



Institute
and Faculty
of Actuaries

Limits to Growth

Momentum 2013
Celtic Manor, Newport

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Institute

6th December 2013



Objective for this session

- Summarise facts and findings presented in the report from January 2013
- Outline activity of International Actuarial Resource and Environment Groups
- Discuss opportunities to get involved



Agenda

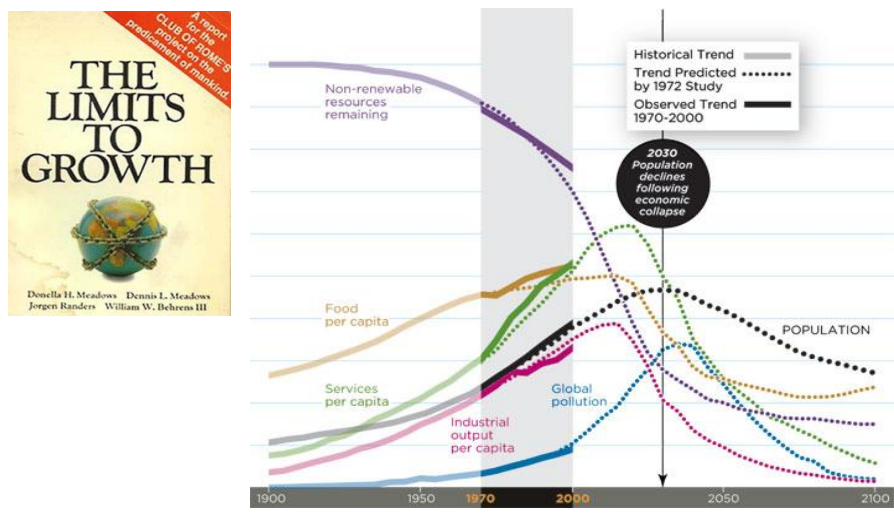
- Background
- Summary of Report
- Activity - Actuarial Associations
- Opportunities for involvement

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Spot the False one !

1. Based on a comparison thirty years on, Limits-to-Growth predictions were remarkably accurate
2. Higher GDP / person is correlated with increased happiness at all GDP levels
3. IFoA Resources and Environment Group has been promoted to a Board

Background



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Limits to Growth – Predictions

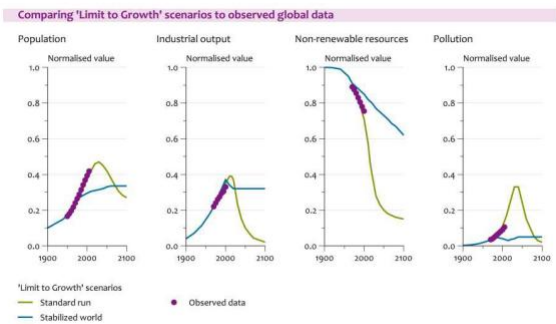


Figure 1: Comparison of World3 Limits to Growth scenarios to observed data. ¹³

Limits to Growth (30 Year Update)

The 1972 LtG paper used a systems dynamics model (World 3) to explore the feedback between;

- Population
- Industry
- Food
- Non-renewable resources
- Pollution system.

The green lines represent the "standard scenario" – which is a business as usual (growth agenda).

The purple observations show the realised observations.

Netherlands Environmental Assessment Agency / Turner (2008)

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Actuarial Context

- Exploration of constraints on the availability of natural resources affect on the global economy
- Resources and Environment MIG of the Institute and Faculty of Actuaries commissioned research:
 - Evidence for resource constraints; and
 - Implications for financial markets and actuarial advice

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Scope of Research Project

- 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)
 - Environmental loading

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- 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
-

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Summary of Report

- Limitations of economic growth measurements
- Four main narratives around Limits-to-Growth
- Evidence for potential constraints on physical resources
- Pension fund case study

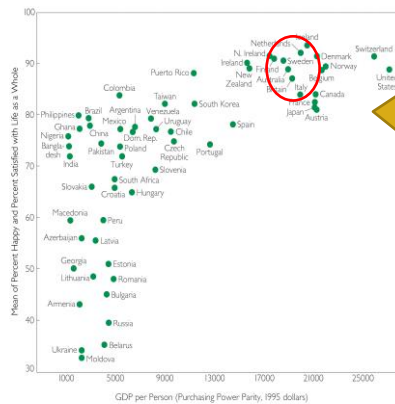
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Quotes

- *“The welfare of a nation can scarcely be inferred from a measure of national income”* – Simon Kuznets, the Nobel laureate economist attributed with making national income accounts a standard.
- Robert Kennedy – *“It [GNP] measures everything, in short, except that which makes life worthwhile.”*
- The Actuary magazine - Soapbox piece - June 2013 - Claire Jones

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Does Growth Make You Happy?



