

THE ENVIRONMENT

A NEW FRONTIER FOR ACTUARIES

Dr. Aled Jones, Director
Global Sustainability Institute, Anglia Ruskin University
Resource and Environment Member Interest Group

Resource and Environmental Issues in the
UK Actuarial Profession



ENVIRONMENT WORKING GROUP, MAY 25TH 2012, JW MARRIOTT, LOS ANGELES



The Actuarial Profession

making financial sense of the future

International Actuarial Association, Los Angeles 2012

Dr Aled Jones



Resource & Environmental Issues in the UK Actuarial Profession

History of Resource and Environment issues in the UK Actuarial Profession

- Environmental Research Group (ERG) was set up in 2001.
- Climate change working party reported in 2007
- In 2010 the ERG UK group was renamed as the Resource and Environment Member Interest Group (REG)
- Current REG membership is around 400 actuaries, plus some experts from outside the profession.
- In 2010 and 2011, the first two literature reviews of resource and environmental issues were published.
- The limits to growth research project was commissioned in 2011.
- This year the Resource and Environment Panel was constituted.

Literature Reviews “Climate Change and Resource Depletion: The Challenges for Actuaries”

1st Review – November 2010

Broad range of climate change, environmental and resource issues covered. Sections covering impact on actuarial practice areas: ERM, pensions, investment, GI, life insurance and health

2nd Review – November 2011

17 actuaries reviewed 21 papers and reports

Continued coverage of broad environmental and resource issues, with particular focus on energy.

3rd Review – estimated completion in March 2013

Focus will be on the sustainability of the financial system

Future Development of Resource/Environment issues

The Resource & Environment Panel:

- Is a small group of senior actuaries and experts from outside the profession. Chaired by Peter Tompkins, president-elect Philip Scott is a member
- Will guide the development of R&E issues within the UK profession, including developing a budgeted plan
- Responds to both risks and opportunities for actuaries

Scale of sustainability challenges?

Planet Under Pressure Conference, March 2012

Planet Under Pressure 2012 was the largest scientific conference leading up to the United Nations Conference on Sustainable Development (Rio+20), with over 3000 delegates.



State of the Planet Declaration:

- “1. Research now demonstrates that the continued functioning of the Earth system as it has supported the well-being of human civilization in recent centuries is at risk...”

Limits to Growth Research Project

We face many challenges in the 21st century. For example:

- Climate change
- Other environmental problems e.g. biodiversity loss
- Oil depletion and other resource depletion

All of these problems are driven by increasing human consumption, caused by population and economic growth.

- UK Profession has commissioned a research project to determine whether there are limits to growth, and if there are, what might be the impact on financial markets and actuarial advice.
- Limits to growth research project is due to be completed towards the end of 2012, with launch event in January 2013.

Limits to Growth Research Project

The Kaya Identity

$$I = P \times A \times T$$

I = Impact

P = Population

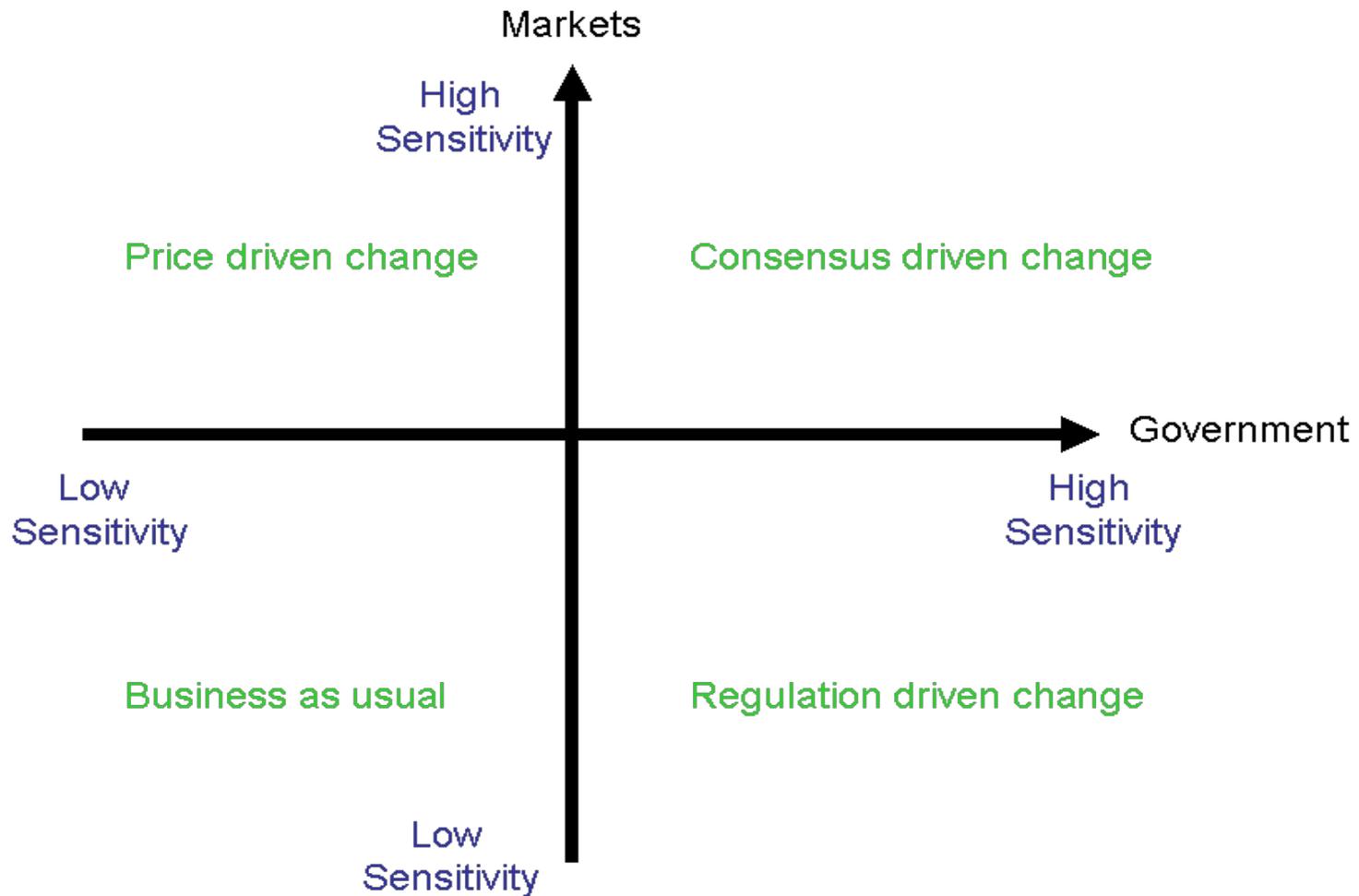
A = Affluence (consumption per capita)

T = Technology (environmental impact per unit of consumption)

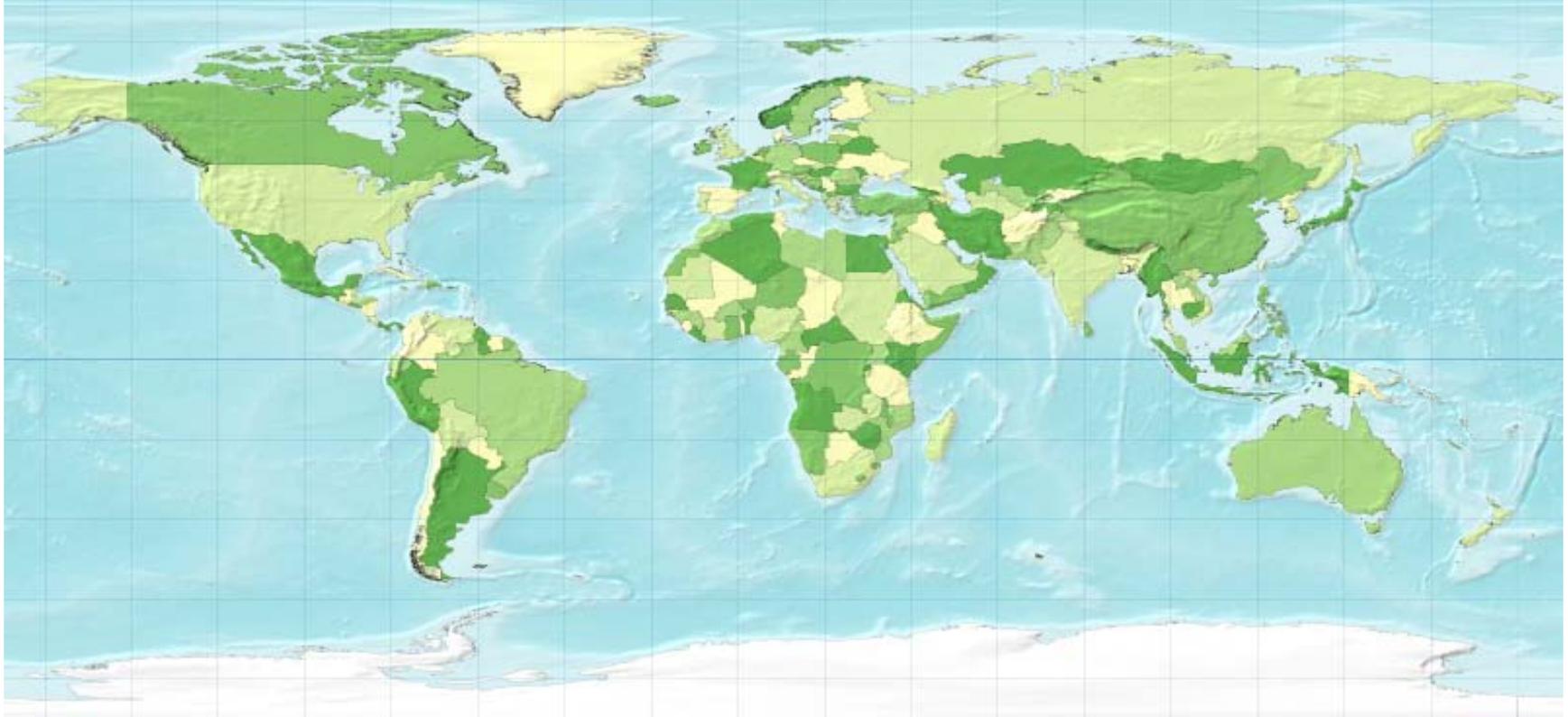
Resource Constraints

- Taking a systems view of the natural and social (human) capitals what do scarce resources potentially mean for the system flows in a global economy and in particular to financial capital?
 - Energy availability
 - Food availability
 - Water availability
 - Land availability
 - Commodity availability
 - Social mobility (including migration, equity, health and wellbeing)

