



Per Fugelli Lecture 2015

Andy Haines



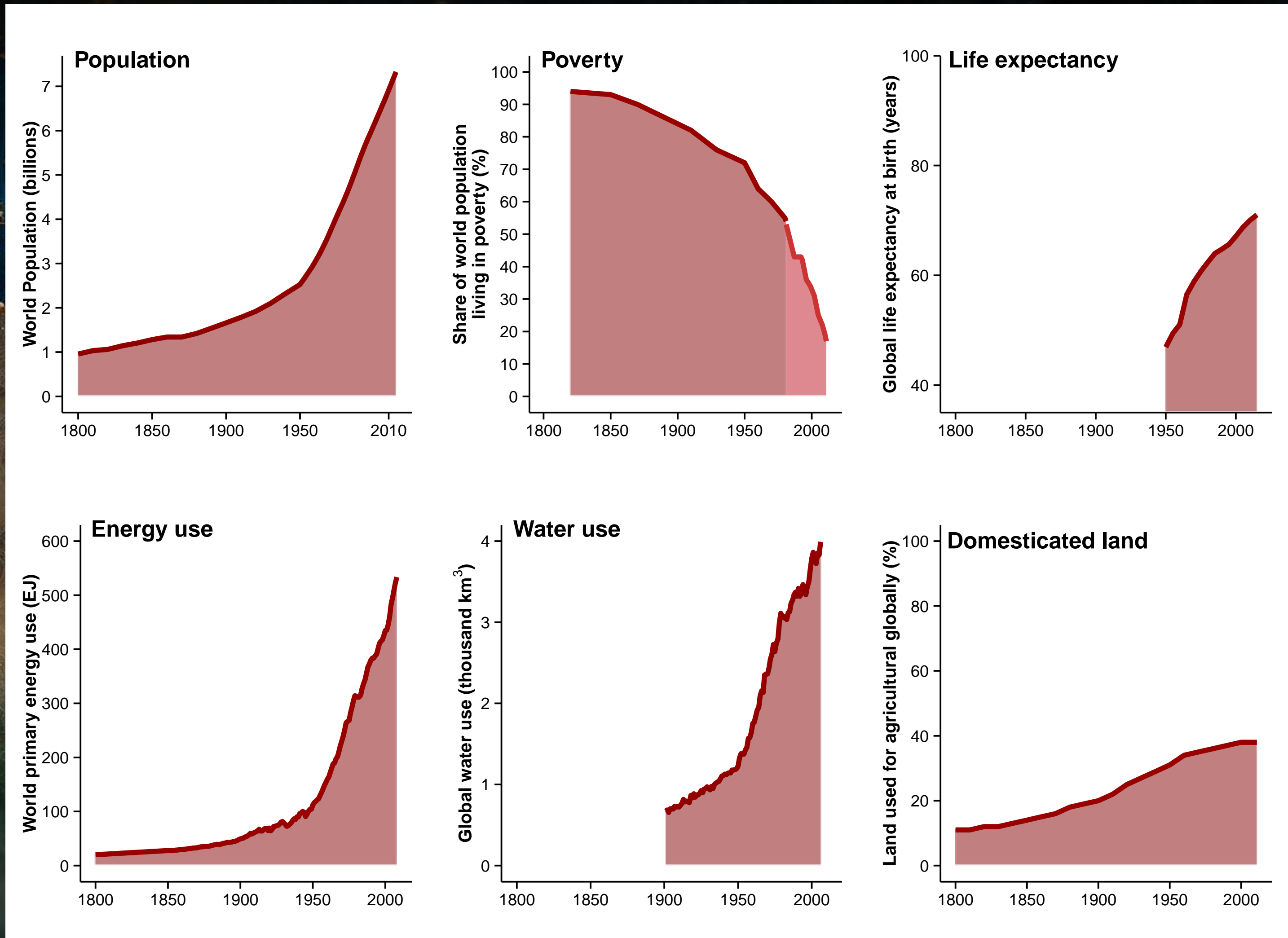
LONDON SCHOOL of HYGIENE & TROPICAL MEDICINE

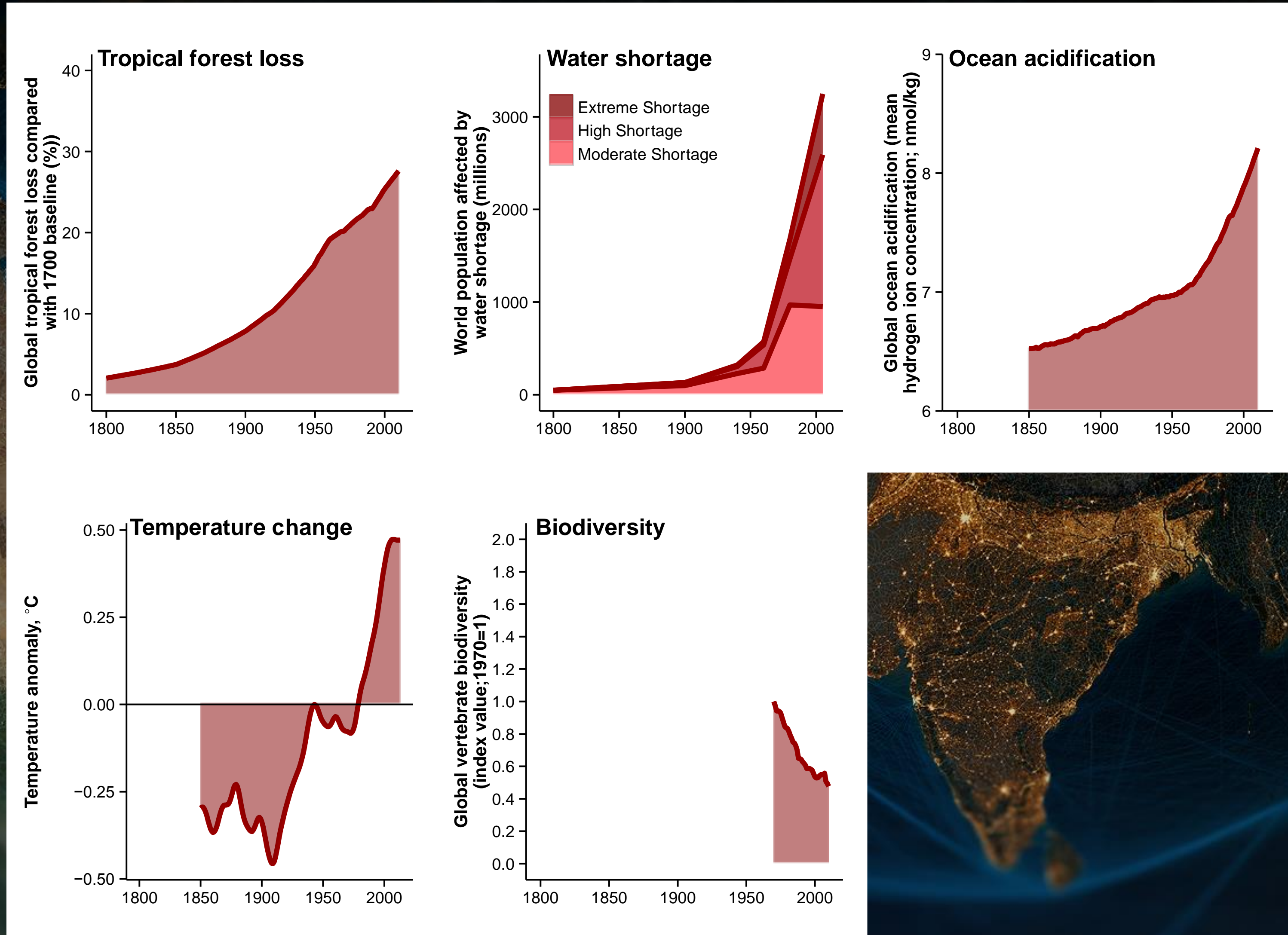


The
ROCKEFELLER
FOUNDATION

THE LANCET

Commission on Planetary Health



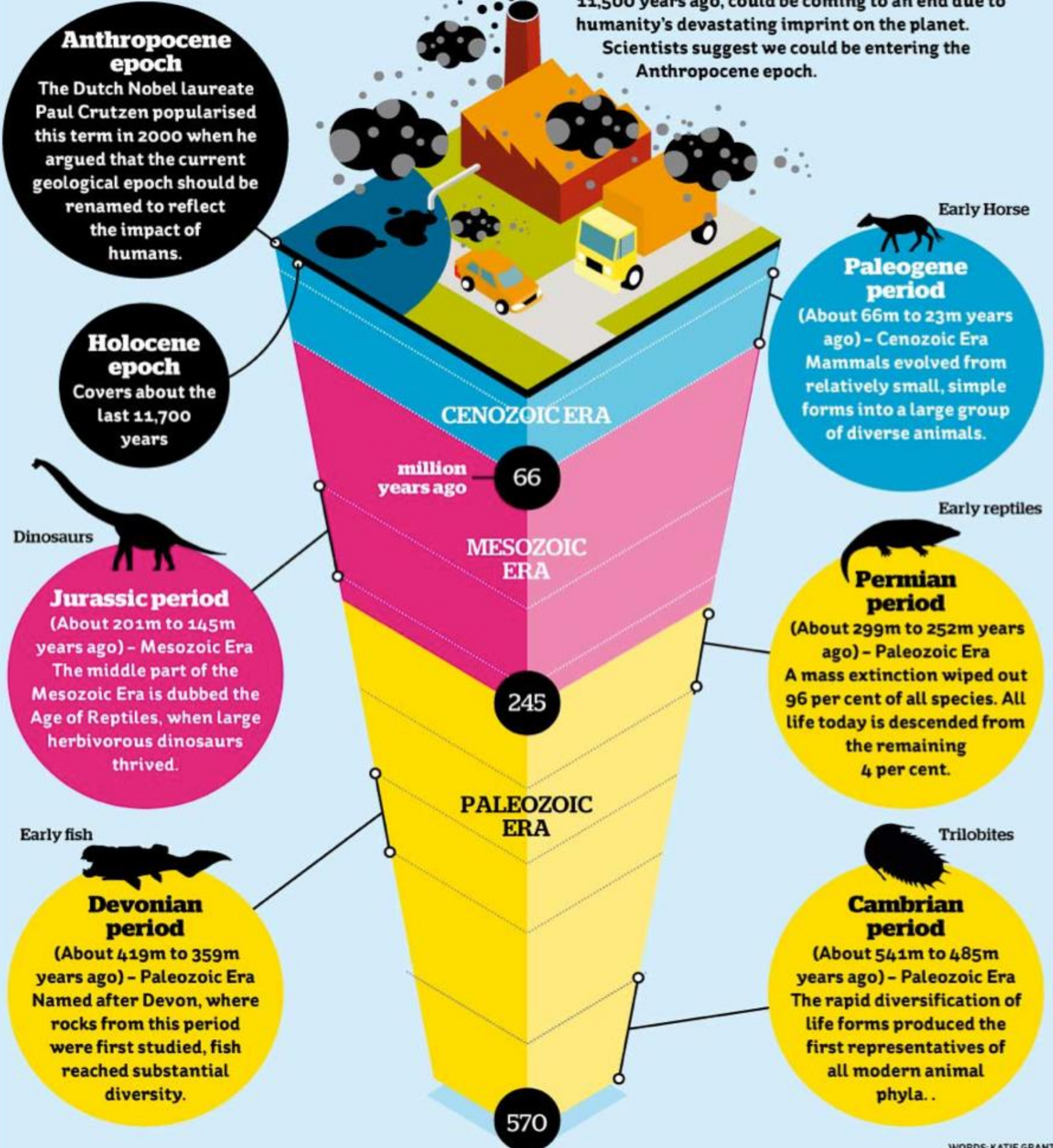




TIMELINE

An epoch for humankind?

Humankind is entering a new epoch, according to an influential group of geologists, ecologists and climate experts. The Holocene epoch, which began roughly 11,500 years ago, could be coming to an end due to humanity's devastating imprint on the planet. Scientists suggest we could be entering the Anthropocene epoch.