Does growth make you happy?

The graph % of people content versus GDP per person at PPP.

Economic growth remains the dominant concern of politics even in rich countries yet beyond the levels achieved by countries like Ireland, South Korea or New Zealand the positive correlation between GDP / person and happiness breaks down.

Source: Jackson, T. (2009) Prosperity without growth? Economics for a finite planet,

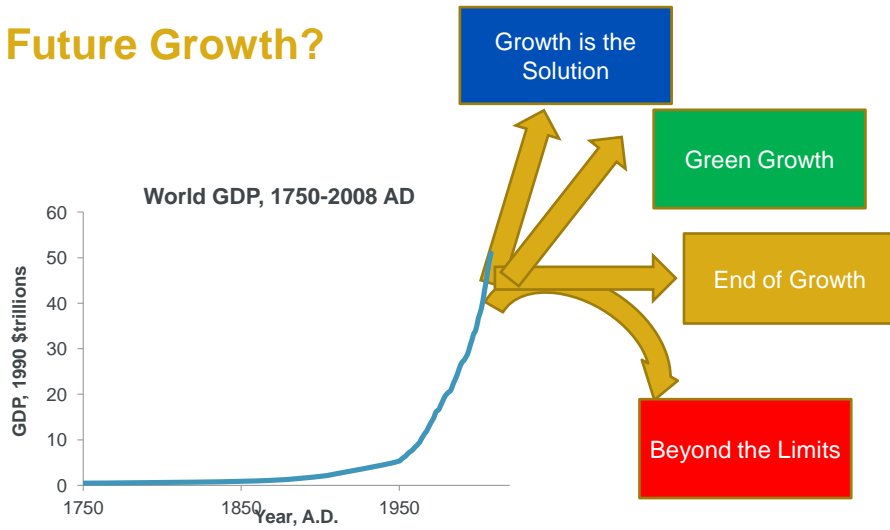
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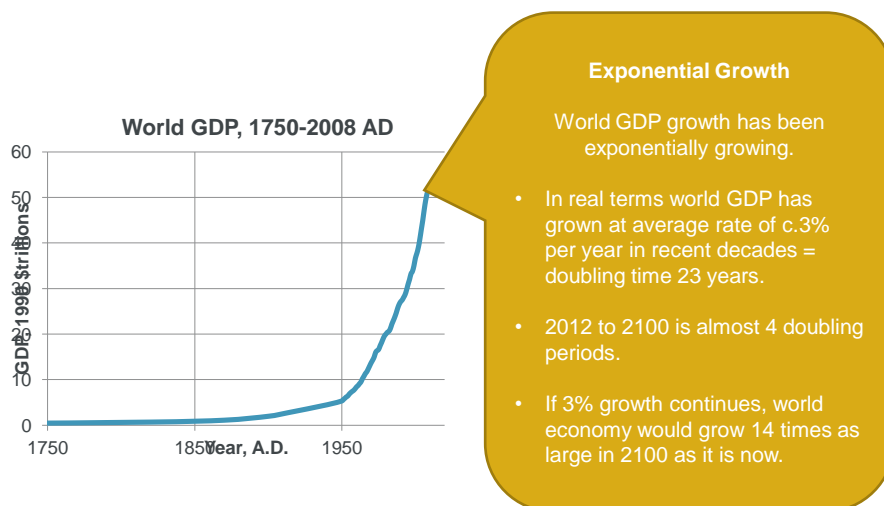
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Future Growth?



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Opinions: Growth is the Solution



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Opinions: Green Growth

Next 20 years increase of 3bn more middle class consumers.

Three scenarios offered:

1. Productivity static (supply expansion)
2. Productivity response (most demand met by productivity)
3. “Climate response case” – move to low carbon energy, reforestation, land restoration, carbon capture

First two scenarios don't avoid two degree warming.