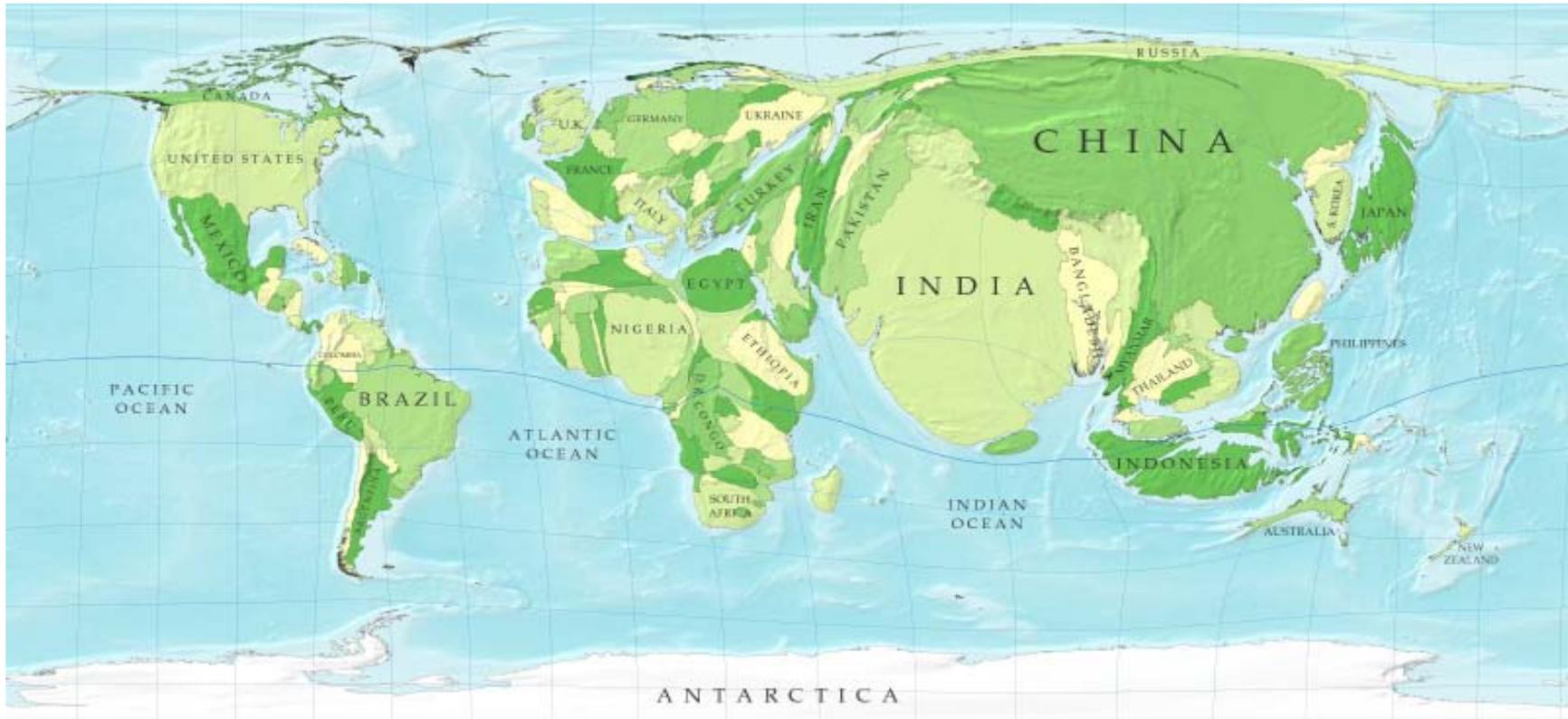
Scenarios for the future



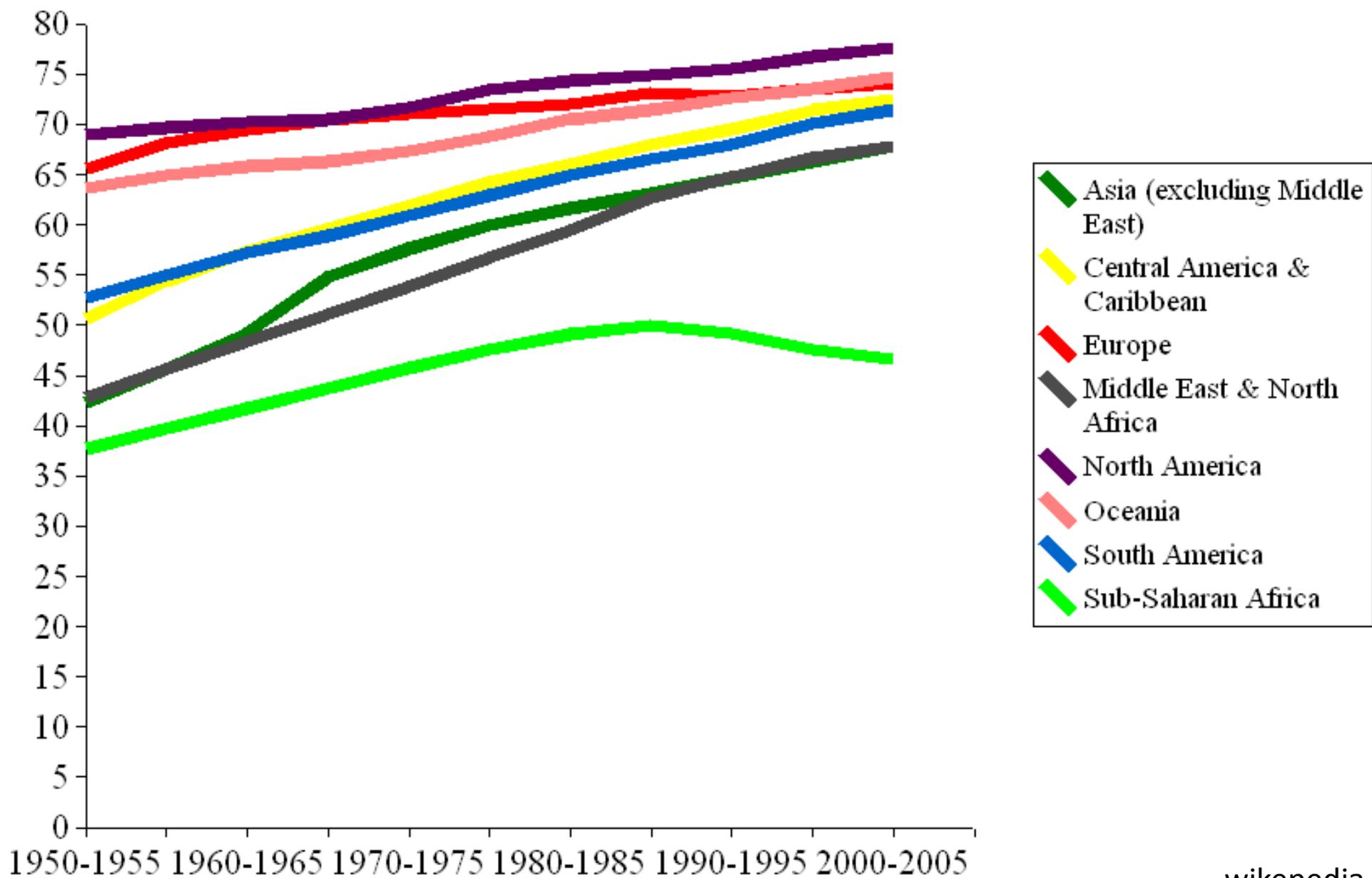
Global pressures & trends



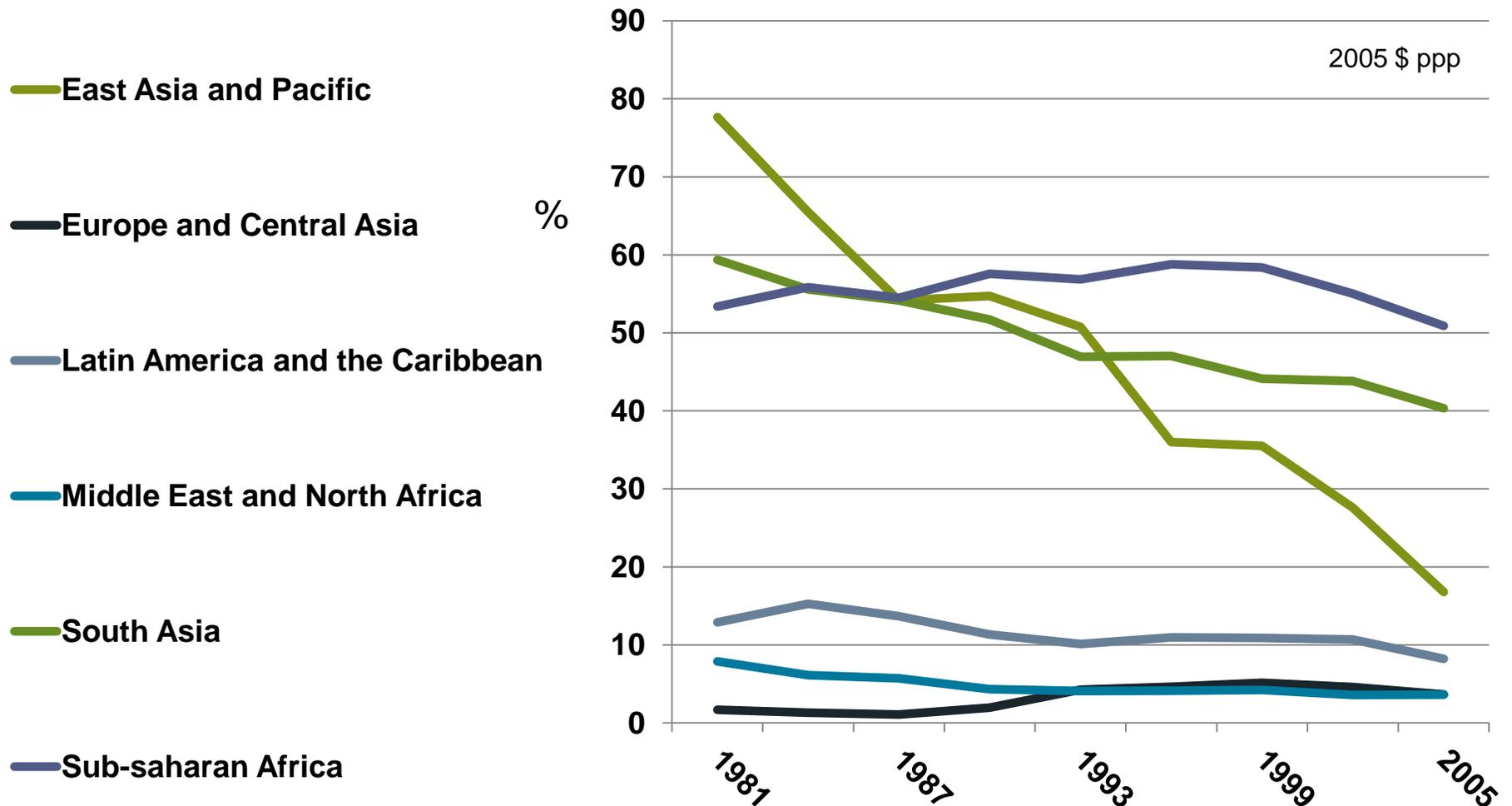
A growing world population