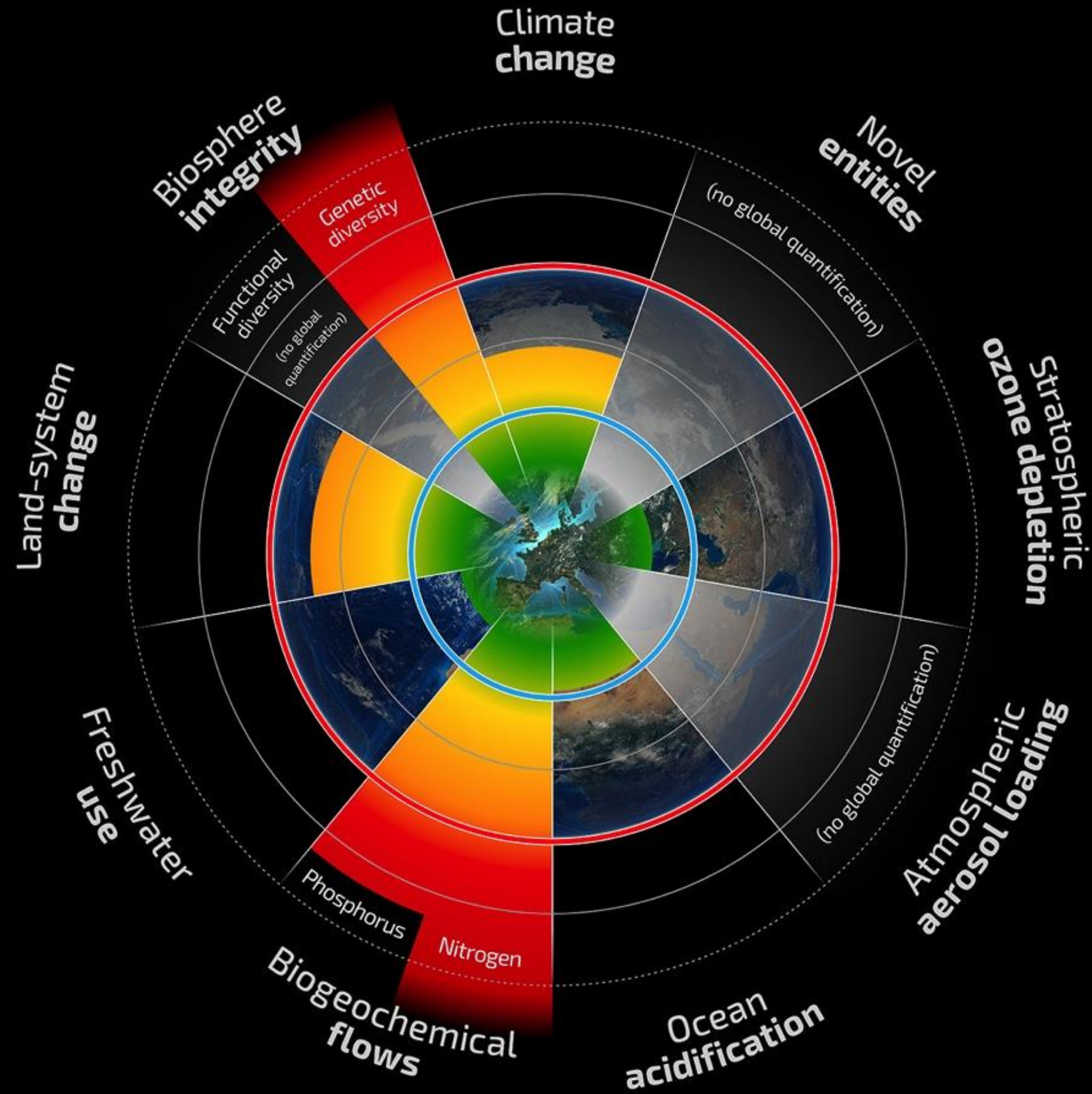
WORDS: KATIE GRANT

The Anthropocene epoch



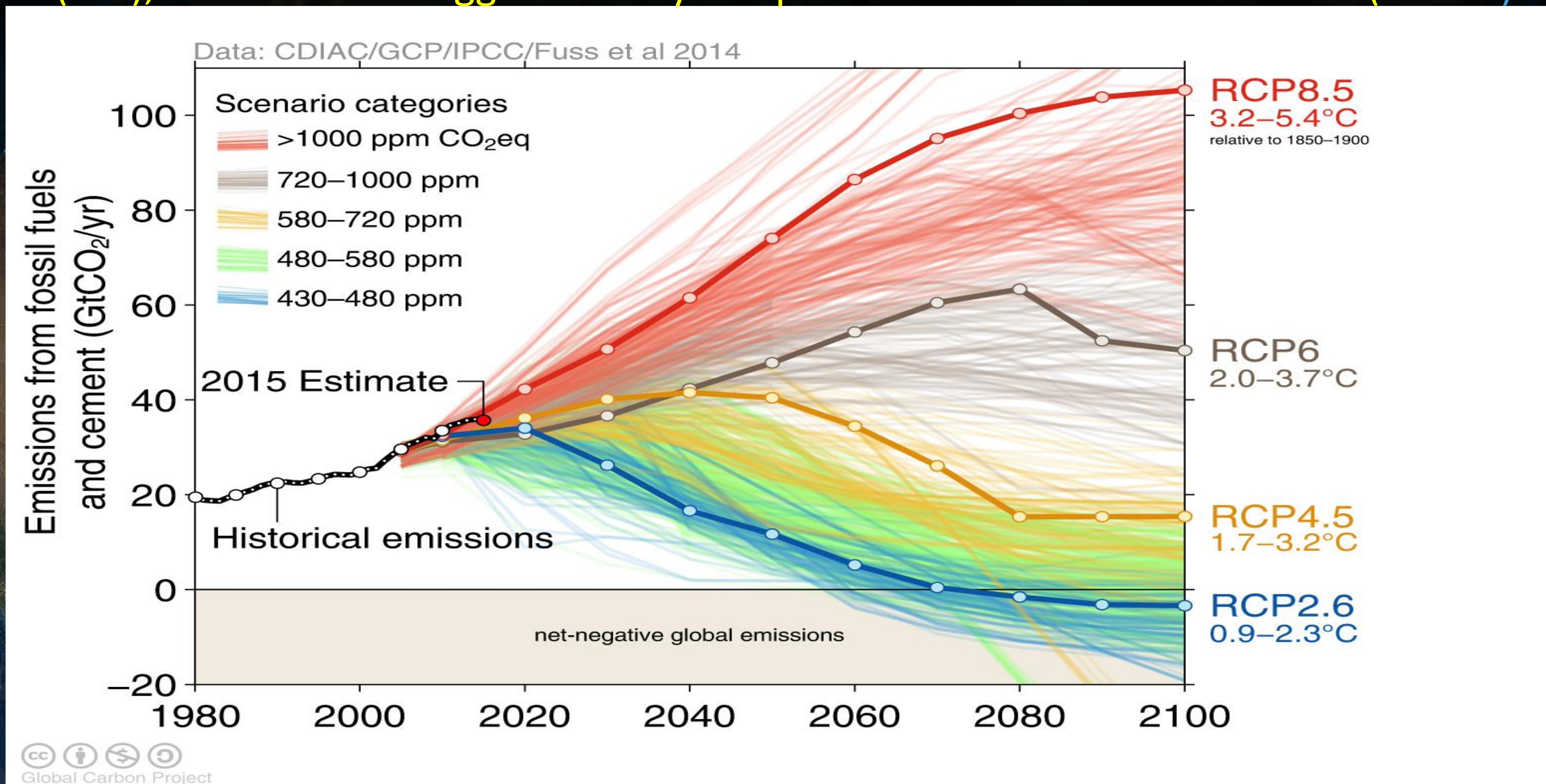
Planetary boundaries

(Steffen et al Science 2015)



Observed emissions and emissions scenarios

The emission pledges submitted to the Paris climate summit avoid the worst effects of climate change (red), most studies suggest a likely temperature increase of about 3°C (brown)

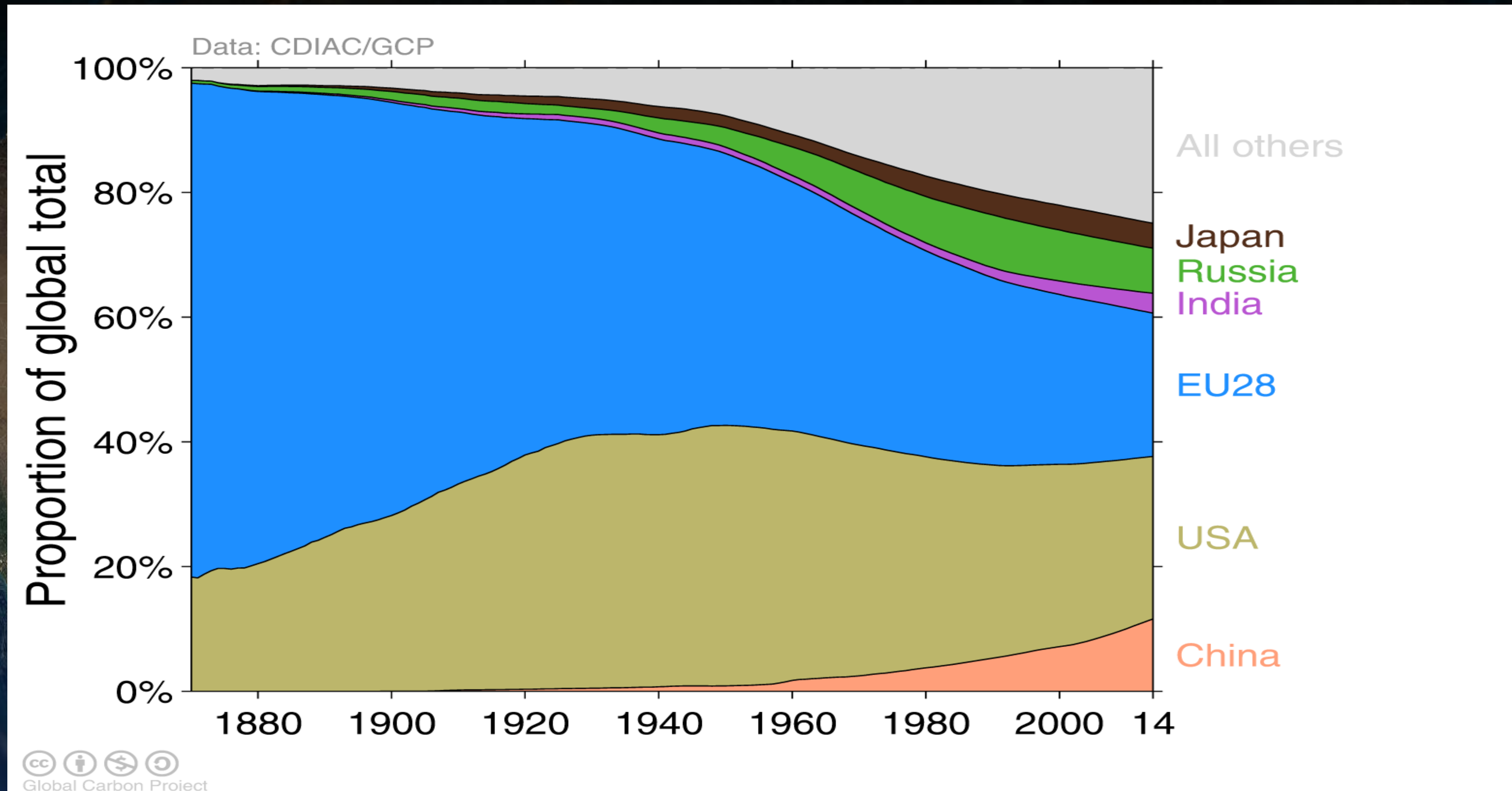


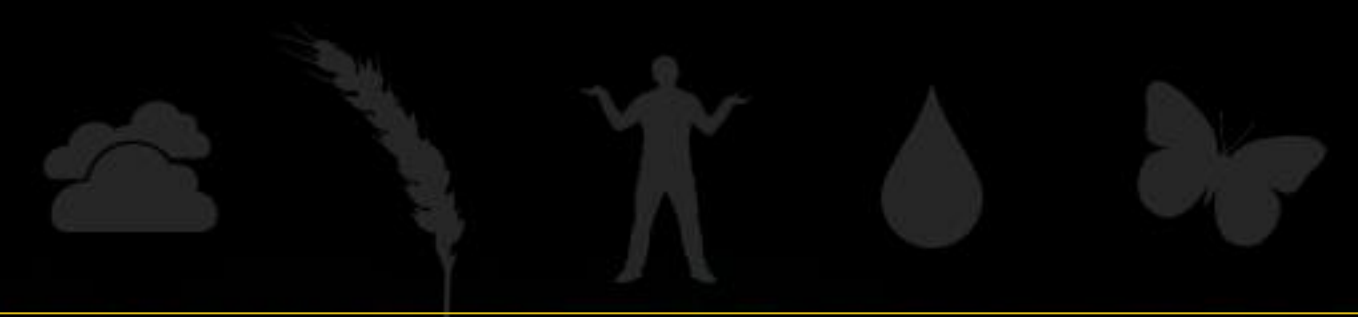
Over 1000 scenarios from the IPCC Fifth Assessment Report are shown

Source: [Fuss et al 2014](#); [CDIAC](#); [Global Carbon Budget 2015](#)

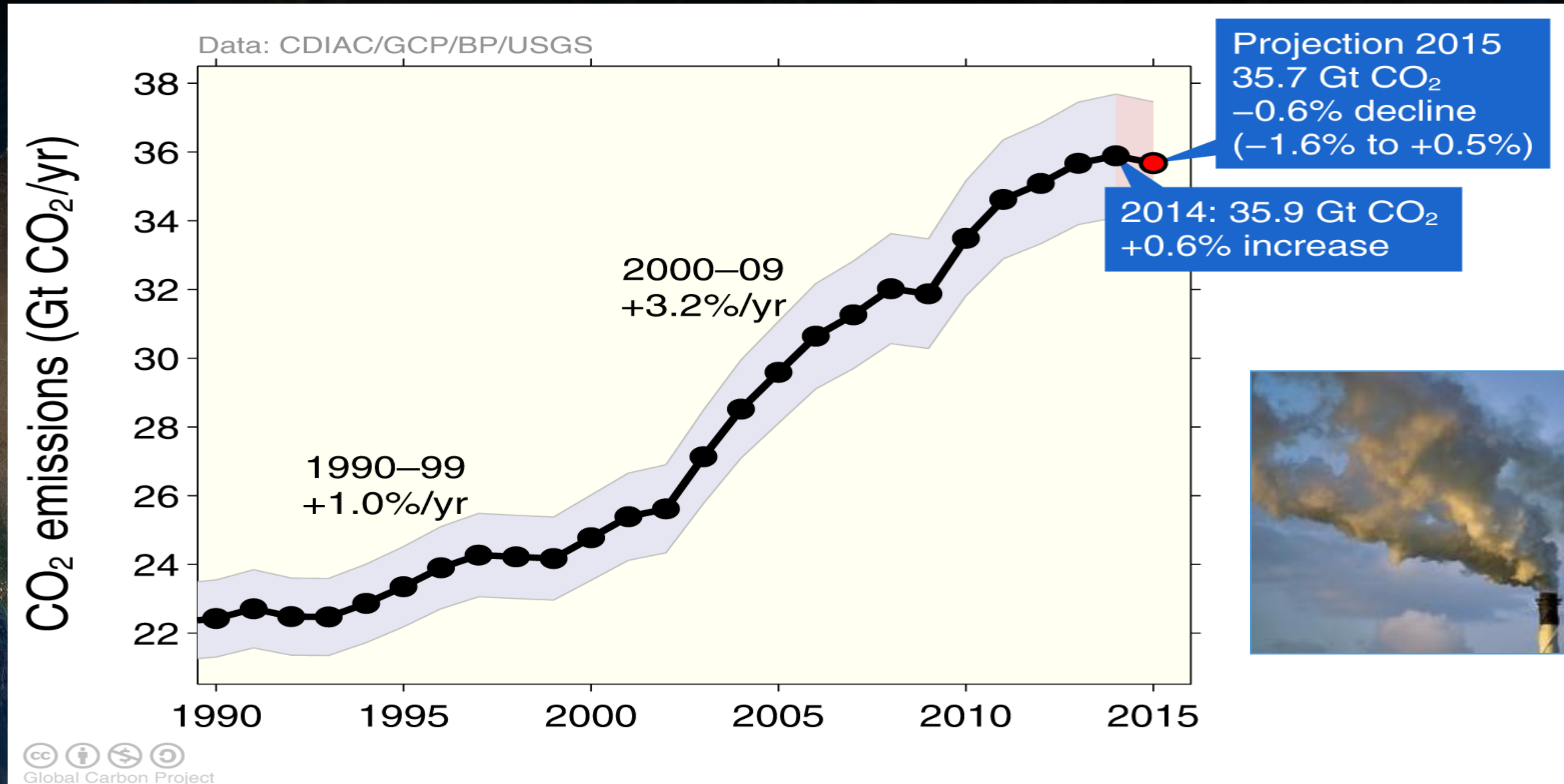
Historical cumulative GHG emissions by country

