

Gates Inaugural Cambridge Lecture 2014

Dame Barbara Stocking
Murray Edwards College
Cambridge

Is there Enough for All of Us?

Global Growth, Climate Change and Food Security

Overview

- 1) I want to look at natural resources of planet, also at basic human needs – and see how near we are to living within the boundaries while meeting the needs. What does this mean for economic growth and measuring, eg. GDP?
- 2) Then particularly want to look at food security – now and by 2050. What needs to be done by whom?
- 3) But what about the climate changed world? How can we get back to living with food security in a resource constrained world?

Living within the doughnut

I want to start by looking at what we know about resource constraints briefly.

Stockholm Resilience Centre (2009) work.

Earth-system process	Parameters	Proposed boundary	Current status (as of 2009)	Pre-industrial value
Climate change	Atmospheric carbon dioxide concentration (parts per million by volume)	350	387	280
	Change in radiative forcing (watts per metre squared)	1	1.5	0
Rate of biodiversity loss	Extinction rate (number of species per million species per year)	10	>100	0.1–1
Nitrogen cycle	Amount of nitrogen removed from the atmosphere for human use (millions of tonnes per year)	35	121	0
Phosphorus cycle	Quantity of phosphorus flowing into the oceans (millions of tonnes per year)	11	8.5-9.5	-1
Stratospheric ozone depletion	Concentration of ozone (Dobson unit)	276	283	290
Ocean acidification	Global mean saturation state of aragonite in surface sea water	2.75	2.90	3.44
Global freshwater use	Consumption of freshwater by humans (km ³ per year)	4,000	2,600	415
Change in land use	Percentage of global land cover converted to crop land	15	11.7	low
Atmospheric aerosol loading	Overall particulate concentration in the atmosphere, on a regional basis	To be determined		
Chemical pollution	E.g. amount emitted to, or concentration of persistent organic pollutants, plastics, endocrine disrupters, heavy metals and nuclear waste in, the global environment, or the effects on ecosystem and functioning of Earth system thereof	To be determined		

Source: Rockström et al (2009b). Shaded areas show boundaries that have been crossed.

Many argue about precise numbers but there are clearly serious problems especially with CO₂ and with the nitrogen cycle and of course we are continuing to use so much more of these resources.

But it is not just the overall, it also matters who is using up the resources.

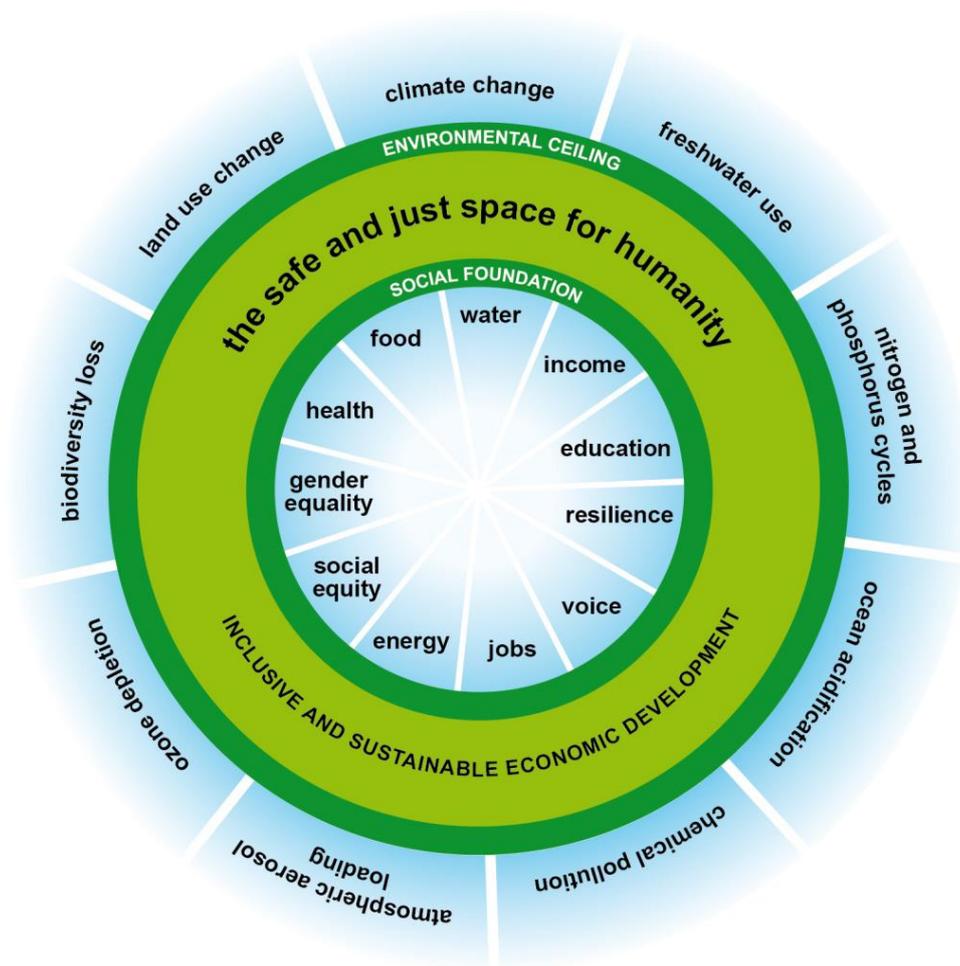
I want to look also at the social foundation that all people should have.