Life expectancy 1950-2005



Households with income less than \$1.25/day

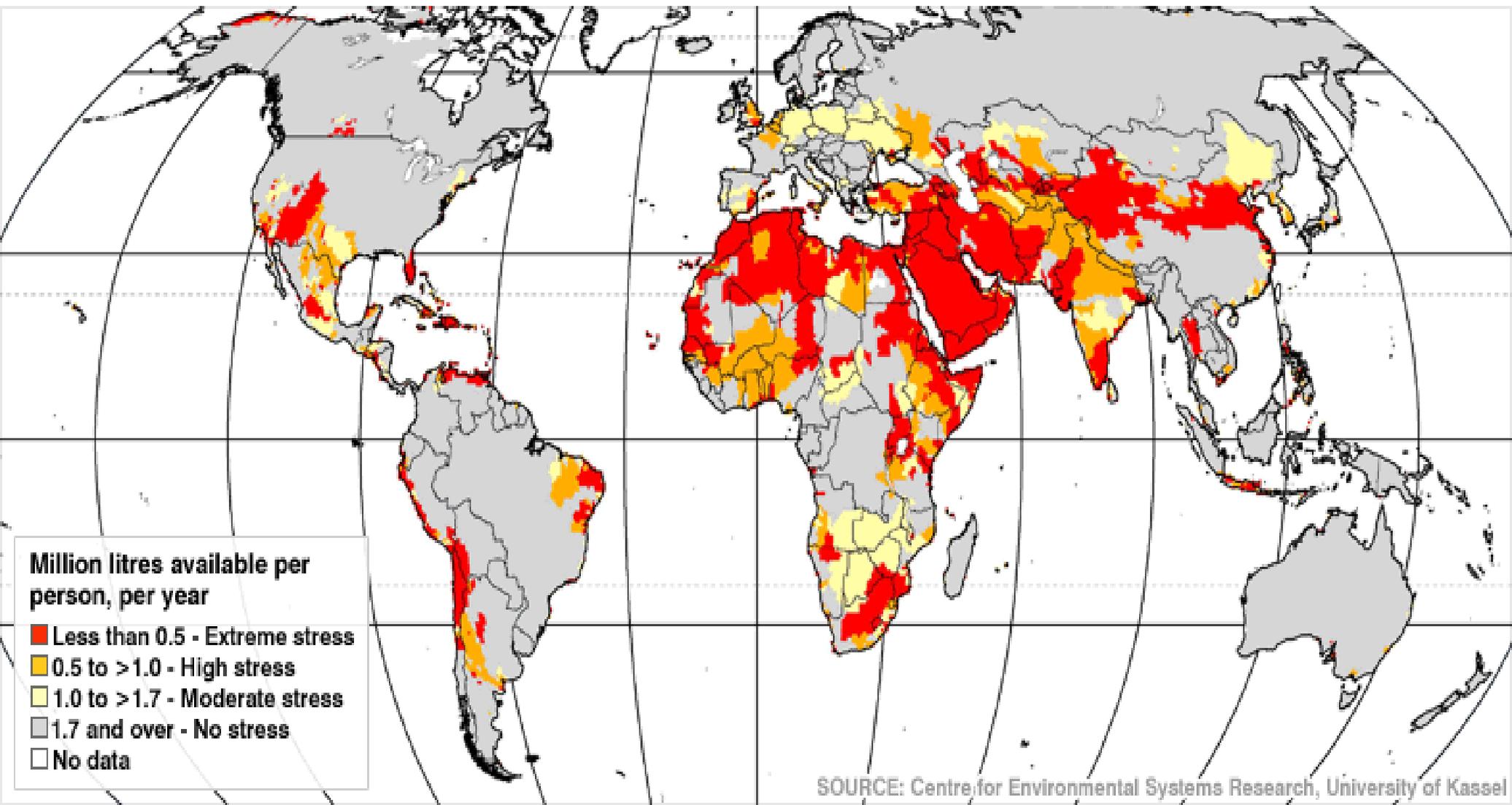


Source: World Bank PovcalNet

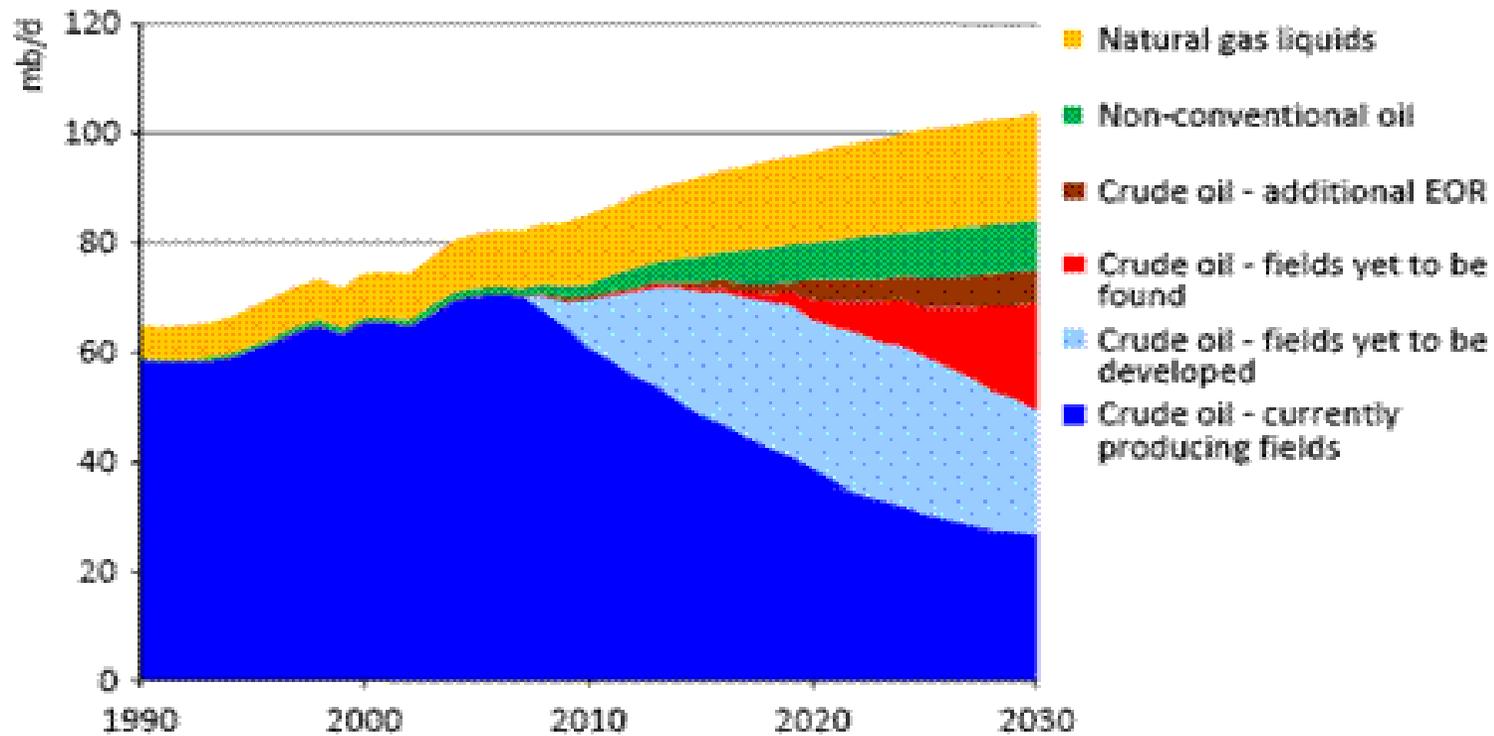
But...