Cumulative emissions from fossil-fuel and cement were distributed (1870–2014): USA (26%), EU28 (23%), China (12%), and India (3%) covering 64% of the total share





CO₂ Emissions from fossil fuel use and industry

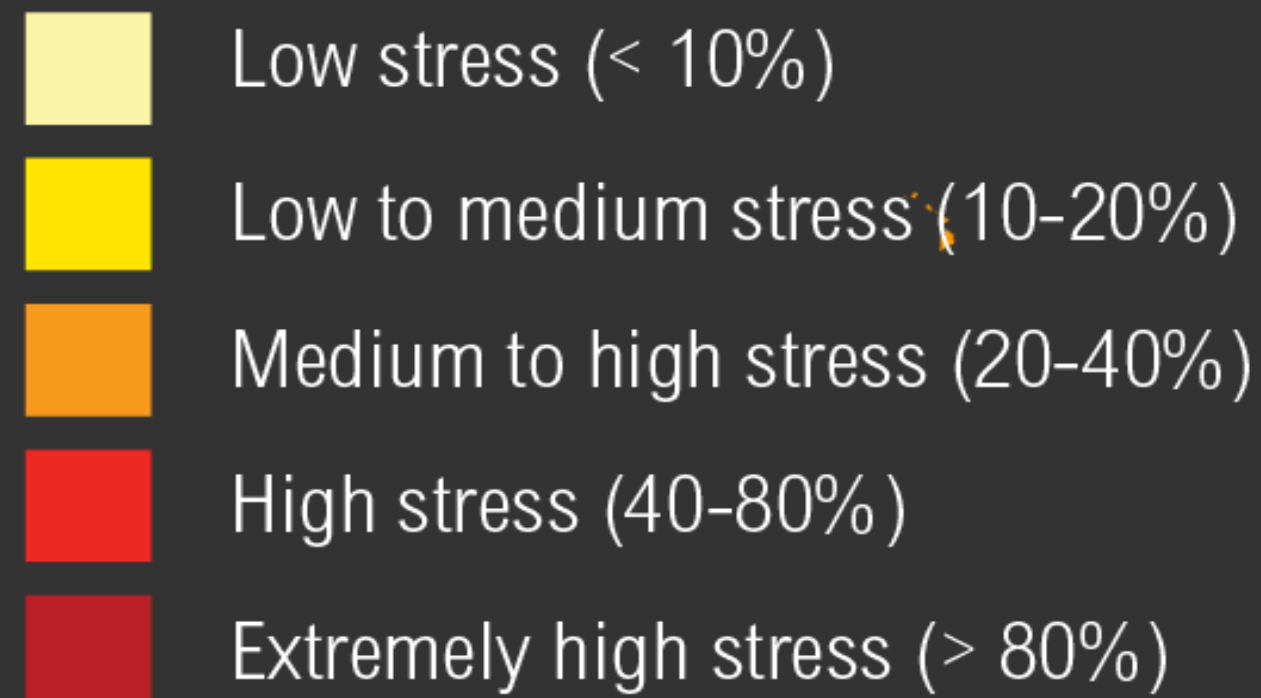


Estimates for 2012, 2013, 2014, and 2015 are preliminary
 Source: [CDIAC](#); [Le Quéré et al 2015](#); [Global Carbon Budget 2015](#)

Uncertainty is $\pm 5\%$ for one standard deviation (IPCC "likely" range)

WATER STRESS BY COUNTRY

ratio of withdrawals to supply

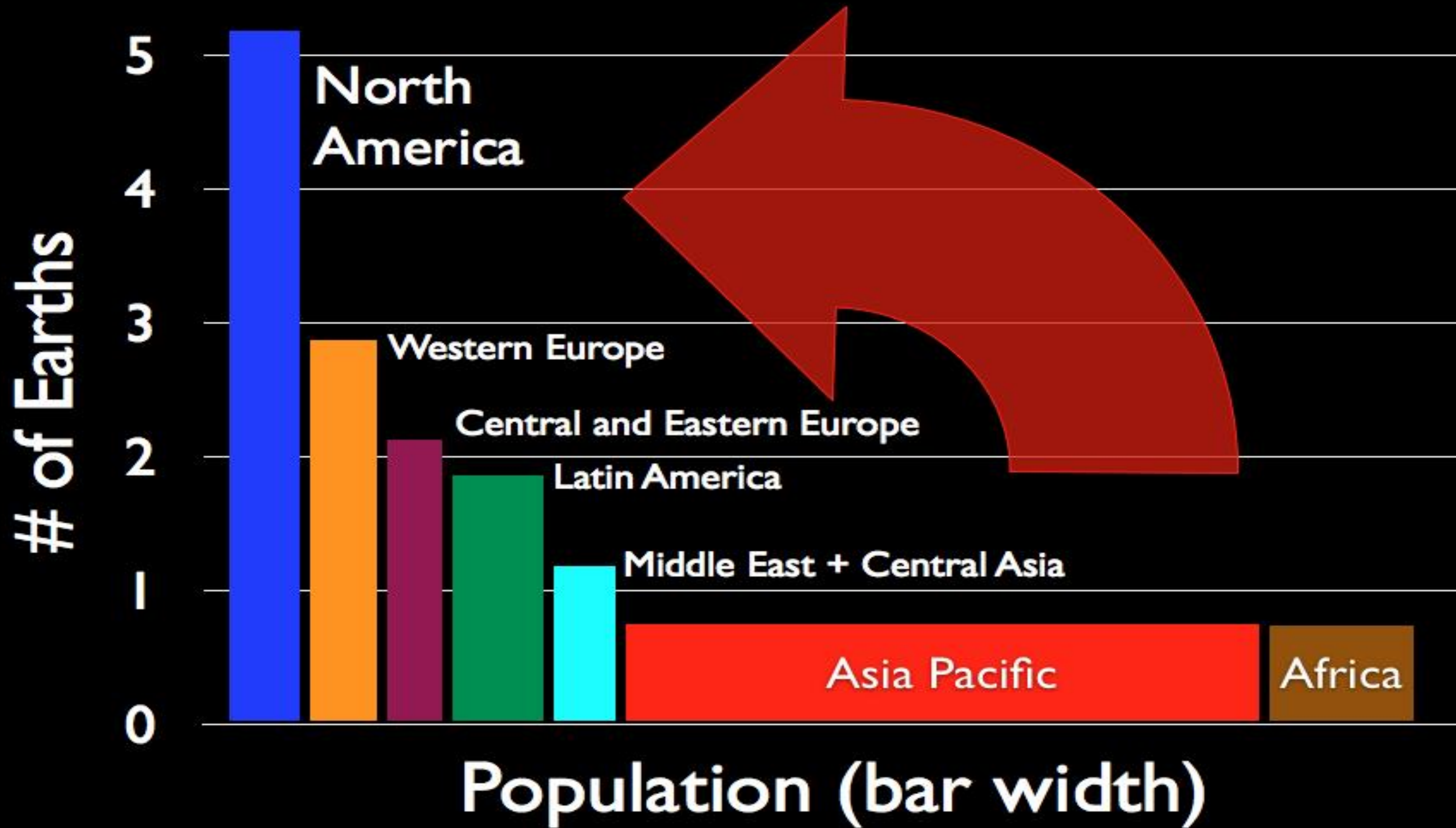


This map shows the average exposure of water users in each country to water stress, the ratio of total withdrawals to total renewable supply in a given area. A higher percentage means more water users are competing for limited supplies. Source: WRI Aqueduct, Gassert et al. 2013





