



**Presented by Dave Griggs**  
**Director, Monash Sustainability Institute**

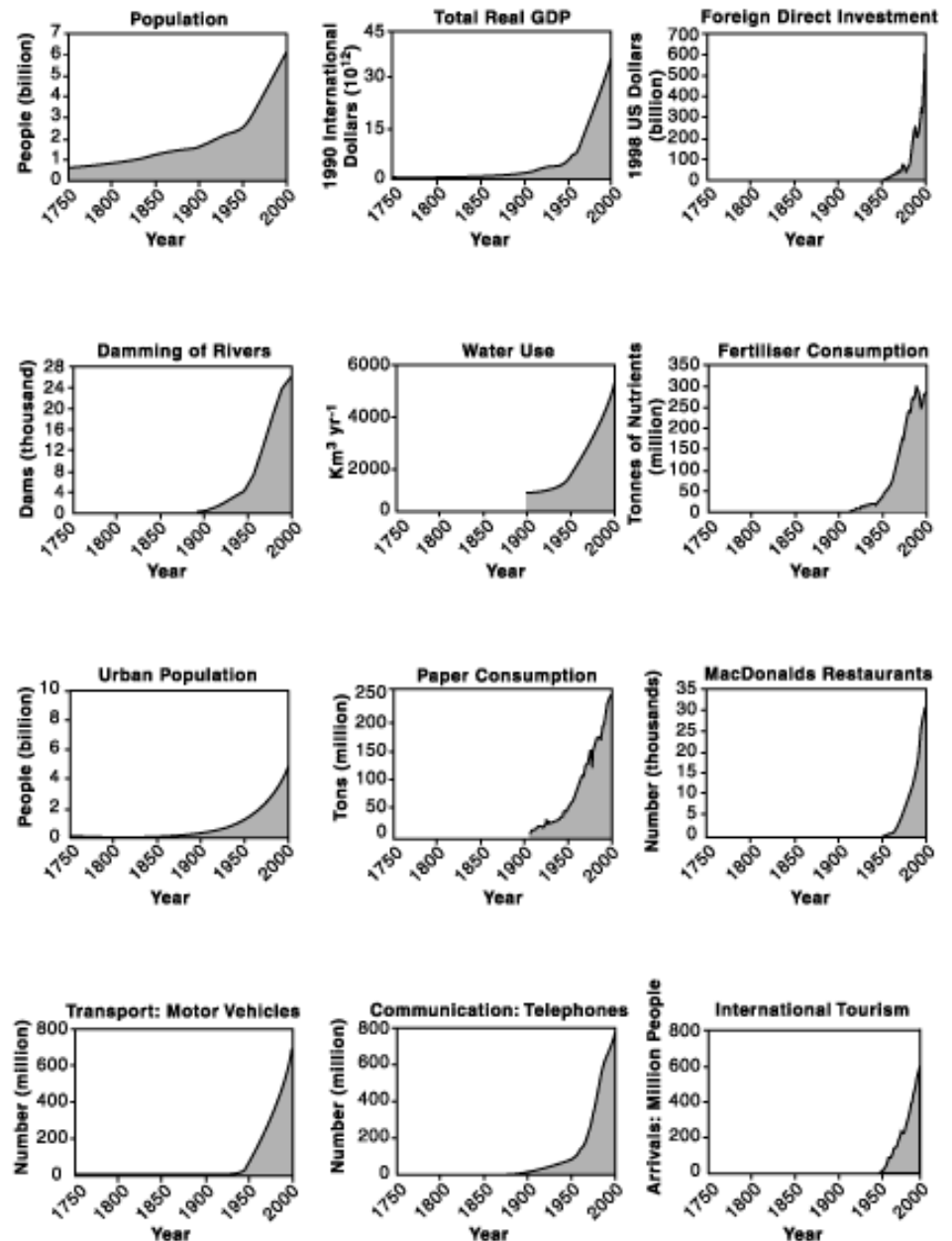
# **Sustainable Development Goals and the role of energy**





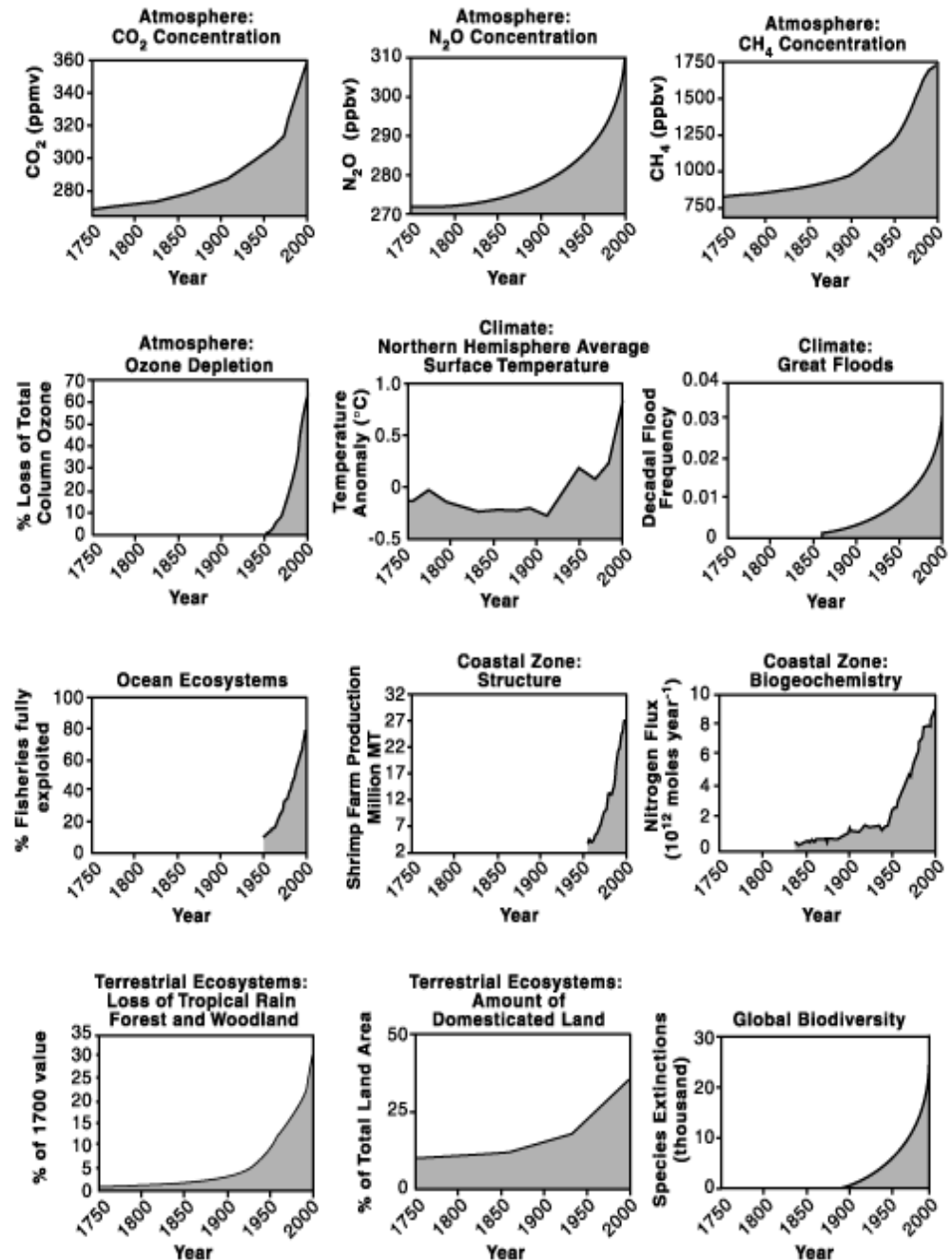
# The changing human enterprise, from 1750 to 2000

Note the start of the 'Great Acceleration' around 1950, when many activities began or accelerated sharply.



