Making room for Nature in the Anthropocene:

How much does Nature need and what are the implications for human consumption?

Australian Earth Laws Alliance, Griffith University Eco-Centre, 28August 2015

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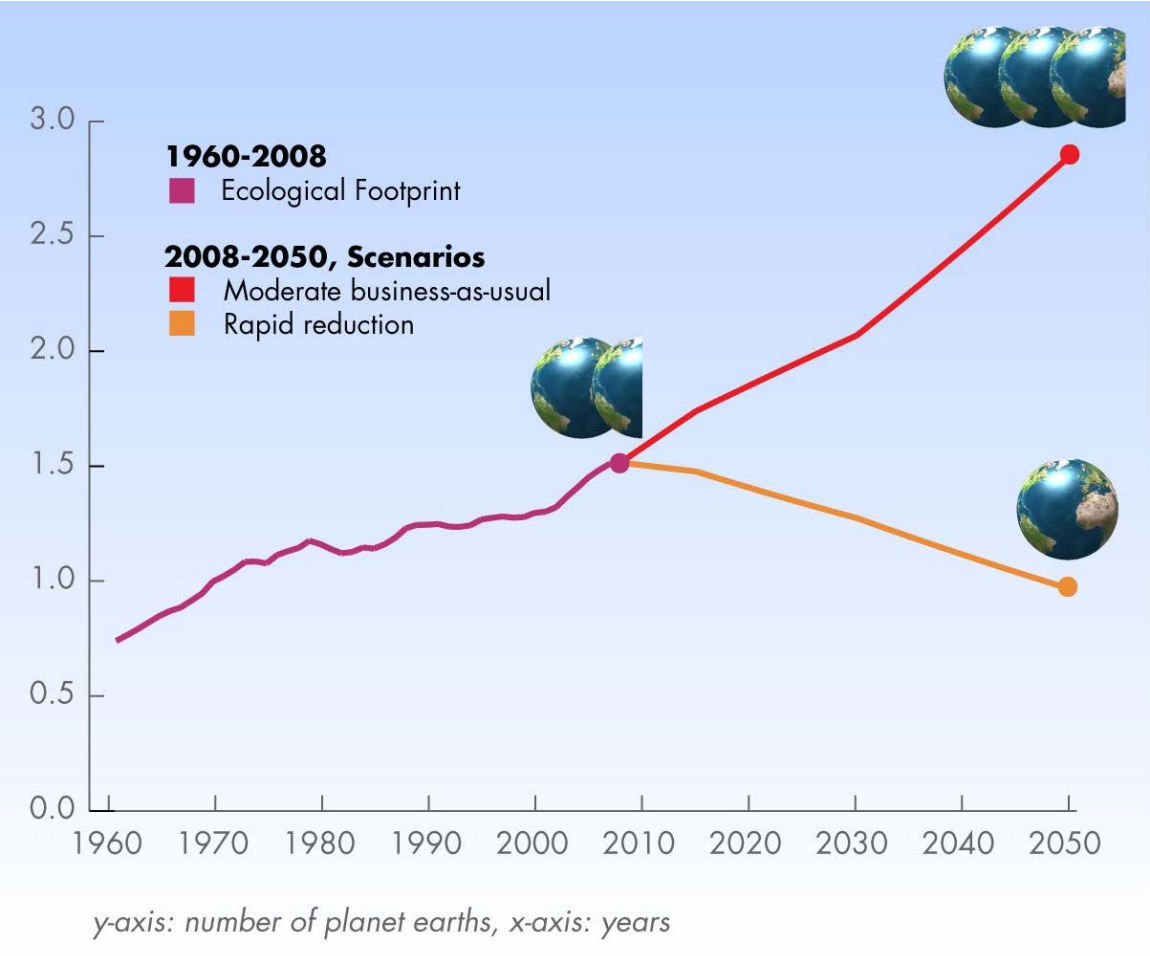
Griffith UNIVERSITY

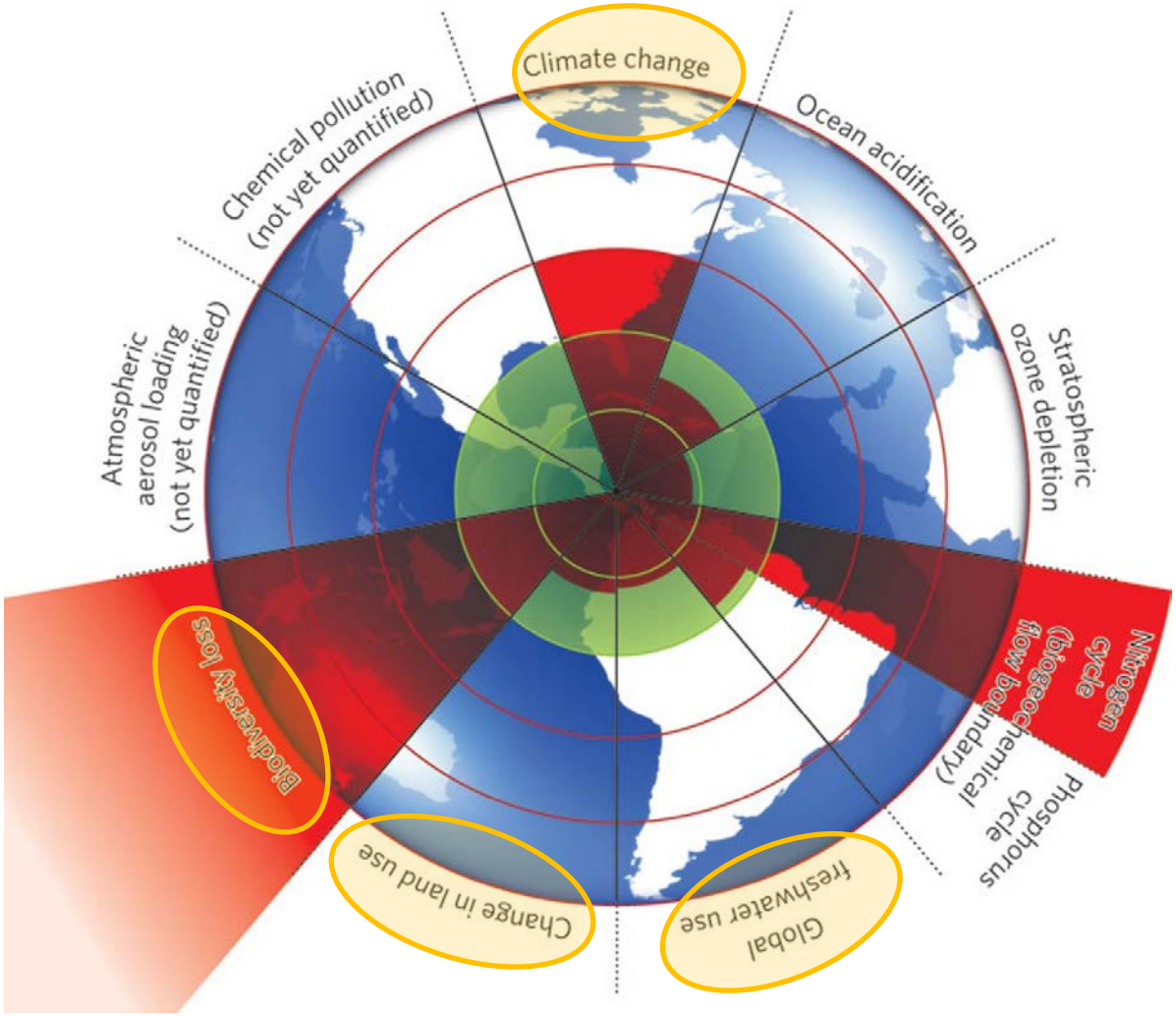
Already, we are consuming 1.5 Earths



Source: http://www.footprintnetwork.org/

But, we also need to make room for Nature!

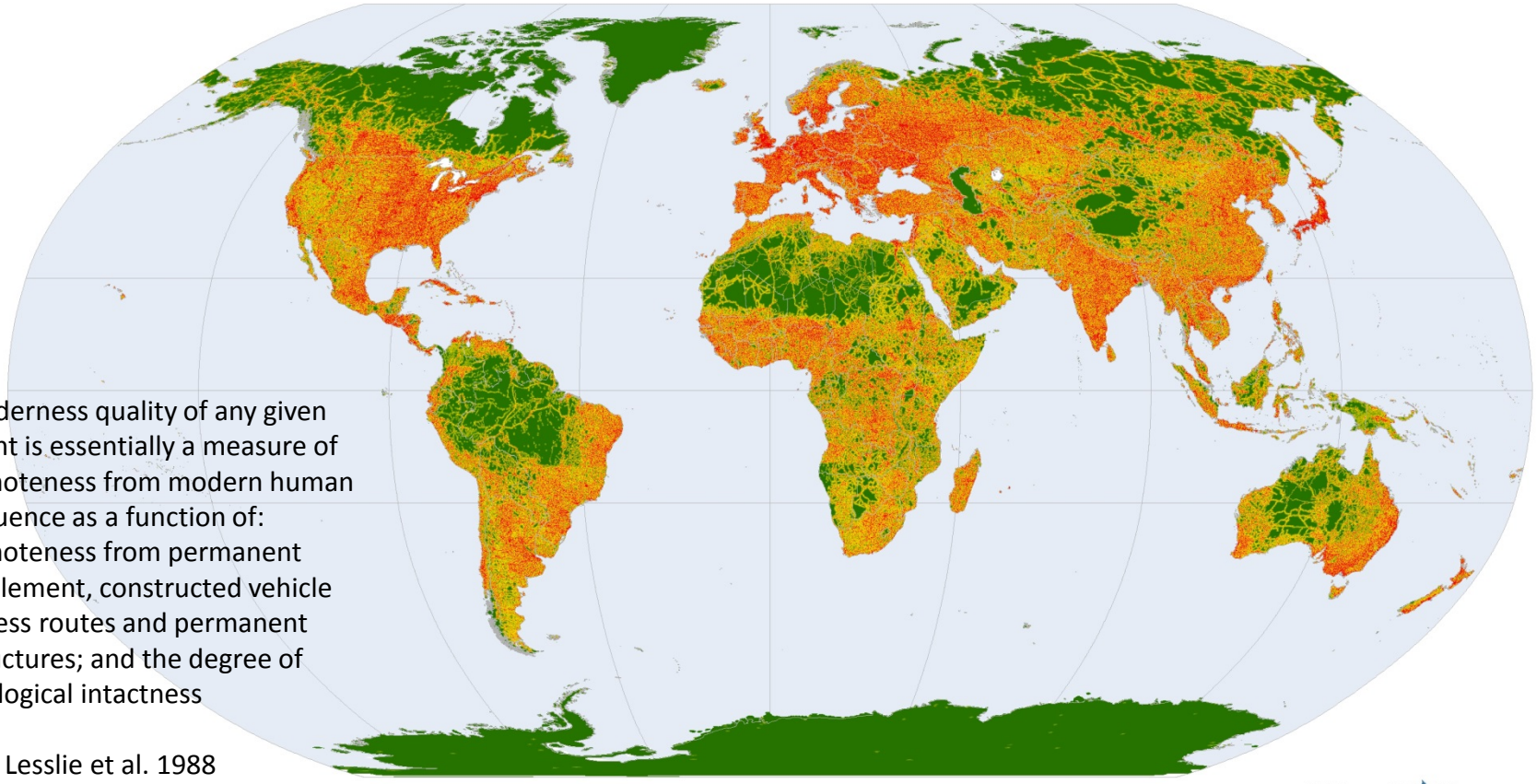
Planetary boundaries identify specific thresholds, relevant to making room for nature



Source: Rockström et al. (2009) http://www.ecologyandsociety.org/vol14/iss2/art32/

So, how much of Earth are humans taking up?