McKinsey Global Institute, Resource Revolution

Opinions: End of Growth

- Limits-to-Growth stressed (reiterated) that humanity is on course to overshoot. Profound change needed soon to avoid collapse.
- Overshoot caused by:
 - Rapid Change
 - Limits / barriers to change
 - Errors / delays in perceiving limits / controlling change

Opinion: End of Growth

- Richard Heinberg (End of Growth) states that the global economy is playing a zero sum game with an ever shrinking pot divided among the winners.
- He cites the causes:
 - Depletion of natural resources
 - Negative environmental impacts
 - Inability of financial systems to service debt accumulated over recent year

Debt is a claim on ??

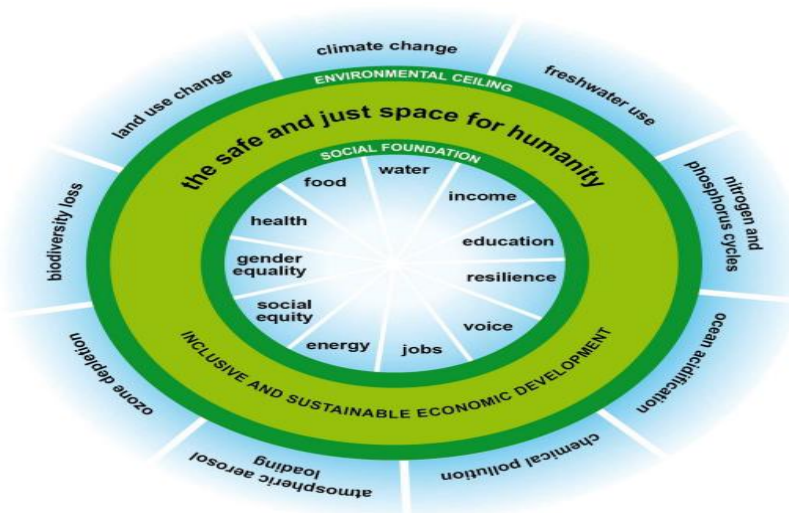
Opinion: Beyond Limits

- WWF 2010 Living Planet Report tells us topical diversity has reduced by 60%. They find 5 threats to biodiversity which underpin human ecosystems (freshwater, carbon storage, agriculture):
 - Habitat loss, fragmentation, alteration
 - Over-exploitation of wild species (food, materials, medicine)
 - Pollution (excessive fertiliser, pesticides)
 - Climate change
 - Invasive species
 - WWF highlight water as the main link between ecosystems and climate – current demand placed on freshwater ecosystems is already beyond sustainable levels
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Opinion: Beyond Limits

- Carbon Tracker Initiative (Unburnable Carbon) tell us we have used one third of our budget for carbon to 2050 in order to remain within 2 degrees of global warming
- Only 20% of global carbon reserves are burnable to stay within 2 degrees. What we use this budget for is a key question.

Doughnut Economics



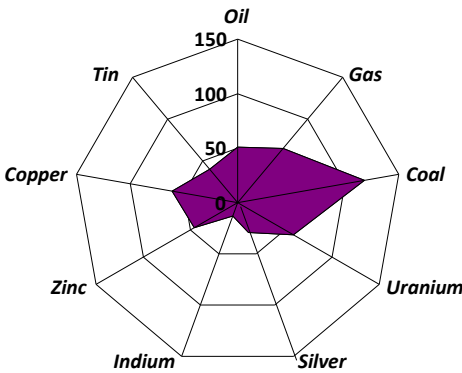
Source: Oxfam, Kate Raworth

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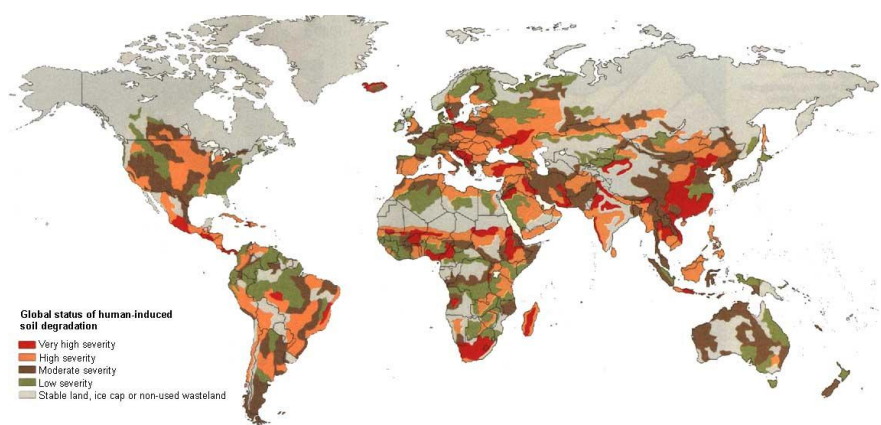
Global challenges: Fuel, Metals, Minerals