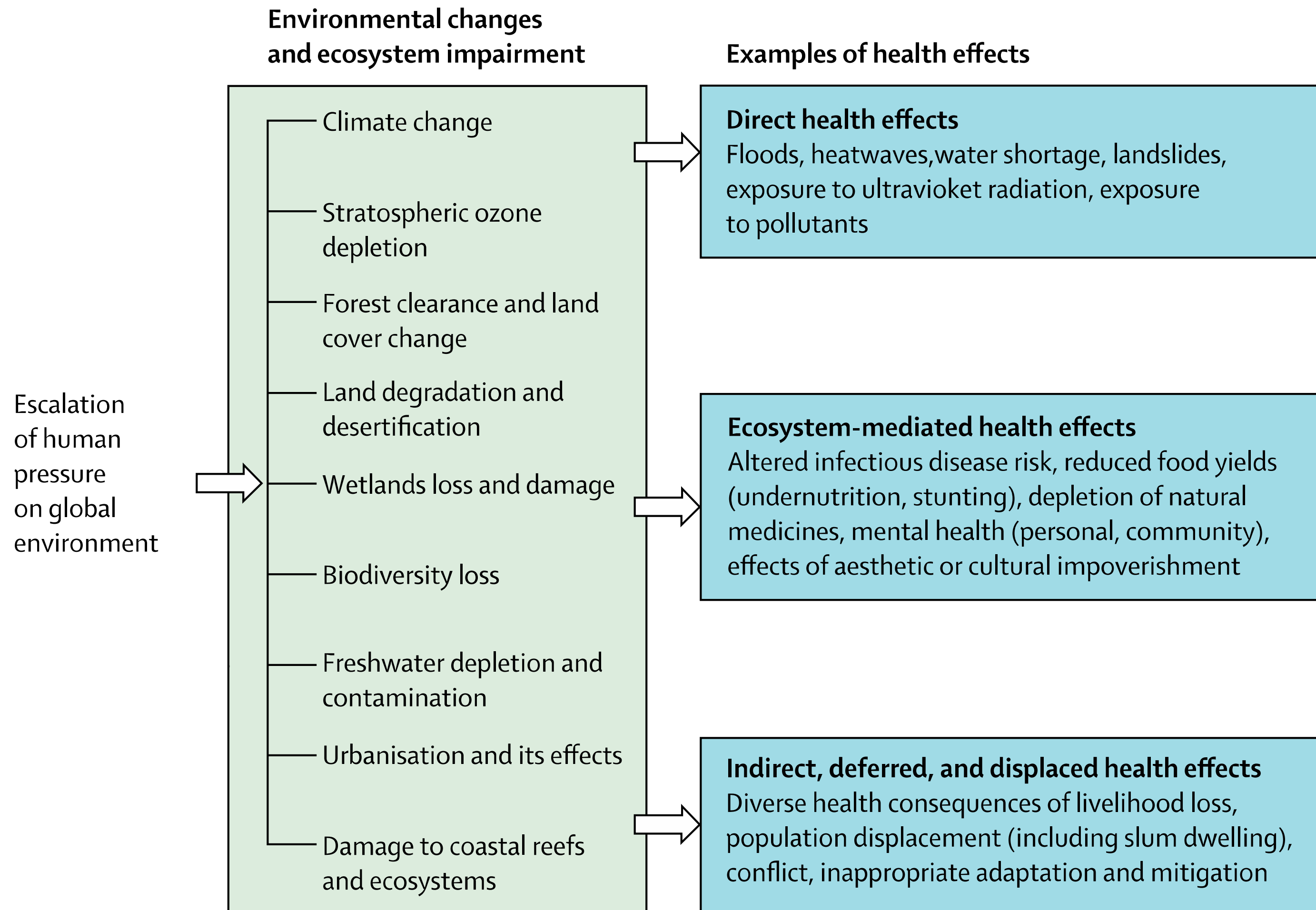
Our Global Ecological Footprint



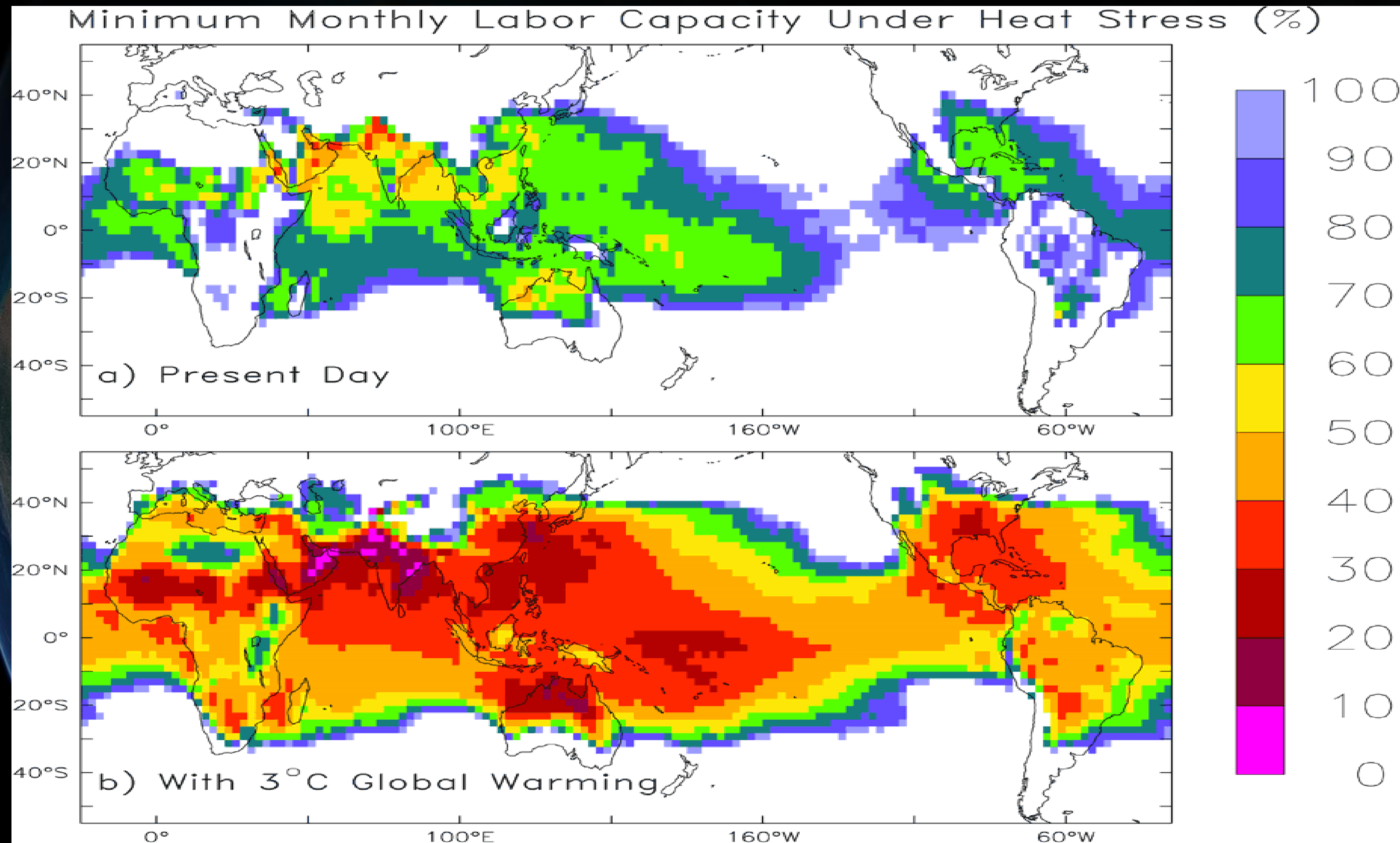


What is

“ Put simply, planetary health is the health of human civilisation and the state of the natural systems on which it depends. ”



Inability to work due to thermal stress



Geophysical Fluid Dynamics Laboratory
National Oceanic and Atmospheric Administration

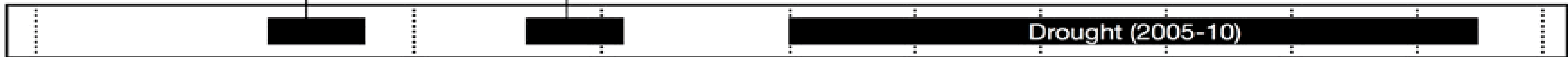
Record drought in Syria – risk more than doubled by climate change

Timeline of Events Prior to the 2011 Uprising

1970s-1990s

Agricultural policies promote production of staple crops, leading to increase in number of groundwater wells and use of inefficient and outdated irrigation methods

Drought (1988-1993) Drought (1998-2000)



1971

1995

2000

2005

2006

2007

2008

2009

2010

2011

12 March, 1971
Hafez al-Assad becomes president of Syria

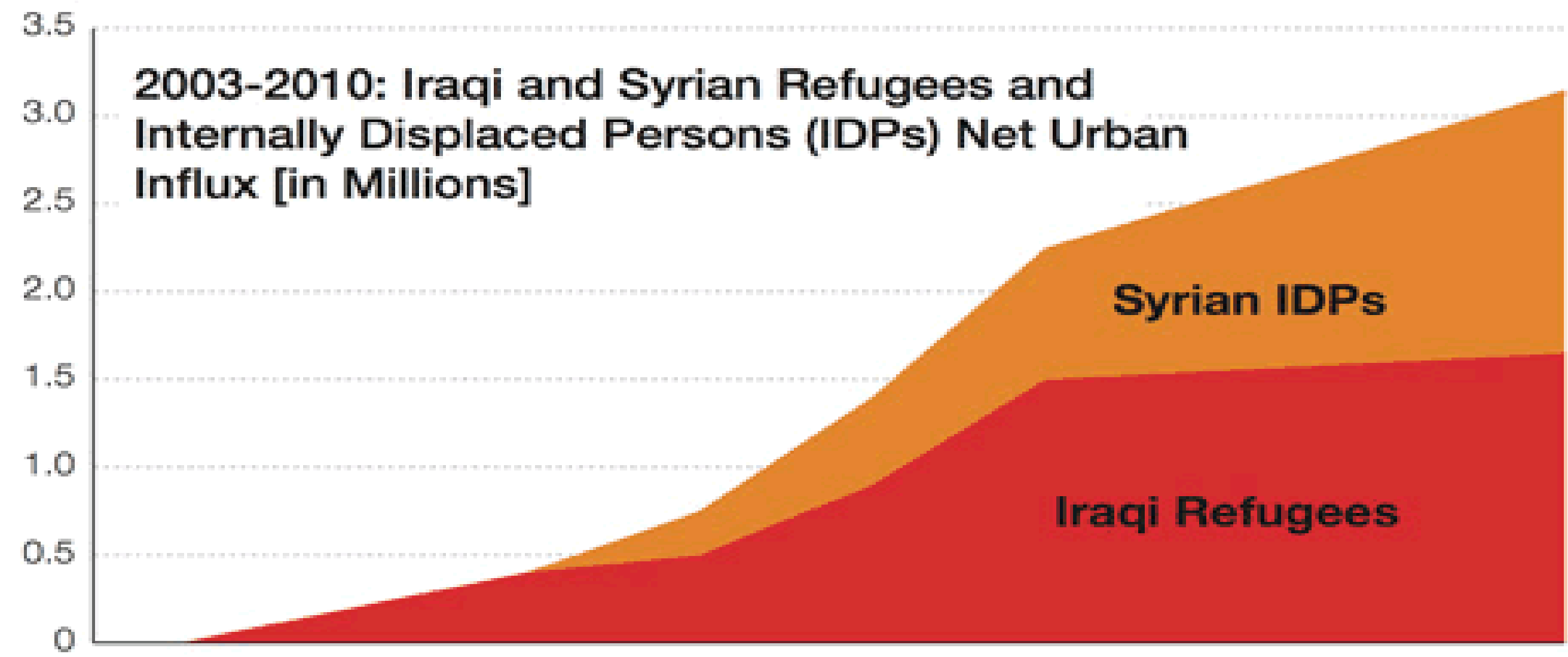
Syria achieves self-sufficiency in wheat production

Drying of the Khabur River in NE Syria

Since 2005 Apartment prices in Damascus have more than doubled

Winter 2007-08: Driest in observed record
Since 2007 Wheat, rice, and feed prices have doubled

March 2011 Uprising in Syria



Kelley et al., PNAS 2015

Saltwater intrusion and pre-eclampsia in coastal Bangladesh

Khan , Vineis et al 2009-14

High levels of salinity in drinking water for ~ 40 million people

□ Mean Urinary Sodium x 2 WHO/FAO recommended levels in pregnant women

□ Adjusted risks for (pre)eclampsia and gestational hypertension increased with increasing sodium concentrations



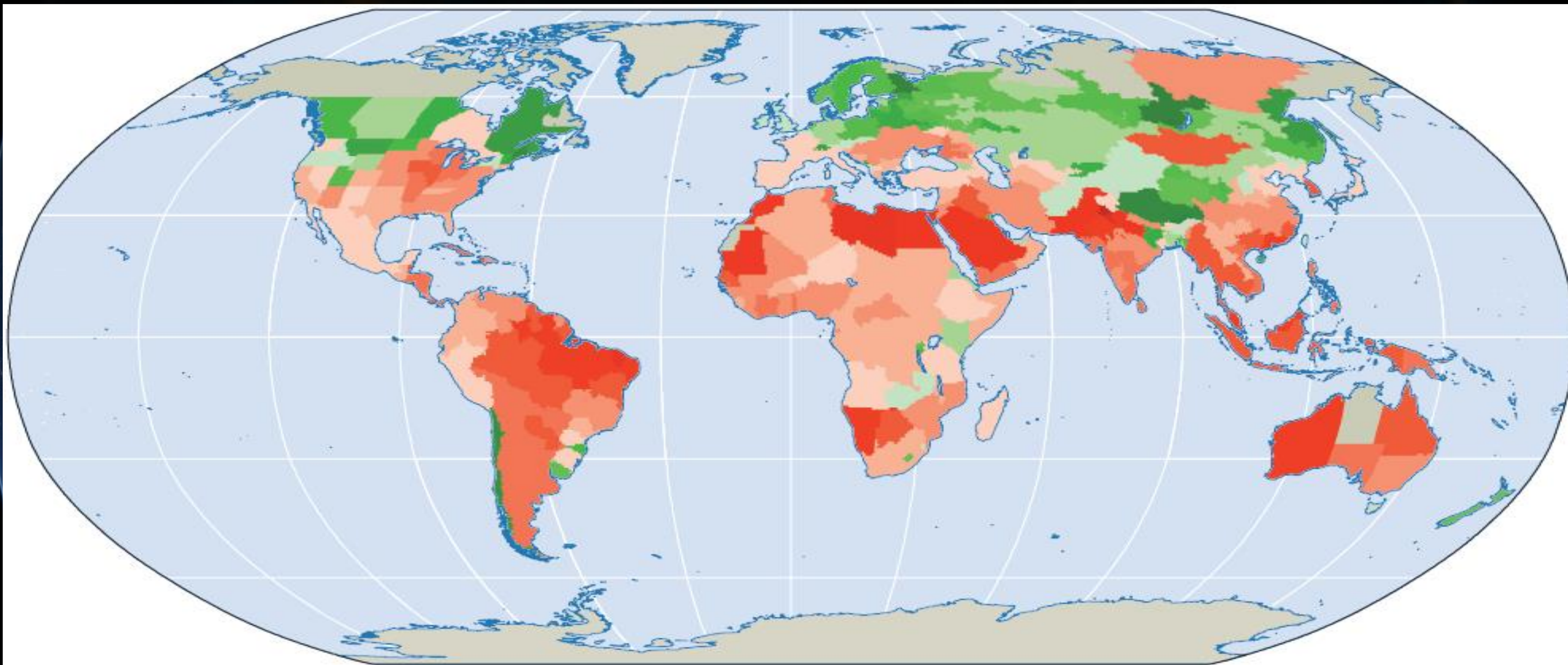


Effects of multiple environmental changes on food availability and quality

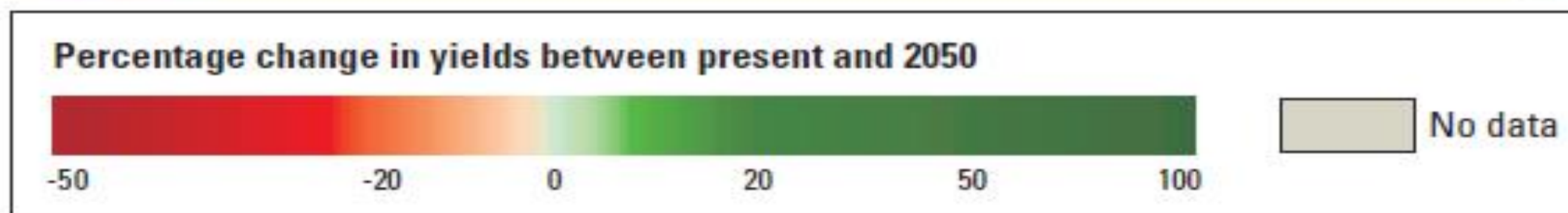


- Land degradation and soil erosion
- Water scarcity
- Loss of pollinators
- Overfishing/Ocean acidification
- Climate change
 - CO₂ fertilization
 - Ozone
 - Pests, mold and fungi

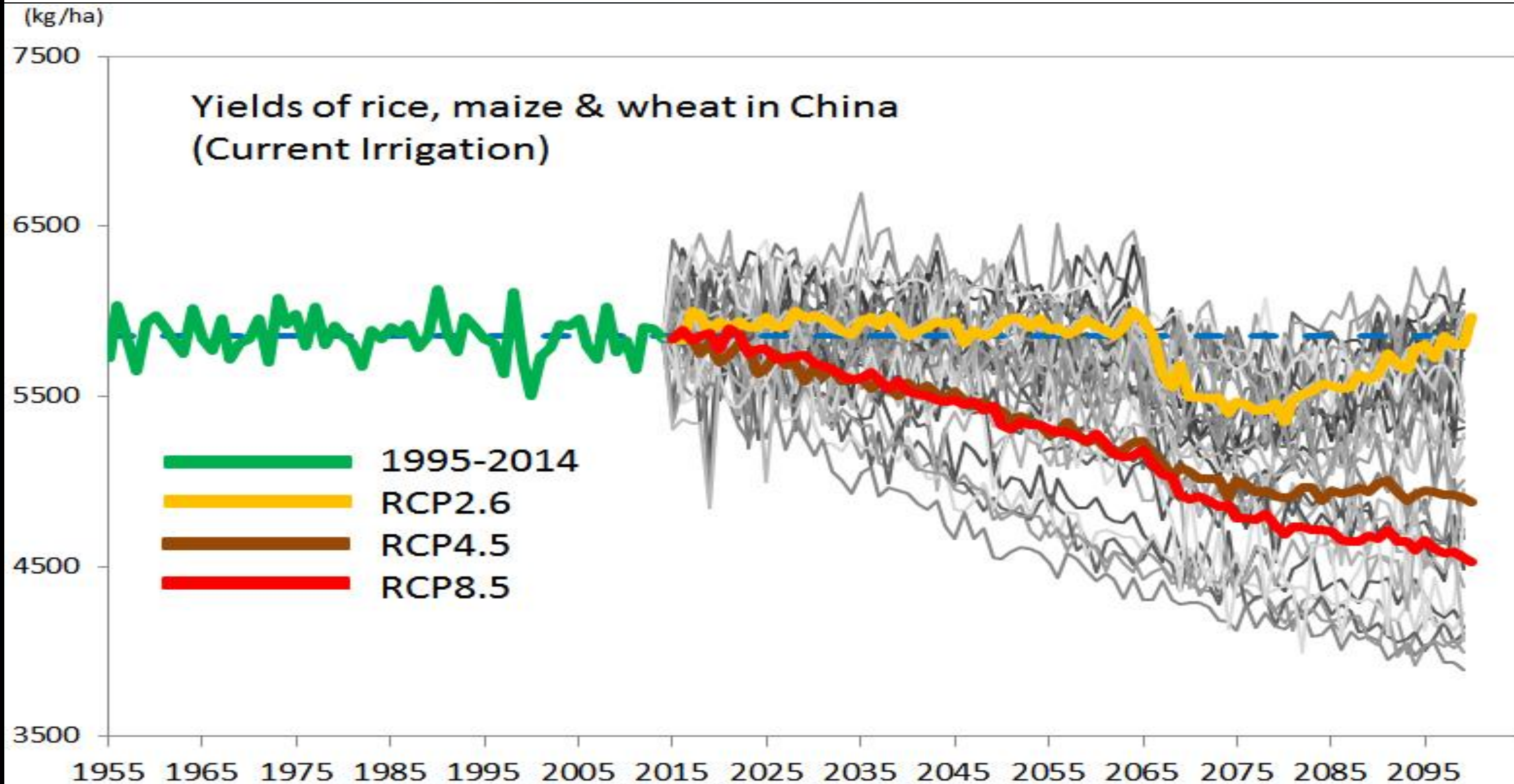
CLIMATE CHANGE: Poor Countries Projected to Fare Worst MODELLED CHANGES IN CEREAL GRAIN YIELDS, TO 2050