Global Wilderness



Wilderness quality of any given point is essentially a measure of remoteness from modern human influence as a function of: remoteness from permanent settlement, constructed vehicle access routes and permanent structures; and the degree of ecological intactness

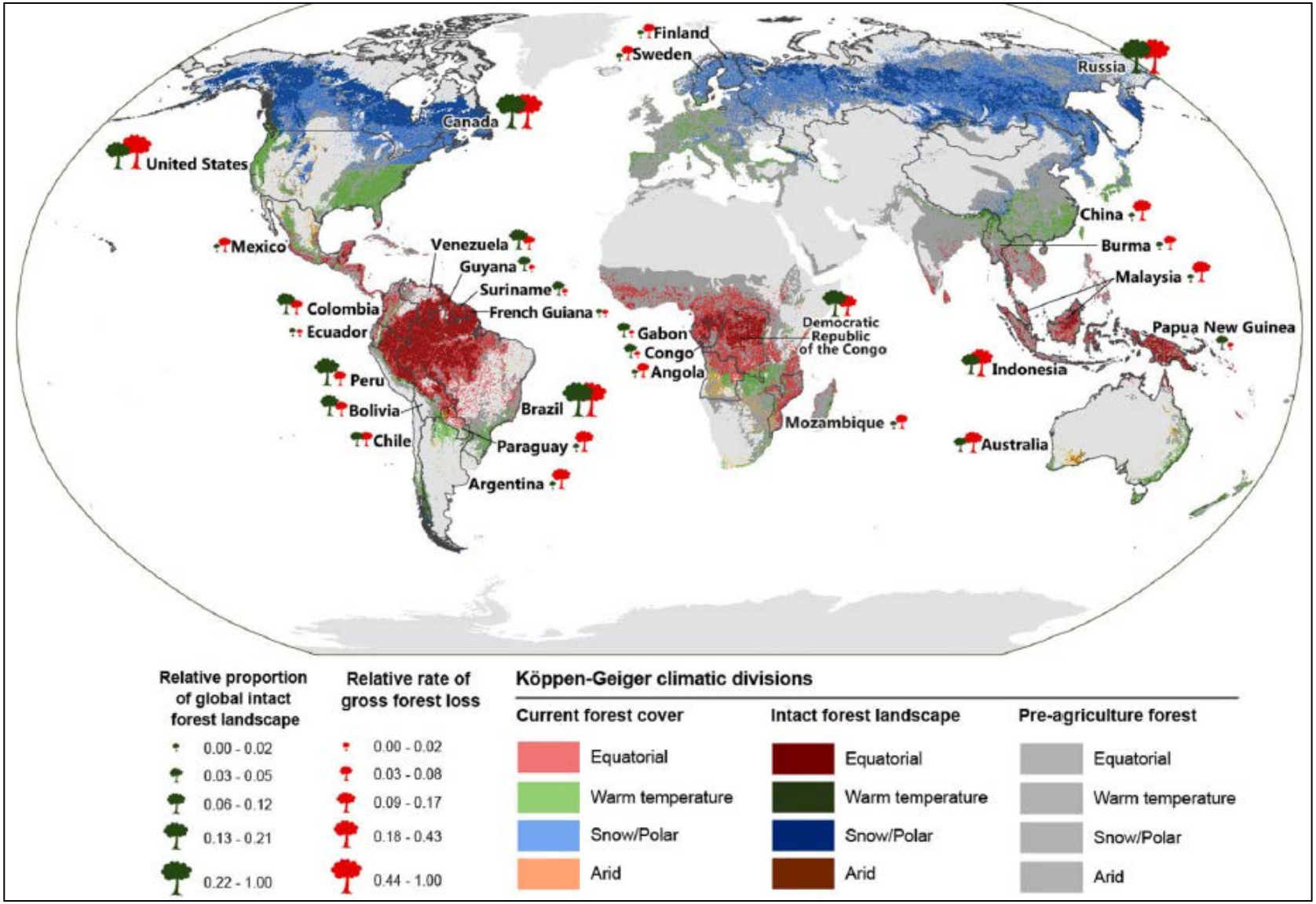
See Lesslie et al. 1988 *Environmental Conservation* **15**, 225-232.

Source: Dataset derived using the Digital Chart of the World 1993 version and methods based on the Australian National Wilderness Inventory (Lesslie, R. and Maslen, M. 1995. National Wilderness Inventory Handbook. 2nd edn, Australian Heritage Commission. Australian Government Publishing Service, Canberra).

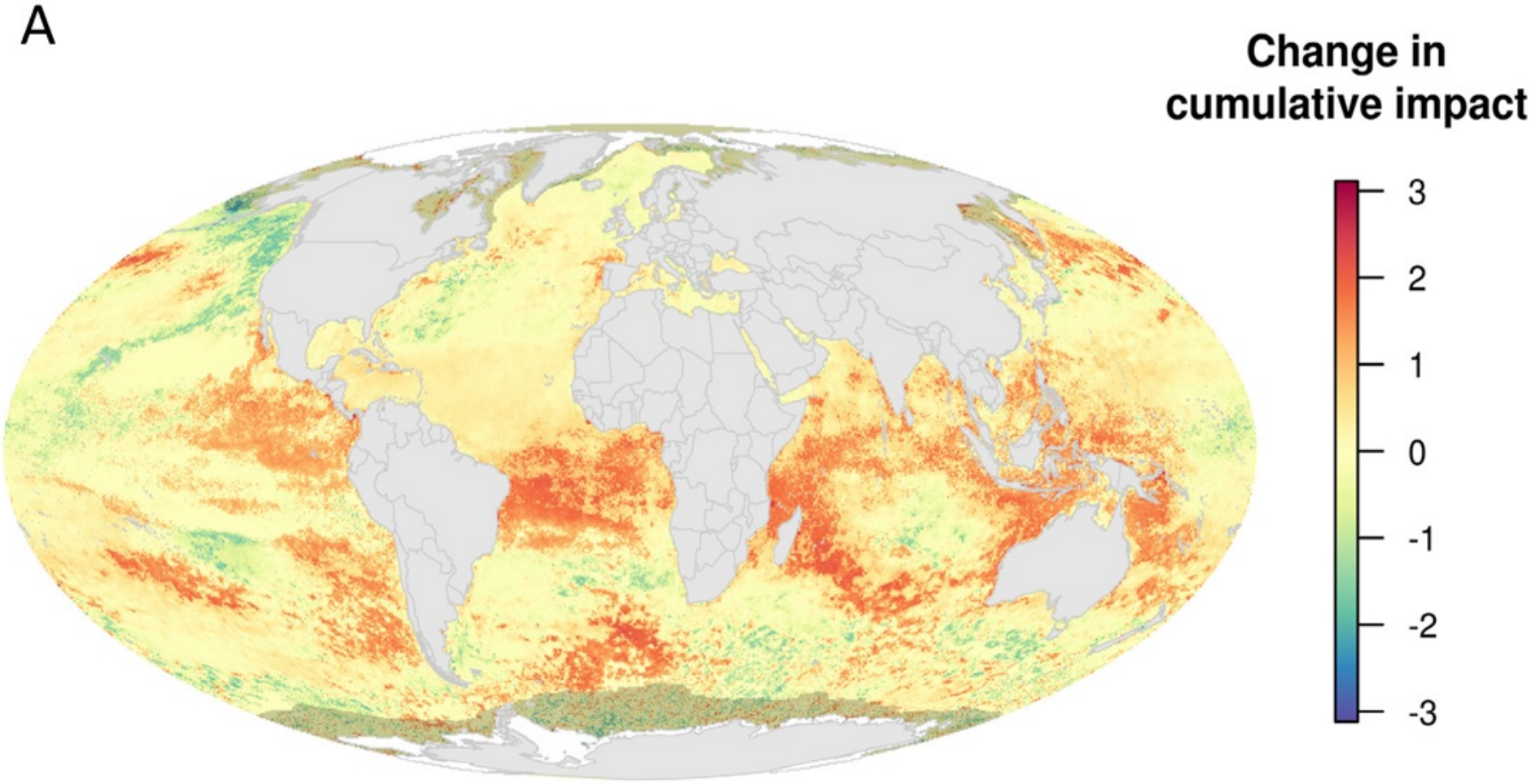
UNEP WCMC

Source: http://old.unep-wcmc.org/global-wilderness-1998_722.html

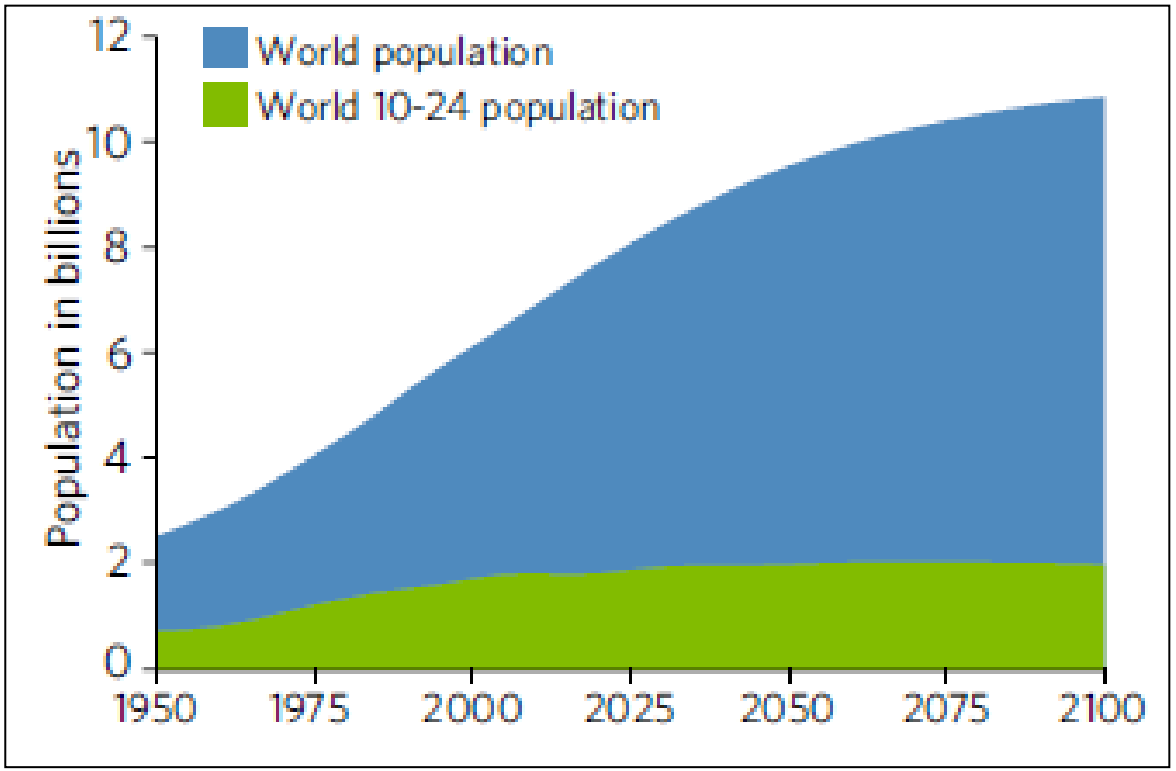
Only 1/5 world's forest left intact



Source: Mackey et al. 2014 http://onlinelibrary.wiley.com/doi/10.1111/conl.12120/abstract