[1] Current global reserves divided by current annual consumption (assuming no growth in demand).
[2] Data taken from BP Statistical Review 2012, <http://bp.com/statisticalreview> and David Cohen, 'Earth's natural wealth: an audit', *New Scientist*, Issue 2605 (23 May 2007) pp. 34-41

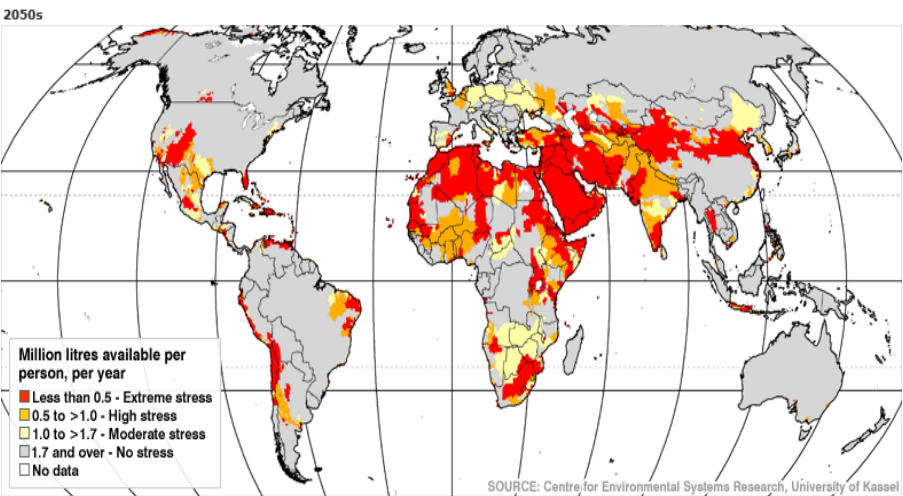
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Local challenges: Degradation of soils



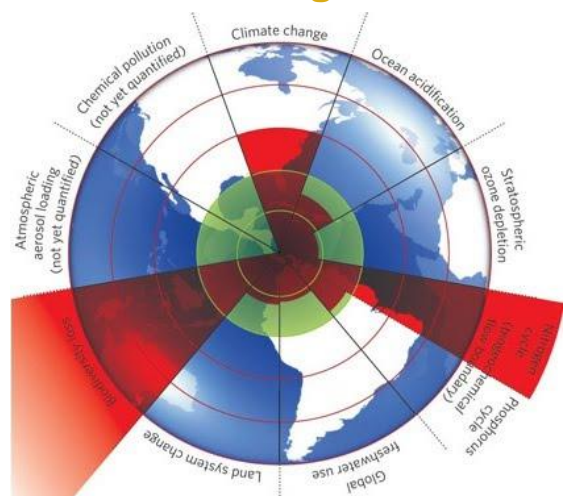
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Local challenges: Water availability



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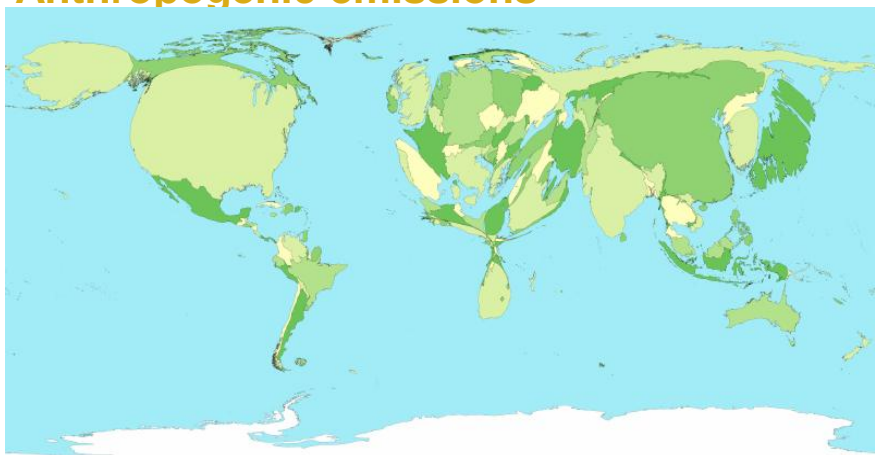
Global challenges: Environmental Loading