UN Devt Prog,
2009



Future drought impacts on yields under climate change (Rice, maize, wheat)



Yield changes:

Avg. RCP2.6:
(+3%; -9%)

Avg. RCP4.5:
(+0.4%; -17%)

Avg. RCP8.5:
(+0.8%; -23%)

- Using 15 models, and 3 RCP scenarios for each



Full pollinator service loss would lead to an estimated 1.42 million (1.38–1.48) additional deaths per year Myers et al Lancet 2015

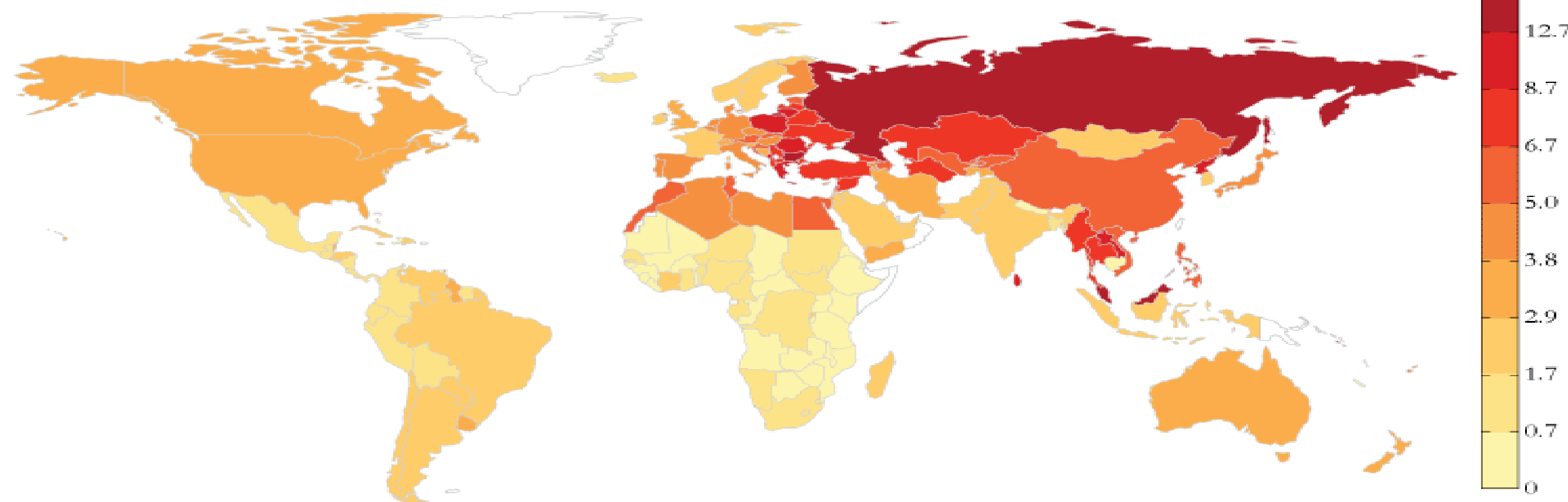


ADDITIONAL HEALTH BURDEN FROM POLLINATOR REMOVAL

A

Non-Communicable Cardiovascular Disease, Cancer & Diabetes

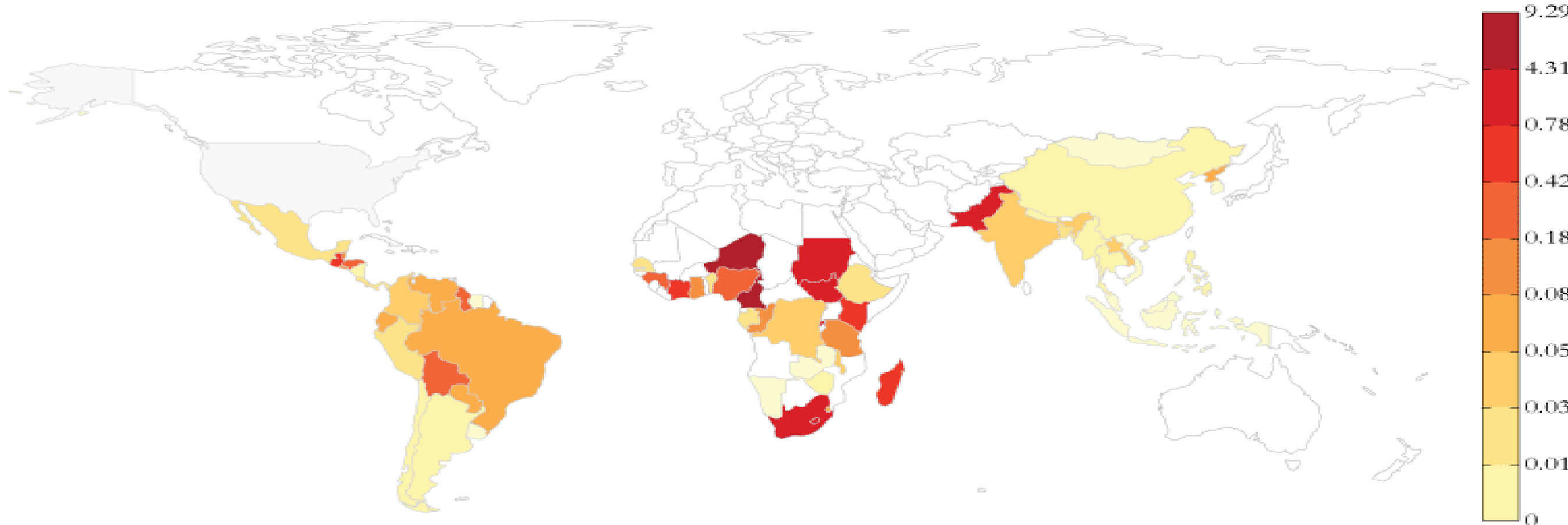
— DALYs lost per 1,000 people —



B

Malnutrition and Communicable Disease

— DALYs lost per 1,000 people —





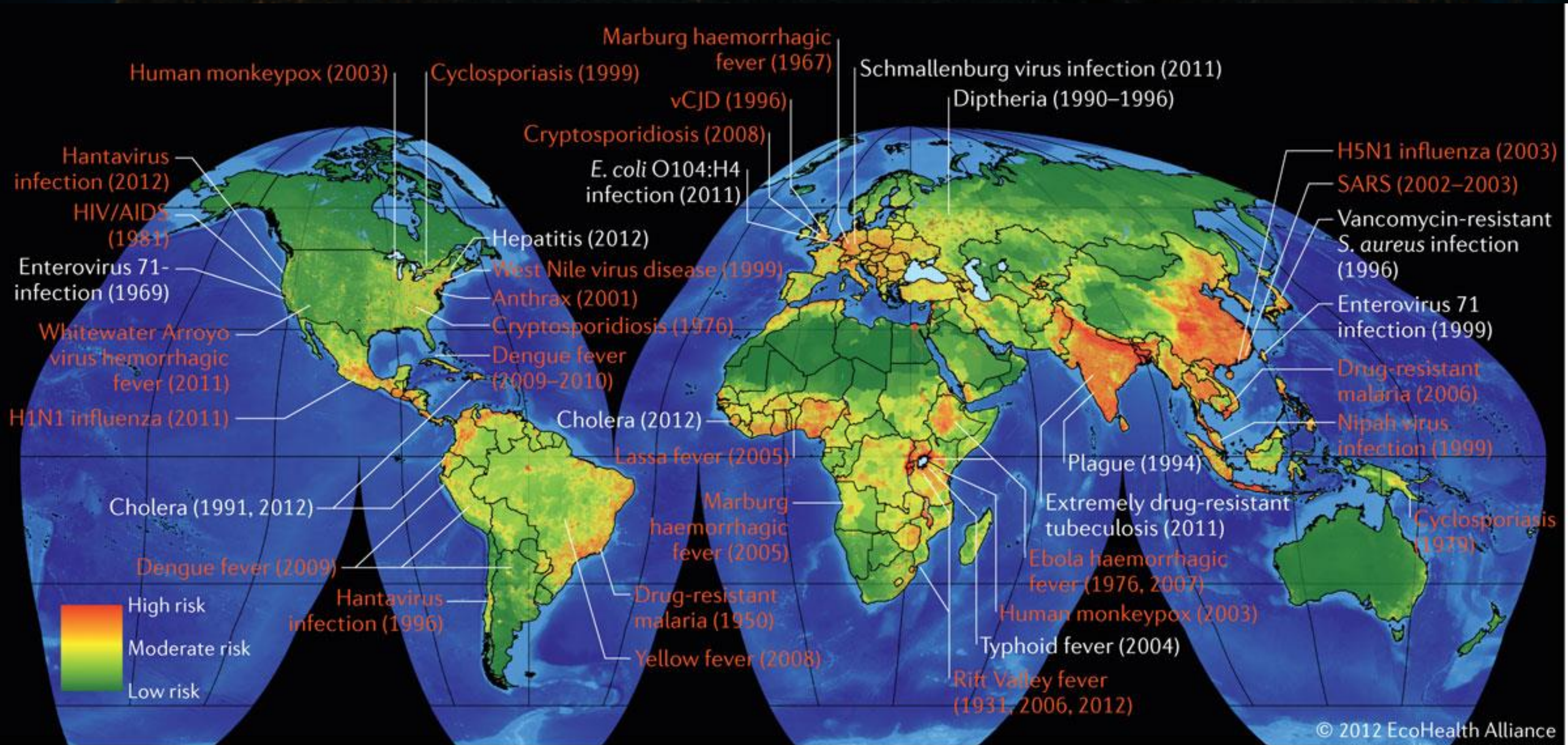
Water-related illness



- In 2015, one in three people (2.4 billion) still use unimproved sanitation facilities, including 946 million people who still practise open defecation.
- Inadequate water accounted for 685,000 deaths from diarrhoeal disease in 2012.
- Incidence of diarrhoeal disease expected to increase 8-11% globally by 2040 despite prevention and treatment campaigns.



Emerging diseases





Estimates of air pollution deaths

(WHO 2014, Lim et al LANCET 2012 ;380)

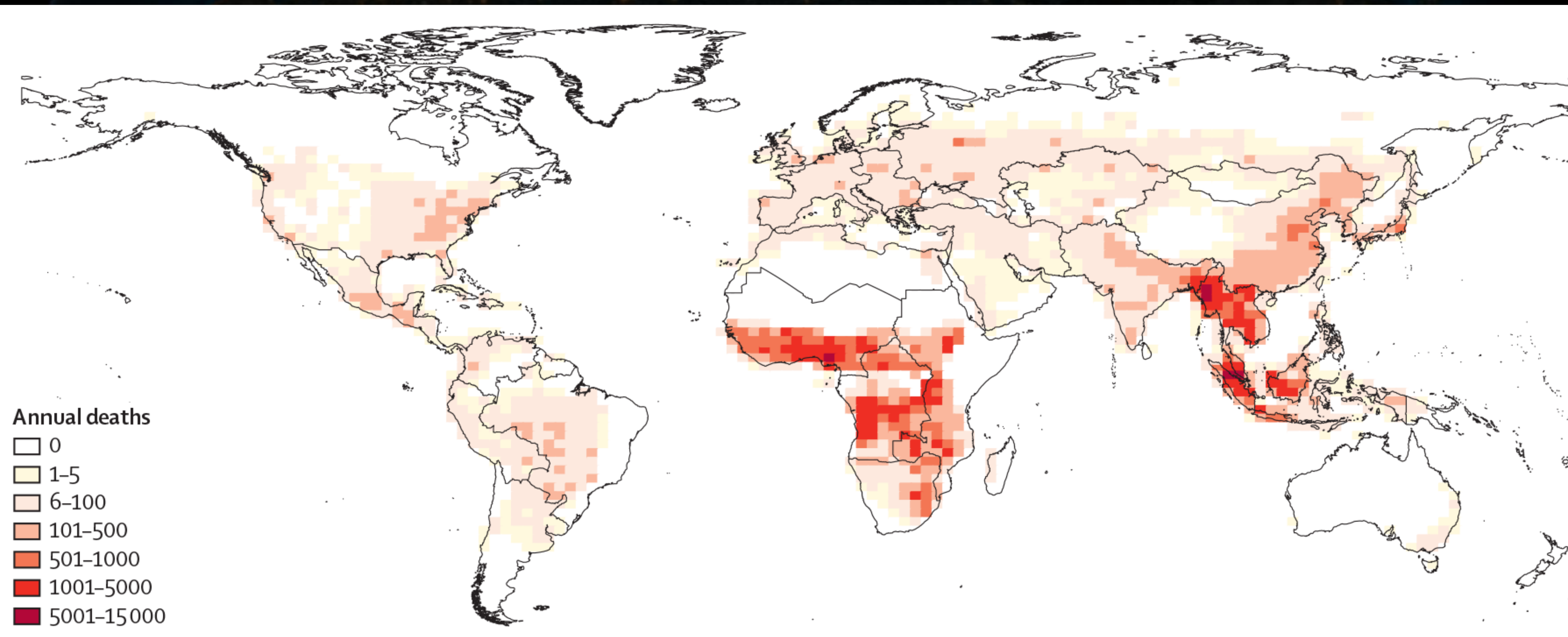


- Ambient particulates ~3.7 m deaths p.a.
- Household from solid fuels ~4.3 m deaths p.a.
- Around 7 million in total
- Tropospheric Ozone ~ 150 k deaths p.a.





