Sustainability Science meets Society

25 years of challenges for sustainability research. What's next?

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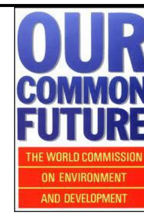
Outline

- Eight "Strategic Imperatives" from the Brundtland Report (1987): How they have evolved
- Sustainability science meets society
- Focus on certain points: evolution of environmental challenges, risks, public opinion, climate change and controversies, importance of the economy
- Work on sustainable development

Brundtland Report (1987): ***Strategic Imperatives***



① *reviving growth;*

② *changing the quality of growth;*

③ *meeting essential needs for jobs, food, energy, water, and sanitation;*

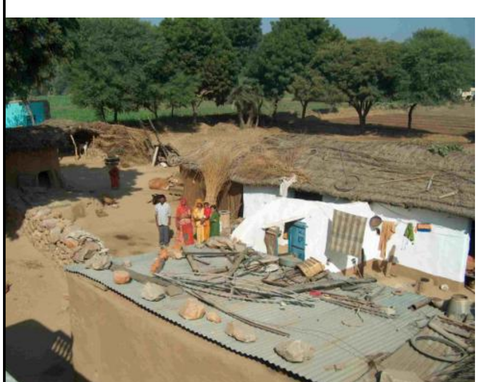
④ *ensuring a sustainable level of population;*

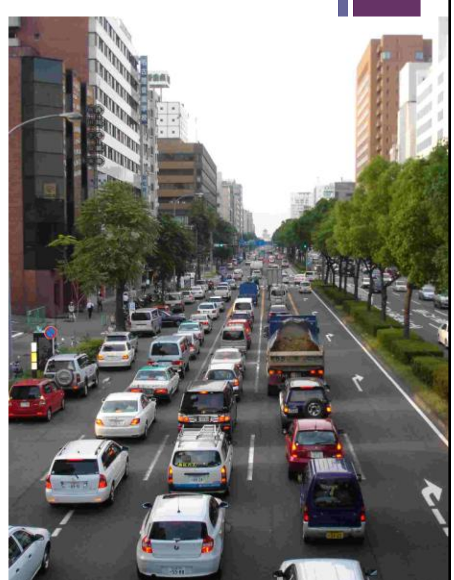
⑤ *conserving and enhancing the resource base;*

⑥ *reorienting technology and managing risk;*

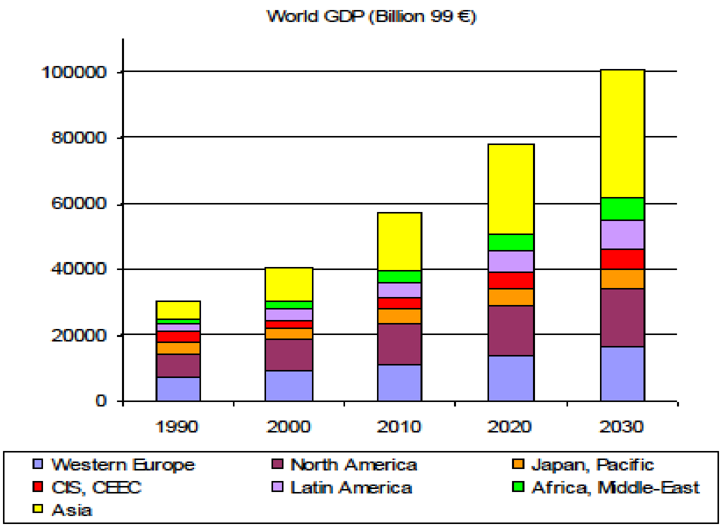
⑦ *merging environment and economics in decision making.*

"The Earth is one but the world is not"





① *reviving growth*



EC, DG RTD

② *changing the quality of growth*
Growth: 2 conditions

Share its benefits (with overriding priority to essential needs)