A
Change in
cumulative impact
3
2
1
0
-1
-2
-3

Homo sapiens population continues to increase



Source: UNFPA The State of World Population 2014

All of whom need and have the right to:

- ✓ Food
- ✓ Water
- ✓ Shelter
- ✓ Clothing
- ✓ Health
- ✓ Community
- ✓ Culture
- ✓ Education
- ✓ …

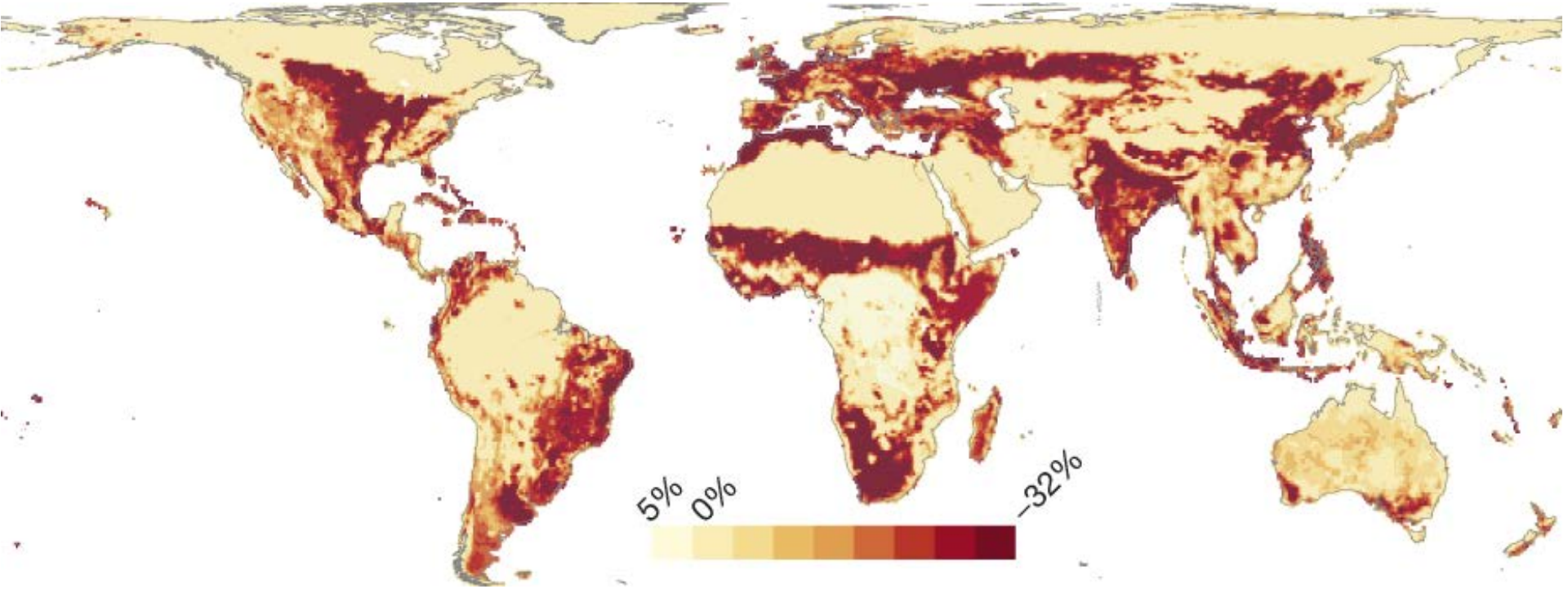
> Population > Demand for FFF > Land for crops

BUSINESS-AS-USUAL EXPANSION			
	Low estimate	High estimate	Source
Food supply	71	300	Based on Bruinsma 2009, RFA 2008, Bringezu et al. 2009a
Biofuel supply	48	80	Based on Fischer 2009, IEA 2011
Biomaterial supply	4	115	Based on Colwill et al. 2011, Raschka and Carus 2012

Expansion of global cropland under business-as-usual conditions: (Mha; area of Australia is 769 Mha)

Source: UNEP (2014) Assessing Global Land Use: Balancing Consumption with Sustainable Supply

Net change in local richness caused by land use and related pressures by 2000.

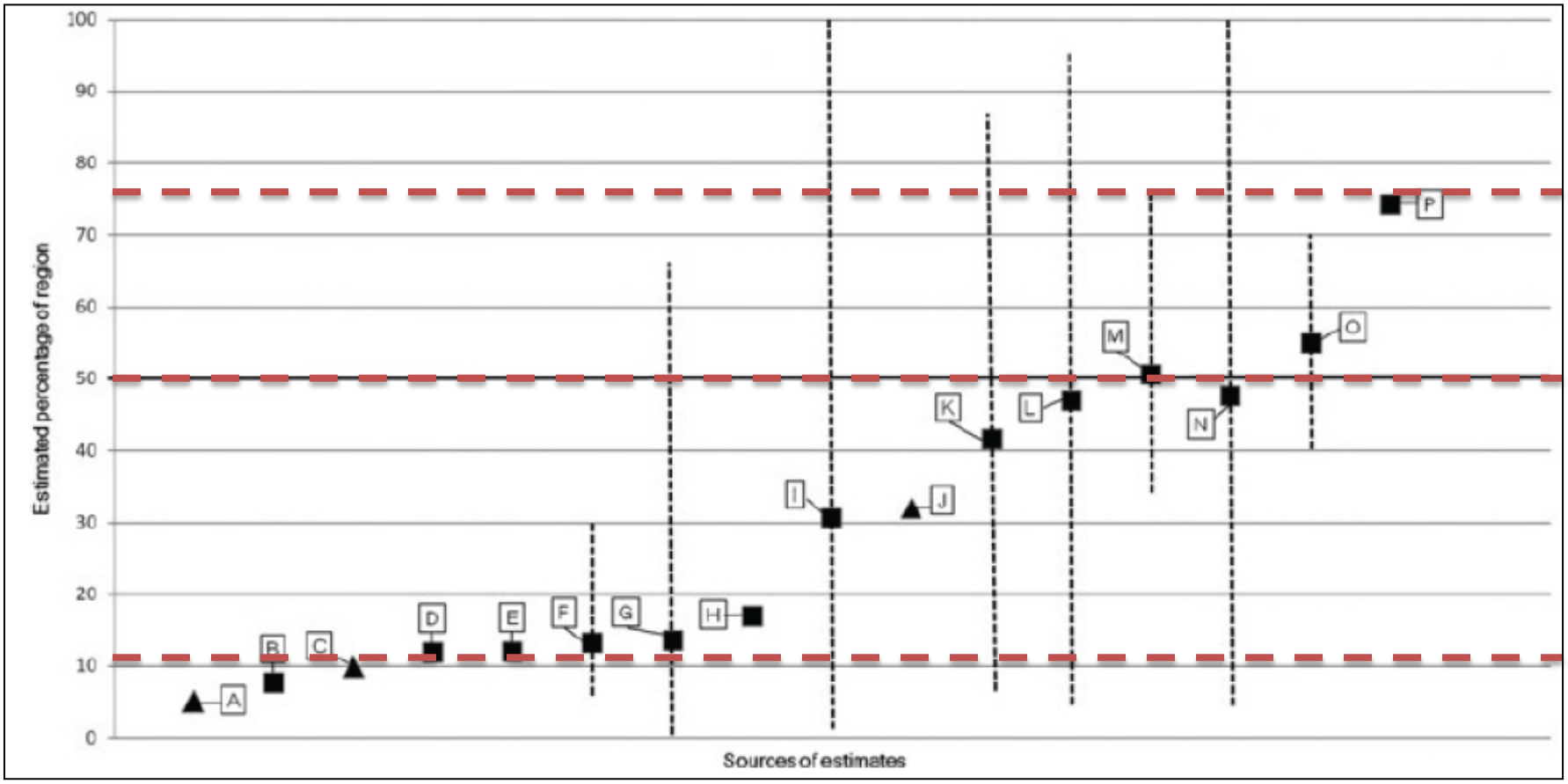


Source: Newbold T. *et al. Nature* **520**, 45-50 (2015) doi:10.1038/nature14324

nature

So, how much does Nature need?

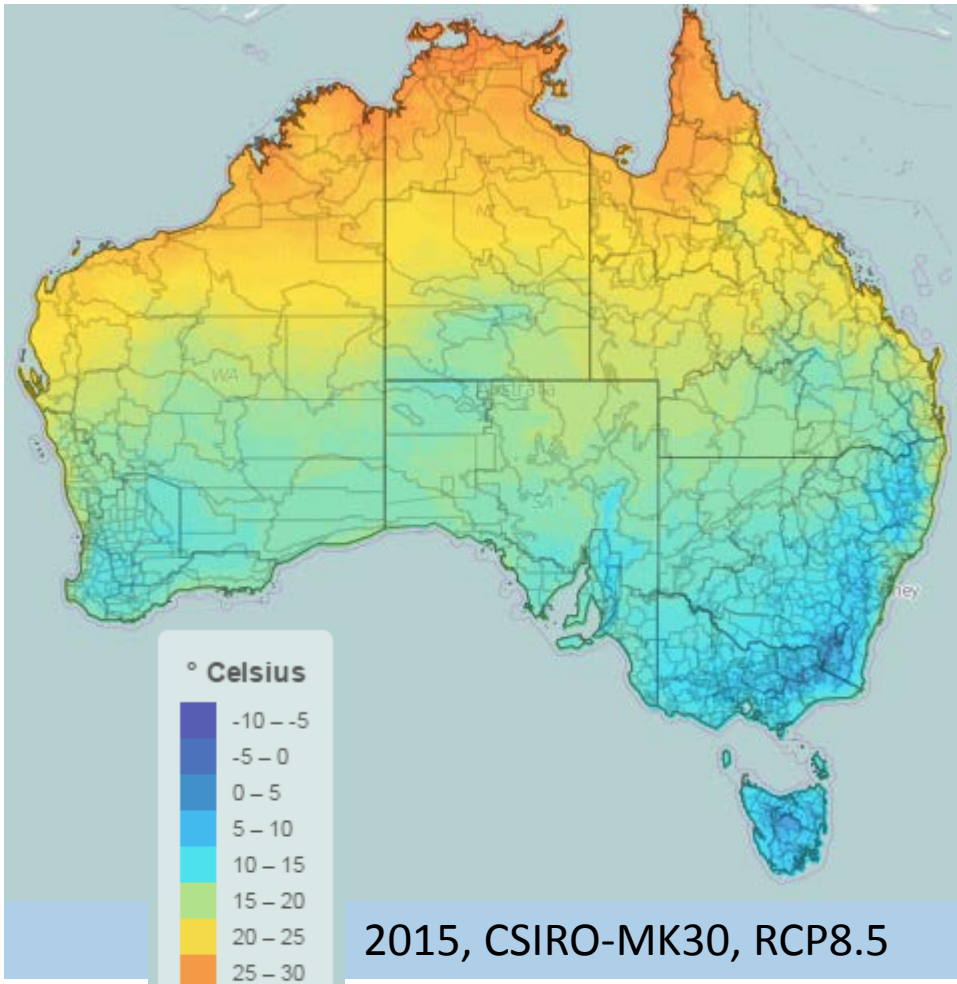
What does science say Nature needs?