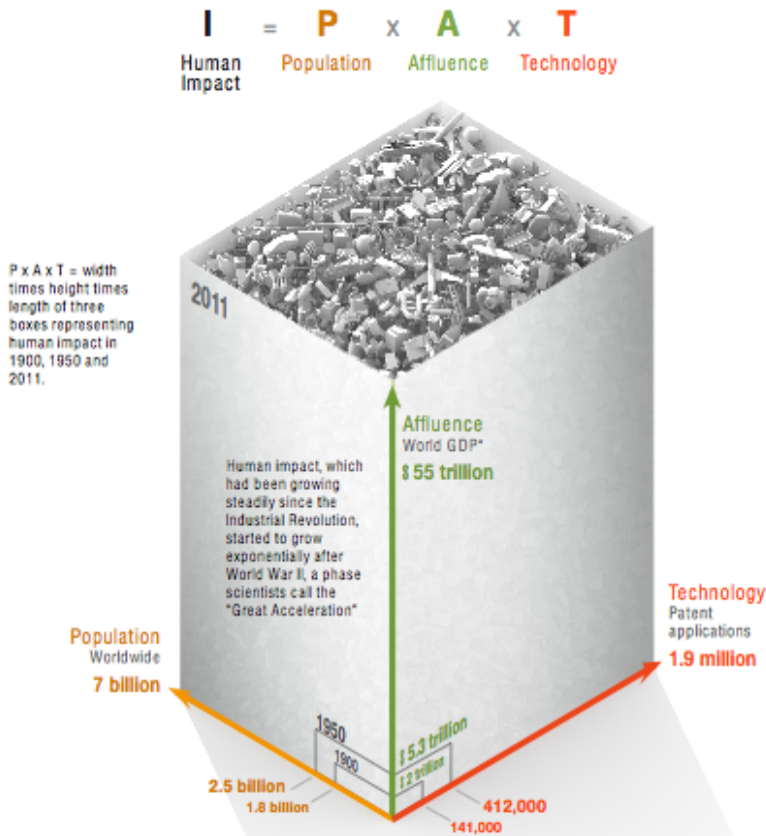


# Responses of the biophysical Earth System to the accelerating human enterprise



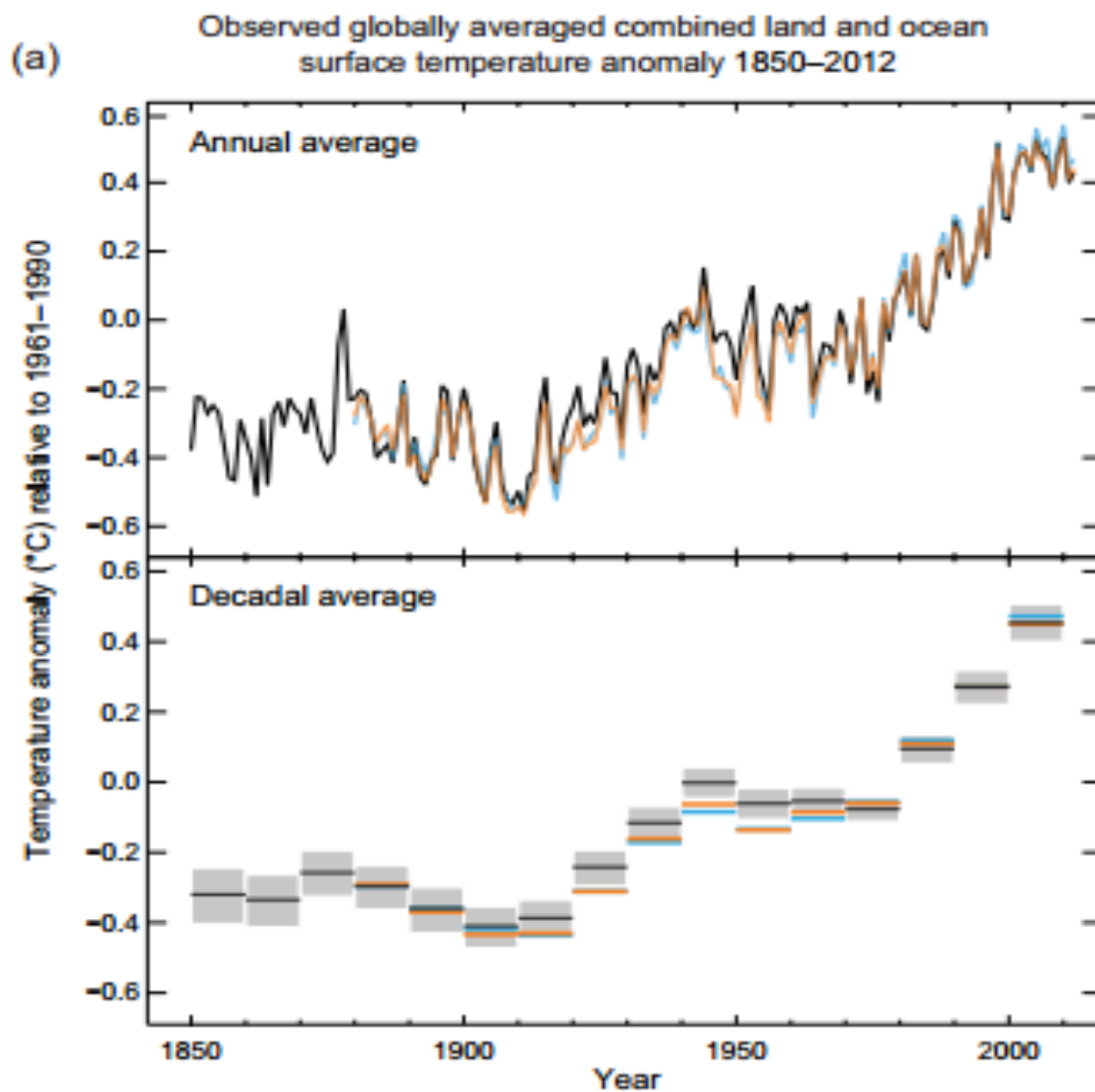
#### WHY IS OUR IMPACT GROWING?

Is population growth the root cause? Or is it affluence, which leads to greater consumption of energy and other resources? Or technology, which offers new tools for exploiting and consuming? The IPAT formula is a way of thinking about the issue: it says the three factors compound. Since 1900 world GDP (a measure of A) and the number of patent applications (a measure of T) have grown even faster than population.

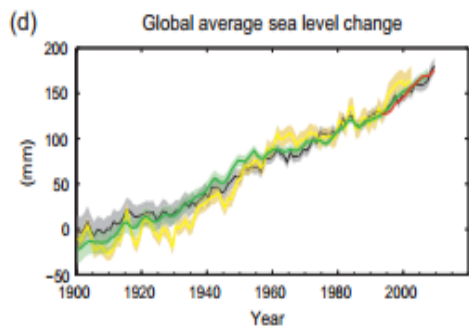
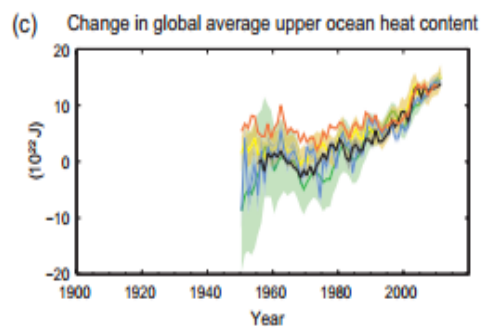
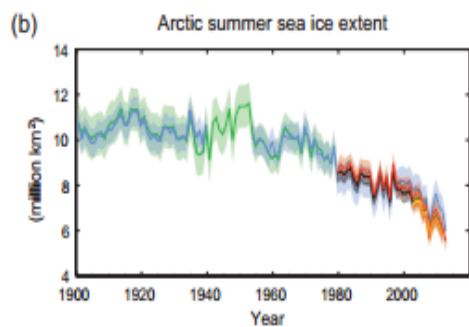
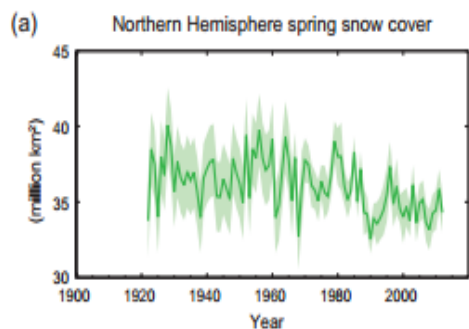


\*GDP FIGURES ARE CONSTANT 1990 INTERNATIONAL DOLLARS.  
 JOHN TOMANKO, NGM STAFF; AND, BRYAN CHRISTIE, SOURCES: UNITED NATIONS; ANGUS MADISON, "STATISTICS ON WORLD POPULATION, GDP AND PER CAPITA GDP, 1 2008 A.D.," UNIVERSITY OF GÖTTINGEN; WORLD BANK; WORLD INTELLECTUAL PROPERTY ORGANIZATION

- Equity issues profoundly complicate the challenge of global change.
- In the Great Acceleration technology and especially consumption have overtaken population as a driver of change.



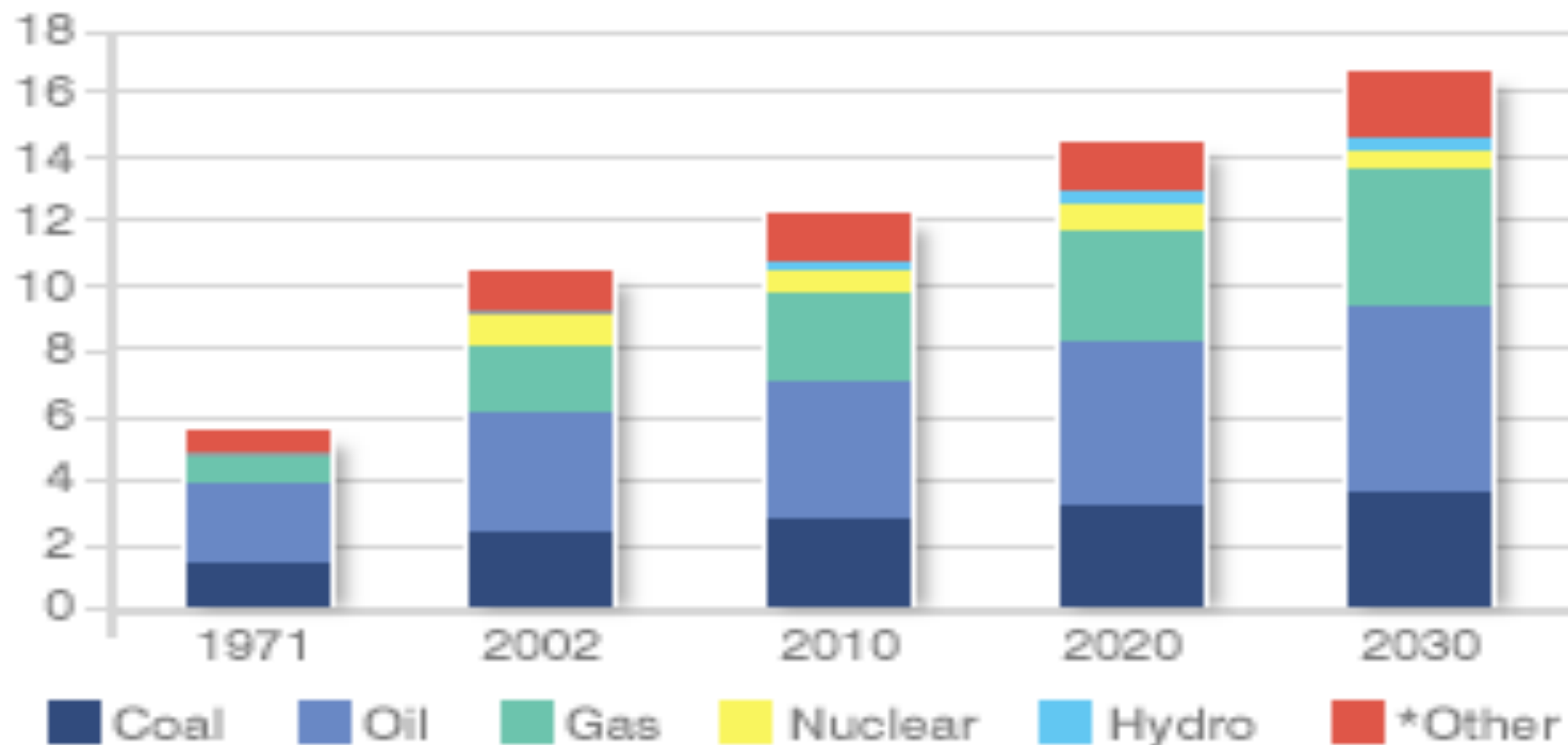
(b) Observed change in surface temperature 1901–2012