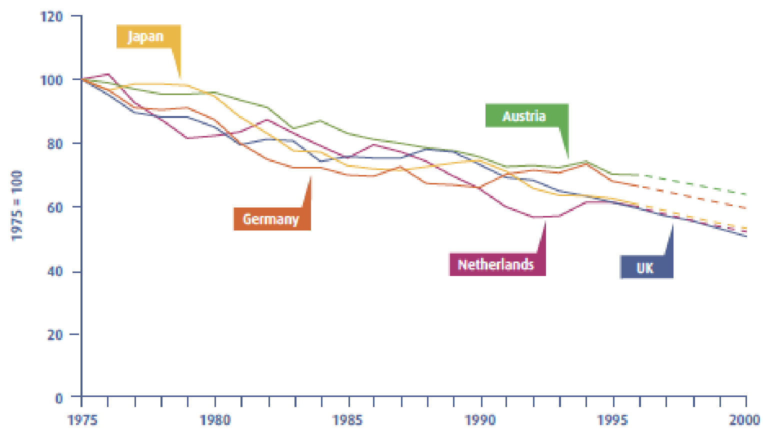
Make it ecologically sustainable

- Decoupling economic growth from ecological impacts and resource use
- Engineering: resource efficiency, substitution
- Regulation: political, economical

+ The bright side of decoupling

Figure 12 **Relative Decoupling in OECD countries 1975–2000**[7]

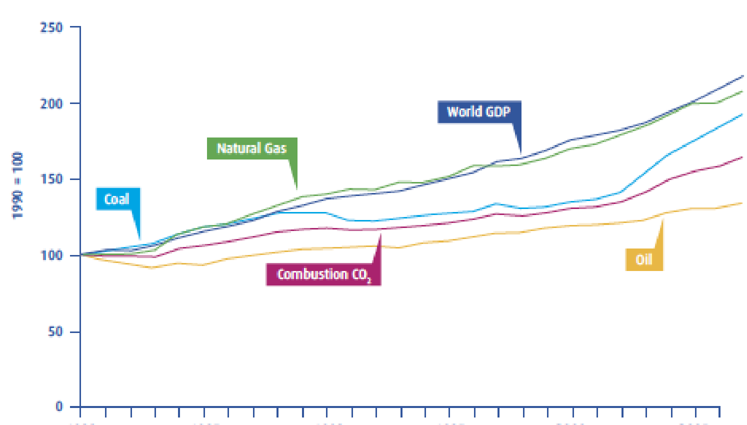
Material intensity of the GDP



UK-SDC 2009

+ The dark side

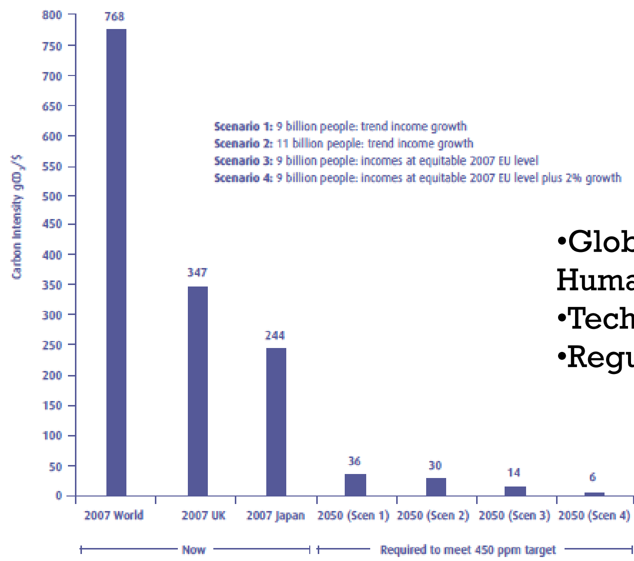
Figure 14 **Trends in Fossil Fuel Consumption and Related CO_2: 1980–2007**[9]



UK-SDC 2009

+ The impossible side

Figure 17 **Carbon Intensities Now and Required to Meet 450 ppm Target**[25]