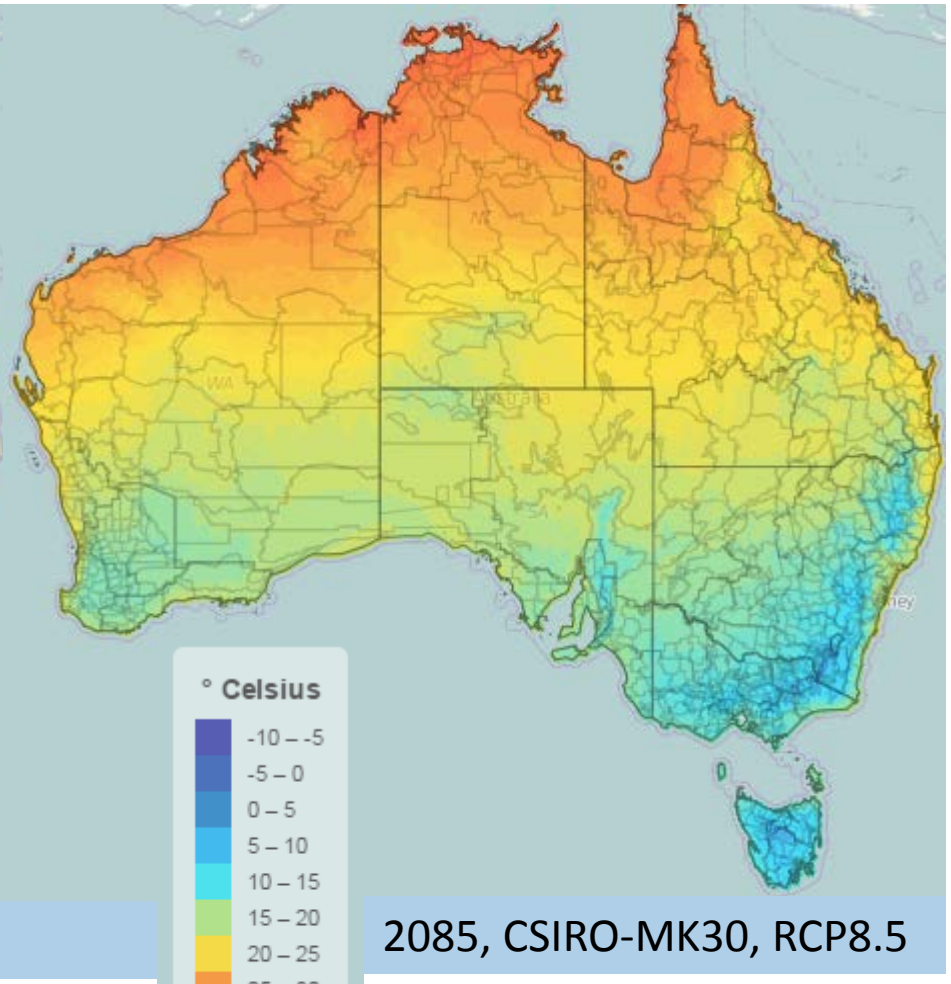
Noss et al. 2012 Bolder Thinking for Conservation. *Conservation Biology*

And let’s not forget climate change…

Continental climate change

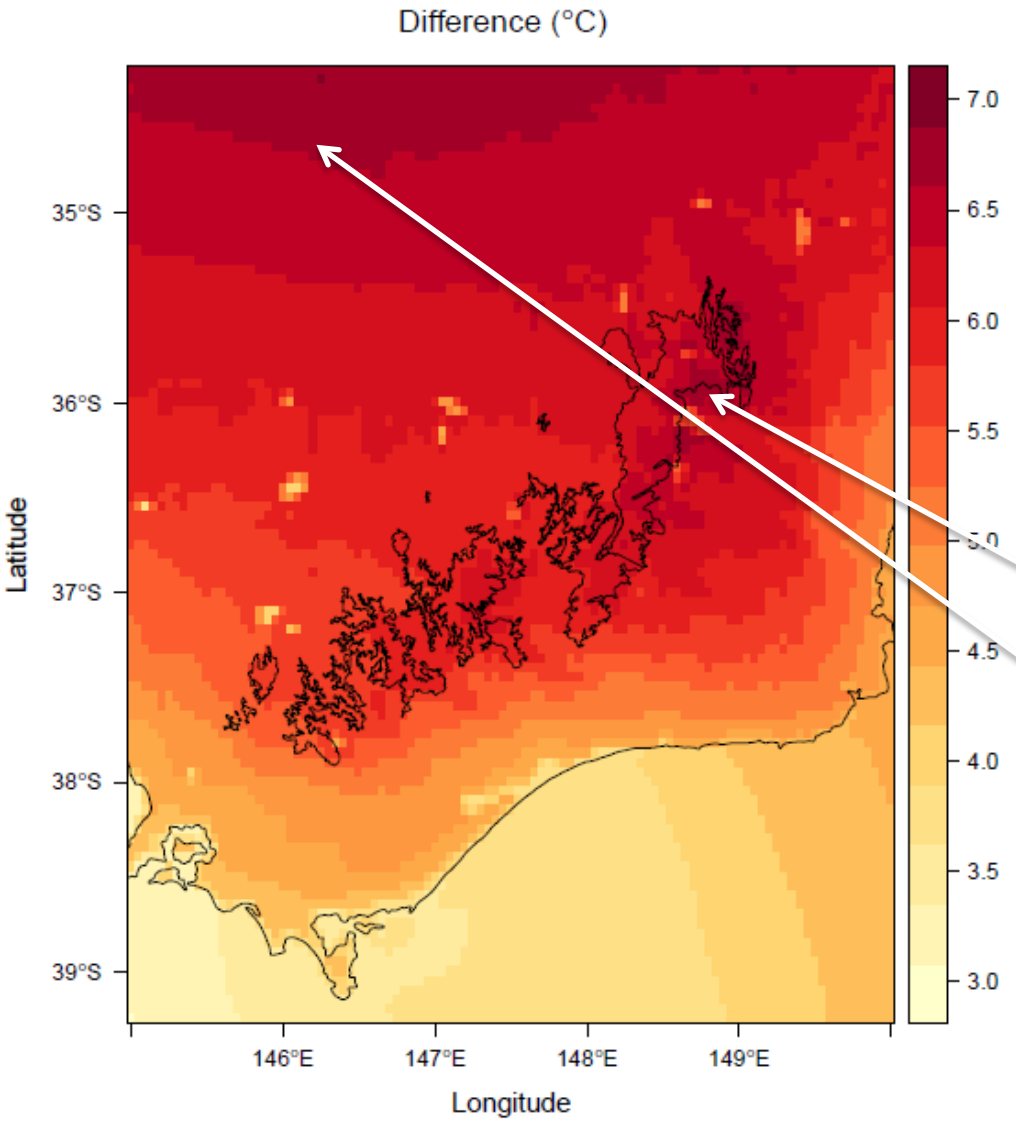


2015, CSIRO-MK30, RCP8.5



2085, CSIRO-MK30, RCP8.5

But, regional impacts more extreme



2070 to 2099 minus 1961 to 1990

- ✓ Warming everywhere
- ✓ Warming is non-uniform

Greater warming in lee of peaks

Greatest warming inland

- ✓ Coastal regions 3 degrees
- ✓ Inland greater than 7 degrees
- ✓ Northern Alps warm more.
- ✓ Southern Alps warm less