Worsening per capita water availability

2050s



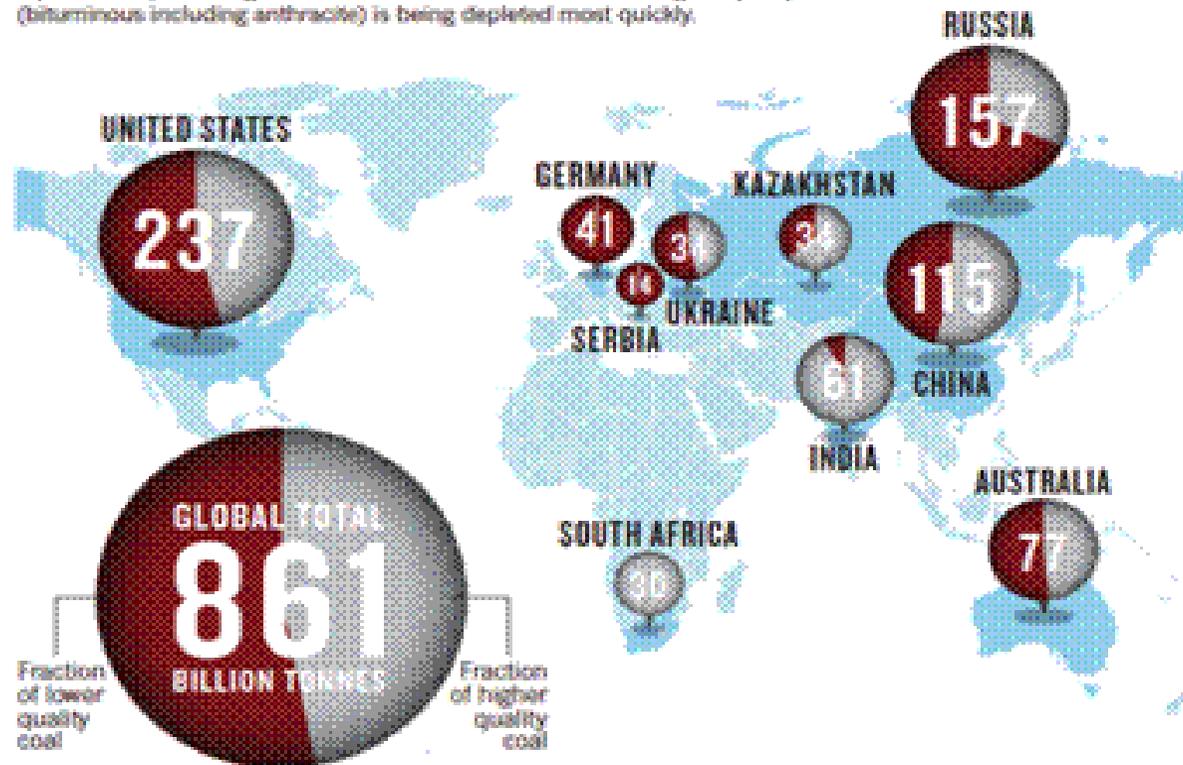
Resource limits: oil



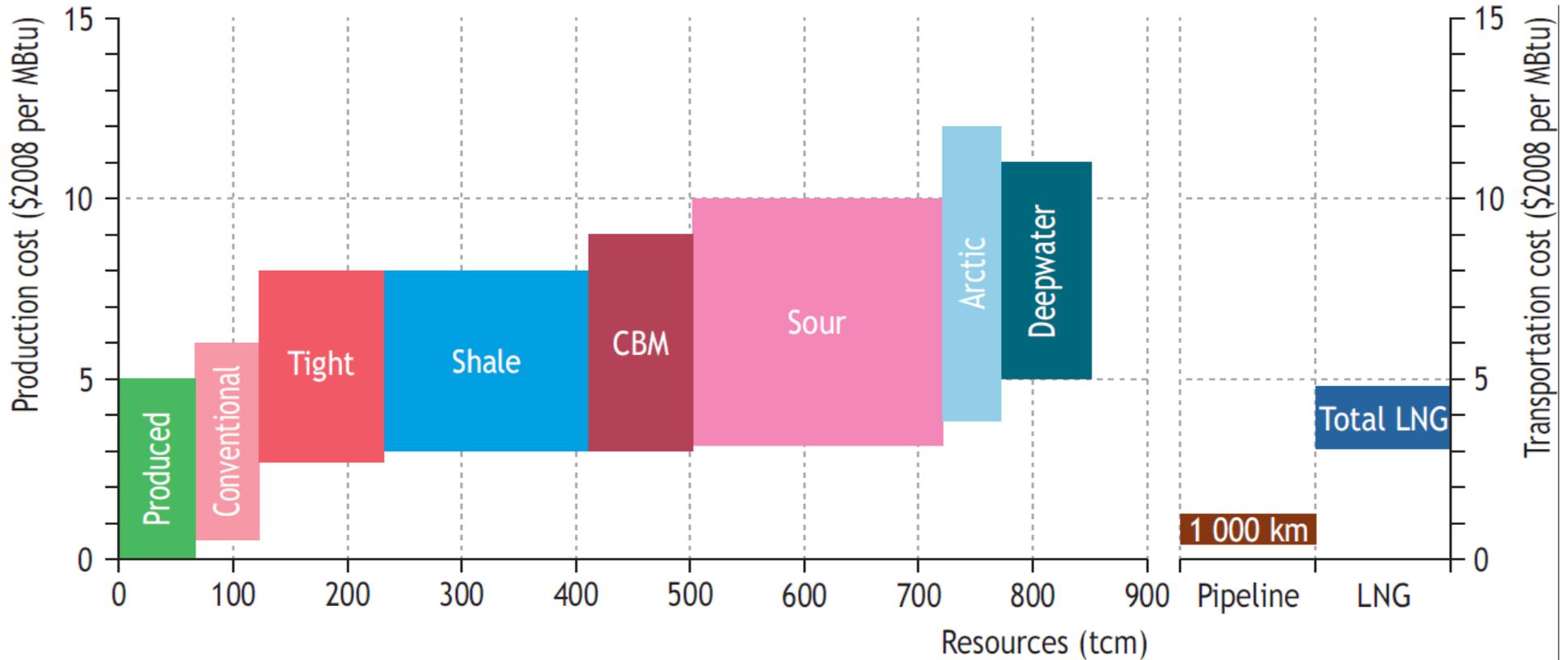
Resource limits: coal

WORLD COAL RESERVES

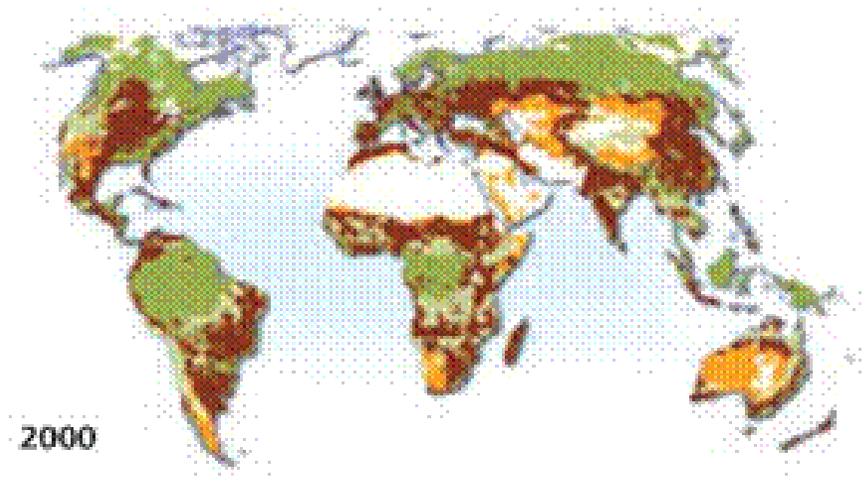
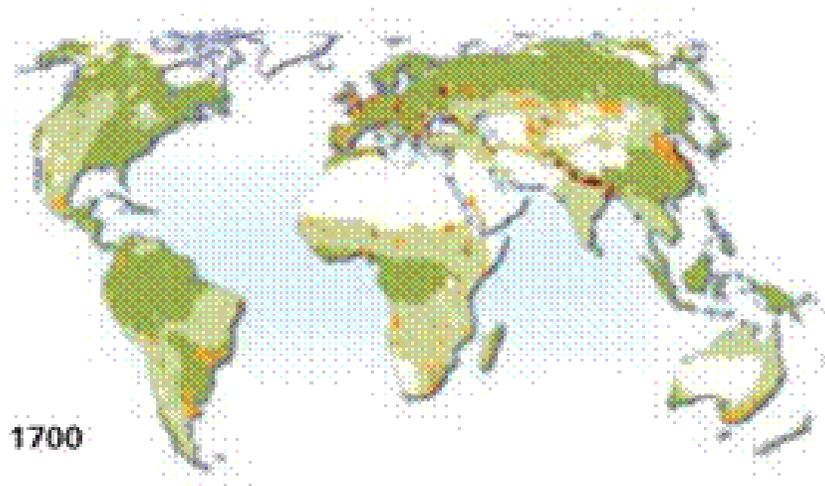
Proven recoverable coal reserves reported to the World Energy Council by the top-ten coal-producing countries at the end of 2008. Coal of higher quality (bituminous including anthracite) is being depleted most quickly.