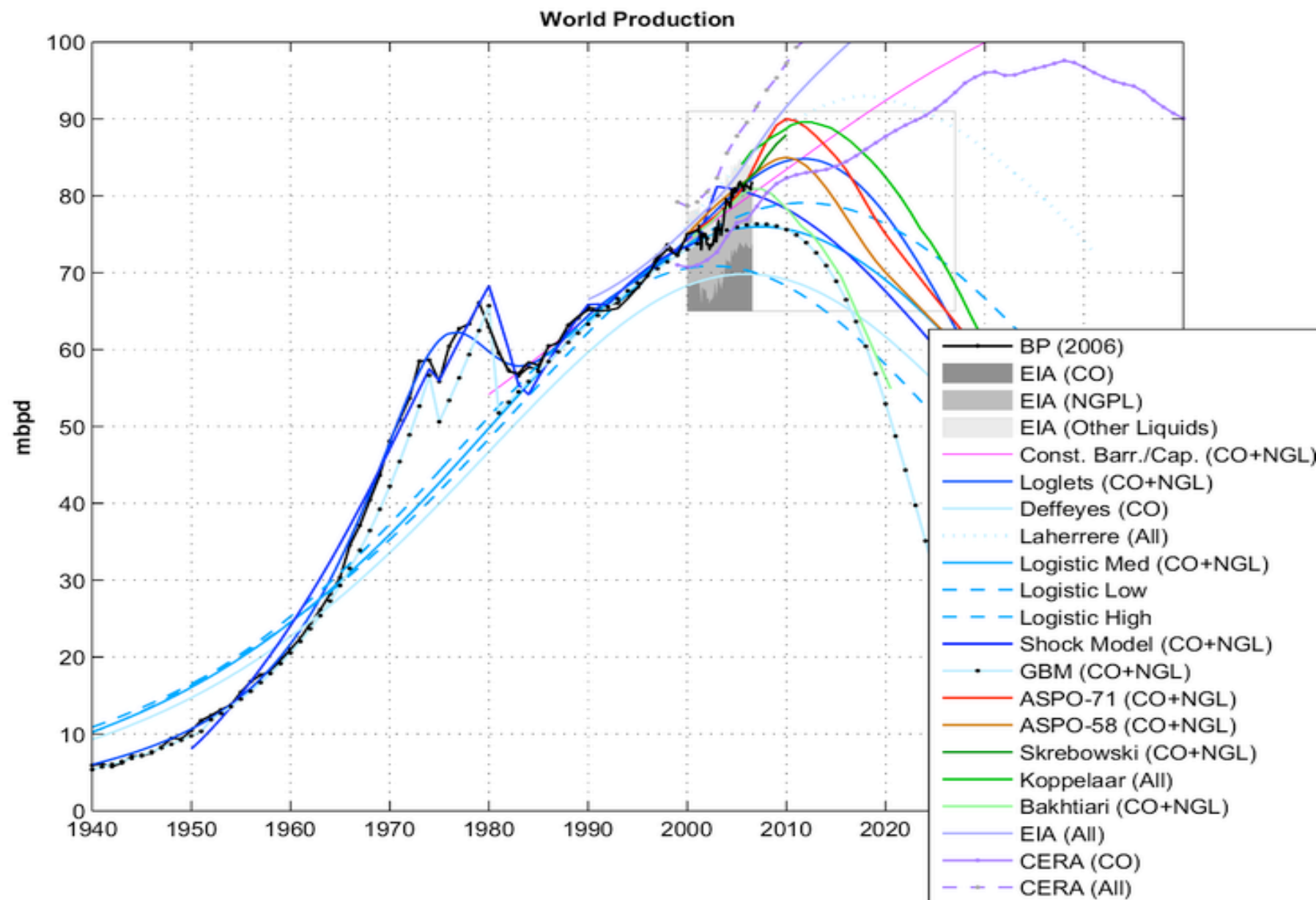
## PROJECTED FUTURE DEMAND

Billion tonne oil equivalent



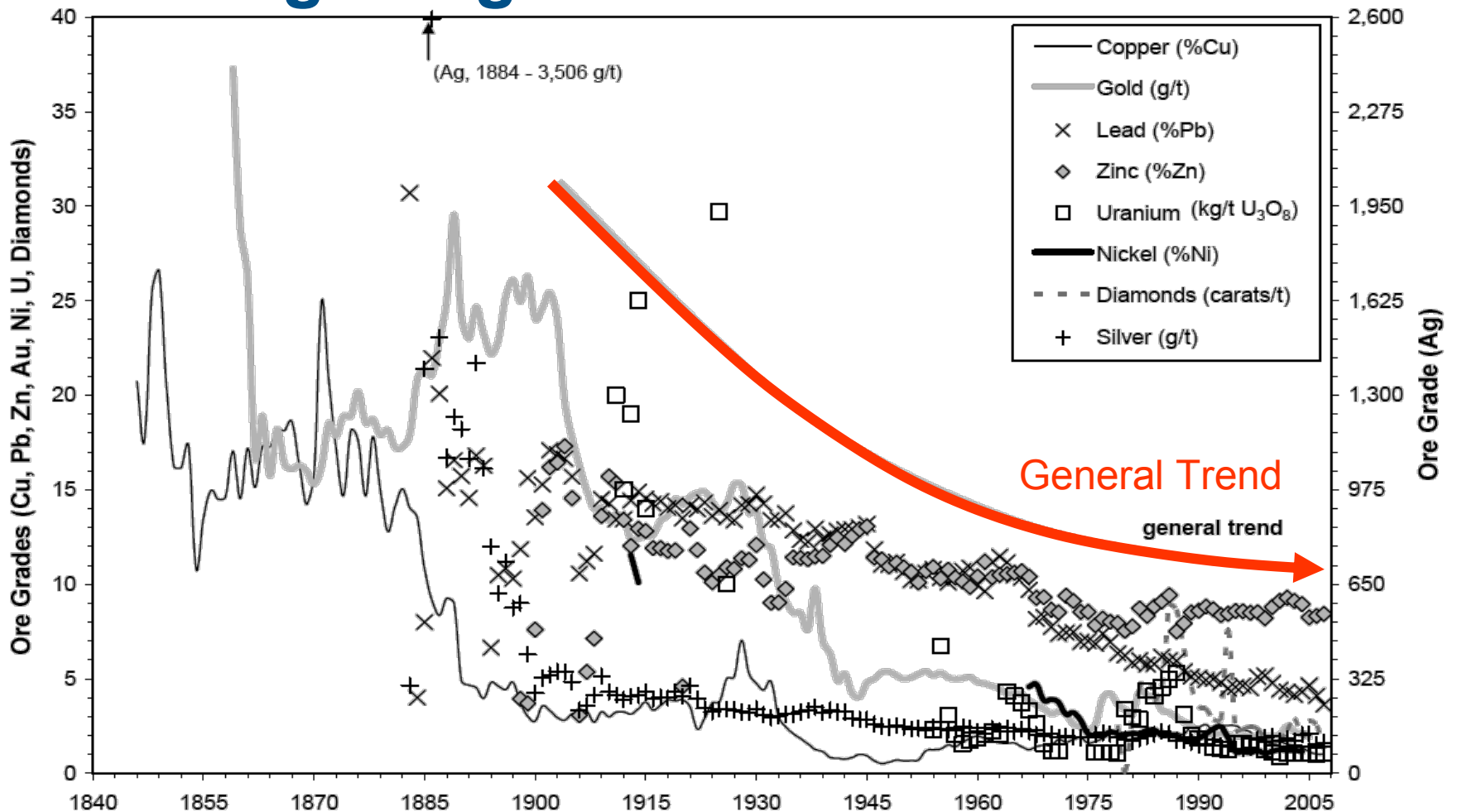
\*Includes geothermal, solar, wind, heat, etc.

