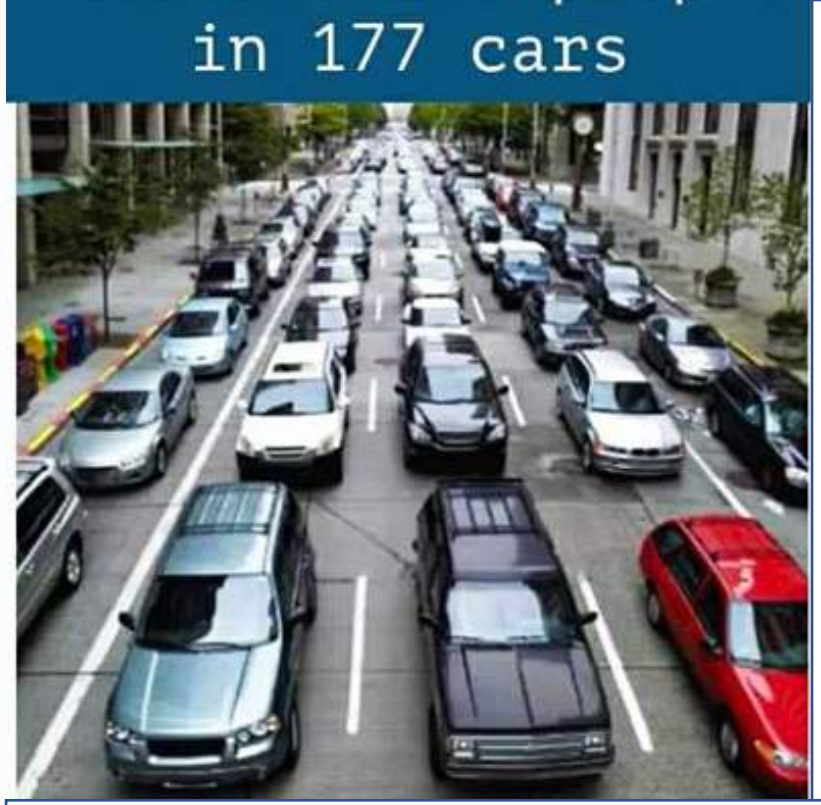
# Agenda 2030

- The **integrated and indivisible nature of Agenda 2030** reflects the deep interconnections and cross-cutting elements across the goals and targets, making inter-linkages crucial in ensuring that sustainable development is pursued.
- Together the SDGs provide a set of global priorities (with universal validity) that are fundamentally interdependent, calling for an understanding of interactions between goals along with coherence in design, implementation and monitoring.
- Moreover, notions of 'indivisibility' and 'integration' call for improved governance and for **multi-level implementation and multi-actor responsibility** in the pursuit of the SDGs **linking global, regional, national** and local levels, public, private and social actors, and cutting across national borders in terms of effort, regulation and effects