Resource limits: gas



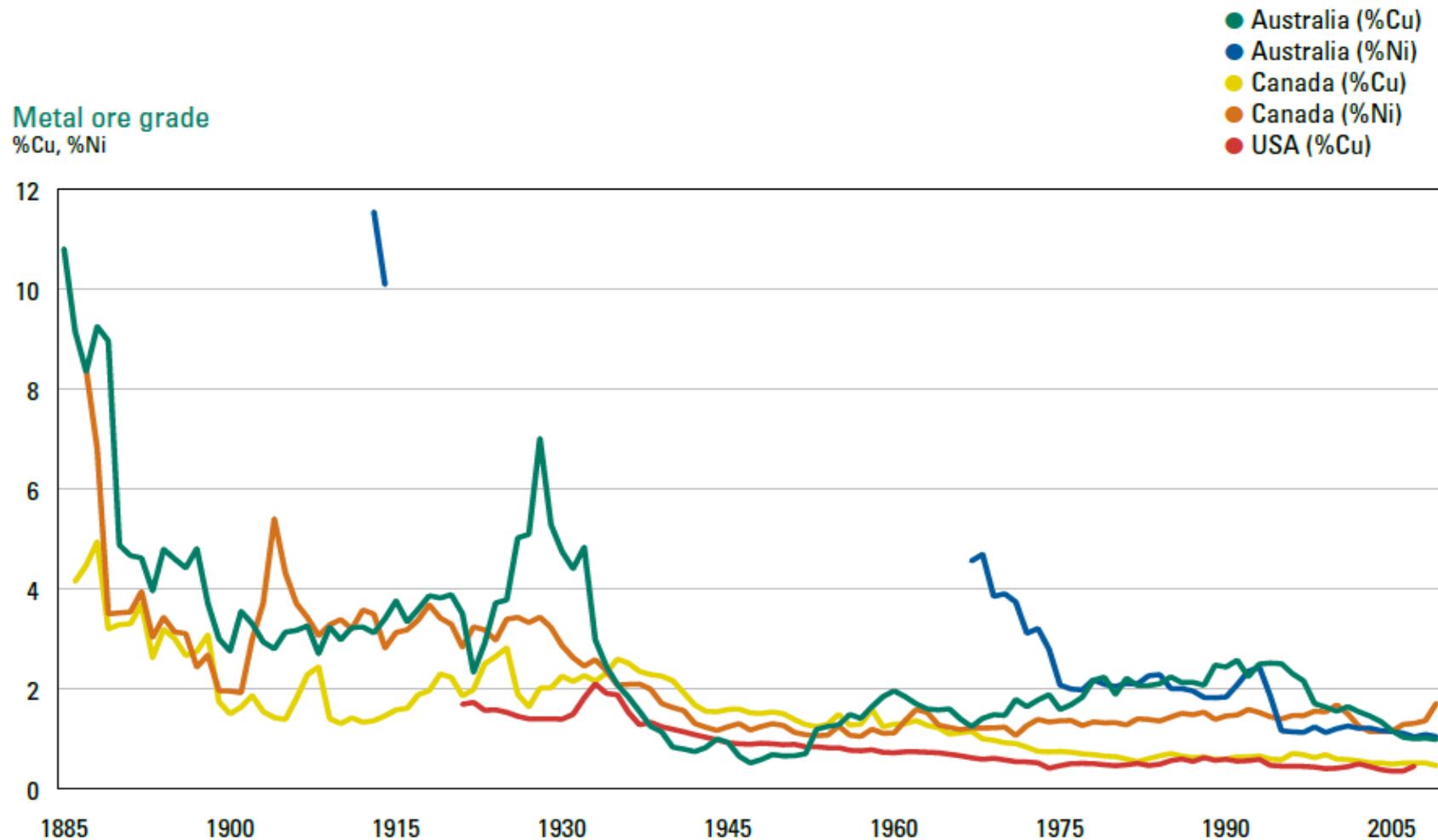
Resource limits: land



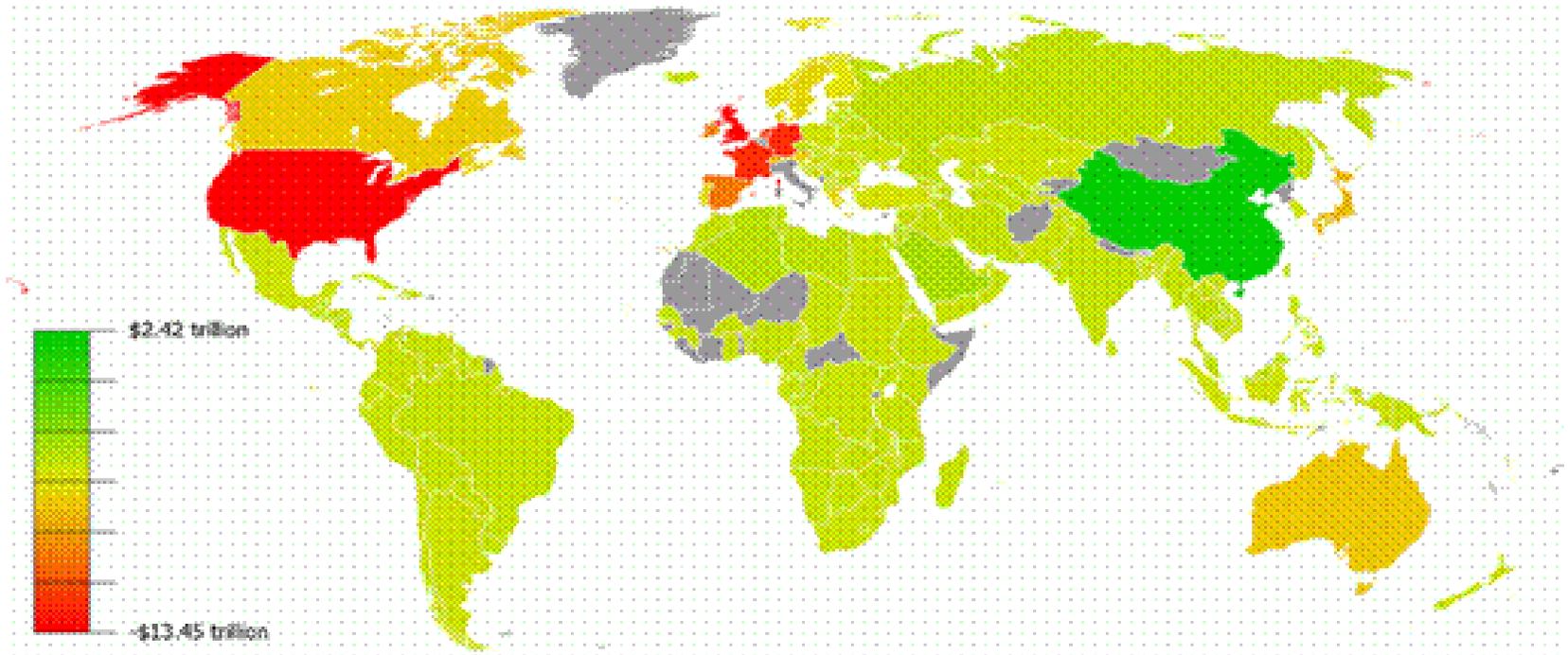
Land use and agriculture

 Agricultural land  Extensive grasslands (inc. pasture)  Regrowth after use  forests  Rangelands  Non-productive land