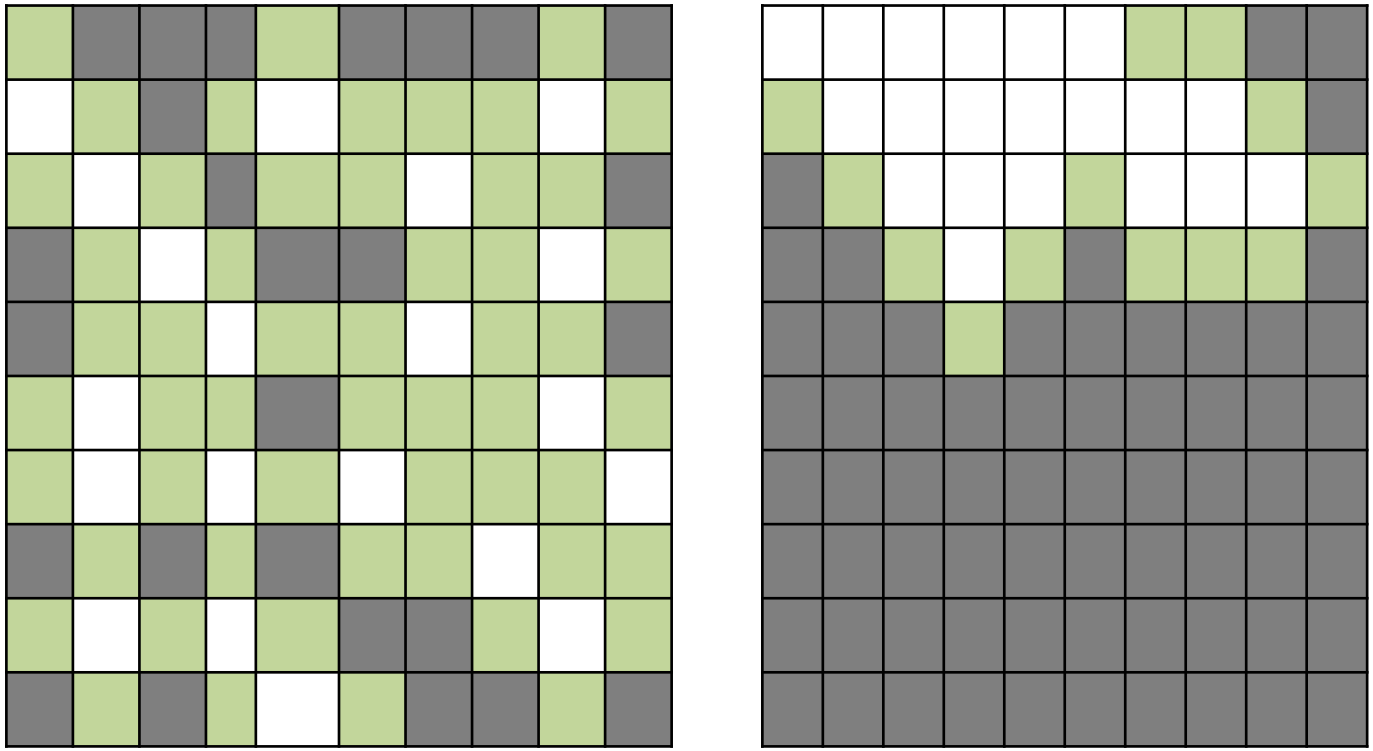
Source: Nathan Bindoff, UTas

More species will be on the move, needing more room

So, NATURE NEEDS HALF

And, not just any half

Theoretical habitat spatial configuration

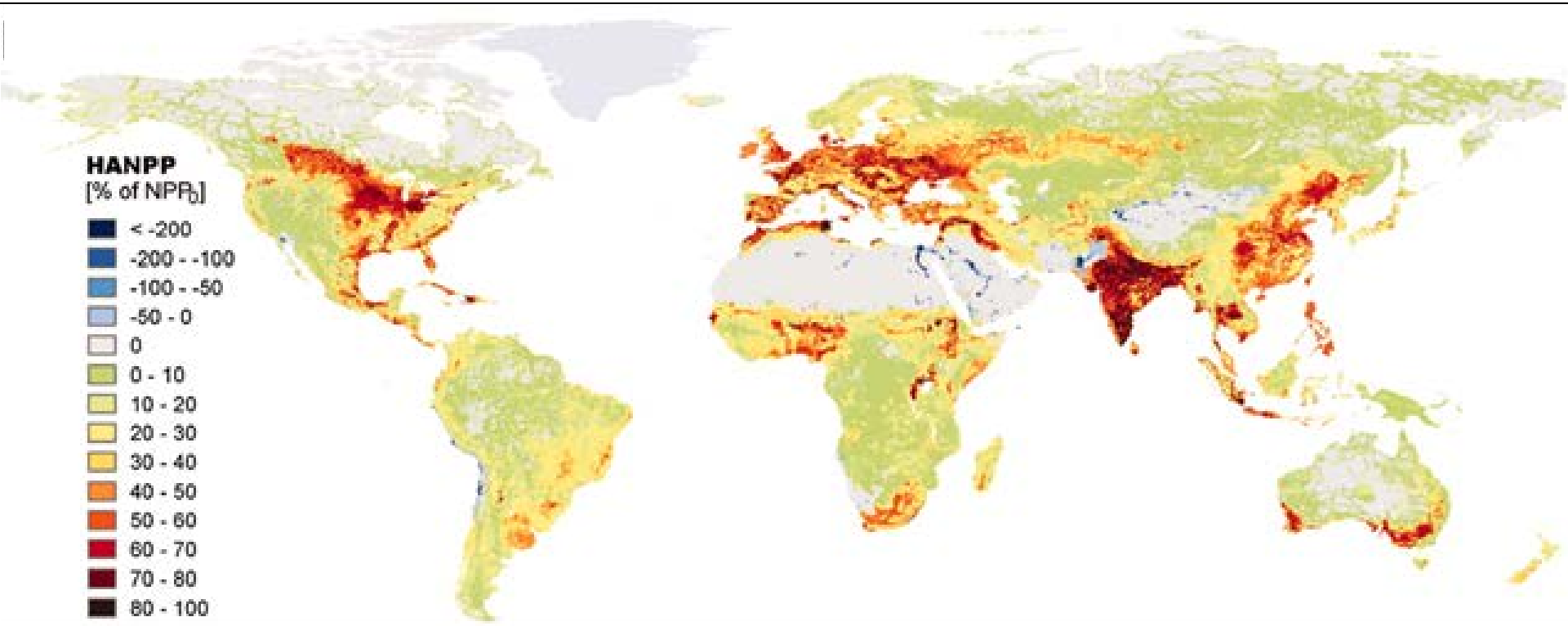


White = 20% cleared
Green = neighbouring cells degraded
Grey = intact habitat

Source: Woinarski & Trail, Planning for the conservation future of the Australian Outback, in press

Or the half we don't want

Human appropriation of natural net primary production (HANPP), excluding human-induced fires

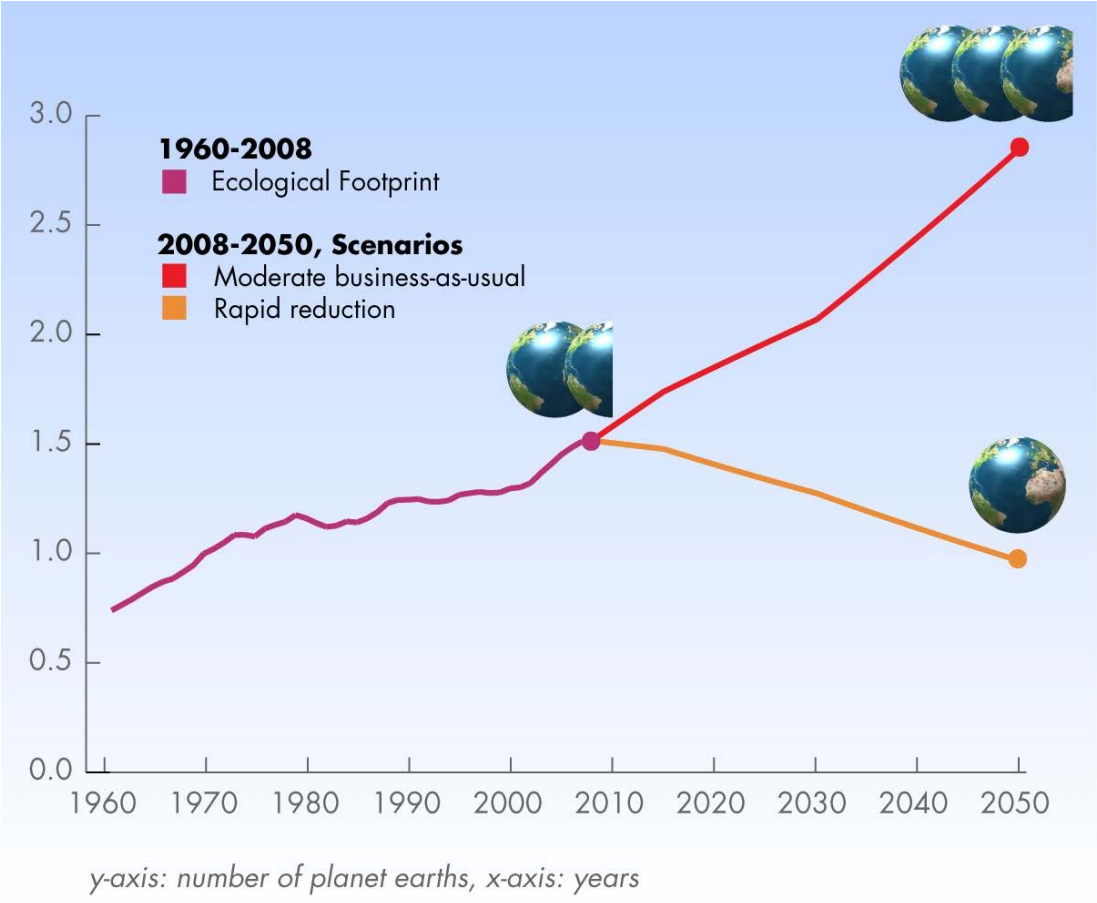


We have taken the most biologically productive lands for human use

Source: Haberl H. et al. PNAS (2007) 104:12942-12947

But, we must also address root cause of the problem

Making room for nature means reducing human ecological footprint by transforming *modes of production & consumption*



Source: http://www.footprintnetwork.org/

Solution?

Adopt *Contraction & Convergence* framework

1. Scientifically determine sustainable global cap for human appropriation of a resource = global budget = permissible consumption

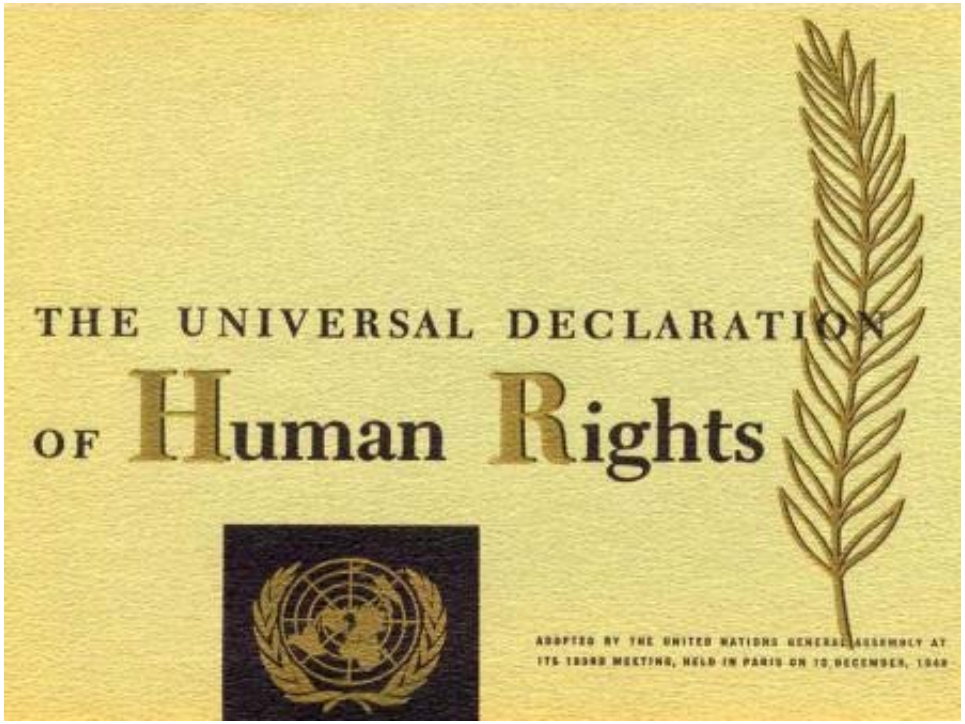
2. Distribute the global cap to countries on a per capita basis

3. Negotiate the year at which global consumption contracts to the sustainable level (i.e., to within the global cap)

4. Negotiate the year when national consumption rates converge to a common per capita value (i.e. rich countries given some time to reduce, while poor countries can increase)