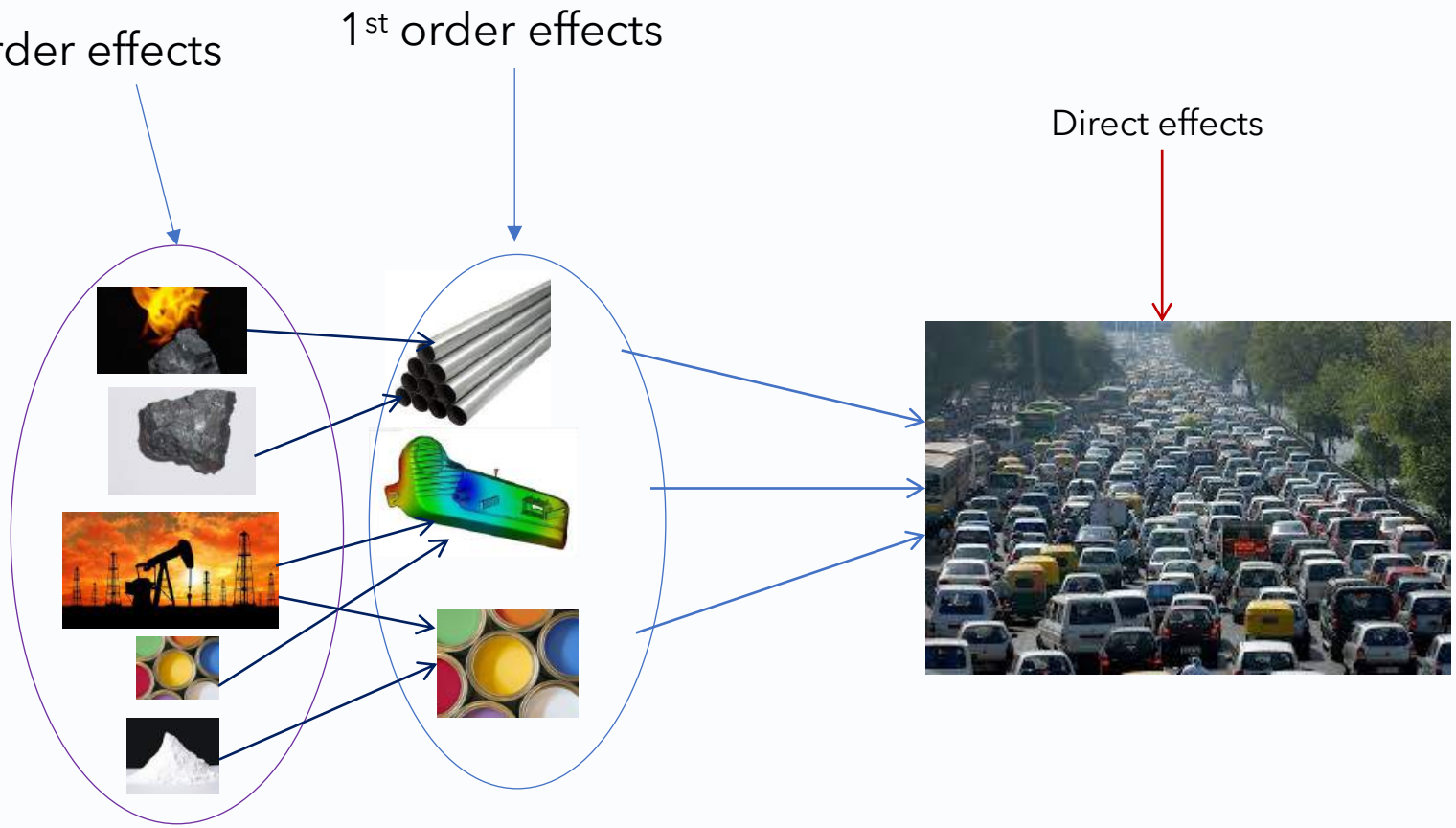
# System thinking

# Electric cars?

- Public service to reduce impact and moment of socialization and empowerment
- Socialization and collectivization imply a reduction in consumption but not necessarily in needs