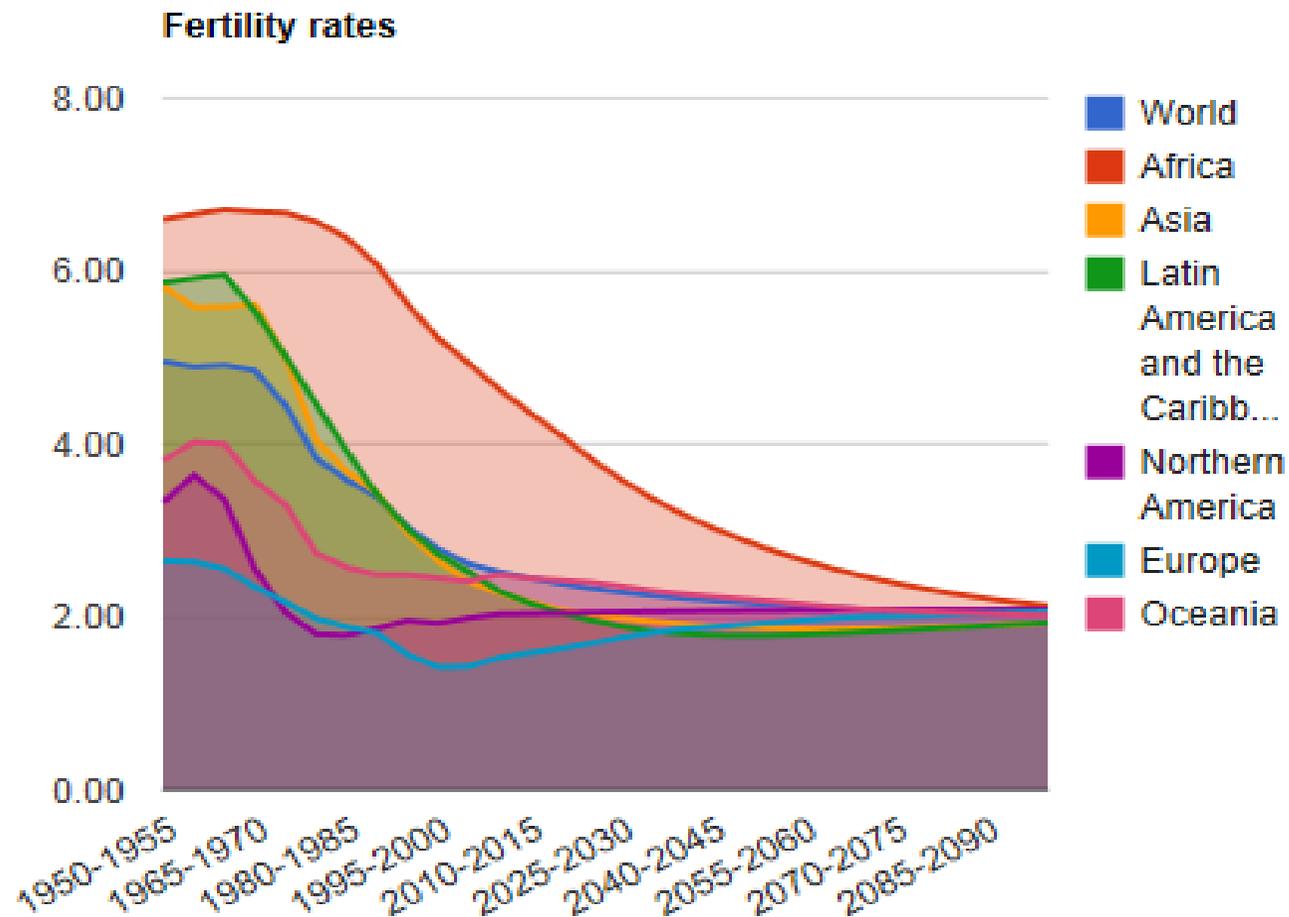
Resource limits: metals



Resource limits: capital



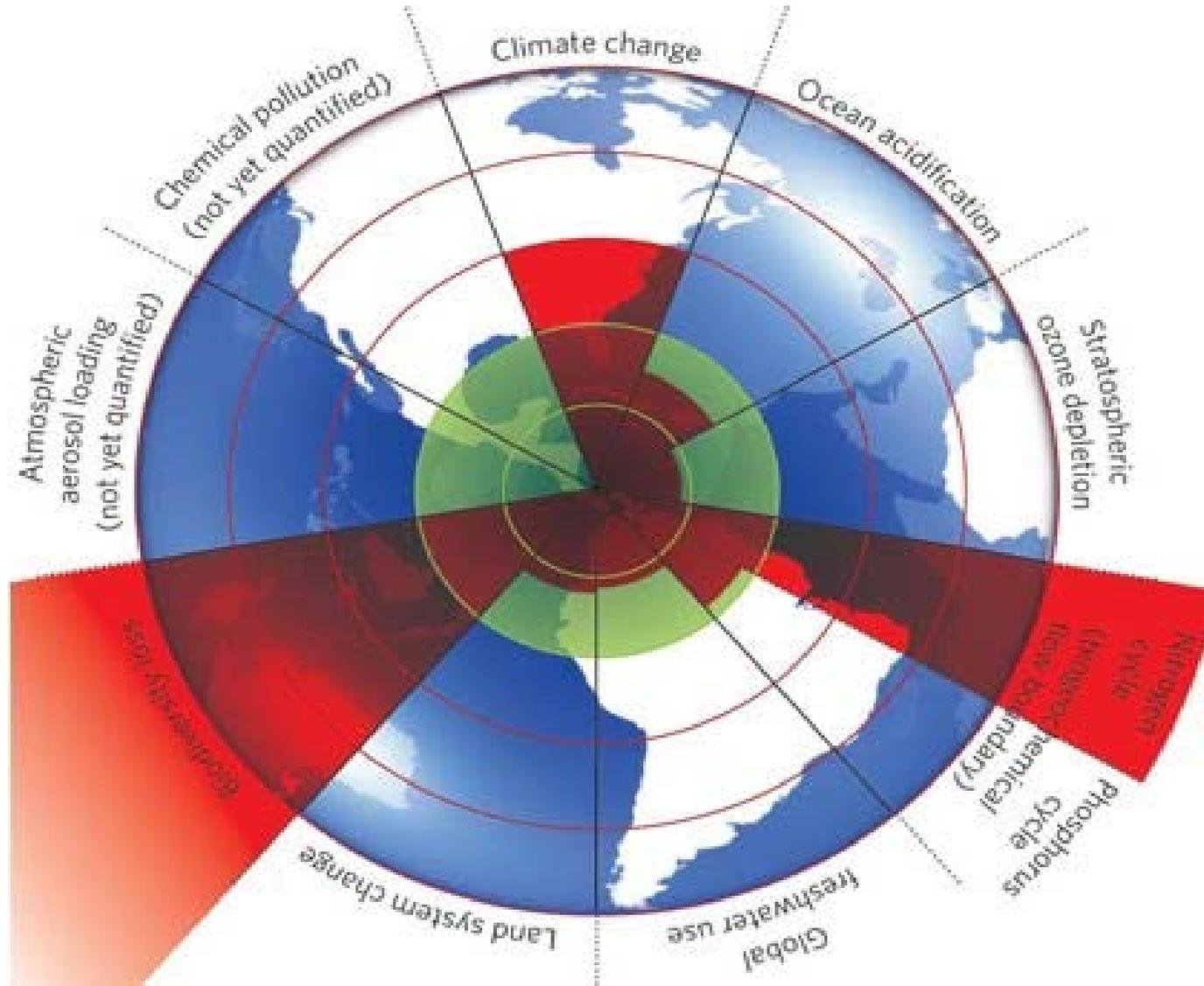
Resource limits: people



Productivity and efficiency

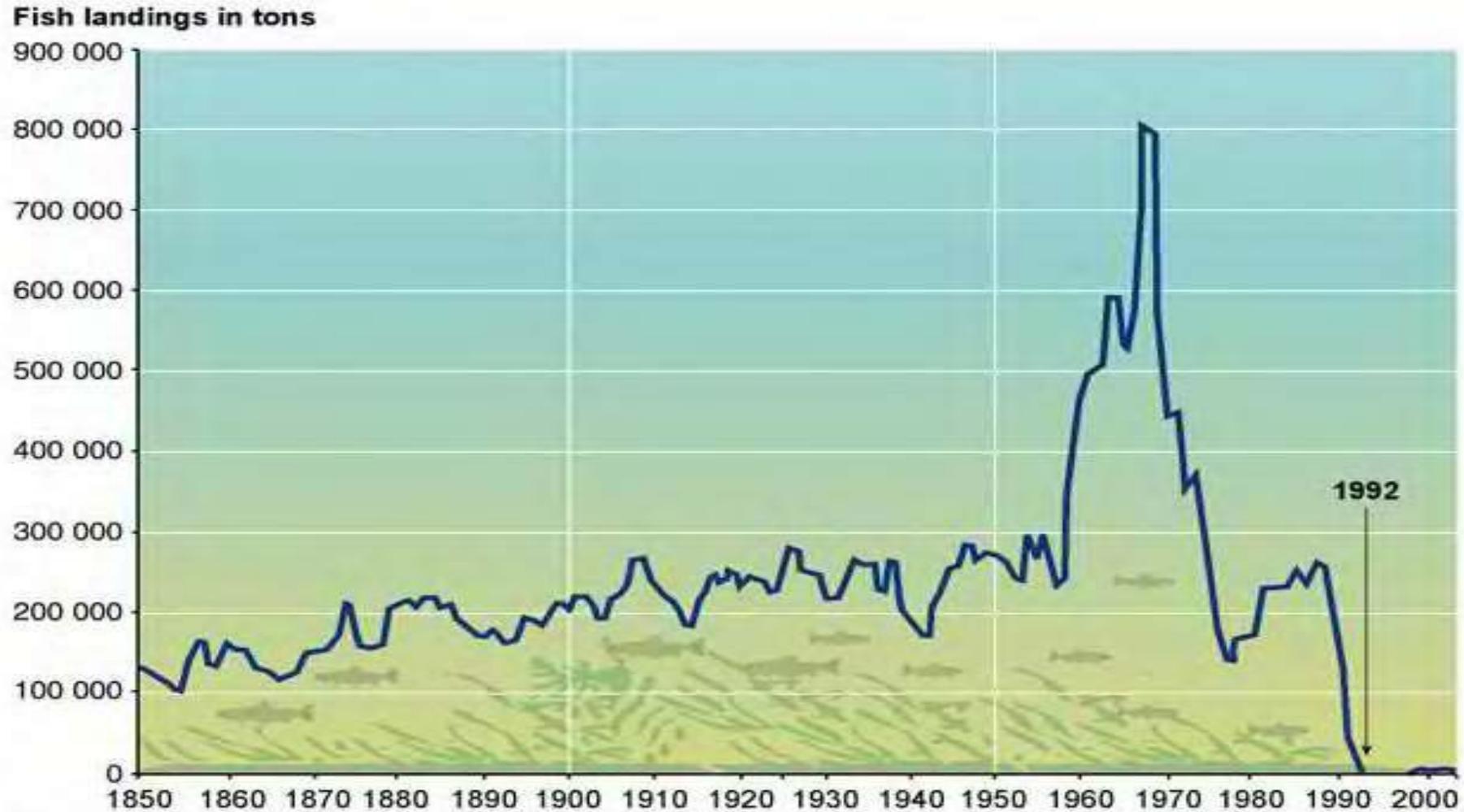
- Resource productivity grew in parallel with economic growth in the last 100 years although seems to have stagnated in the last 10 (leading to more volatile prices)
- McKinsey estimate \$2.9 trillion resource productivity potential by 2030 which will currently not be captured under business as usual
- However, even this resource productivity will not meet the resource constraint challenge