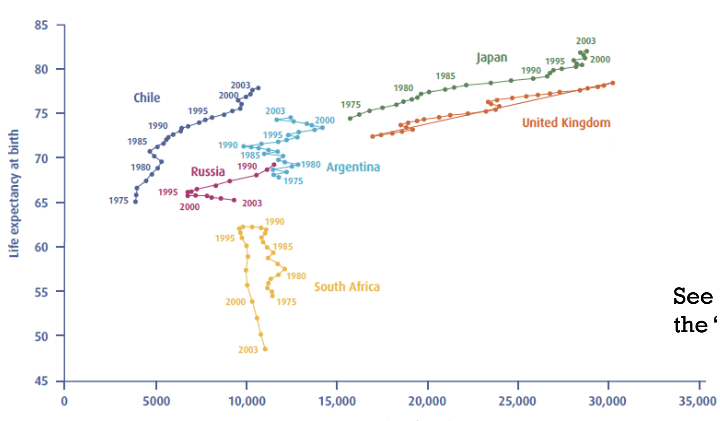


- Global evolution: Human and Nature
- Technologies
- Regulation

UK-SDC 2009

+ *③ meeting essential needs*

Figure 11 **Changes in average life-expectancy and income over time**[21]



See also the "MDG's"

UK-SDC 2009

④ ensuring a sustainable level of population

Global growth rate is decreasing. Stabilisation by 2050 ?

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⑤ *conserving and enhancing the resource base*

- In the OECD: progress on point sources (ex. power plants), progress with end-of-pipe, and partially with greener technologies. "Ecological Modernisation". Green trends in fashion, business, investment
- Everywhere: increase in massive fluxes of resource consumption (partially delocalised), and emissions
- Climate change came to the forefront and will mix with other environmental and socioeconomic problems

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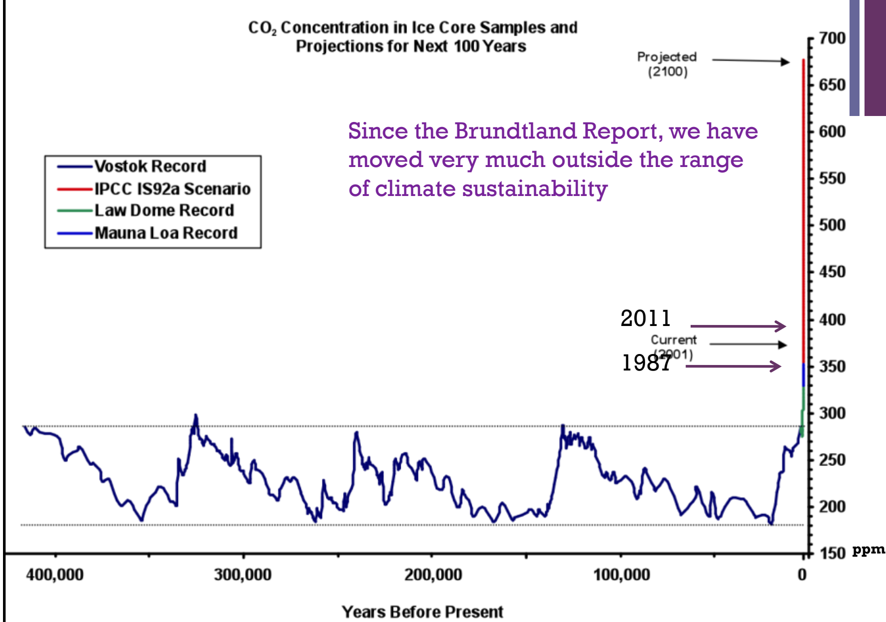

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- Biodiversity: The global Living Planet Index declined by about 30% between 1970 and 2007 (60% for tropical species)(LPI: population trends of over 2500 vertebrate species) (WWF 2010)

- Over the past 50 years, humans have changed ecosystems more rapidly and extensively than in any comparable period of time in human history (…) The challenge of reversing the degradation of ecosystems while meeting increasing demands for their services can be partially met under some scenarios that the MA has considered but these involve significant changes in policies, institutions and practices, *that are not currently under way* (Millennium Ecosystem Assessment 2005. Italics added)