Source: IEA 2005



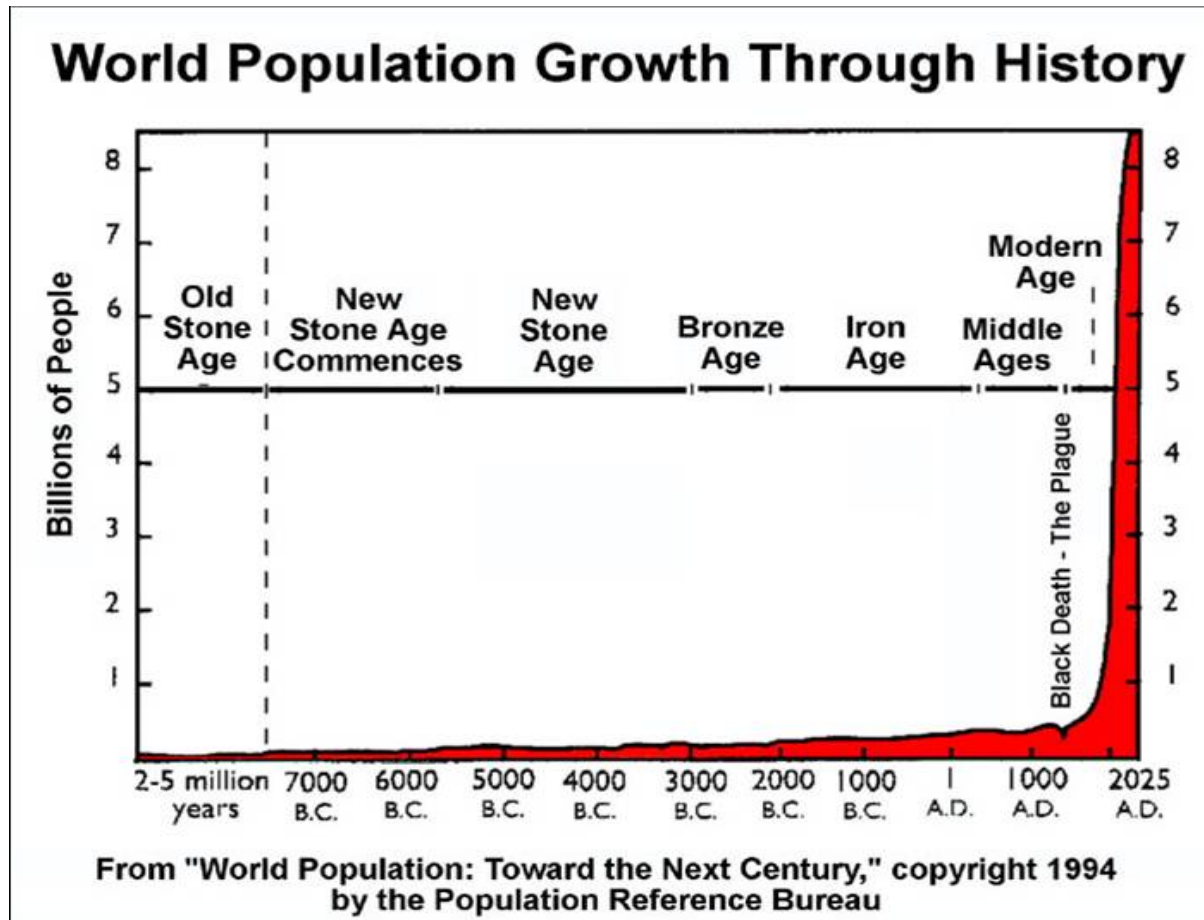


# Declining ore grades



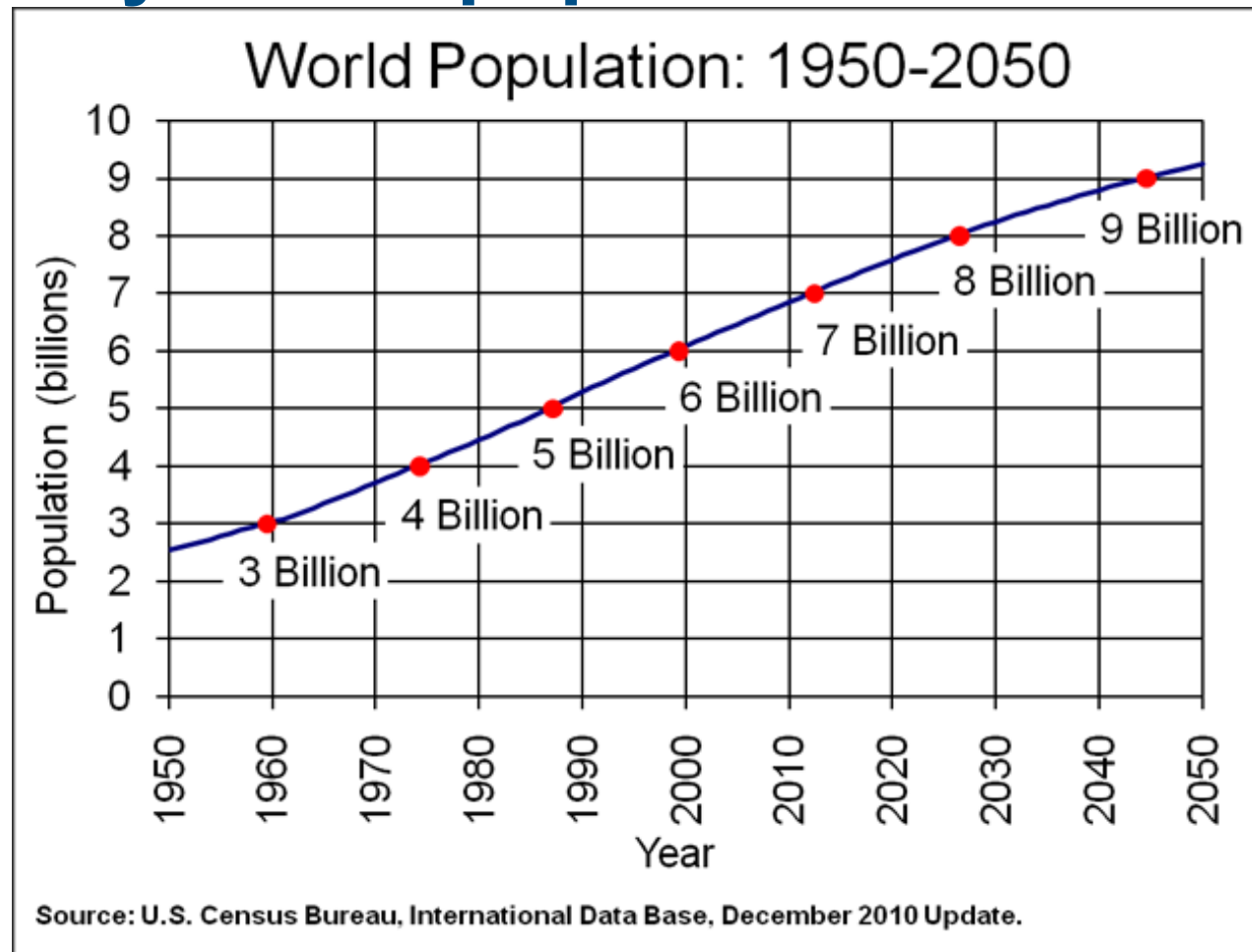


## Natural system – population links

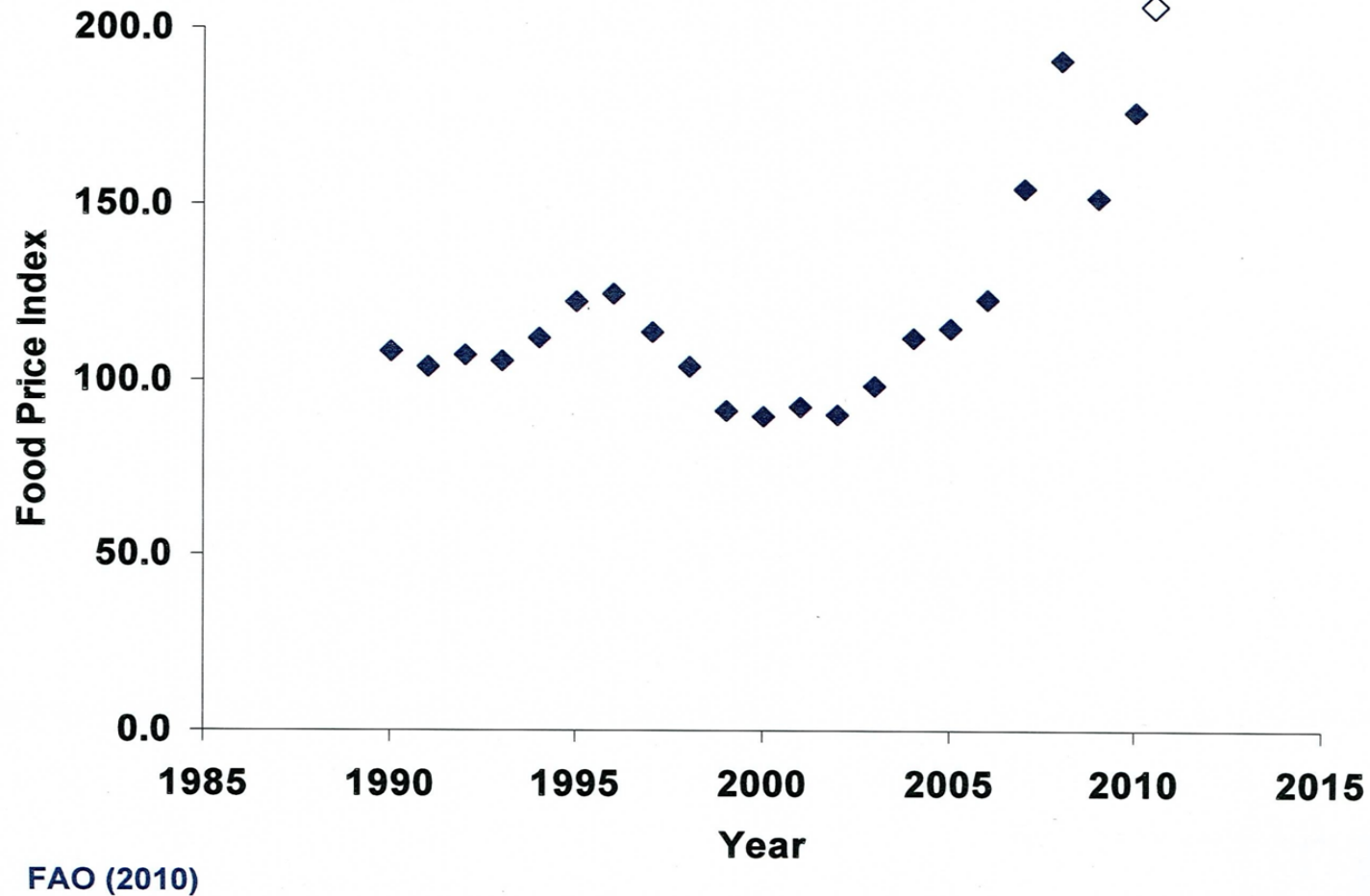




## Natural system – population links



# Food price increases impact disproportionately on the poor



# Natural system – population links