Rockstrom et al, Nature 461, Sept 2009, Stockholm University Resilience Centre

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Global challenges: Anthropogenic emissions



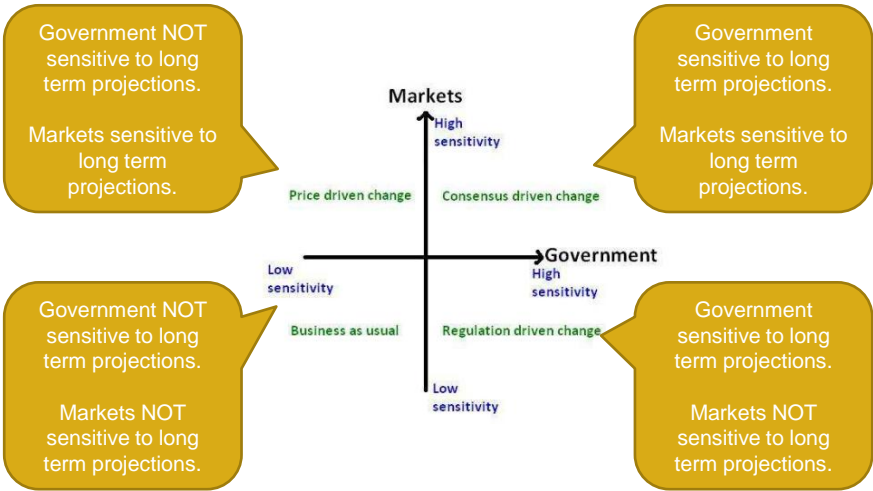
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Actuarial - Scenarios



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Possible actuarial impacts

- Reduced economic growth
- Reduced access to many commodities, and hence increased prices (or price shocks) or lack of availability
- Reduced international security and coordination
- Repression of investment returns by governments
- Possible changes to life expectancy and morbidity

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For more information..

- Twenty-five page executive summary report
- Two-hundred-and-fifty page evidence report
- Video recording of presentation
- Multi-disciplinary team led by Dr Aled Jones which included Dr Catherine Cameron and Nick Silver

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Activity - Institute & Faculty

- Resource & Environment promoted to Board status
- As a MIG (REG) has c.500 members
 - Literature review in 2010 focusing on climate change
 - Literature review in 2011 focusing on energy
- Research into the limits to growth published January 2013
- 2012 thought leadership lecture on climate change by Professor Sir Brian Hoskins
- Networking evenings in 2011 and 2012

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Activity - International Actuaries

- IAA Resource and Environment Working Group (REWG)
 - Sessions at the 2014 Congress of Actuaries
 - CAS Climate Change Committee
 - Have commissioned research and created a climate change index
 - SOA have started a group looking into resource and environmental issues
 - Australian actuaries active for many years on climate change
 - Society of Actuaries in Ireland wider fields group
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Opportunities for involvement

- Literature Review
- Book/Journal Club
- Feeding back on talks, relevant initiatives in your company or other organisations
- Social media
- International actuarial groups

Volunteer – please send Kimberley Hutton an email at kimberley.hutton@actuaries.org.uk. It could be helpful to include information about relevant skills/experience which might be useful, particular interests or type of involvement

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Engagement

- Two-page document on webpage
 - LinkedIn
 - Googlegroup
 - Online forum
 - Mailing list
 - Newsletter

<http://www.actuaries.org.uk/members/pages/resource-and-environment-member-interest-group-reg-mig>

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The False one is...

1. Based on a comparison thirty years on, Limits-to-Growth projections were remarkably accurate - TRUE
2. Higher GDP per capita is correlated with increased happiness at all GDP levels - FALSE
3. Resources and Environment Group has been promoted to a Board - TRUE

Thanks due for selected slides

- Dr Aled Jones
- Oliver Bettis
- Elliot Varnell

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