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Sustainability science

- **driven by societal problems,**
- **addressing coupled social–ecological systems,**
- **addressing complexity, uncertainty, cross scale (micro/macro) and multilevel interactions (local, regional, national and global),**
- **acknowledging change, evolution and dynamics (long term perspectives),**
- **providing prognosis, (re-)contextualizing research and results,**
- **addressing normativity (acknowledging and explicating values),**
- **engaging in a dialogue with practitioners**
- **implementing participation (participatory methods, extended peer review)**
- **consciously defining and enacting its societal role by staying independent, communicating results to society and formulating policy advise.**

Kastenhofer et al. 2011

+ Basic/Applied/Target-oriented Research

Still a (growing ?) domination of the first two columns

Fuelled in the academic realms by quantiative assessments of careers

Basic research	Applied research	Implementation- and target-oriented research
Classical sectoral disciplines	Engineering sciences	Sustainability science
Emphasis on expanding knowledge	Product orientation	Goal orientation
Problem definitions and discoveries	Technical concepts, products, processes	Holistic solutions and strategies
Mono-disciplinary research	Interdisciplinarity	Inter-, multi- and transdisciplinarity
Top-down methods theory – practice	Top-down and/or bottom-up	Bottom-up and top-down practical research
Teams internal to science organisations	Cooperation with industry	Stakeholder involvement
Education of next-generation scientists	Prototype development	Models and instruments to support decision-making processes

Moll & Zander 2006

+ Science and sustainable development

- Science for sustainable development: a political objective, dependant on social values
- Contributions from many sources of knowledge, including disciplinary
- The conditions by which these contributions might sustain sustainability pertain not only to the change of scientific practice or direct interactions with stakeholders.
- They are conditioned by the functioning of the economy and society itself: competition, globalisation, (short term) profitability, …
- "Society" is fragmented… and not particularly led by science
- 2 examples towards sust. science in the last decades : major panels, precautionary principle

+ Sust. Science 1: Major panels

Major collective research taking into account some of these characteristics

- Millennium Ecosystem Assessment (2005)

Addressing complex, integrated socio-environmental problems

Addressing uncertainty

Long-term integrated scenarios

Policy questions, independence

- Intergovernmental Panel on Climate Change (1988 -)

Interdisciplinary, long term, response to policy questions

+ Sust. Science 2: Precaut. principle

⑦ *reorienting technology and managing risk*

- Precautionary principle in risk management
- See ”Late lessons of early warnings”, a report from the EEA (2002), examining a series of problems where risks have not been adequately managed. Ex. CFC's, asbestos. ”In both cases we were taken by surprise: the hazards of these beneficial technologies were not ‘known about' until it was too late to stop irreversible impacts”. A dozen of cases.
- “Often experts involved in technological developments — and officials in government — need better sensitivity to (often underarticulated) public values, priorities and concerns, at a variety of levels, from local to international. This can be achieved without the need for what would be paralysing indiscriminate full public participation in every single decision.”

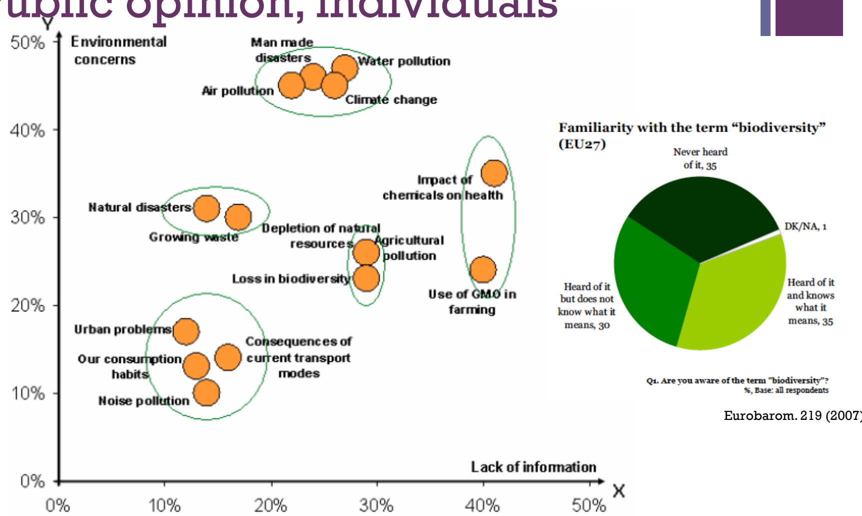
+ "The EEA Twelve Late Lessons"