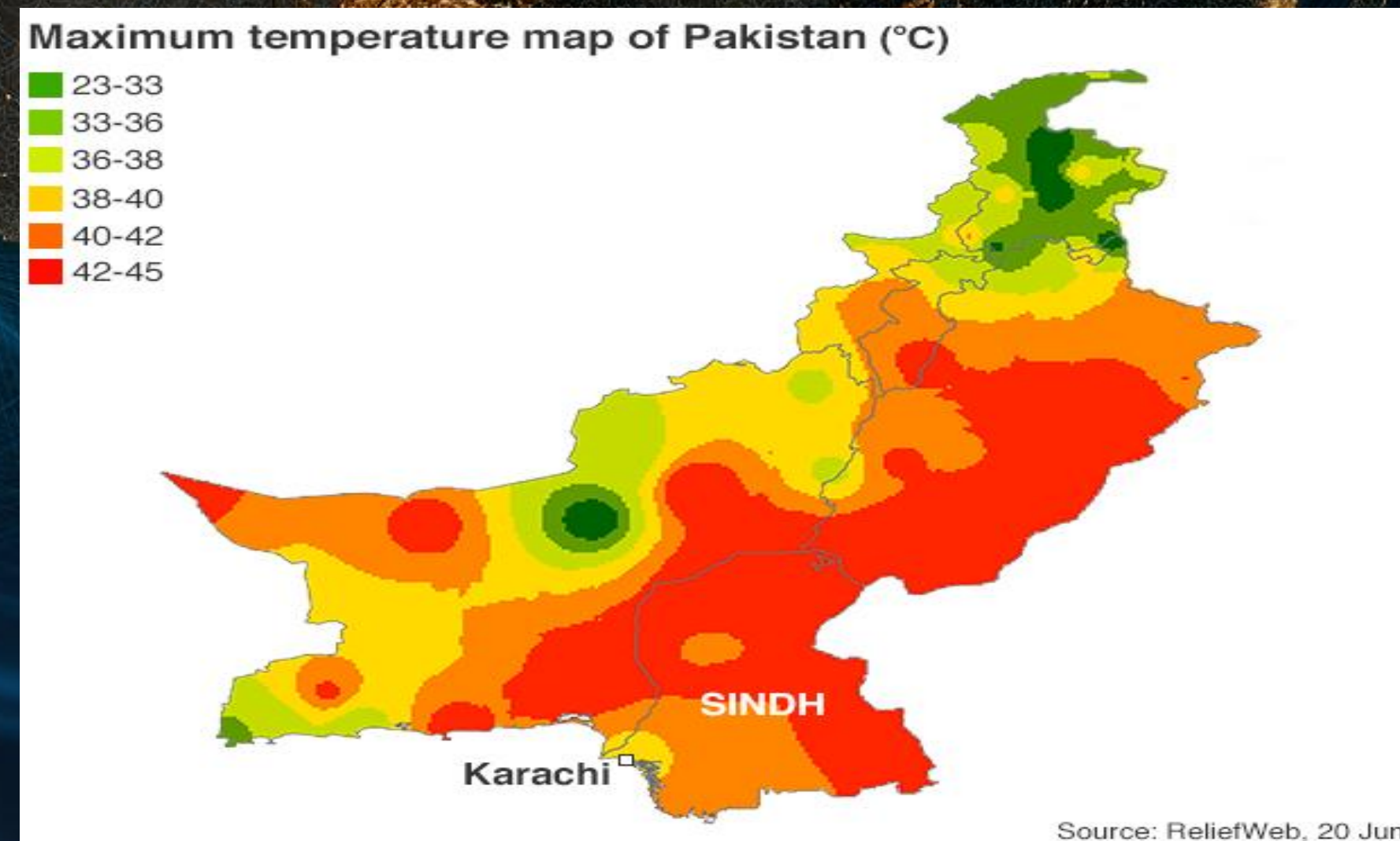
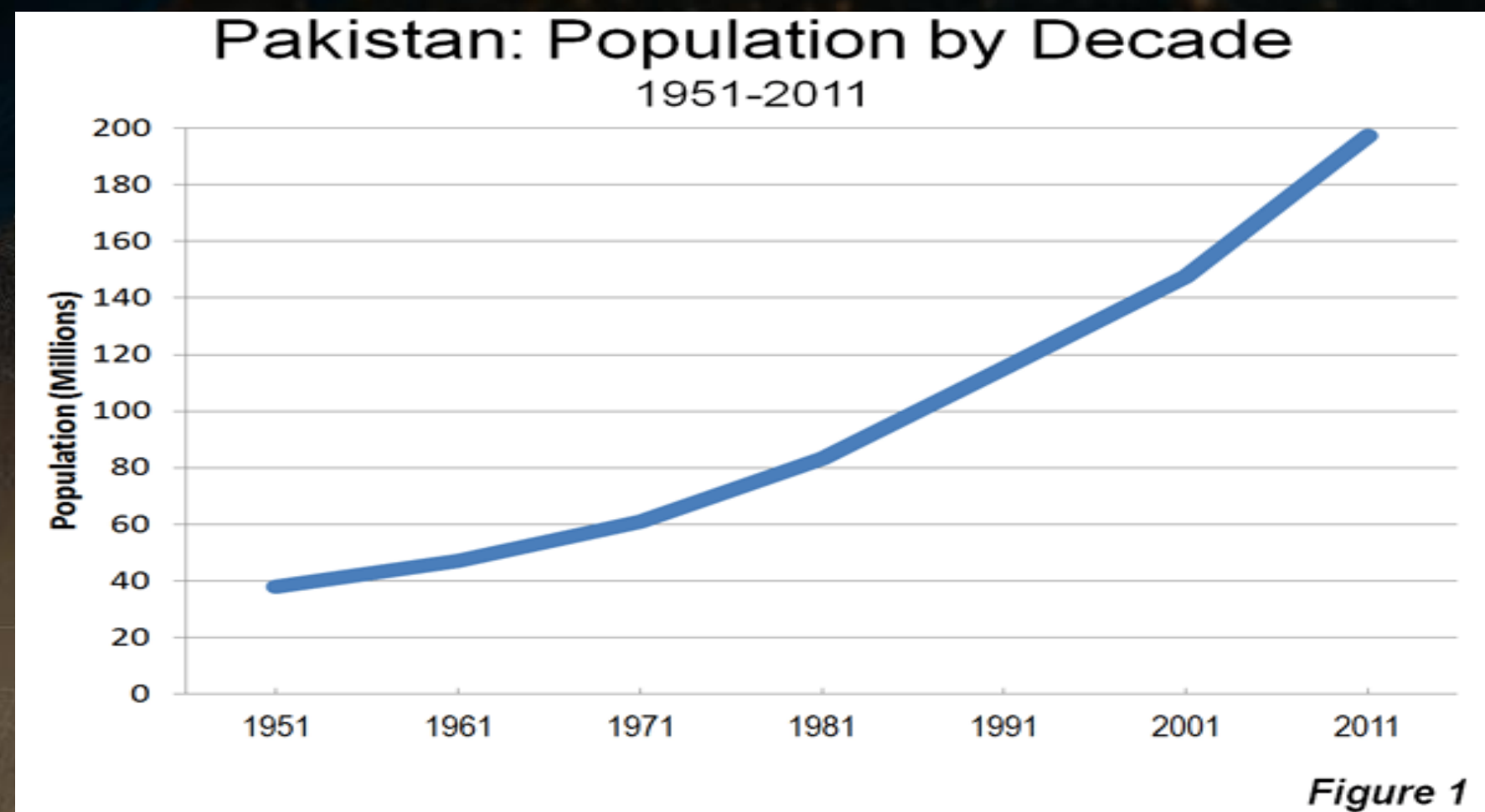
Annual average global mortality (1997–2006) due to Landscape fire smoke



Reproduced from Johnston and colleagues 2012; by permission of Environmental Health Perspectives.

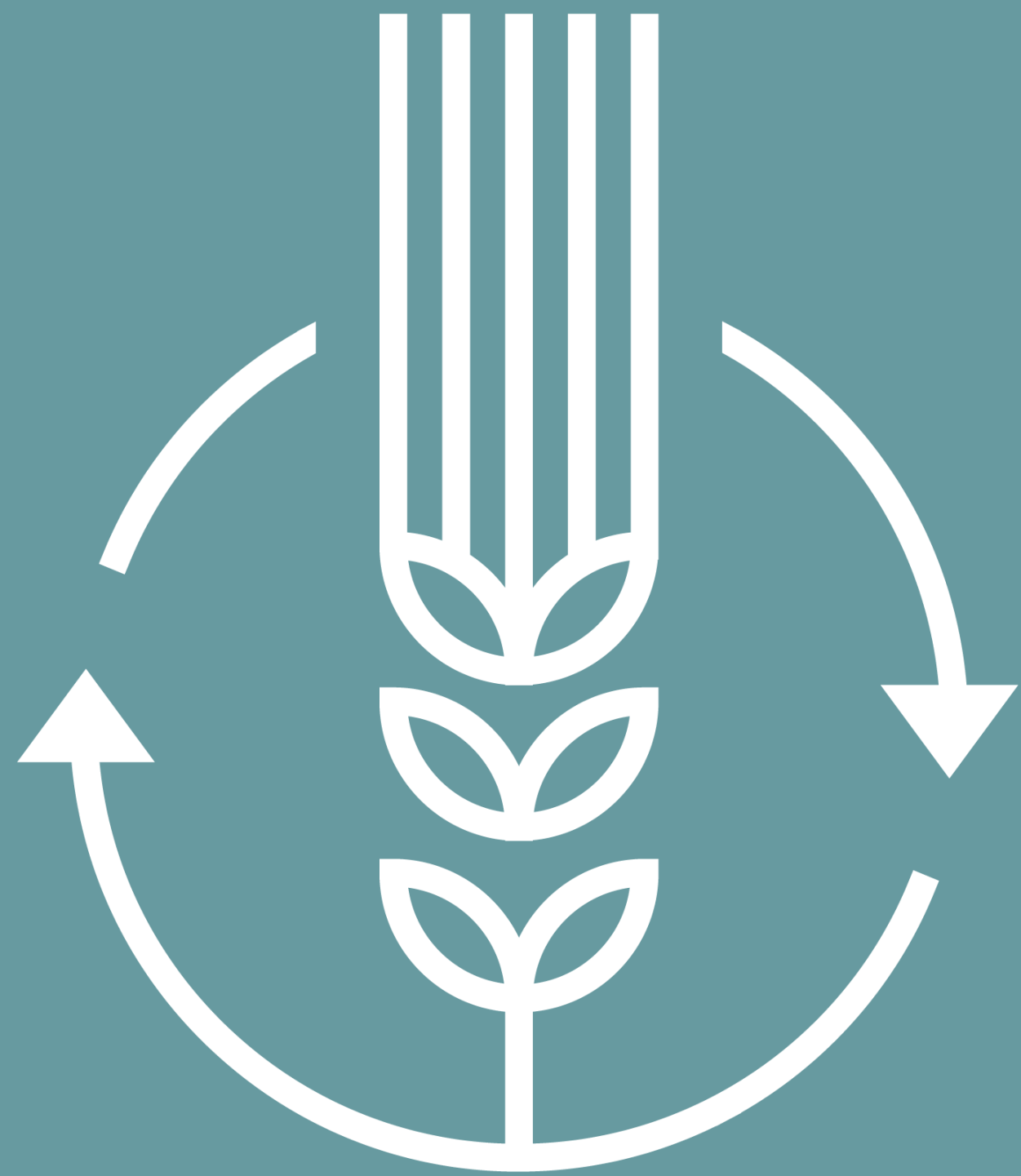


Disasters and displacement – the example of Pakistan





Meeting the challenges – Imagination, Knowledge, Implementation





Developing sustainable and healthy cities



- Active travel /public transport
- Reduced fine particulate air pollution
- Green spaces –biodiversity, reduced heat island and mental health benefits
- Watershed conservation
- Access to healthy food
- Increased resilience to floods, storms and droughts

2.4 m deaths averted from measures aiming to reduce black carbon emissions (UNEP 2011)