# Electric cars?

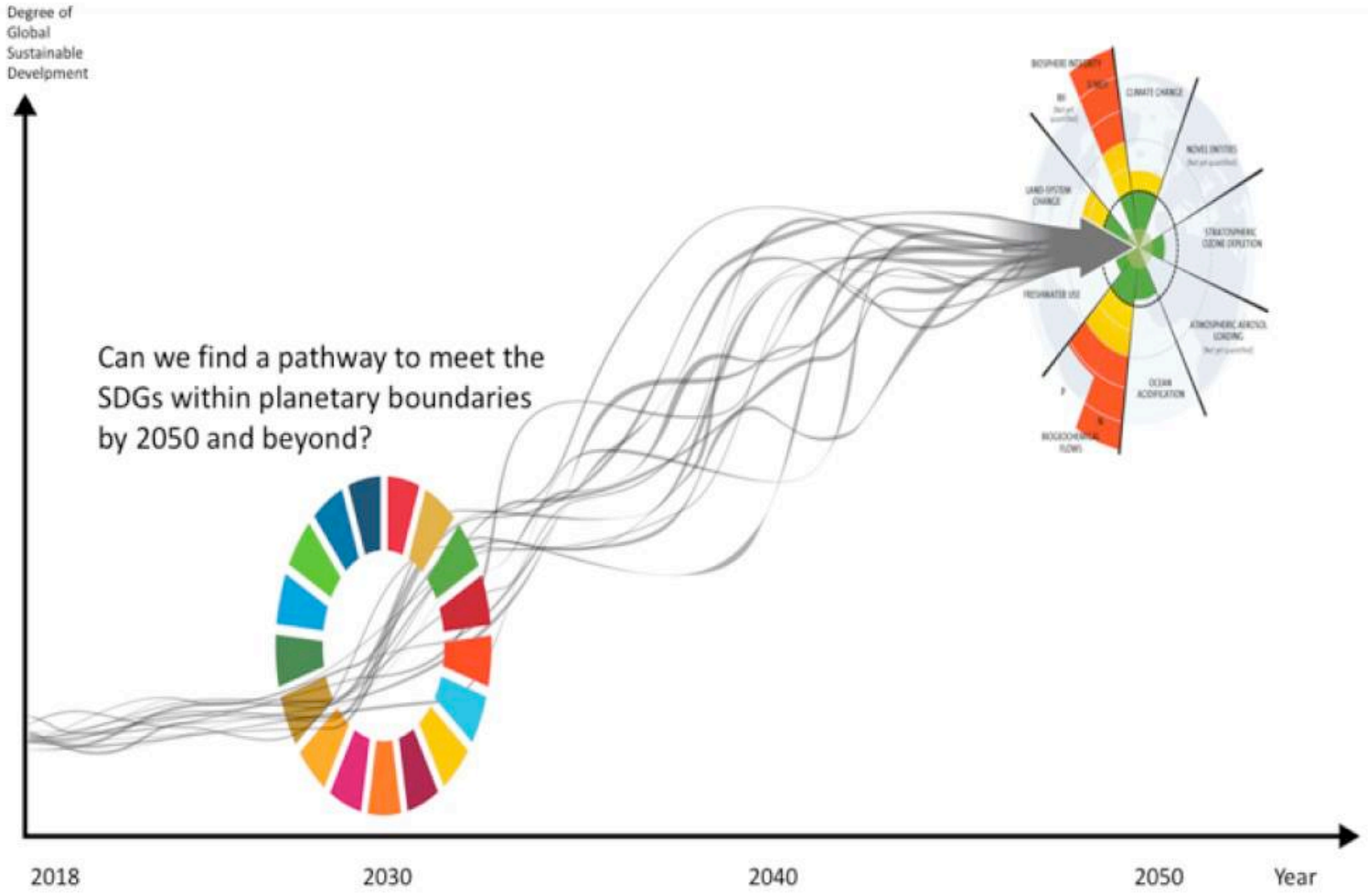



BREAKING NEWS:

- An **electric car needs 6 times more minerals** than a conventional car
- an onshore wind farm needs **9 times** the mineral resources of a gas power plant