Thresholds



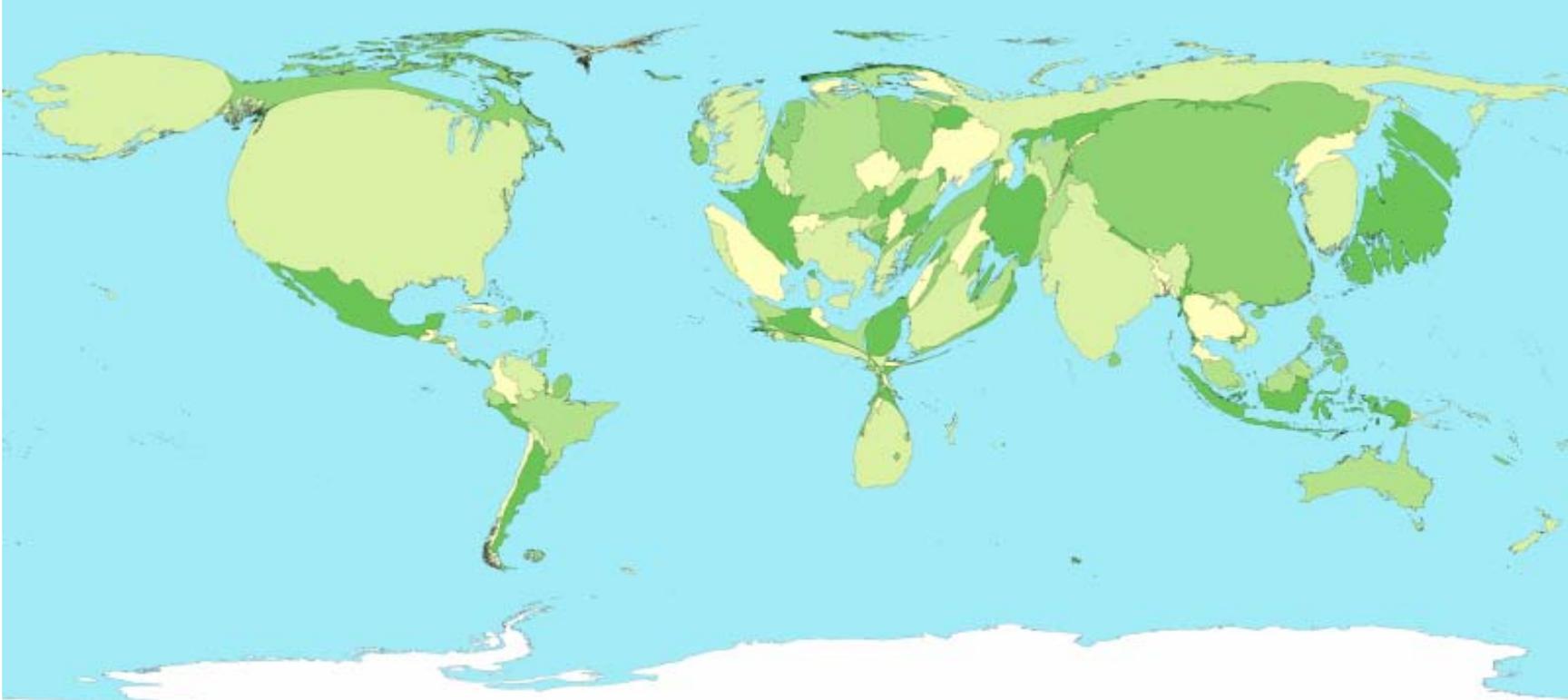
Thresholds

Collapse of Atlantic Cod Stocks Off the East Coast of Newfoundland in 1992

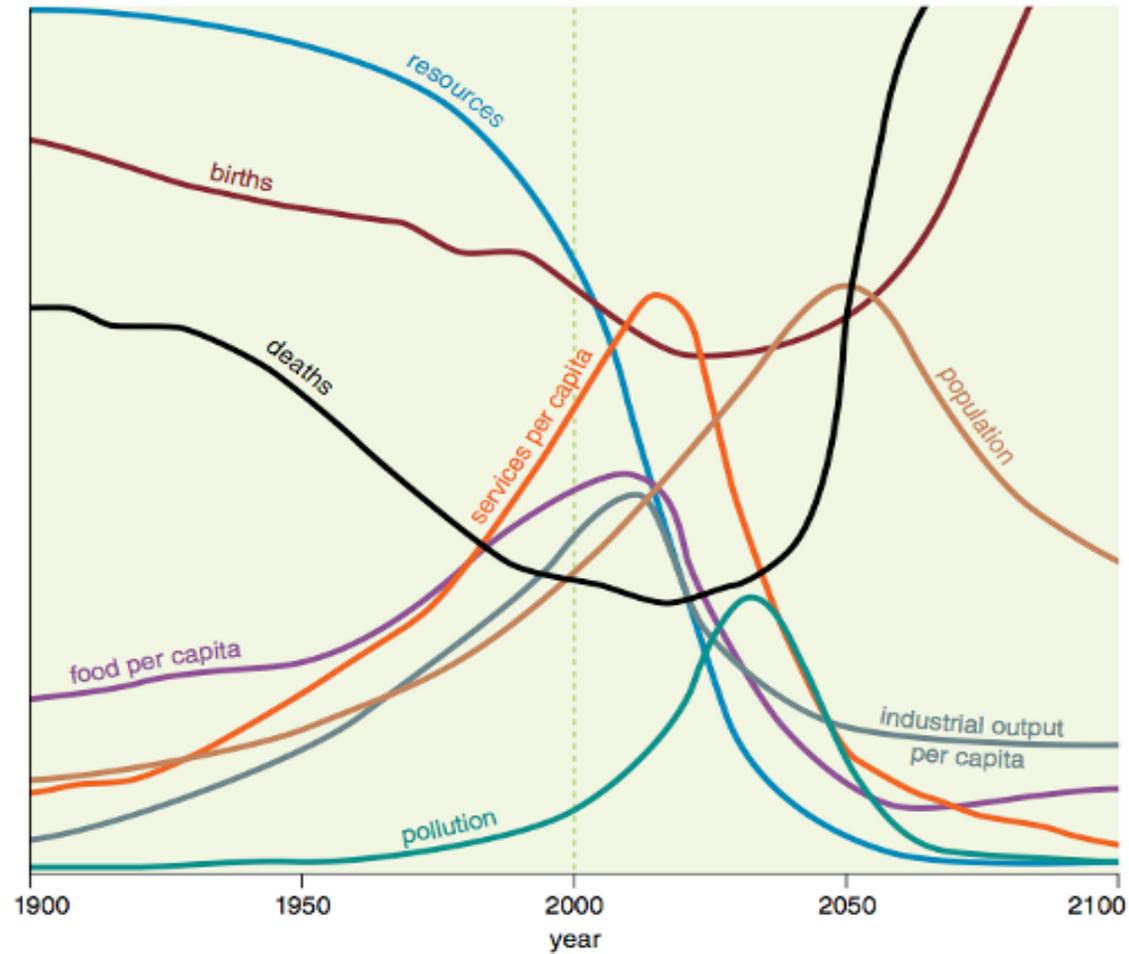
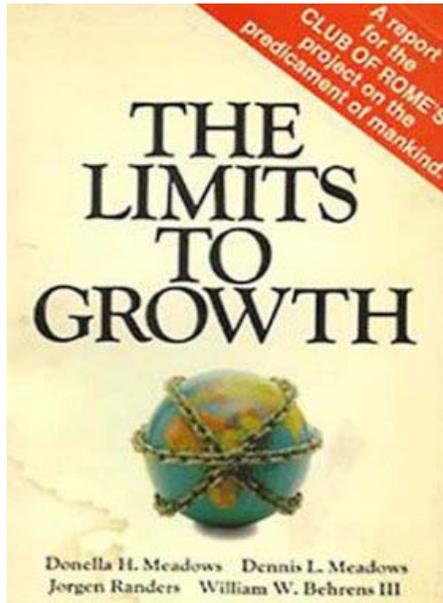


Source: Millennium Ecosystem Assessment

Anthropogenic emissions



So What?