How far below the social foundation is humanity?

Social foundation	Extent of global deprivation (illustrative indicators)	Percentage	Year
Food security	Population undernourished	13%	2006–8
Income	Population living below \$1.25 (PPP) per day	21%	2005
Water and sanitation	Population without access to an improved drinking water source	13%	2008
	Population without access to improved sanitation	39%	2008
Health care	Population estimated to be without regular access to essential medicines	30%	2004
Education	Children not enrolled in primary school	10%	2009
	Illiteracy among 15–24-year-olds	11%	2009
Energy	Population lacking access to electricity	19%	2009
	Population lacking access to clean cooking facilities	39%	2009
Gender equality	Employment gap between women and men in waged work (excluding agriculture)	34%	2009
	Representation gap between women and men in national parliaments	77%	2011
Social equity	Population living on less than the median income in countries with a Gini coefficient exceeding 0.35	33%	1995-2009
Voice	E.g. Population living in countries perceived (in surveys) not to permit political participation or freedom of expression	To be determined	
Jobs	E.g. Labour force not employed in decent work	To be determined	
Resilience	E.g. Population facing multiple dimensions of poverty	To be determined	

Sources: FAO⁹. World Bank¹⁰. UNStat¹¹. WHO¹². IEA¹³. and Solt 2009¹⁴

Between the boundaries: a safe and just world for humanity



Is it possible?

- at minimum, for wealthy people to have to increase GDP without using more resources
- for developing countries to find a way to increase GDP, yet increase resource risk as little as possible

A challenge:

- Nick Stern has said that the way we are going in climate change, in future virtually all carbon emissions will be required for agriculture, rest will have to be carbon neutral.

Begs question of GDP

- Why do we want these measures, misses out unpaid work especially in caring

- And happiness - the spirit level shows people do not get much happiness above about \$25k per person. Are there more meaningful measures we could use which make the economy work for us rather than us being driven by the economy?

Food Security

Where we are now

About 840m (2011 IPCC) people undernourished in calories.

About 300m in South Asia though sub-Saharan Africa has highest percentage at 27%.

Do have enough food for everyone but even if we left well-off with the same food consumption as now, still only require 1% increase in food production to deal with the calorific needs of the billion. At the moment the world has food security, though about 1bn people in it do not.

By 2050 though FAO estimates (2013) we should require 70% over 2010 more food – for 9bn people, but also many more middle class who now eat better, and much more meat (which needs feed stock). Don't forget demands for biofuels.

Leaving aside issues of climate change, how could we get this food?

- 1) Reducing food waste – developed world
 - Europe / US – 95-115 kgm waste each year, in total equivalent to sub-Saharan Africa total population
 - Also waste in developing countries – lack of storage, proper grain banks, refrigeration, etc.
- 2) With girls, improvement through education and through access to contraceptives could help reduce growth in global population – but do remember it is not the poorest who consume the most, whether it is food or the world's resource constraints on nitrogen or on CO₂ emissions.

But the two big ones are:

- 3) Increase agricultural production
- 4) Fixing the global food system to make it fairer

Agriculture

- Invest in small farmers – aid for agriculture - 1983 to 2006 dropped from 20.4% to 3.7% (though of course plenty of money was found for agriculture subsidies in the north – and dumping of produce)
- In 2008 committed to \$20bn over 3 years but very little new money turned up

What is needed: agricultural extension support, some fertiliser (but mainly organic), rural roads. Above all it means farmers having land which helps them invest not least because they can get loans, access to water (ie. irrigation not just rainfall).

Ethiopian bee keeping

Demonstrates how well cooperatives can do when people work together – this honey is exported to the French bakery system.



And organisation – producer organisations, marketing organisations, cooperatives, buy inputs cheaply, get goods to market, negotiate well with companies and of course mobile phones help.

And don't forget women – 70% of small farmers in Africa but with just a few percent of land, no access to extension services, etc.

Fixing the global system

Northern subsidies, massive use of land on biofuels (which is not helping carbon emissions).

Stopping land grabs – giving people their customary rights – free fair informed consent.

Who owns the global system?

This is one of the few areas where consumers can do something by showing what they want. But mustn't be a race to the bottom in prices.

The whole system is very opaque – even how much grain there is in the world.

Get R and D focussed on what small farmers need and get technology available – most of all innovations in practice.

Why not big farms?

Maybe in the long term but would mean huge numbers of people pushed off the land to urban slums and abject poverty yet small farms can be productive.

Big farms use huge amounts of inputs.