# Policy interventions

**Figure 1** What pathways can lead to achieving the SDGs within planetary boundaries in 2050?

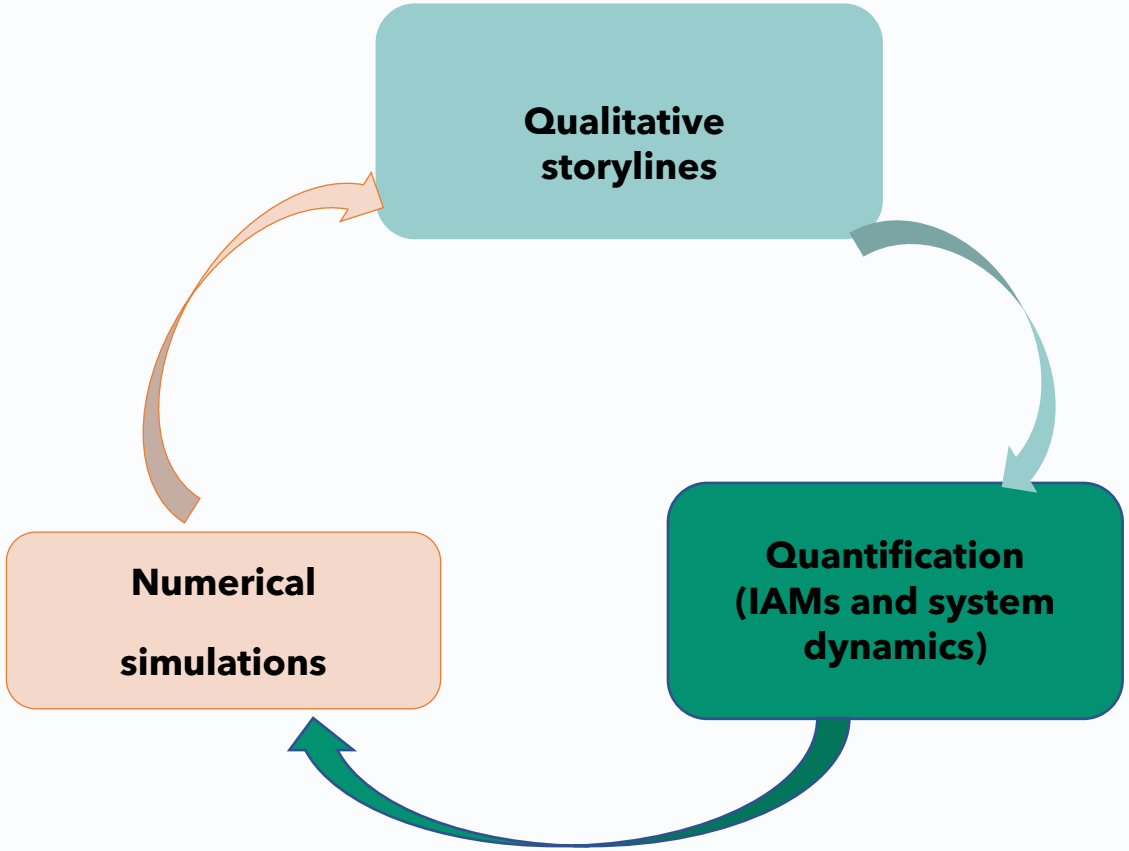



(Stocknes, 2019, Real world economics review)

# Policy interventions

- In today's interconnected world, the SDGs cannot be achieved unless there is sustainable wellbeing globally.
- Countries – apparent committed to sustainable development – had not been sufficient to reverse the environment problem: almost all significant global indicators have continued to worsen
- An environmental discourse focused on costs and limits and the need to constrain growth to address them would be unlikely to attract political support
- Green growth claims that:
  - protecting the environment can actually yield better growth
  - growth is necessary for protecting the environment
- To mitigate the scarcity effect, policies should provide incentives for resource-saving innovations in production