Figure I. Proportion of population 60 years or over: world, 1950-2050

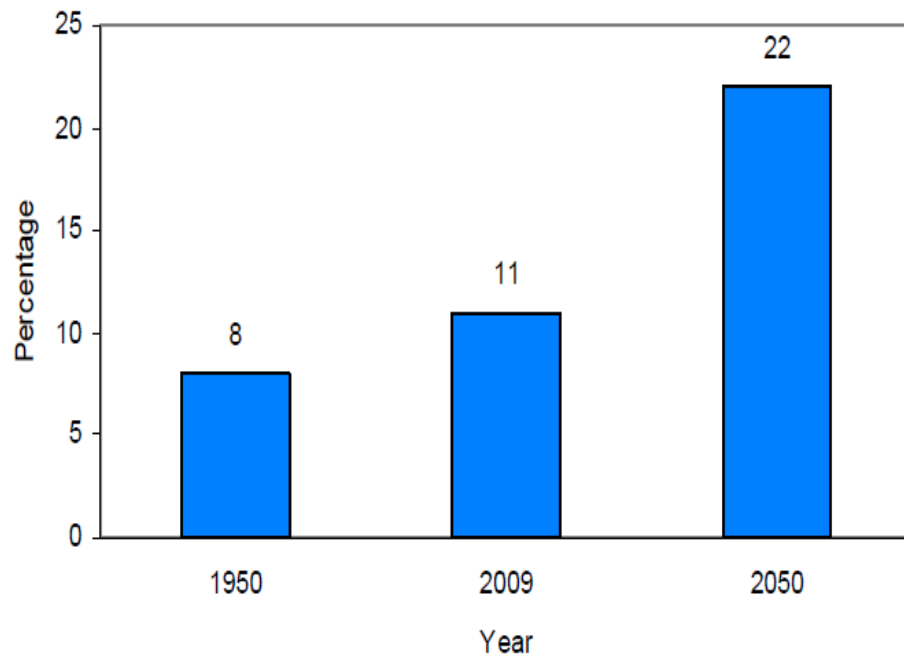
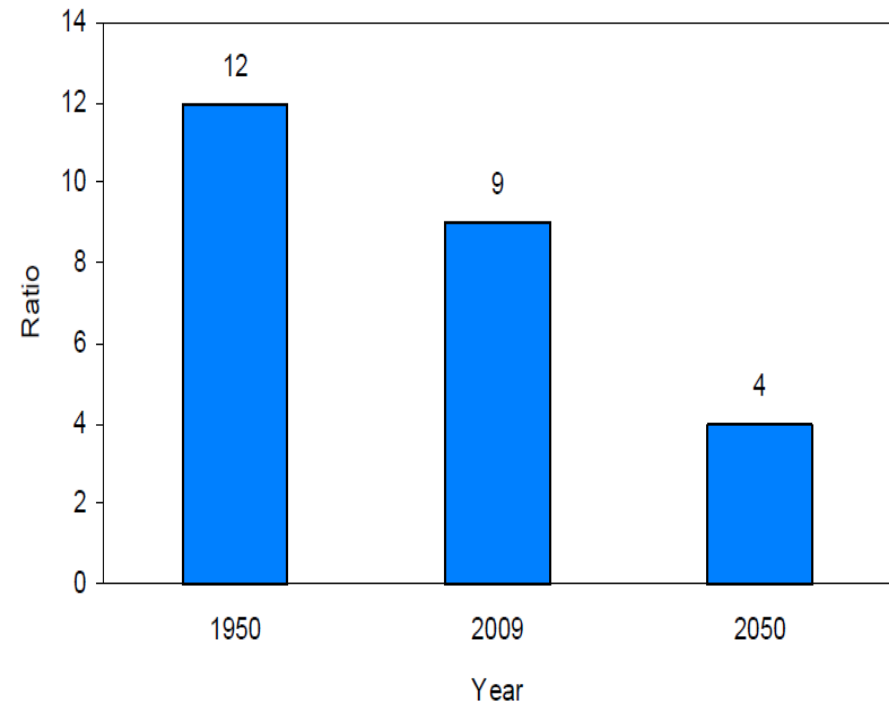
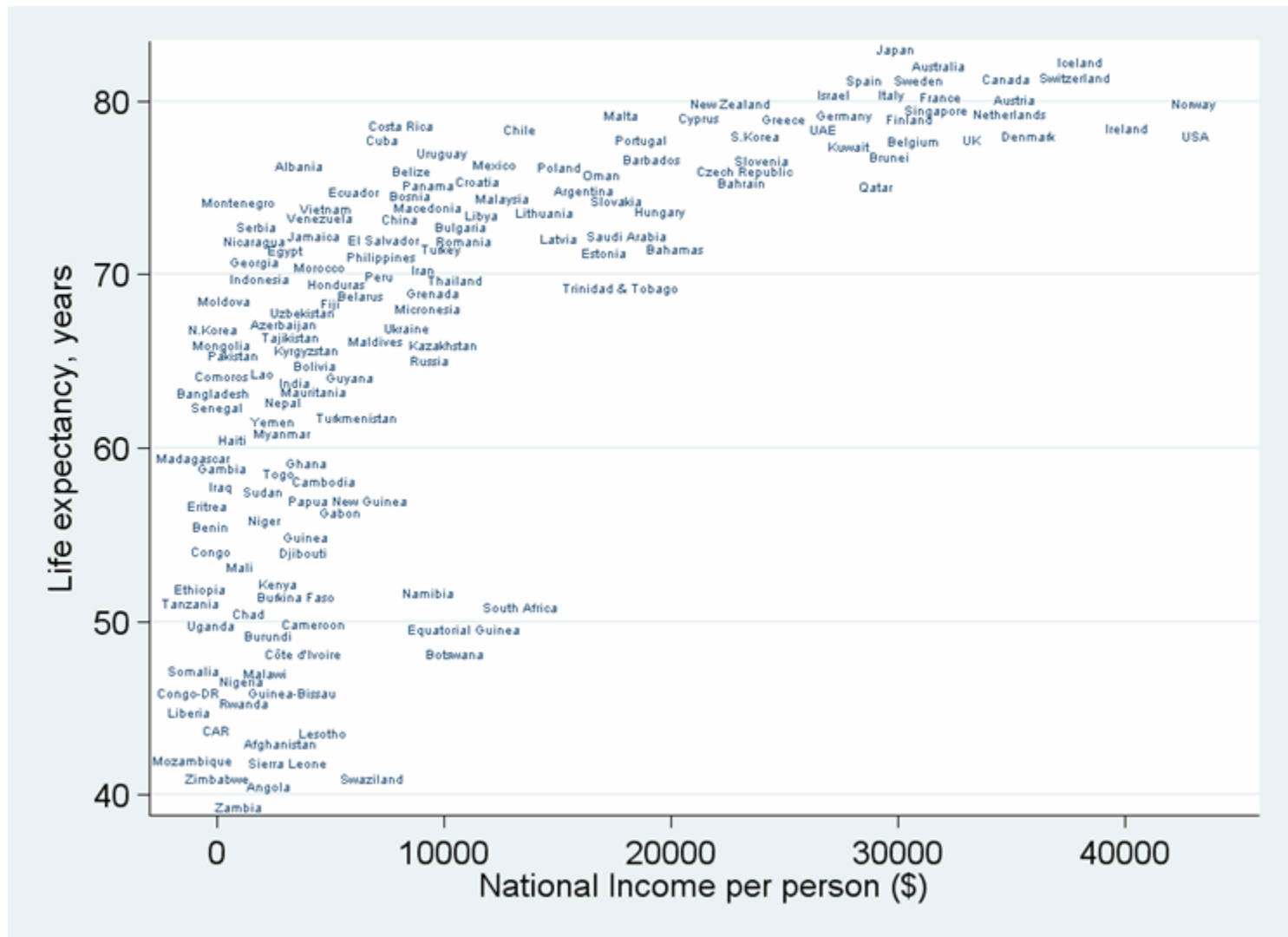


Figure II. Potential support ratio (PSR), 1950-2050



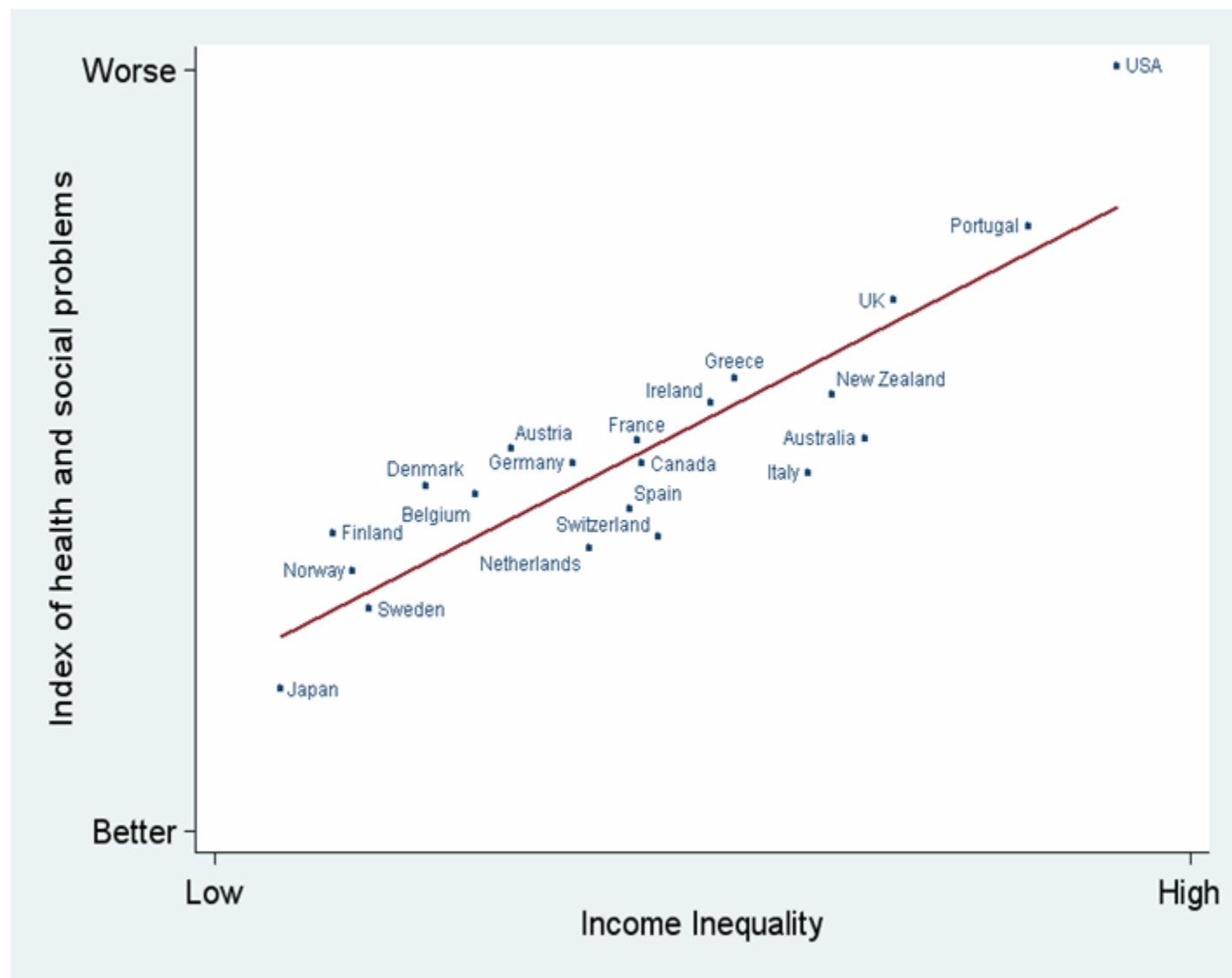
# Income per head and life-expectancy: rich & poor countries