Photograph courtesy of Surya project

Improved biomass stoves



Modern coke ovens



UNEP Photo

Remove big smokers / DPF



Cooking with clean fuel



Pellet biomass heating stoves



Improved brick kilns



Coal briquettes replacing coal



Reduce agricultural burning



UNEP Photo

Reduce flaring

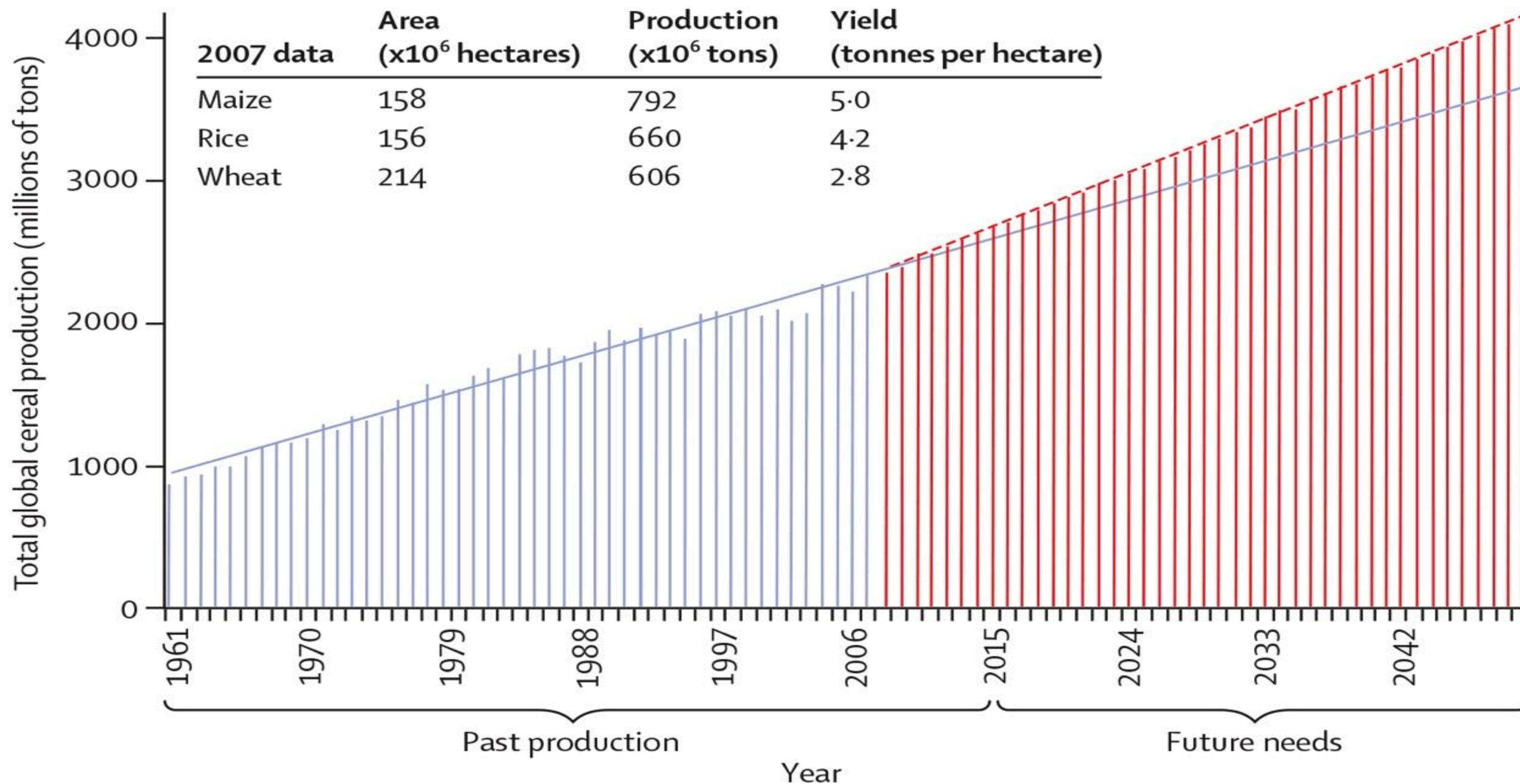
Image: Globaia

Health Economic Benefits of reducing air pollution

- Air pollution reductions in EU: E38bn/year by 2030
- Global 36% renewables --- avoided health costs of \$230bn/year by 2030
- Benefits of avoided mortality \$50-380/tCO₂



Multiple approaches for meeting increased food requirements





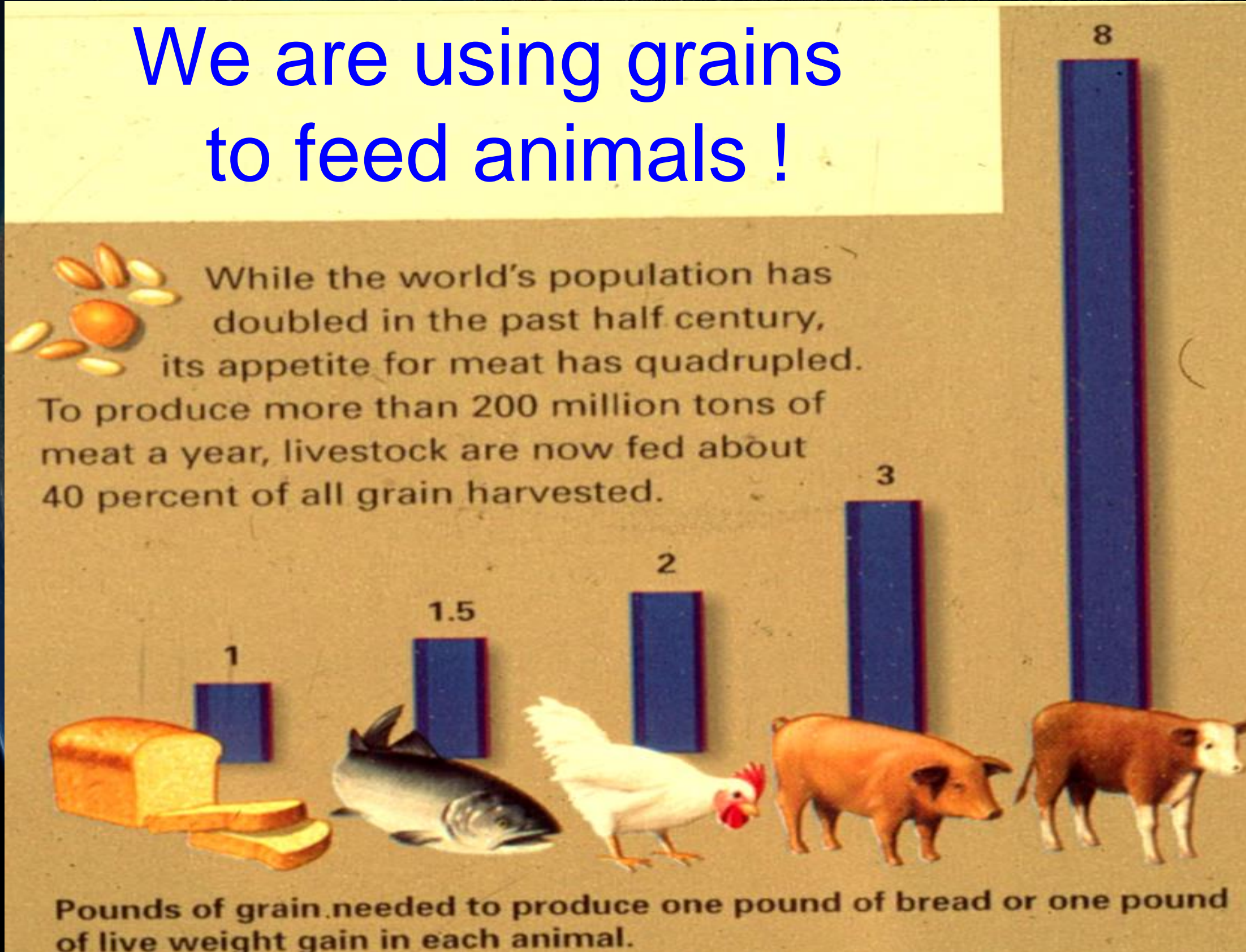
Reducing food waste



Nearly 30% of the world's total agricultural land is used to produce food that is never eaten.

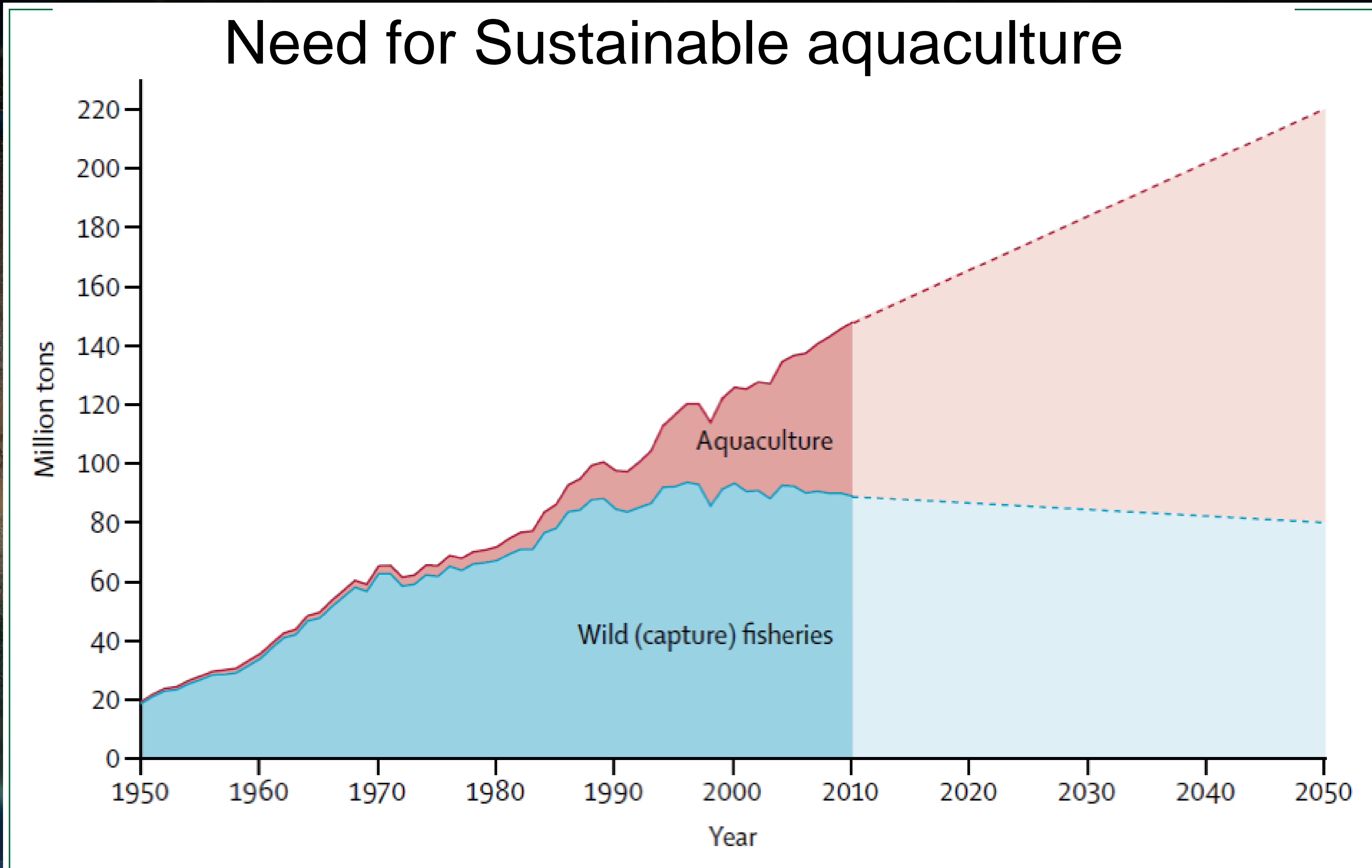


Reduced GHG emissions and land use requirements from healthy diets





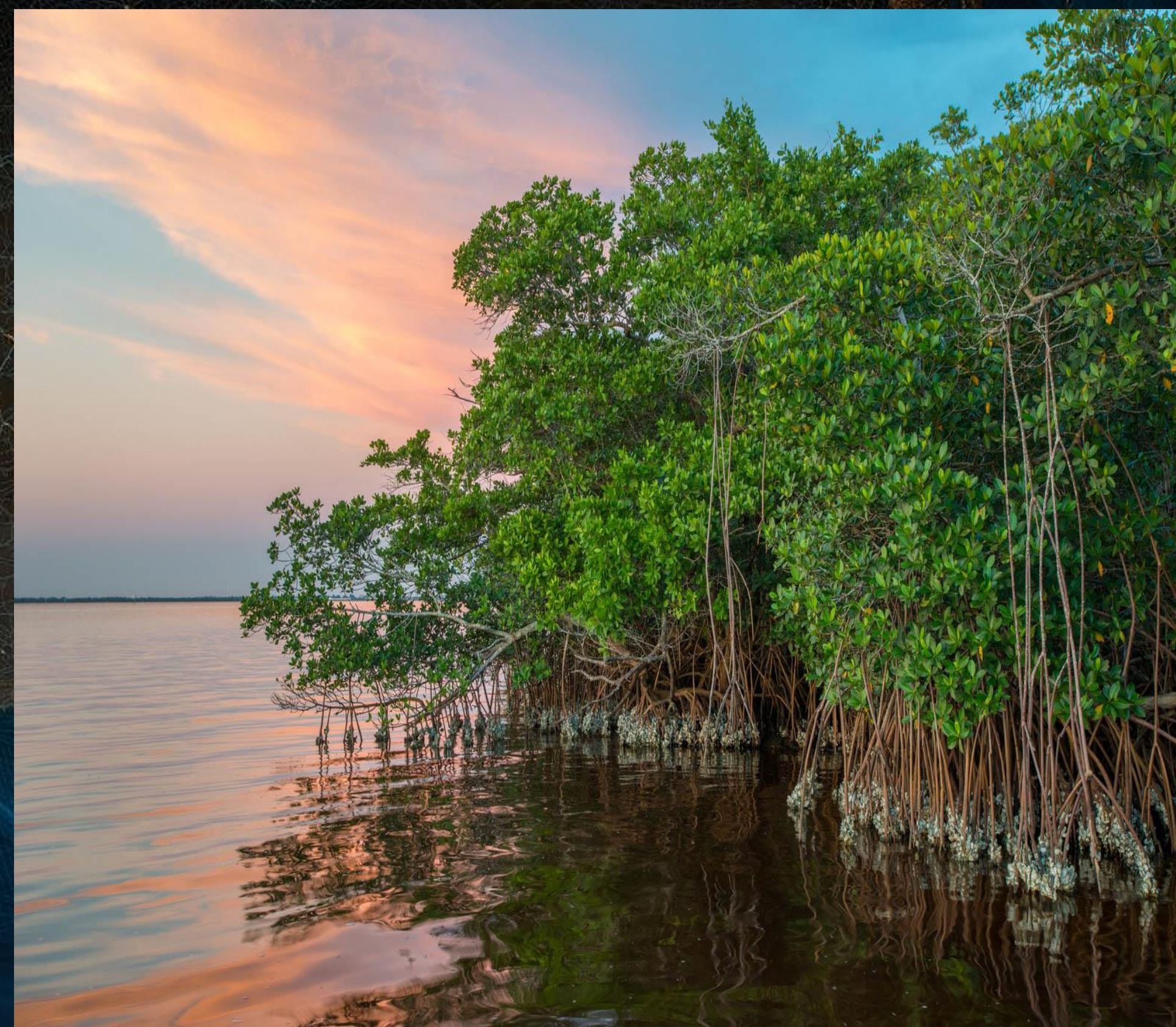
Need for Sustainable aquaculture





Ecosystem strategies to increase disaster resilience

e.g. Wetlands, mangroves and coral reefs can protect coastlines





How Forest Conservation Reduces Disease risks –examples from the Brazilian Amazon



Malaria transmission

- (-) fewer vector breeding sites.
- (-) larger vector predator populations and greater diversity of mammalian species (promoting dilution effects)
- (-) microclimate inhibits anopheline mosquitoes.