# Scenario building

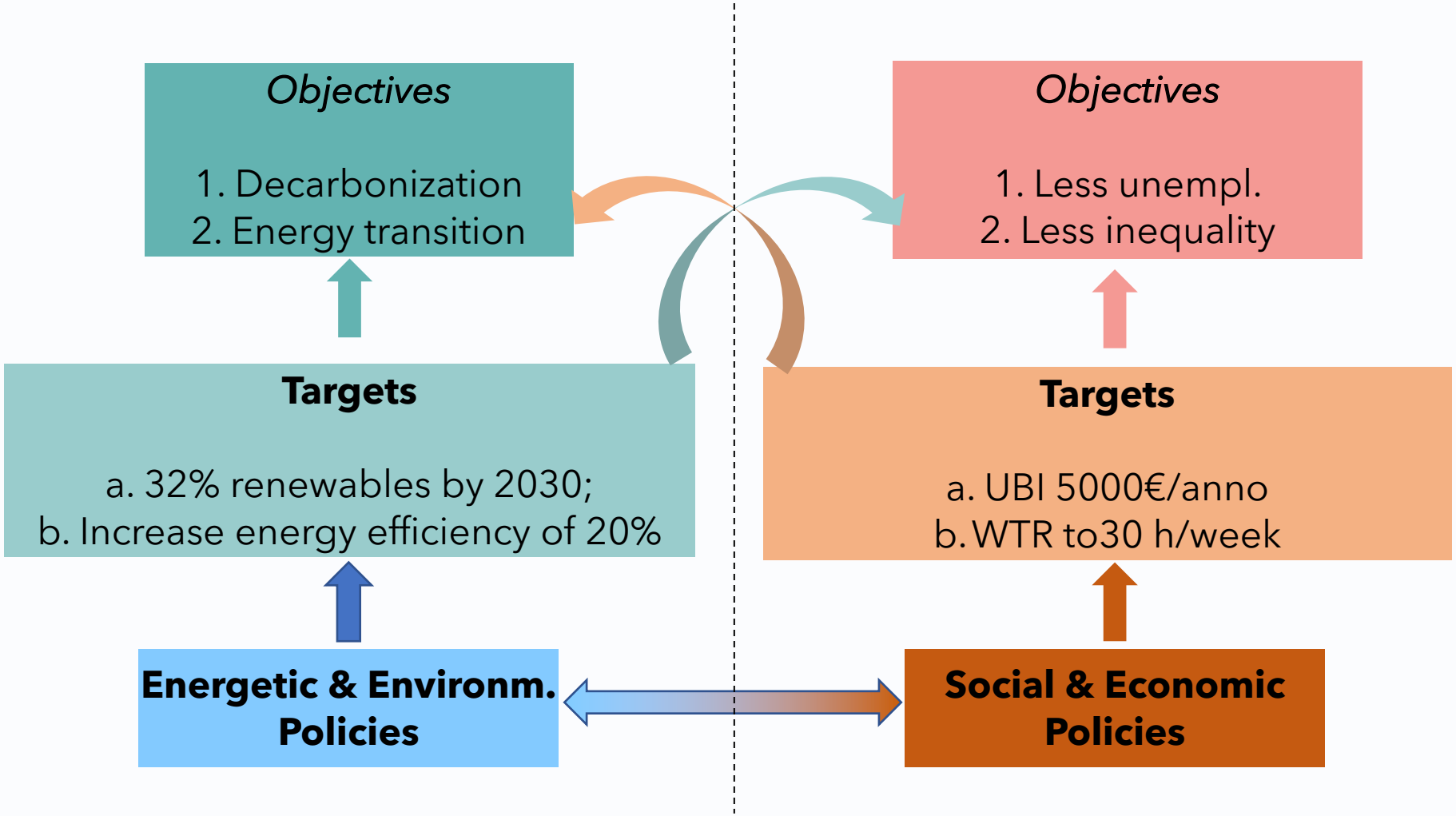



Understanding complex systems requires mastery of concepts such as feedback, stocks and flows, time delays, and nonlinearity.

Doing so requires the use of formal models and simulations to test our mental models and develop our intuition about complex systems.

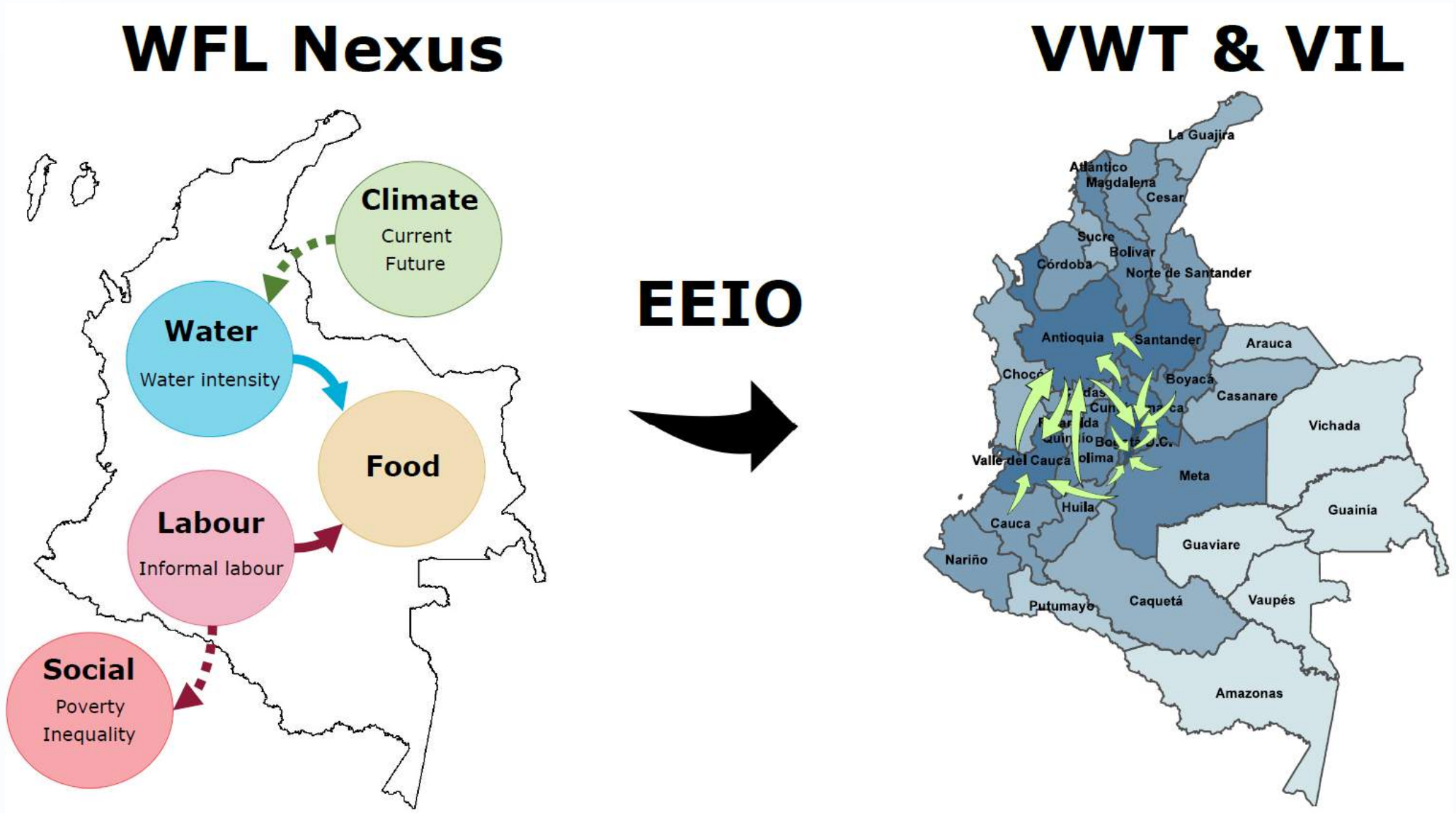
Yet, though essential, these concepts and tools are not sufficient. Becoming an effective systems thinker also requires the rigorous and disciplined use of scientific inquiry skills so that we can uncover our **hidden assumptions** and biases. It requires respect and **empathy** for others and other viewpoints. Most important, and most difficult to learn, systems thinking requires understanding that **all models are wrong and humility about the limitations of our knowledge**.
(John D. Sterman, 2002)