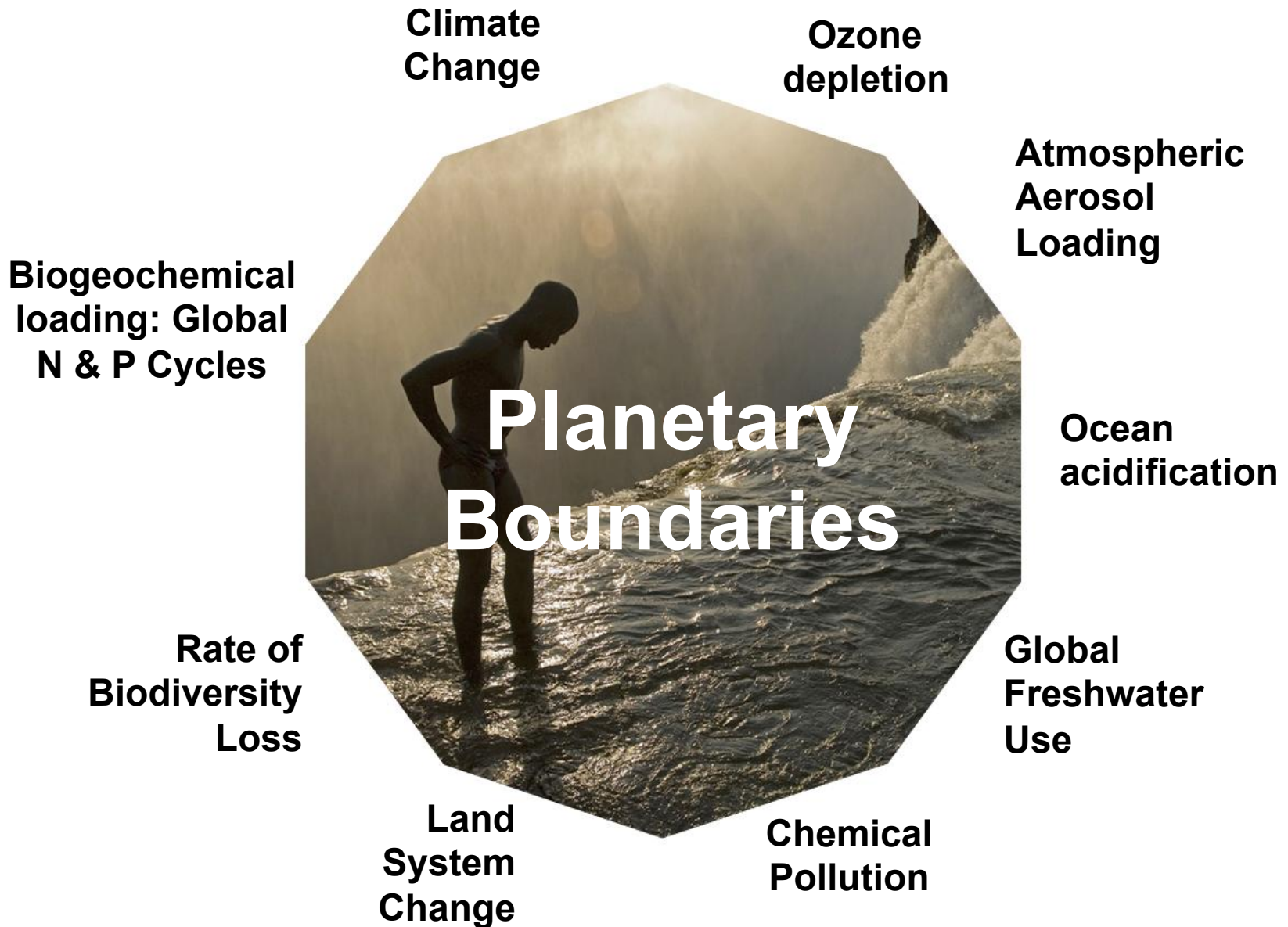


# Health and Social Problems are Worse in More Unequal Countries

## Index of:

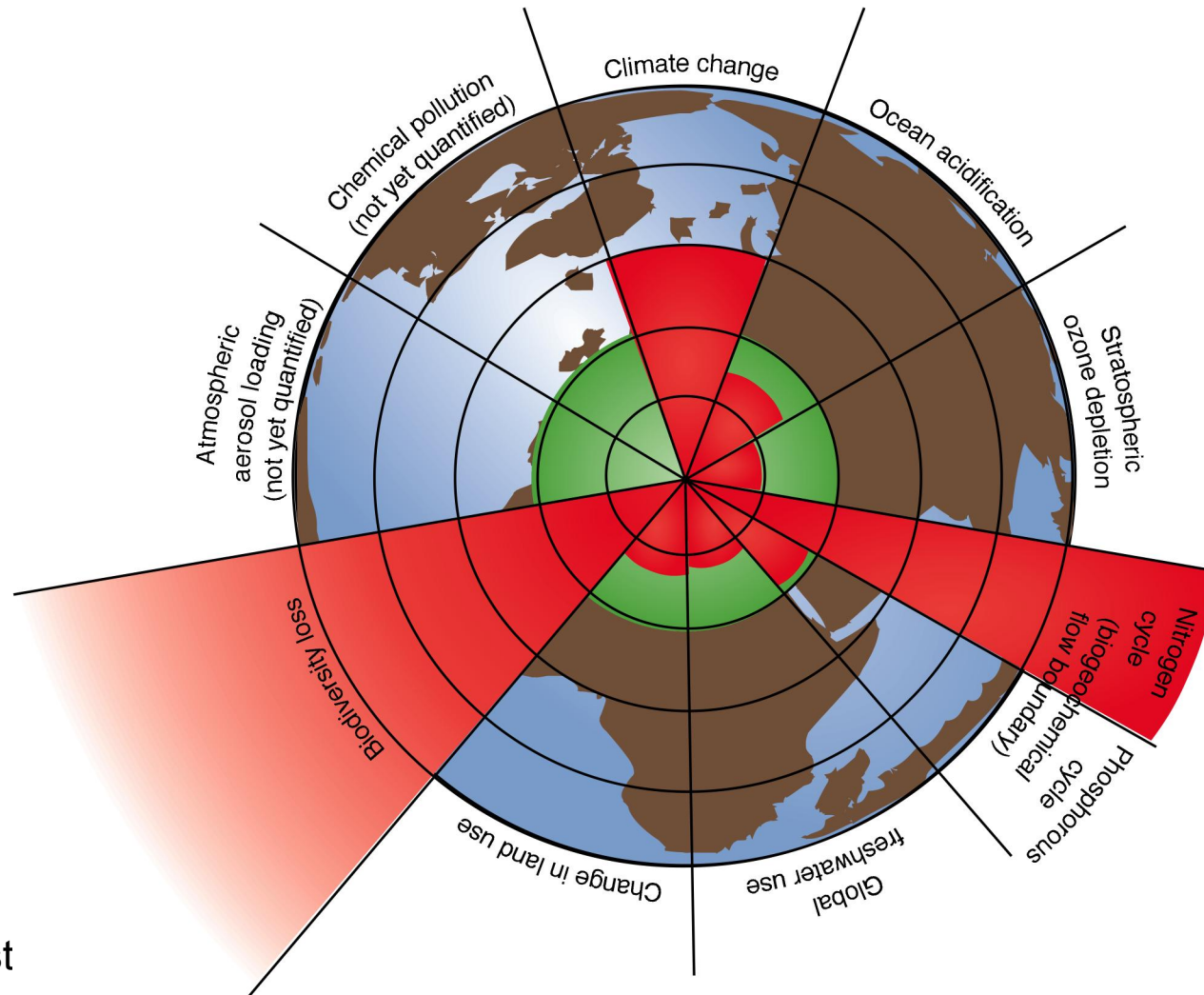
- Life expectancy
- Math & Literacy
- Infant mortality
- Homicides
- Imprisonment
- Teenage births
- Trust
- Obesity
- Mental illness – incl. drug & alcohol addiction
- Social mobility