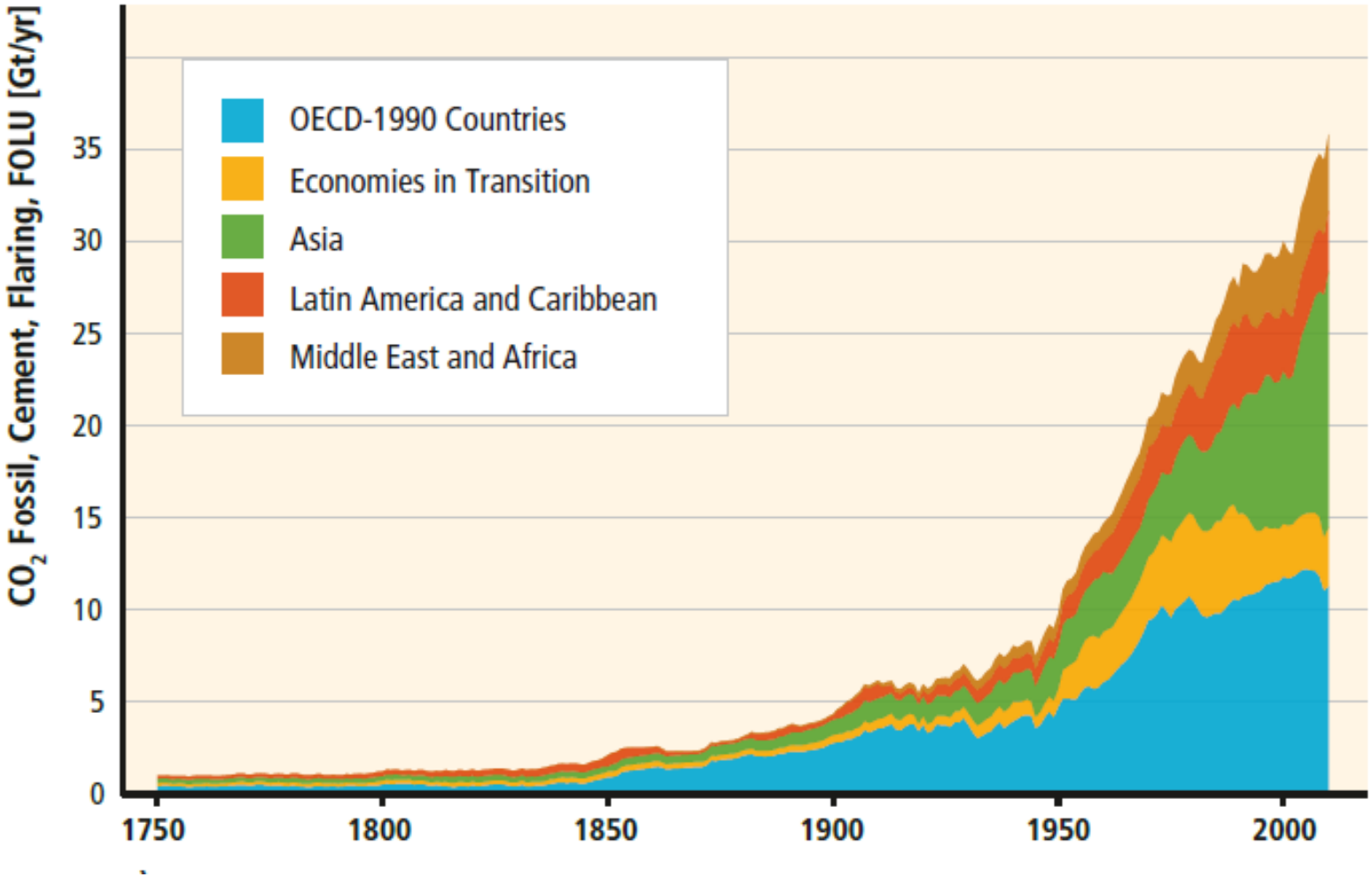
Per capita has a ‘hard to beat’ ethical basis

Article 1 All human beings are born free and equal in dignity and rights. They are endowed with reason and conscience and should act towards one another in a spirit of brotherhood.



So, what would a C&C approach look like for carbon, land, water and animal protein?

Global GHG emissions

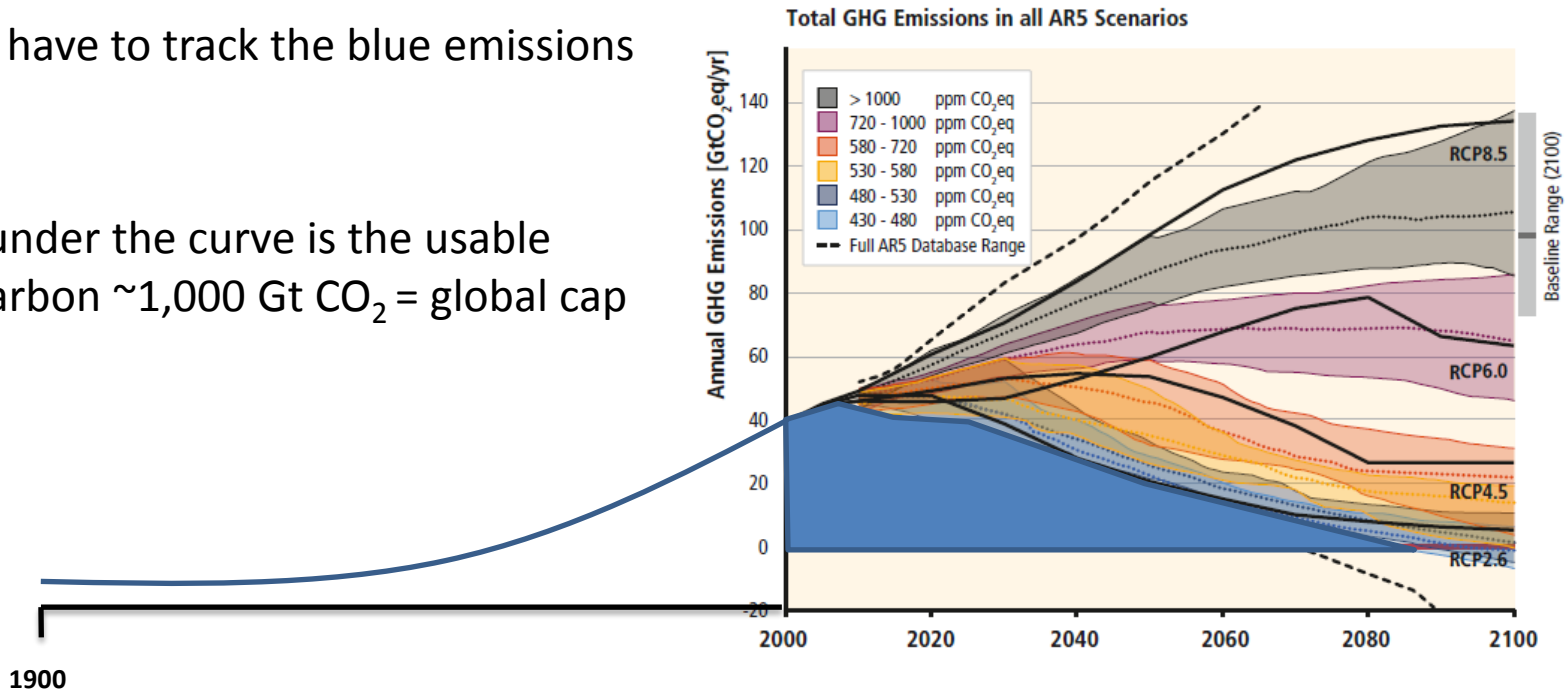


Source: IPCC AR5

How much do we have to reduce GHG emissions to limit warming to 2 degrees?

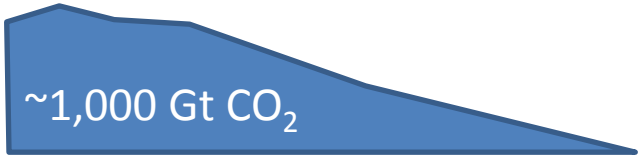
Emissions have to track the blue emissions curve

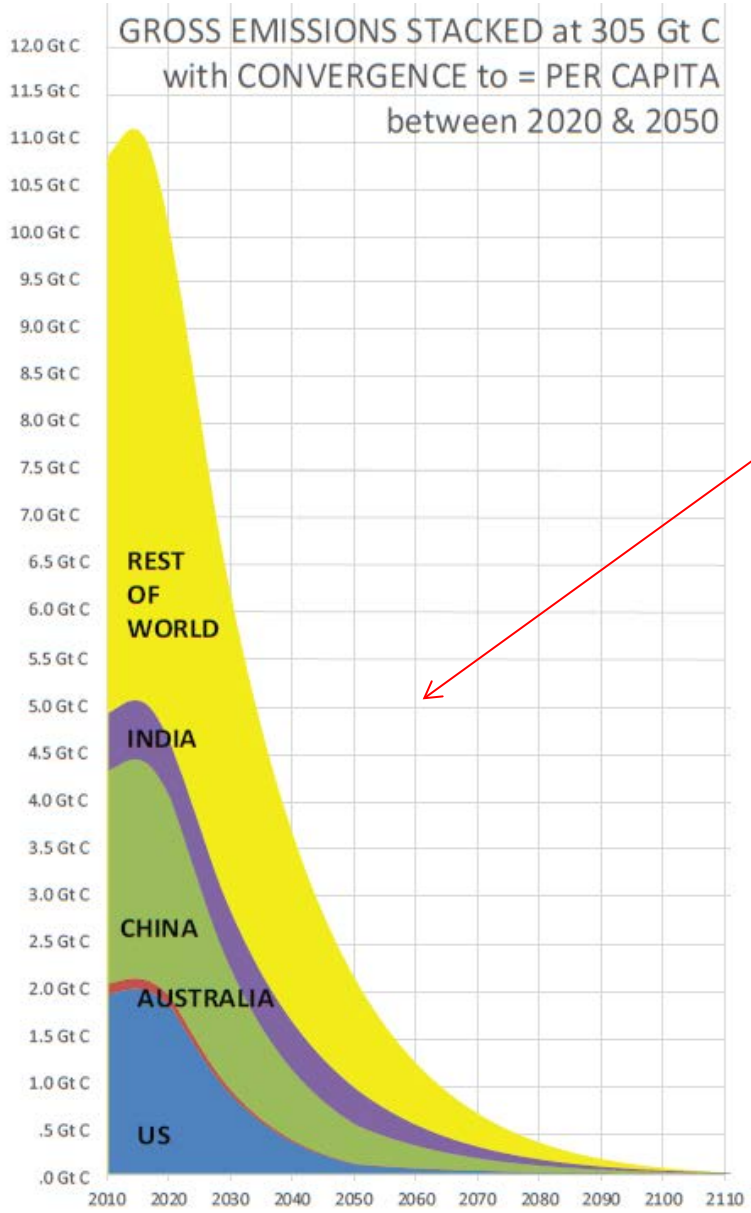
The area under the curve is the usable stock of carbon ~1,000 Gt CO_2 = global cap



Source: IPCC AR5 WGIII

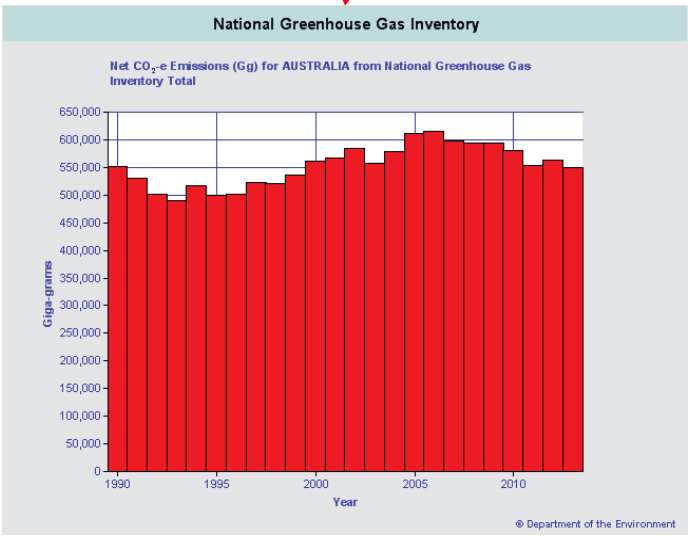
But who gets the usable carbon?