But what about climate change? What is it going to do to food production and how do we move to sustainable agriculture?

Food production

At 2⁰C in global temperature - with no adaptation overall yields predicted to drop 0-2% per decade.

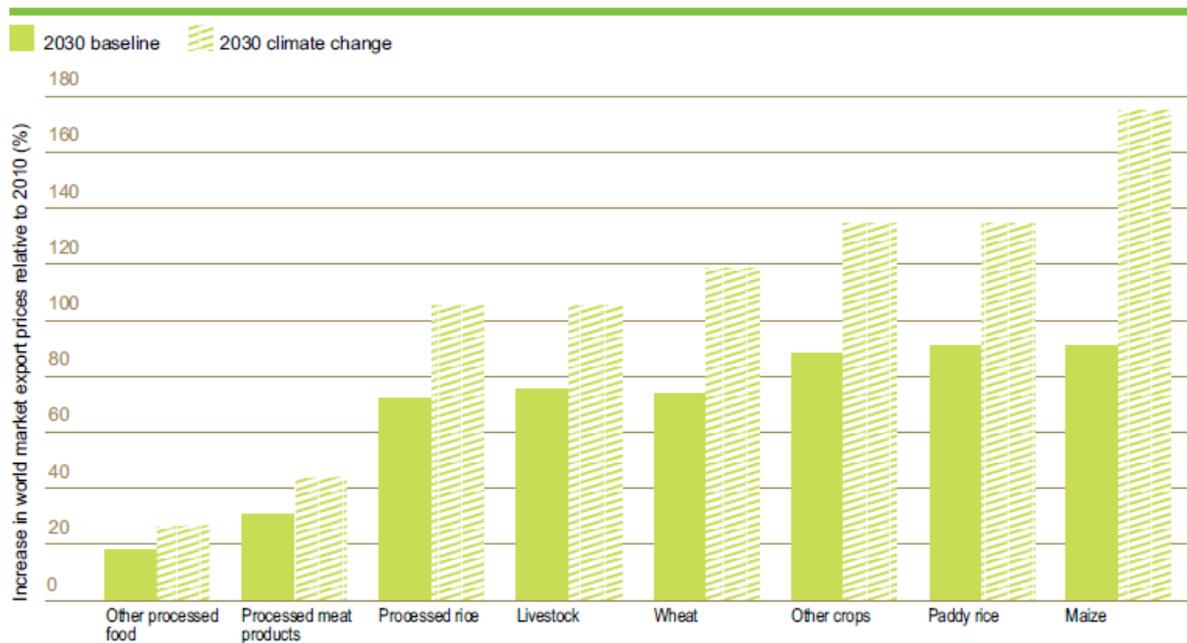
Might be able to cope with that through adaptation. But yields would be better in high latitudes. Lower yields in poorest countries.

At 3-4⁰C - substantial decline – serious problems – not just for poorest people, but globally.

Above 3⁰C crop yields fall even in temperate areas.

Disparities

Real food price changes predicted over next 20 years



Source: D. Willenbockel (2011) 'Exploring Food Price Scenarios Towards 2030', Oxfam and IDS

- 1) Poorest countries already most affected – all sorts of reasons:
 - Rapid senescence of wheat if $>34^{\circ}\text{C}$ after flowering
 - Change in rain patterns, people have no idea when rains coming
- 2) Extreme weather events – droughts, floods.

First developing countries most affected, low lying areas like Bangladesh and rising sea level. Droughts in sub-Saharan Africa. Poor people are in areas most affected by extreme weather events, plus they are most vulnerable, eg. flimsy housing. But also, extremes in other places eg US 2012 drought, Russia 2012 heat wave, can have dramatic effects on food prices. Poor people simply can't cope with doubling of prices on staples, unlike us.

Rice prices particularly vulnerable.

What happens

- trade bans – Nigeria and Niger in 2010
- speculation (so far limited)
- land grabs

ASDA says 95% of its fresh food supply chains are at risk.

Answers on climate change

1) Helping people cope now

- a) Community based disaster preparedness
- b) Social protection (cash) schemes – immediately or longer term
- c) Community, national and regional food reserves

2) Adaptation and sustainable agricultures

All of these things I have talked about demand an increasing investment in agriculture but adapted to climate change.

Yes, drought-resistant crops but also much better water management, ponds, wells, ditches, etc. Animal and green manure rather than inorganic fertilizers.

Soil conservation, inter-cropping, etc.

Indonesia, India, Vietnam – system of Rice Intensification

3) Of course, constrain them to reduce global carbon emissions.

Global governance not responding – how do we go about changing this? Can't and won't give up.

Must mobilise for 2015 Paris COP

Look for where energy is

- cities

- companies who want to know what future costs / regulations will be

But massive vested interests especially in fossil fuels (by the way just think what you could do with subsidies on fossil fuels).

How many hurricanes in the US and floods in the UK will it take for people to demand that their government acts?

This is a question for all of us, especially you Gates Scholars, as leaders in the world.