# Policy implications

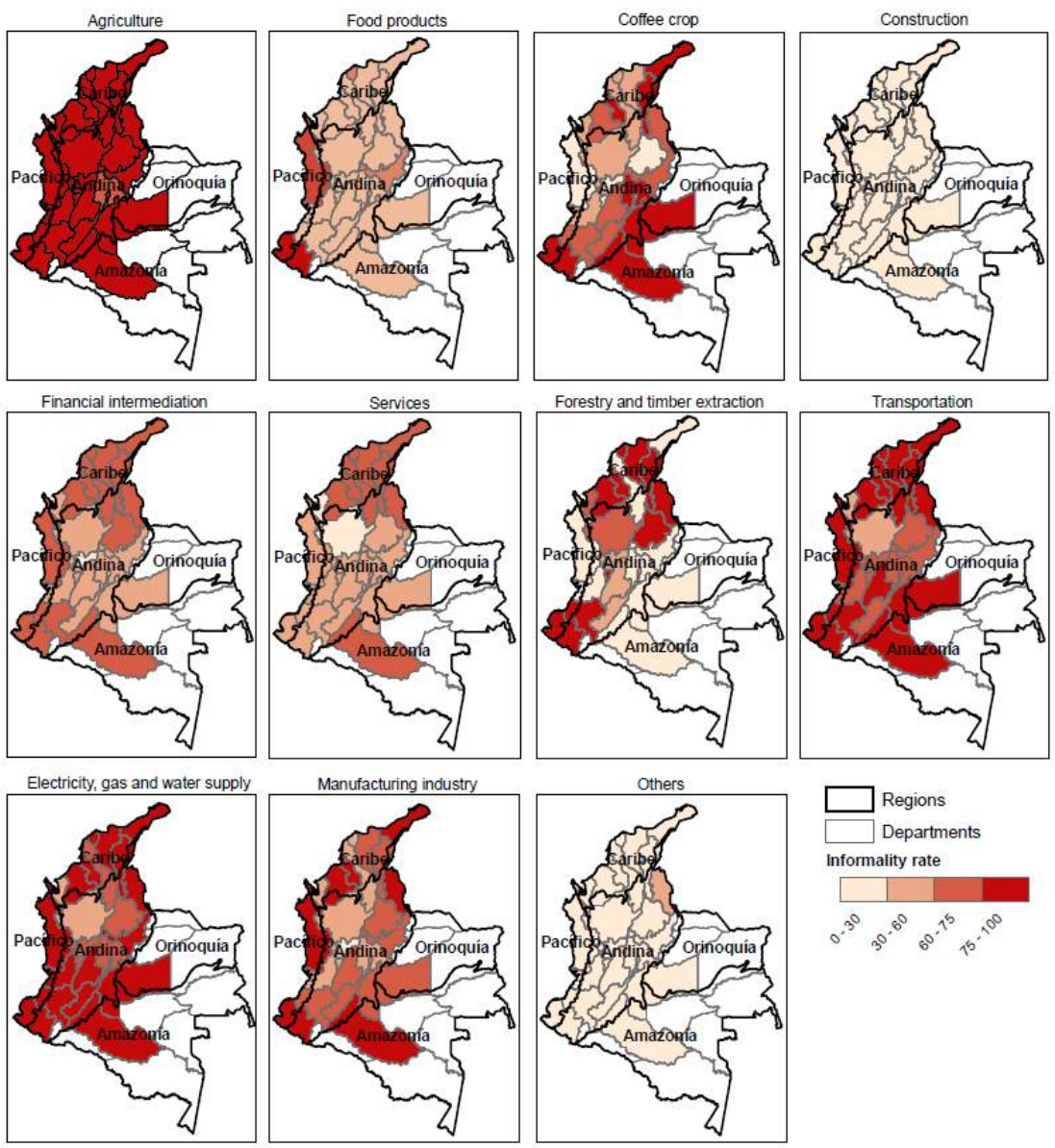


# Geographic and political boundaries: scale down the SDGs

# Sub-national scale analysis



# Socio-environmental spatial variability




# DEFORESTATION

https://www.nature.com/articles/s41598-020-61861-y

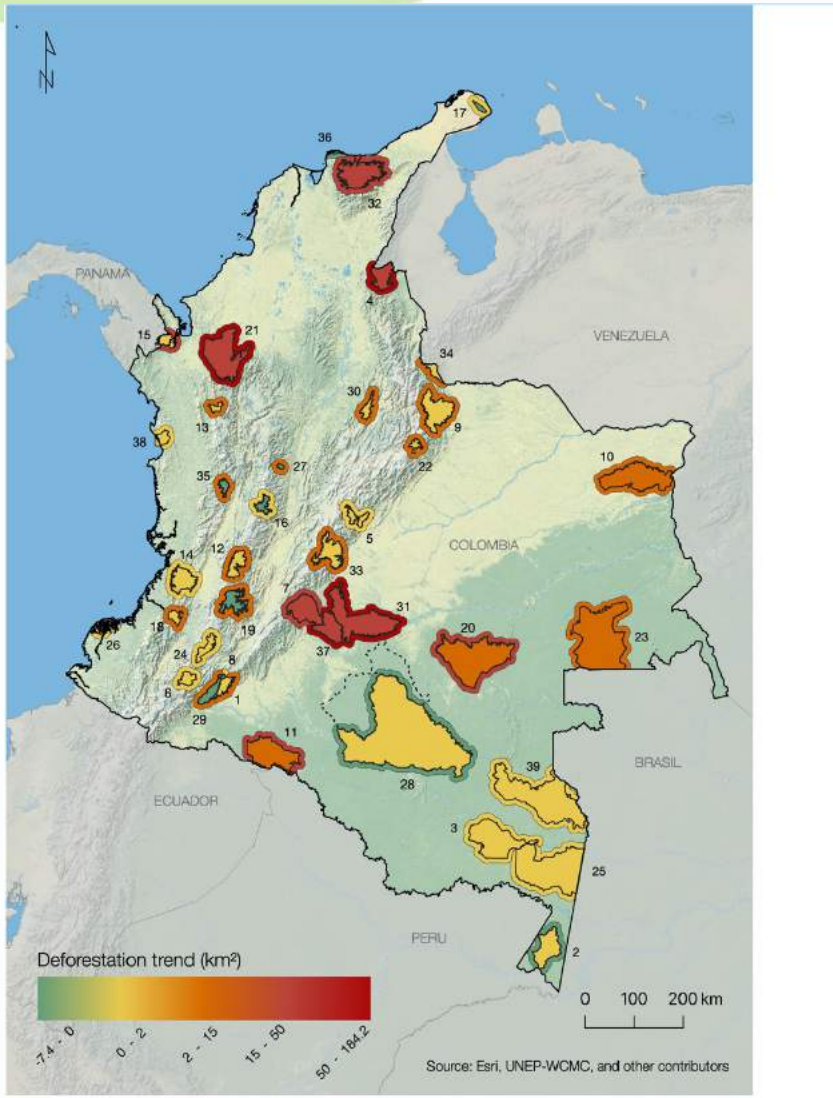



**Figure 2.** Change in deforestation extent (km²) before and after the peace agreement with FARC (2013–2015 vs. 2016–2018) in continental Colombian National Natural Parks and National Natural Reserves and buffer areas (10 km). Dotted line: 2018 enlargement of Serranía de Chiribiquete NNP (not used in calculations). Numbers correspond to protected area IDs, detailed in Table 1. Figure created using ArcGIS software by Esri, used herein under license.

# SDGs and Regional differences

**Tabla 3. Resultados de la similitud entre los planes de desarrollo y los ODS, por regiones PND**

Fuente: Secretaría Técnica Comisión ODS, DNP, 2020.

| Región | ODS 1 | ODS 2 | ODS 3 | ODS 4 | ODS 5 | ODS 6 | ODS 7 | ODS 8 | ODS 9 |
|---|---|---|---|---|---|---|---|---|---|
| Caribe | 0,4083 | 0,3728 | 0,4551 | 0,4405 | 0,2904 | 0,2905 | 0,2630 | 0,3727 | 0,3626 |
| Santanderes | 0,3505 | 0,3366 | 0,4196 | 0,4187 | 0,2985 | 0,2262 | 0,2135 | 0,3746 | 0,3154 |
| Eje cafetero y Antioquia | 0,3646 | 0,3512 | 0,4084 | 0,3983 | 0,2657 | 0,2468 | 0,2400 | 0,3436 | 0,3758 |
| Pacífico | 0,3595 | 0,3431 | 0,4149 | 0,4043 | 0,2819 | 0,2610 | 0,2234 | 0,3242 | 0,3383 |