Global cap (budget) is ~1,000 Gt CO_2

Australia's C&C share of the global carbon budget 2010-2100 is about 9 Gt CO_2
which is around 16 years of our current business-as-usual emissions



Source: Australian Government

Source: **Aubrey Meyer** www.gci.org; as used in Mackey B. (2015) Mitigation Policy Options for the Paris Agreement A submission to the public consultation on The Australian Government's post-2020 emissions reduction target; http://www.griffith.edu.au/__data/assets/pdf_file/0009/708687/AustraliaMiigationTarget-MackeySubmissionCorrections.pdf

Animal protein

GHG emissions from agriculture sector account for ~22% of global total emissions and livestock production accounts for nearly 80% of the sector's emissions

Source: McMichael et al. ***Lancet*** 2007; 370: 1253–63

Live stock production and consumption is increasing

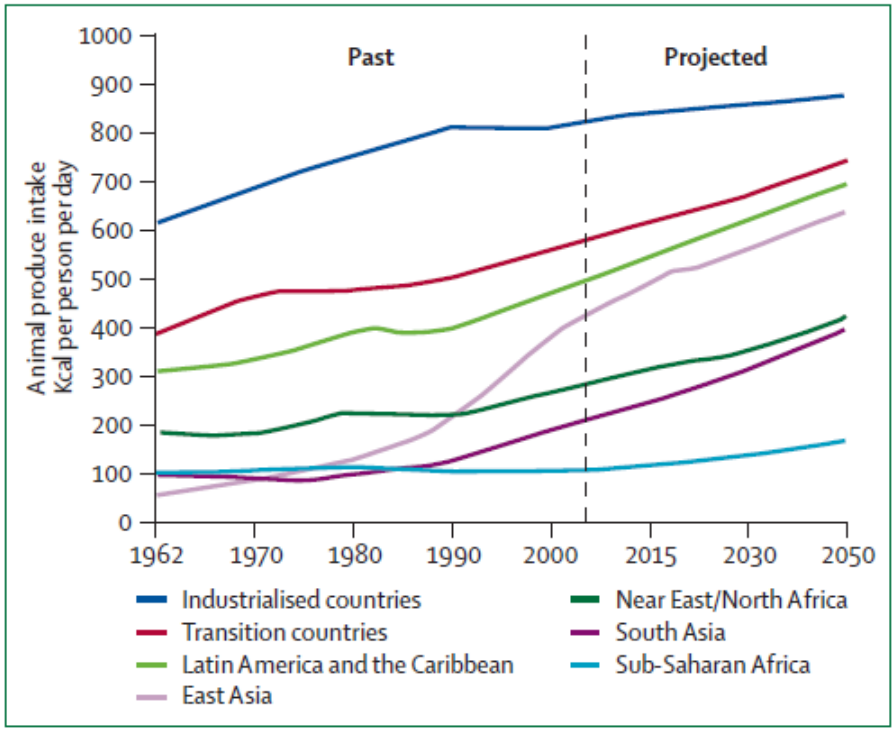


Figure 1: Trends in consumption of livestock products per person (milk, eggs, and dairy products, excluding butter)

Animal protein

	Daily meat consumption per person (g)
Africa	31
East and south Asia	112
West Asia (including Middle East)	54
Latin America	147
Developing countries (overall)	47
Developed countries (overall)	224
Total	101

Quantities actually ingested will be lower, especially in high-income countries, where the proportion wasted is higher. 80–100 g of meat is roughly equivalent to a beef pattie in a regular hamburger. An American quarter-pounder is about 115 g of meat.

Table 1: **Daily meat consumption, by region**[43]

Source: McMichael et al. ***Lancet*** 2007; 370: 1253–63

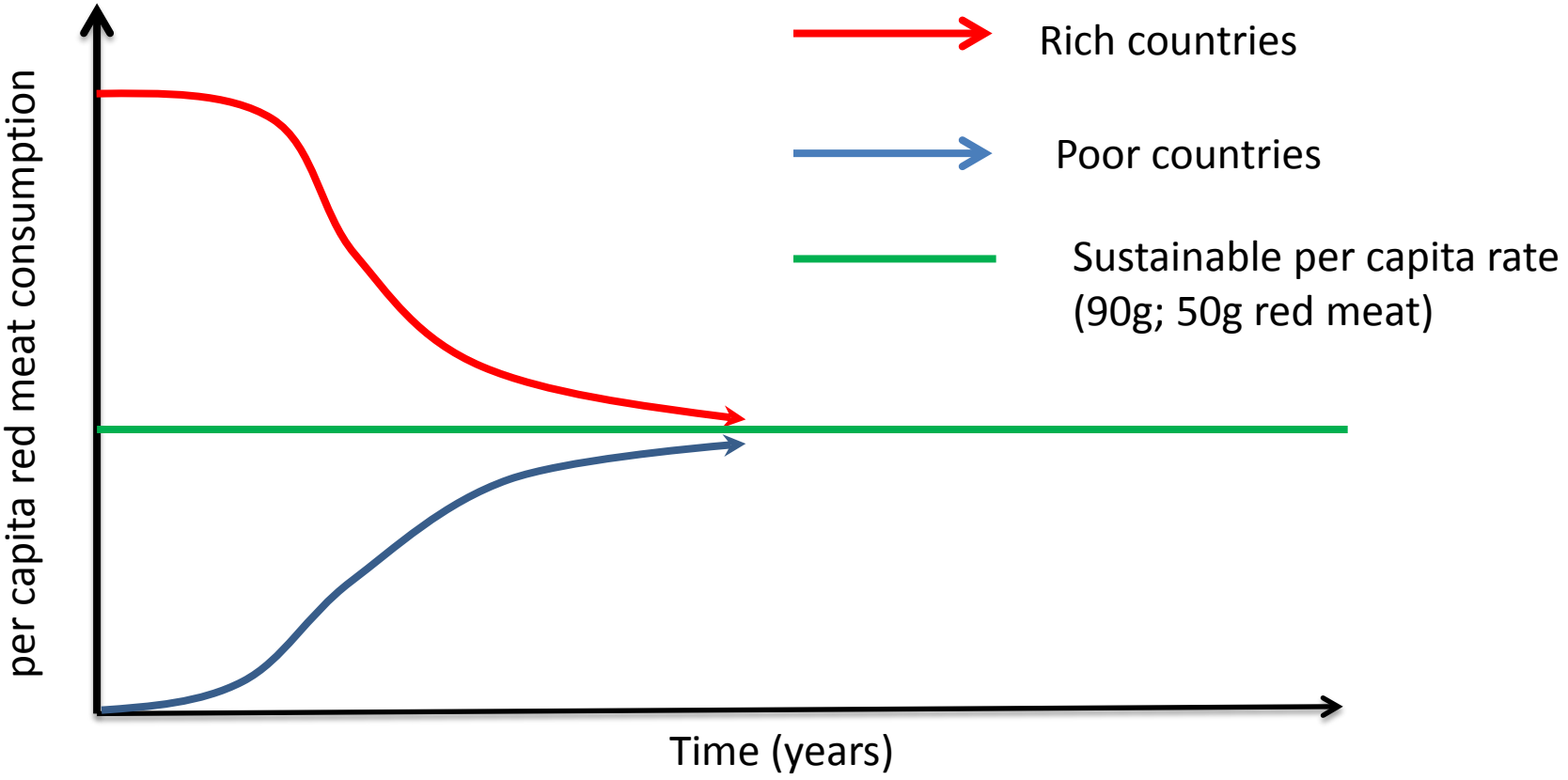
"If we agree on the target that greenhouse-gas emissions from agriculture in 2050 should be limited to no more than their 2005 levels…

…and assuming a 40% increase in global population by 2050 and no advance in livestock related greenhouse-gas reduction practices…

… global meat consumption would need to fall to 90 g per person per day just to stabilise emissions from this sector; not more than 50 g of this should come from red meat from ruminant (methane producing) animals…

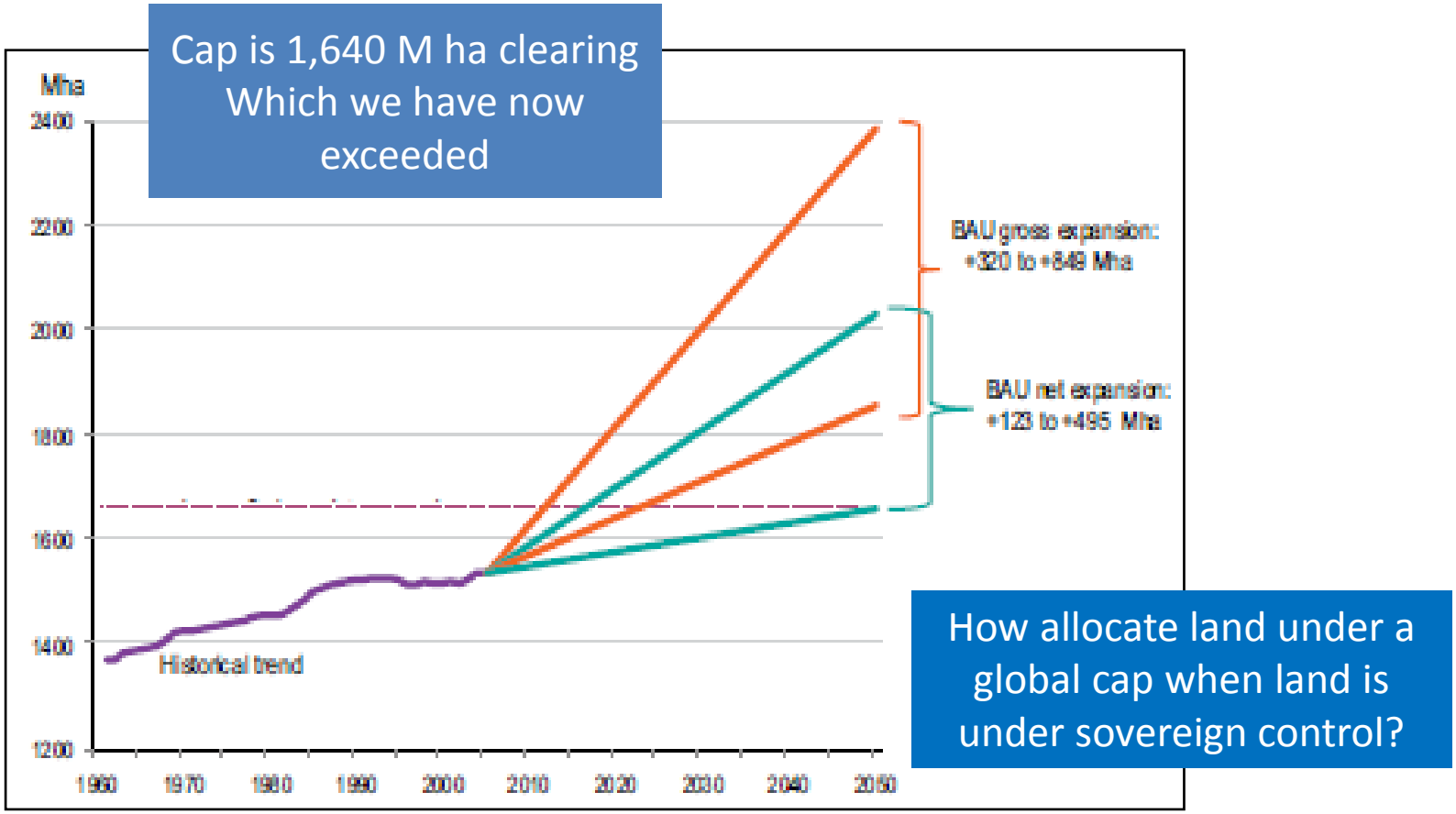
…This would require a substantial reduction of meat consumption in industrialised countries and constrained growth in demand in developing countries"

Contraction & convergence for animal protein



Apply a contraction and convergence strategy to reduce consumption of livestock products: contraction of livestock consumption consumption in high-income countries per head would converge with increasing consumption in lower income countries towards the agreed global, sustainable per capita level