Future growth

- Growth is the solution
- Green growth
- The end of growth

- Beyond the limits

Implications for business

- Resource limits changes the economic and business landscape
- Produces risks and opportunities
- But what about the implications for strategic asset allocation/sector financing?
 - What asset classes/sectors could do better / worse?
 - What regions could do better / worse?

Impact of temperature rise on robusta coffee in Uganda

- Not suitable
- Less suitable
- Suitable

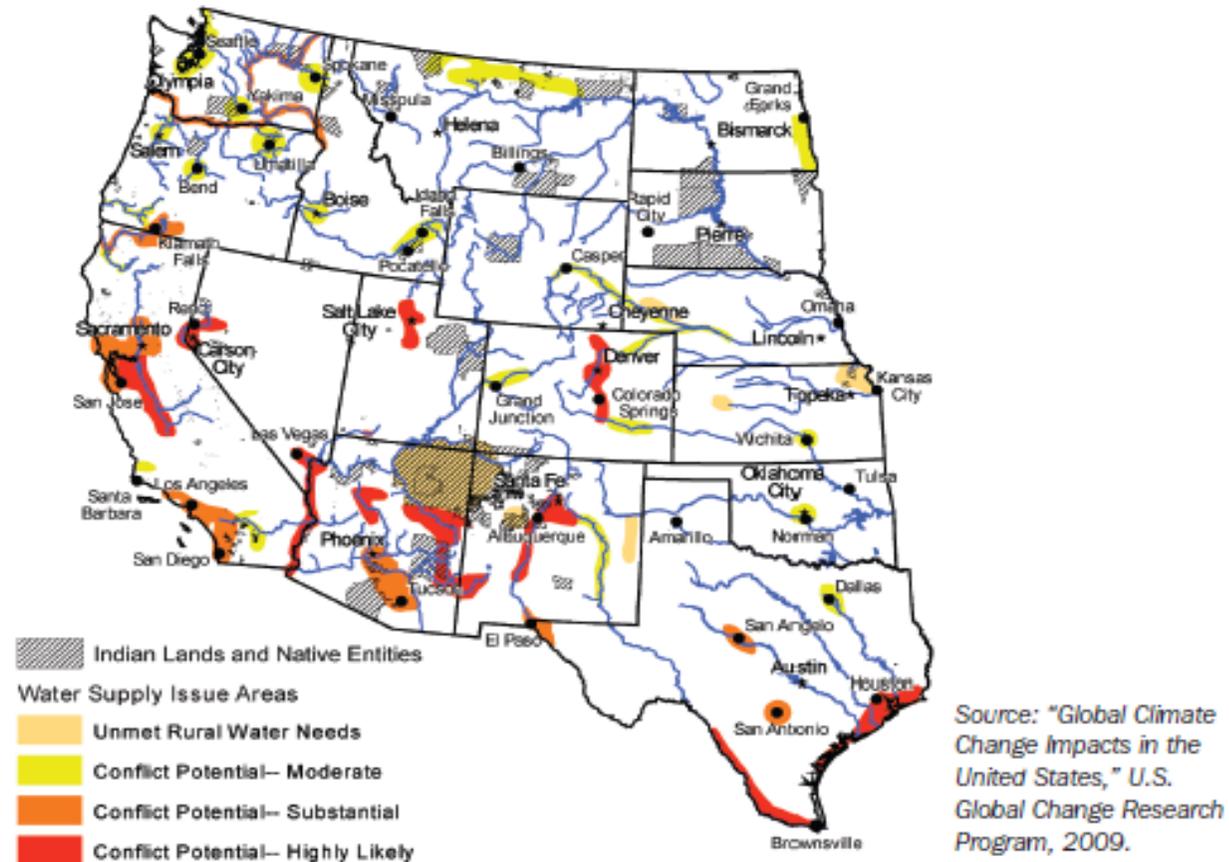


**Today's
temperature**



**A temperature
increase of 2°C**

Hidden risks

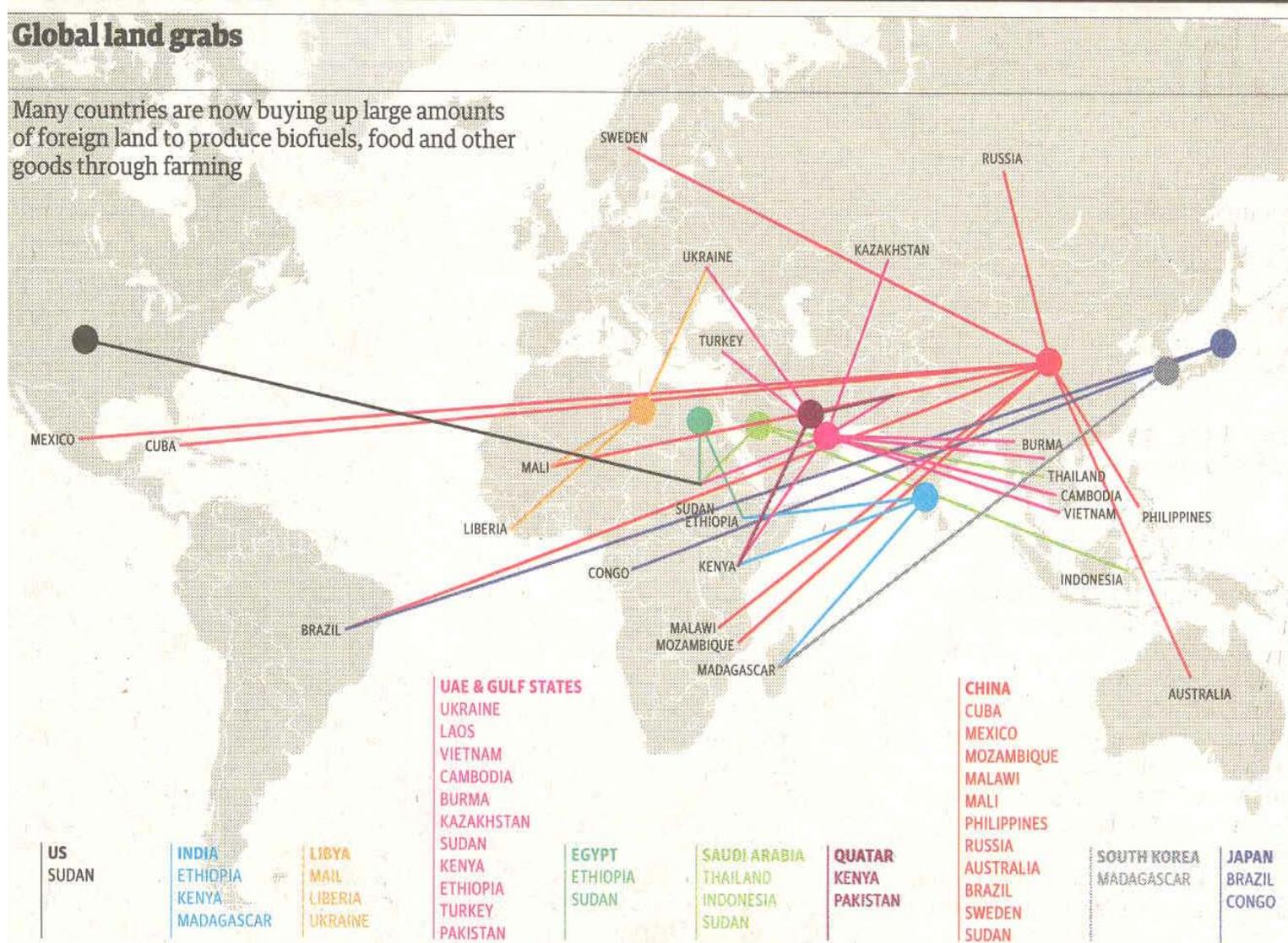


2025 water stress in the US: increased risks to municipal bonds and corporate lending
(Ceres report: *The Ripple Effect*, 2010)

Alternative solutions... buy it up

Global land grabs

Many countries are now buying up large amounts of foreign land to produce biofuels, food and other goods through farming



...and actuarial advice

- How do these system flows interact with the financial system and what does this imply for particular actuarial issues?
 - Interest/discount rates
 - Investment returns
 - Discount rates
 - Inflation
 - Wage growth
 - Equity risk premia
 - Credit spreads
 - Mortality and morbidity
 - Catastrophic risk



Contact details

Dr Aled Jones, Director

Global Sustainability Institute

Anglia Ruskin University

Tel: 0845 196 2931

aled.jones@anglia.ac.uk

<http://www.anglia.ac.uk/gsi>

Scenarios (detail)

Business as usual

Governments and financial markets have a low sensitivity to resource limitations. Prices for resources are set based on short term availability (supply and demand) and government regulation focuses on managing the flows of these resources rather than their stocks. Decision making for both the finance sector and government are based on no limits to resources.

Price driven change

Governments have a low sensitivity to resource limitations while markets have a long term outlook of the stock availability of resources. Price signals within the market are set based on the long term availability of resources and therefore drive changes in the market away from limited resources into more abundant resources. However, no regulation is put in place to manage these flows of investment or the availability of resources for society as a whole.

Regulation driven change

Governments operate on a long term basis and regulate the stock of resources rather than the flows. The market responds to regulatory change in a short term way and therefore it is not always possible to predict the outcome of policies that are implemented. The feedback from market change to policy development is not effective.

Consensus driven change

Governments and the market operate on a long term basis by pricing and regulating the stock of resources rather than the flows. Government and markets work closely together to develop long term policy and market frameworks that enable and build on market innovation and mechanisms.