| Central | 0,3814 | 0,3710 | 0,4064 | 0,4016 | 0,2703 | 0,2570 | 0,2476 | 0,3505 | 0,3723 |
| Orinoquía-Llanos | 0,3544 | 0,3480 | 0,4004 | 0,3764 | 0,2401 | 0,2425 | 0,2514 | 0,3197 | 0,3650 |
| Amazonía | 0,3661 | 0,3398 | 0,4665 | 0,3840 | 0,2644 | 0,2565 | 0,2318 | 0,3225 | 0,3305 |
| Sea Flower | 0,3476 | 0,3336 | 0,3747 | 0,4082 | 0,2459 | 0,2259 | 0,2284 | 0,3187 | 0,3592 |

# SDGs and Regional differences

**Tabla 3. Resultados de la similitud entre los planes de desarrollo y los ODS, por regiones PND**

Fuente: Secretaría Técnica Comisión ODS, DNP, 2020.

| Región | ODS 10 | ODS 11 | ODS 12 | ODS 13 | ODS 14 | ODS 15 | ODS 16 |
|---|---|---|---|---|---|---|---|
| Caribe | 0,3707 | 0,4149 | 0,3439 | 0,2563 | 0,2737 | 0,2802 | 0,4207 |
| Santanderes | 0,3316 | 0,3956 | 0,2928 | 0,2259 | 0,2123 | 0,2350 | 0,4079 |
| Eje cafetero y Antioquia | 0,3496 | 0,3945 | 0,3398 | 0,2517 | 0,2630 | 0,2643 | 0,3955 |
| Pacífico | 0,3292 | 0,3819 | 0,3201 | 0,2258 | 0,2554 | 0,2718 | 0,3866 |
| Central | 0,3633 | 0,3974 | 0,3576 | 0,2577 | 0,2689 | 0,2800 | 0,3940 |
| Orinoquía-Llanos | 0,3460 | 0,3847 | 0,3227 | 0,2316 | 0,2513 | 0,2559 | 0,3736 |
| Amazonía | 0,3303 | 0,3828 | 0,3109 | 0,2243 | 0,2499 | 0,2586 | 0,4012 |
| Sea Flower | 0,3422 | 0,3801 | 0,3073 | 0,2244 | 0,2618 | 0,2544 | 0,4054 |


Thanks!
(tiziano.distefano@unipi.it)
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