Land

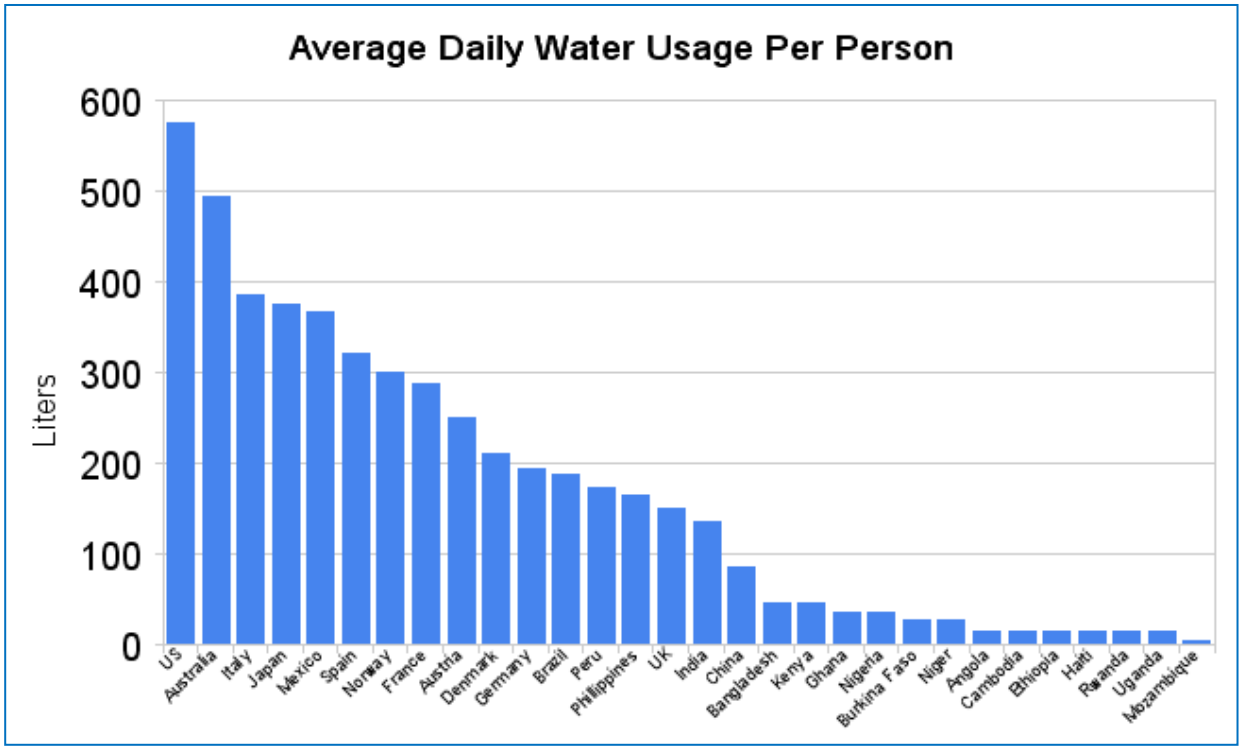


Source: UNEP (2014) Assessing Global Land Use: Balancing Consumption with Sustainable Supply.

Fresh water

Only 0.5%% of the world's fresh water is accessible for direct human uses & available on a sustainable basis = 10.27M km^3

Fresh water is scarce, unevenly distributed and under sovereign control, and no discussion of global regulation even though parallels with carbon are strong



Source: UNDP Human Development Report 2006

Is this approach feasible?

No obvious mechanisms to distribute land area, animal protein and water entitlements through a Contraction & Convergence approach

We would need major reforms in global governance, including new legal instruments and institutions

We have done this before…

- ✓ United Nations
- ✓ Bretton Woods Institutions (the World Bank and the International Monetary Fund)
- ✓ UNFCCC

World Environment Organisation

Bosselmann, Brown & Mackey (2012)* proposed global institutional reform through establishment of a *World Environment Organization* whose mandate would encompass:

1. Global obligations for the integrity of planetary boundaries and the wellbeing of the greater community of life;
2. Overseeing markets to ensure that they are protective of non-market common goods; and
3. Ensuring impartiality between all interests – individual, civil society, corporate, national – along with respect for human rights and concern for ecological wellbeing

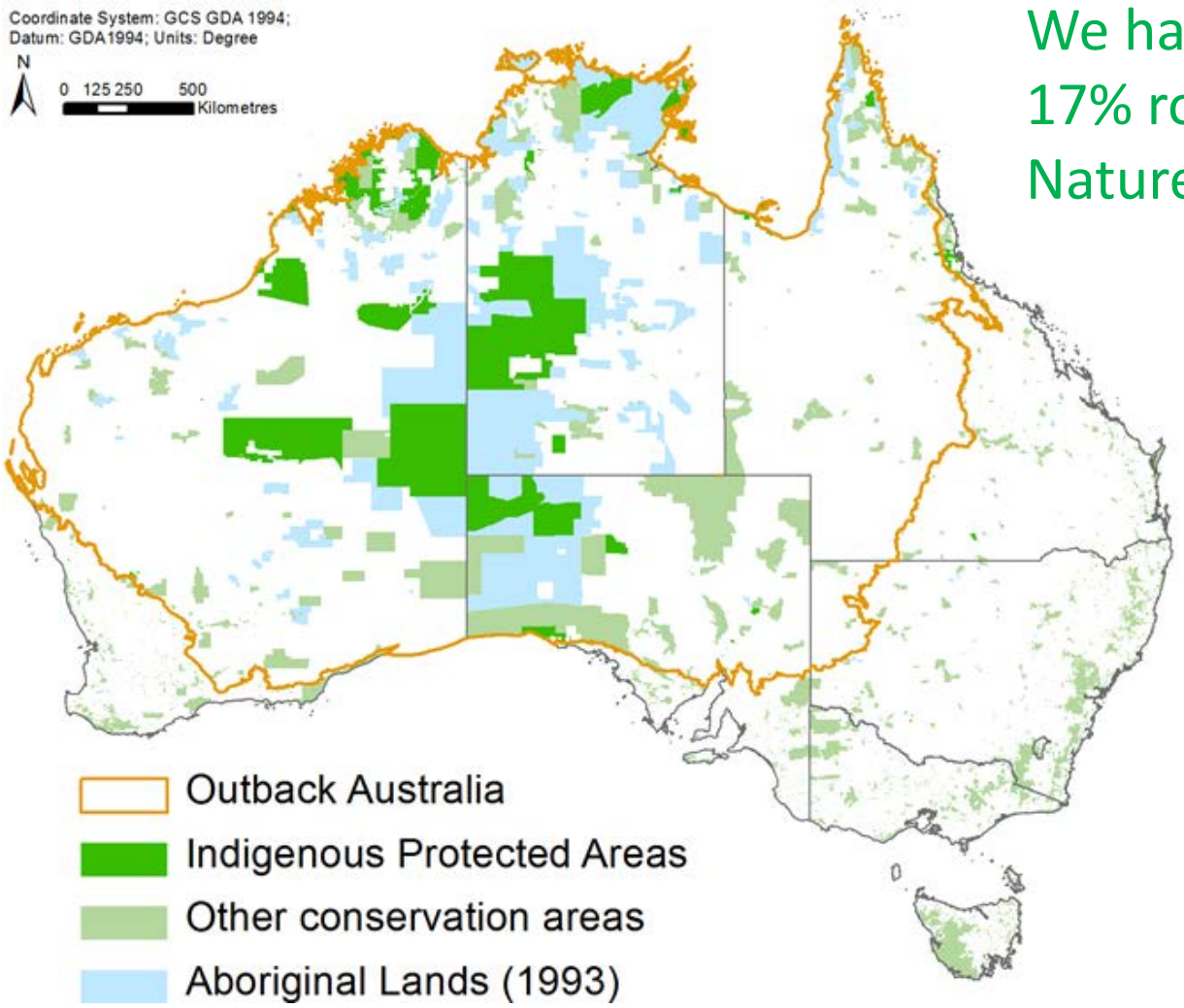
Additional global reforms could include establishment of Global Common Wealth Trust Funds based on recognition of land, carbon & water as global life-support resources

Global caps for these life-support resources, and their national allocations, could be calculated through application of a C&C framework, with national law then be tailored to enable commerce and consumption within these caps, including international trade.

*Klaus Bosselmann, Peter G. Brown, and Mackey B. (2012) Enabling a Flourishing Earth: Challenges for the Green Economy, Opportunities for Global Governance. *Review of European Community & International Environmental Law* **21**, 23-39

But, Nature can't wait and she still needs half

Australia's getting there!

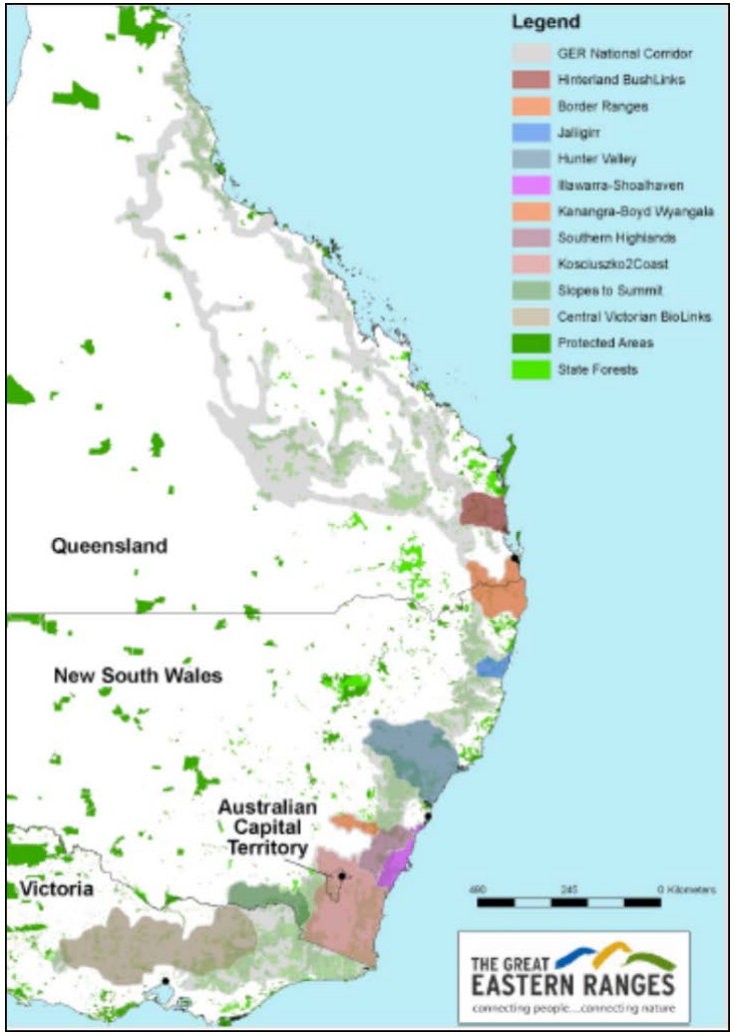


We have made 17% room for Nature

Source: Woinarski & Trail, Planning for the conservation future of the Australian Outback, in press

And the community is responding

The Great Eastern Rangers Initiative: making room for Nature under a rapidly changing climate…



GERI brings people and organisations together to protect, link and restore healthy habitats over 3,600 km from Western Victoria through NSW and the ACT to far North Queensland