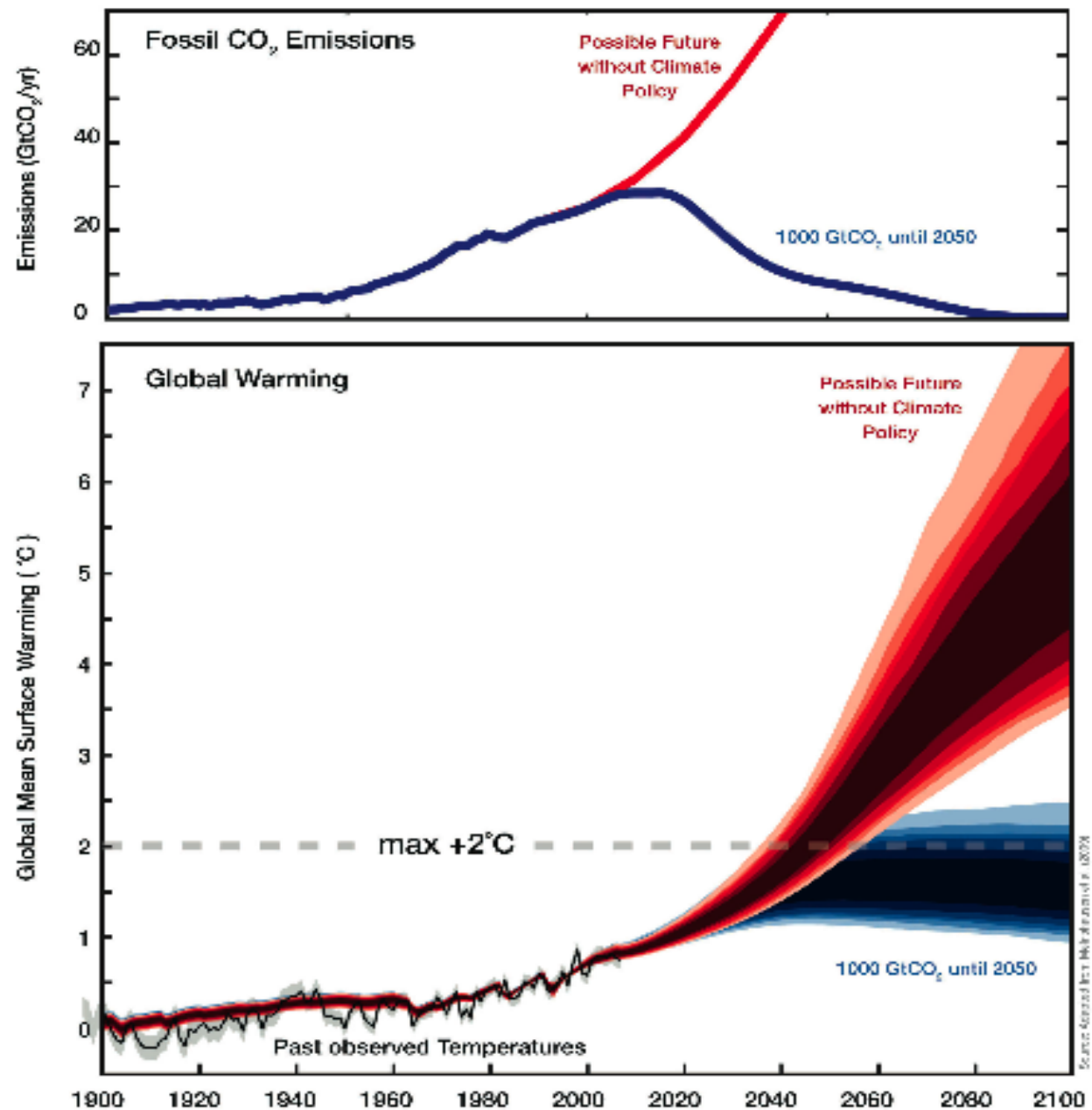


# Defining the safe operating space





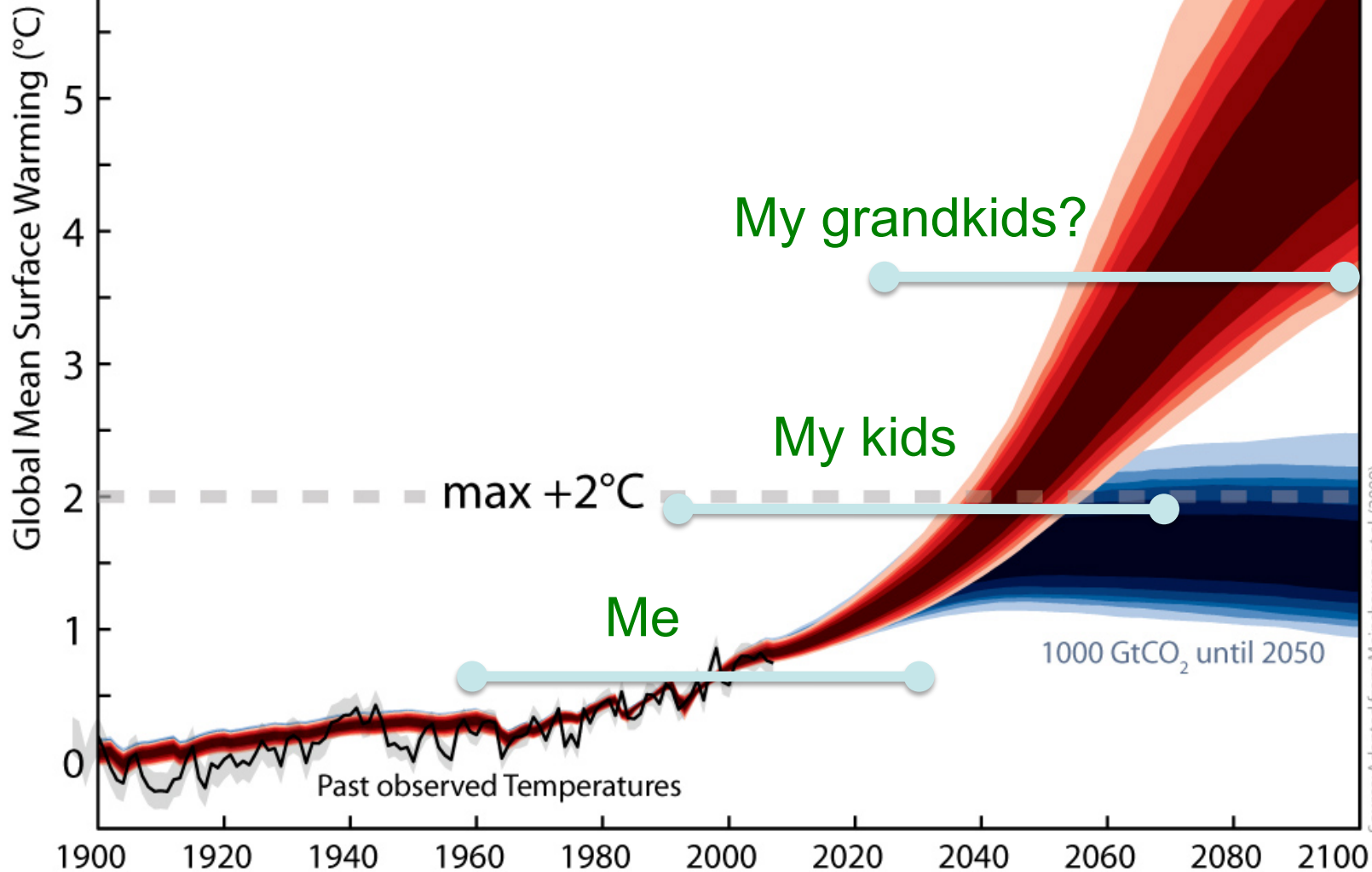
# 4. Science-policy intersection: The critical decade

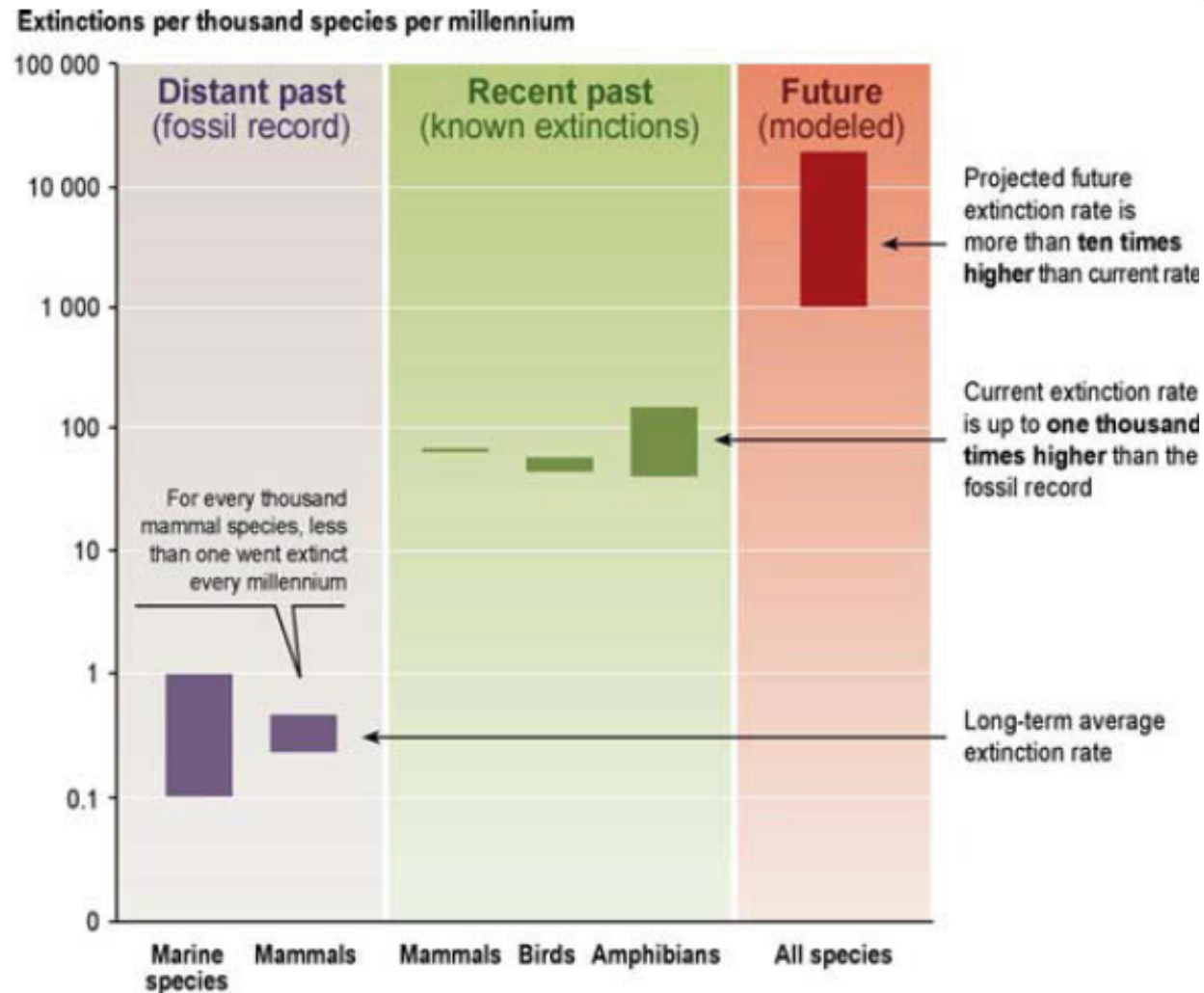




# The Critical Decade

(a la Prof Lesley Hughes)





Source: Millennium Ecosystem Assessment

## Sustainability - definition

The most widely quoted definition of sustainability and sustainable development is that of the Brundtland Commission of the United Nations in 1987:

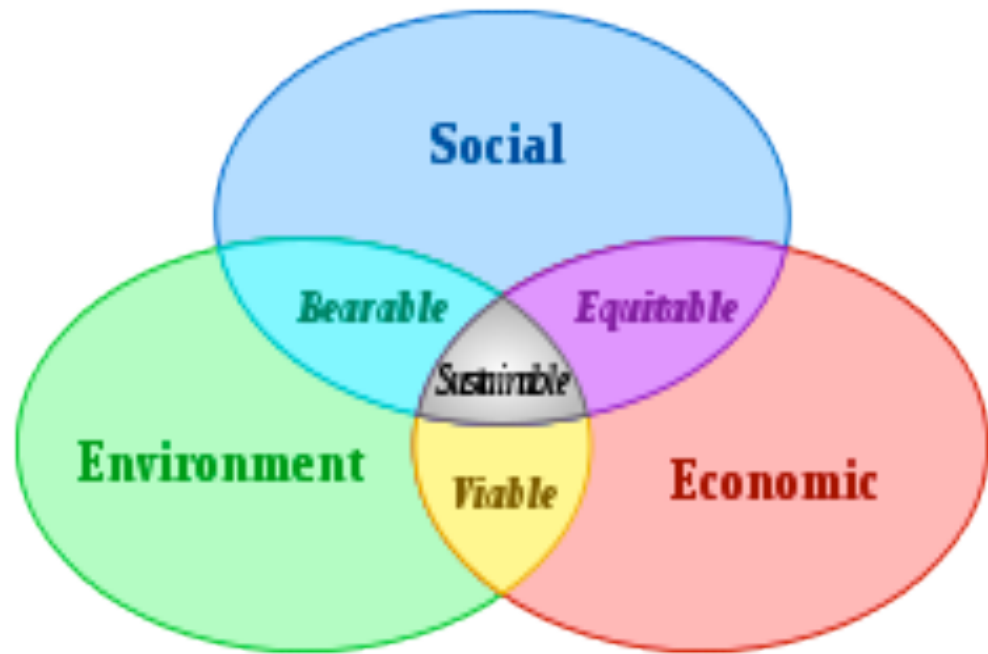
- “sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

At the 2005 World Summit it was noted that this requires the reconciliation of environmental, social and economic demands - the "three pillars" of sustainability.

The simple definition "sustainability is improving the quality of human life while living within the carrying capacity of supporting eco-systems" is vague but conveys the idea of sustainability having quantifiable limits. Some definitions set out common goals and values.