A. "Identify/Clarify the Framing and Assumptions"	Information"

1. Manage "**uncertainty**" and "ignorance" as well as "risk".
2. Identify and reduce "blind spots" in the sciences used.
3. Assess and account for all pros and cons of action/inaction.
4. Analyse and evaluate alternative options to the agent/activity under scrutiny.
5. Take account of **stakeholder values**.
6. Avoid "paralysis by analysis" by acting to reduce hazards via the precautionary principle.
7. Identify and reduce **interdisciplinary** obstacles to learning.
8. Identify and reduce institutional obstacles to learning.
9. **Use "lay" and local as well as specialist knowledge**.
10. Identify and anticipate "**real world**" conditions.
11. Ensure regulatory and informational **independence**.
12. Use more **long-term (i.e. decades)** monitoring and research.

Gee 2009

+ *Sustainability science meets society:* Public opinion, individuals

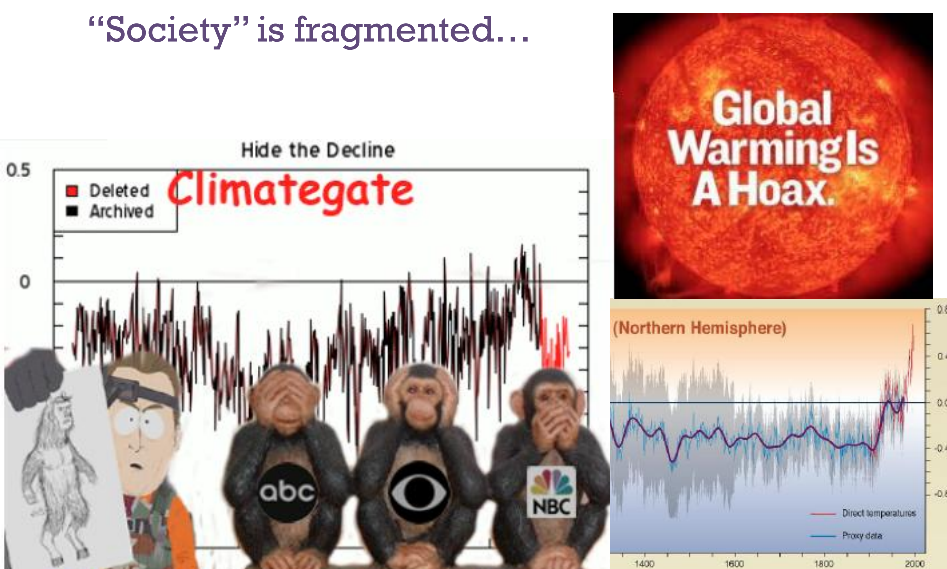


Eurobarom. 219 (2007)

Eurobarom. 217 (2005)

+ I want science to help me calculate *my* impacts

"Society" is fragmented…



Difficult meetings between science and society

- A sign of worry
- Scientific results are unable as such to lead sociopolitical action
- Strategies to be analysed, fragmented medias
- Scientists to be aware of the vulnerability of scientific results
- The importance of trust in institutions
- A positive side : drives scientific literacy, through controversies (instead of indifference)

Conclusions

⑧ merging environment and economics in decision making

- "The Forgotten Imperative" (Mac Neill 2006)
- + Merging social values and economics ("development", "prosperity")
- (Short term) competition remains a strong determinant in research innovation
- Decisions are based on affordability, not necessarily prioritizing essential needs (vs. Brundtland Report)
- Technological innovation is more encouraged than social innovation.
- Lock-in, inertia: how to hasten possible innovation if actual market incentives are insufficient (cf. CO_2 emission in the car industry before 2008). Regulation? Prices ?
- What is the power of public funded research to correct these trends ?
- Research on economy and society (and the environment). Research on transitions…

Thank you for your attention !