Acute Respiratory Infections (ARI)

- (-) forests may filter air particulates .
- (-) fewer fires and lower smoke emission
- (-) reduced collection and burning of biomass fuels

Diarrhea

- (-) forest may reduce flooding and filter pathogens from surface water.

Bauch, Birkenbach, Pattanayak and Sills PNAS 2014



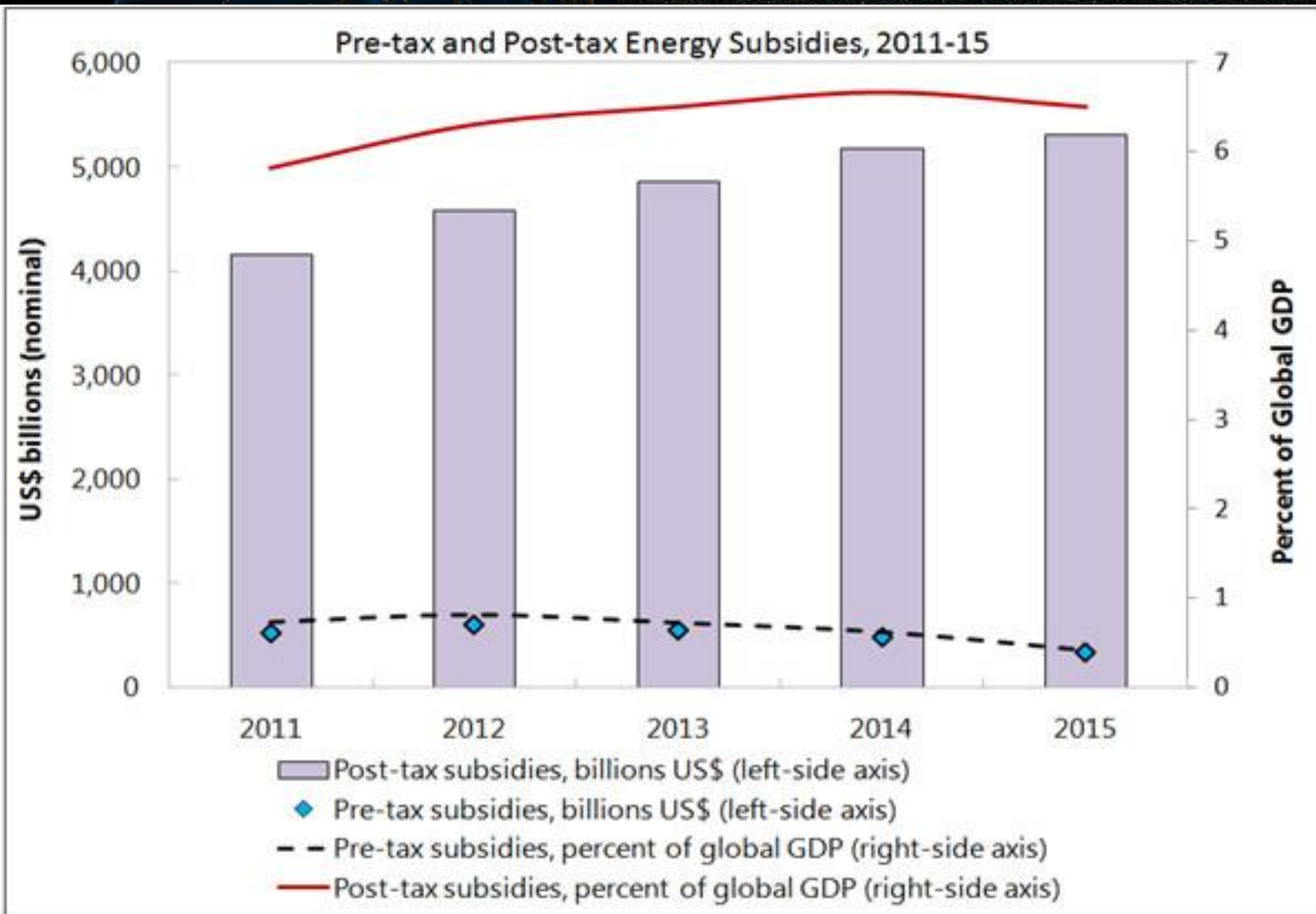
IS YOUR HEALTH SYSTEM RESILIENT?



#HEALTHFORALL



Policies for taxes and subsidies that support planetary health





Increasing access to modern family planning

Around 225 million women who want to avoid pregnancy are not using effective contraception.

Access to family planning could cut maternal deaths by around 30%.



Meeting the needs for modern contraception in low-income countries would cost only an additional \$5.3 billion per year

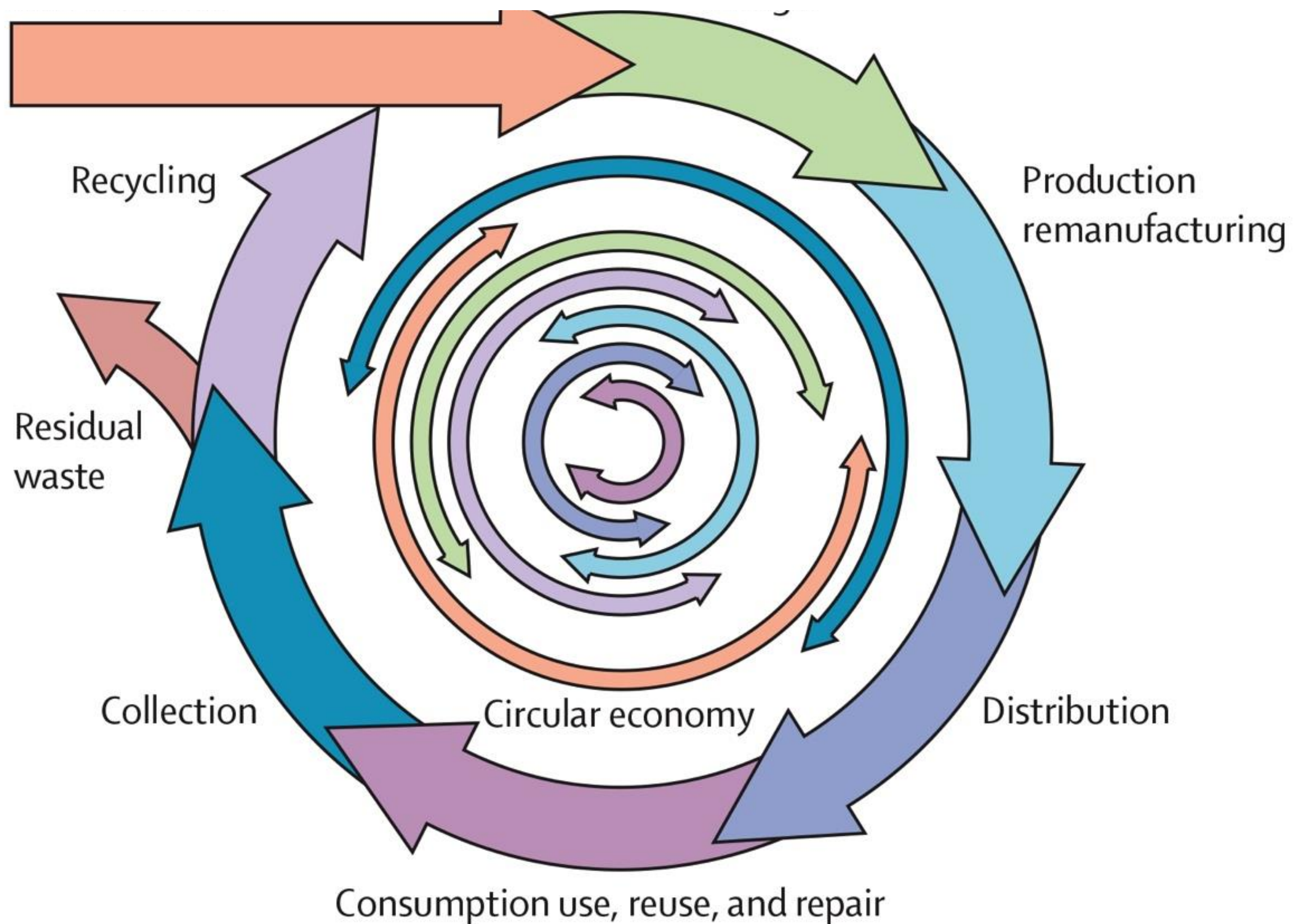


Integrating Planetary Health with the Sustainable Development Goals

<p>GOAL 1</p> <p>END POVERTY IN ALL ITS FORMS EVERYWHERE</p> <p>SUSTAINABLE DEVELOPMENT GOALS More at sustainabledevelopment.un.org/sdgsproposal</p>	<p>GOAL 2</p> <p>END HUNGER, ACHIEVE FOOD SECURITY AND IMPROVED NUTRITION AND PROMOTE SUSTAINABLE AGRICULTURE</p> <p>SUSTAINABLE DEVELOPMENT GOALS More at sustainabledevelopment.un.org/sdgsproposal</p>	<p>GOAL 3</p> <p>ENSURE HEALTHY LIVES AND PROMOTE WELL-BEING FOR ALL AT ALL AGES</p> <p>SUSTAINABLE DEVELOPMENT GOALS More at sustainabledevelopment.un.org/sdgsproposal</p>	<p>GOAL 6</p> <p>ENSURE AVAILABILITY AND SUSTAINABLE MANAGEMENT OF WATER AND SANITATION FOR ALL</p> <p>SUSTAINABLE DEVELOPMENT GOALS More at sustainabledevelopment.un.org/sdgsproposal</p>
<p>GOAL 7</p> <p>ENSURE ACCESS TO AFFORDABLE, RELIABLE, SUSTAINABLE AND MODERN ENERGY FOR ALL</p> <p>SUSTAINABLE DEVELOPMENT GOALS More at sustainabledevelopment.un.org/sdgsproposal</p>	<p>GOAL 11</p> <p>MAKE CITIES AND HUMAN SETTLEMENTS INCLUSIVE, SAFE, RESILIENT AND SUSTAINABLE</p> <p>SUSTAINABLE DEVELOPMENT GOALS More at sustainabledevelopment.un.org/sdgsproposal</p>	<p>GOAL 12</p> <p>ENSURE SUSTAINABLE CONSUMPTION AND PRODUCTION PATTERNS</p> <p>SUSTAINABLE DEVELOPMENT GOALS More at sustainabledevelopment.un.org/sdgsproposal</p>	<p>GOAL 13</p> <p>TAKE URGENT ACTION TO COMBAT CLIMATE CHANGE AND ITS IMPACTS*</p> <p><small>Acknowledging that the United Nations Framework Convention on Climate Change is the primary international, intergovernmental forum for negotiating the global response to climate change.</small></p> <p>SUSTAINABLE DEVELOPMENT GOALS More at sustainabledevelopment.un.org/sdgsproposal</p>
<p>GOAL 14</p> <p>CONSERVE AND SUSTAINABLY USE THE OCEANS, SEAS AND MARINE RESOURCES FOR SUSTAINABLE DEVELOPMENT</p> <p>SUSTAINABLE DEVELOPMENT GOALS More at sustainabledevelopment.un.org/sdgsproposal</p>	<p>GOAL 15</p> <p>PROTECT, RESTORE AND PROMOTE SUSTAINABLE USE OF TERRESTRIAL ECOSYSTEMS, SUSTAINABLY MANAGE FORESTS, COMBAT DESERTIFICATION, AND HALT AND REVERSE LAND DEGRADATION AND HALT BIODIVERSITY LOSS</p> <p>SUSTAINABLE DEVELOPMENT GOALS More at sustainabledevelopment.un.org/sdgsproposal</p>	<p>GOAL 16</p> <p>PROMOTE PEACEFUL AND INCLUSIVE SOCIETIES FOR SUSTAINABLE DEVELOPMENT, PROVIDE ACCESS TO JUSTICE FOR ALL AND BUILD EFFECTIVE, ACCOUNTABLE AND INCLUSIVE INSTITUTIONS AT ALL LEVELS</p> <p>SUSTAINABLE DEVELOPMENT GOALS More at sustainabledevelopment.un.org/sdgsproposal</p>	<p>GOAL 17</p> <p>STRENGTHEN THE MEANS OF IMPLEMENTATION AND REVITALIZE THE GLOBAL PARTNERSHIP FOR SUSTAINABLE DEVELOPMENT</p> <p>SUSTAINABLE DEVELOPMENT GOALS More at sustainabledevelopment.un.org/sdgsproposal</p>



Moving towards the circular economy



Safeguarding both human health and the natural systems that underpin it

FUNDING for research

Our Planet, Our Health funding opportunities



Our Planet, Our Health: call for ambitious, transdisciplinary programmes that research the ways complex changes in our environment affect our health and develop potential solutions to enhance resilience.

wellcometrust



- Solutions lie within reach and should be based on the redefinition of prosperity to focus on the enhancement of quality of life and delivery of improved health for all, together with respect for the integrity of natural systems.