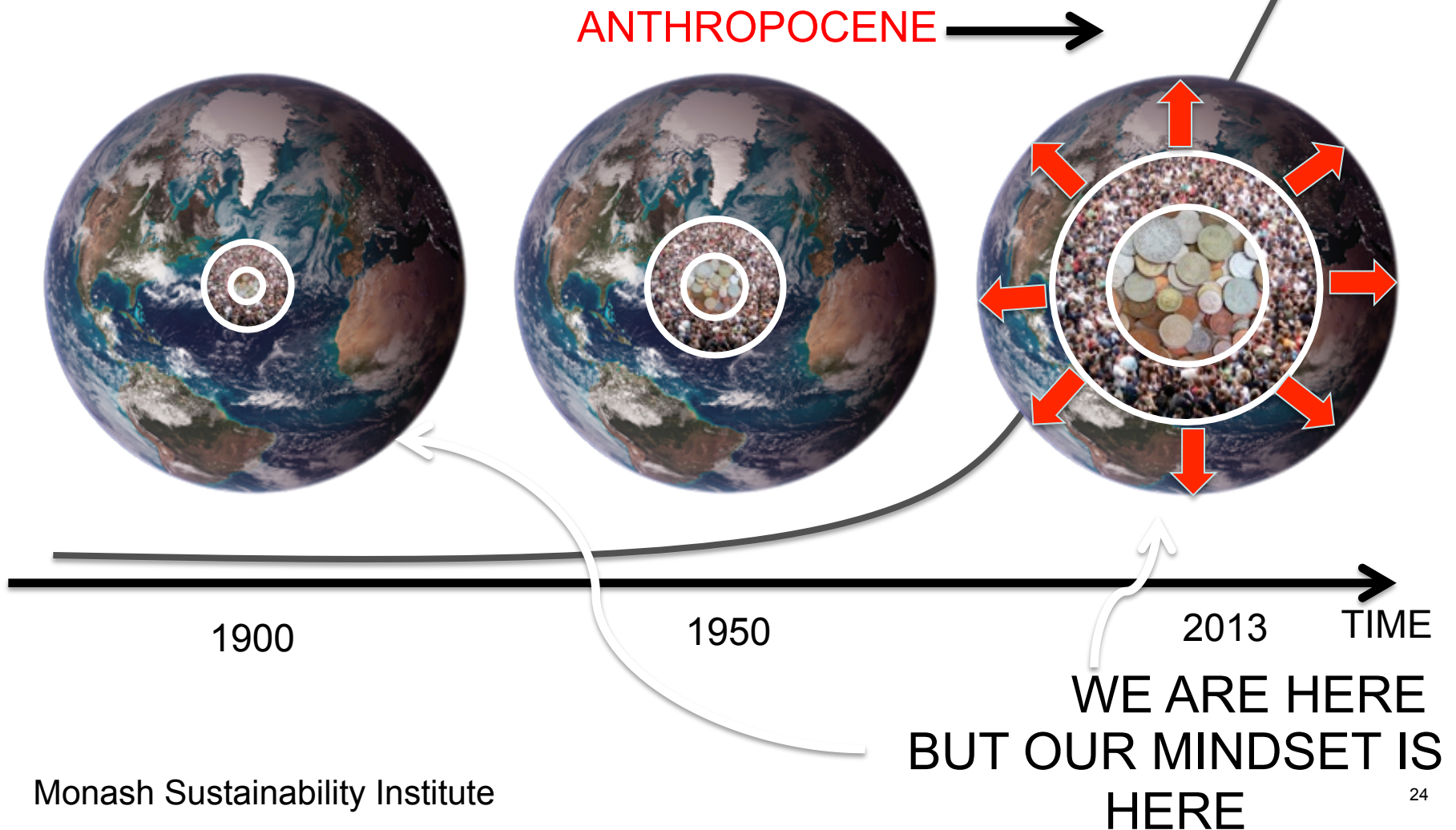


# Models of Sustainability





## RETHINKING SUSTAINABLE DEVELOPMENT IN THE ANTHROPOCENE



## **Rio+20 Future We Want - Outcome document**

We underscore that the Millennium Development Goals are a useful tool in focusing achievement of specific development gains as part of a broad development vision and framework for the development activities of the United Nations, for national priority-setting and for mobilization of stakeholders and resources towards common goals. We therefore remain firmly committed to their full and timely achievement.

We further recognize the importance and utility of a set of sustainable development goals.....The goals should address and incorporate in a balanced way all three dimensions of sustainable development and their interlinkages. They should be coherent with and integrated into the United Nations development agenda beyond 2015....The development of these goals should not divert focus or effort from the achievement of the Millennium Development Goals. We also underscore that sustainable development goals should be action oriented, concise and easy to communicate, limited in number, aspirational, global in nature and universally applicable to all countries while taking into account different national realities, capacities and levels of development and respecting national policies and priorities.



# Cost of Attaining each Millennium Development Goal

## Millennium Development Goals



**2015**

**\$40-60 billion (\$40-60 000 000 000)**



# Global Sustainability Objectives

- Maintain a stable climate system limiting global temperature increases to no more than 2 C
- Reduce the rate of global biodiversity loss
- Safeguard ecosystem services from critical biomes
- Maintain the capacity of the global hydrological cycle to provide freshwater to sustain the resilience of ecosystems
- Maintain well-functioning nitrogen and phosphorous cycles
- Maintain clean air for health and regional environments
- Sustainable and precautionary use of new entities (e.g. chemical pollutants) and abiotic natural resources such as minerals and metals

MDGs + GSOs = SDGs

## SDGs (1)

### Thriving Lives and Livelihoods

- End poverty and improve well-being through access to education, employment and information, better health and housing, and reduced inequality, whilst moving towards sustainable consumption and production

### Sustainable Food Security

- End hunger and achieve long-term food security, including better nutrition, based on sustainable agriculture and fisheries production, distribution and consumption systems.

### Sustainable Water Security

- Achieve universal access to clean water and basic sanitation, and ensure efficient allocation through integrated water resource management.

## SDGs (2)

### Universal clean energy

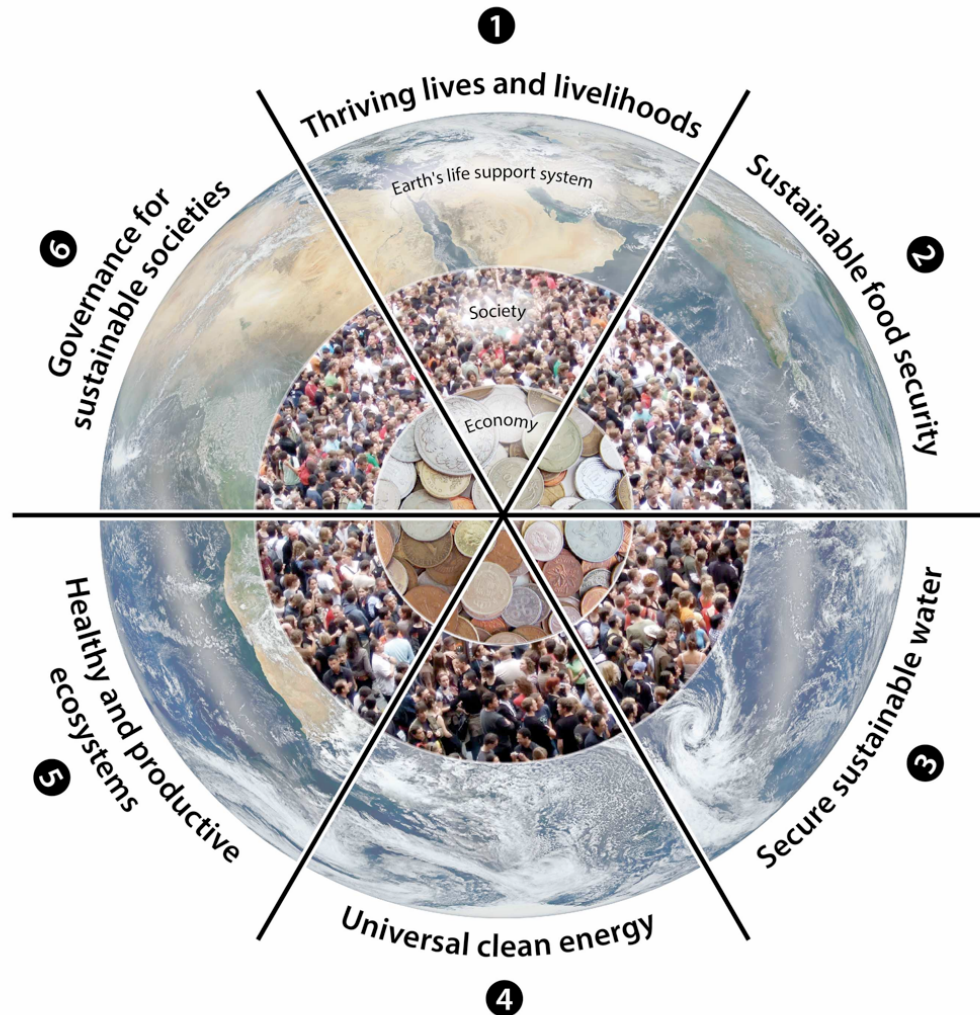
- Improve universal, affordable access to clean energy that minimizes local pollution and health impacts as well as reducing global warming.

### Healthy and productive ecosystems

- Improve the status of biodiversity and sustain ecosystem services through better valuation, measurement, conservation and restoration.

### Governance for sustainable societies

- Transform governance and institutions at all levels to address the previous five SDGs.





MDG's	Griggs et al	SDSN	HLP
Eradicate extreme poverty and hunger	Thriving lives and livelihoods. End poverty and improve wellbeing	End extreme poverty including hunger	End poverty
Achieve universal primary education	Sustainable food security	Achieve development within planetary boundaries	Provide quality education & lifelong learning
Promote gender equality and empower women	Sustainable water security	Ensure effective learning for all children and youth for life and livelihood	Empower girls and women and achieve gender equality
Reduce child mortality	Universal clean energy that mitigates global warming	Achieve gender equality, social inclusion, and human rights	Ensure healthy lives
Improve maternal health	Healthy and productive ecosystems	Achieve health and wellbeing at all ages	Ensure food security and good nutrition
Combat HIV/AIDs malaria and other diseases	Governance for sustainable societies	Improve agriculture systems and raise rural prosperity	Achieve universal access to water and sanitation
Ensure environmental sustainability		Empower inclusive, productive and resilient cities	Secure sustainable energy
Global partnership for development		Curb human induced climate change and ensure clean energy for all	Create jobs, sustainable livelihoods and equitable growth
		Secure ecosystem services, biodiversity etc	Ensure good governance and effective institutions
		Transform governance for sustainable development	Manage natural resource assets sustainably
			Create and global enabling framework and catalyse long term finance
			Ensure stable and peaceful societies



# Energy requirements

## Universal clean energy

- Improve universal, affordable access to clean energy that minimizes local pollution and health impacts as well as reducing global warming.

According to the International Energy Agency's World Energy Outlook 2012, 1.3 billion people in the world do not have access to electricity or remain un-electrified due to poor quality of the grid. Out of them, 84% live in rural areas and 95% of them live in sub-Saharan Africa or developing Asia

According to the Energy Access Practitioner Network initiated by the United Nations, 60% of the additional generation capacity needed to reach universal access to electricity by 2030, will be off-grid.

The United Nations launched Sustainable Energy for All (SE4ALL) in 2011. The Secretary-General's High-Level Group on Sustainable Energy for All has created a Global Action Agenda

The Sustainable Energy for All initiative is intended to attract global attention and public and private commitments to meeting three objectives by 2030:

- Ensure universal access to modern energy services
- Double the rate of improvement in energy efficiency
- Double the share of renewable energy in the global energy mix

These areas include seven sectors: 1) modern cooking appliances and fuels; 2) distributed electricity solutions; 3) grid infrastructure and supply efficiency; 4) large-scale renewable power; 5) industrial and agricultural processes; 6) transportation; and 7) buildings and appliances. It also includes four enabling action areas: 1) energy planning and policies; 2) business model and technology innovation; 3) finance and risk management; and 4) capacity building and knowledge sharing.

# Drop in Centre for Remote Communities

## **The need:**

To simultaneously address the multiple development issues facing remote communities, e.g., energy, health, education, information, expertise, social services.

## **The solution:**

Develop a multi-purpose centre for remote communities consisting of a set of modular, self contained units that when combined will enable the remote delivery of a wide range of services, e.g., health services via telemedicine, education via distance learning.

## **The challenge:**

How can the units be made small enough, light enough and robust enough to be transported into remote communities. How can the technology be made simple and unbreakable enough to be used by largely unskilled personnel. How will the units be powered how will the units communicate back to the host centre(s).