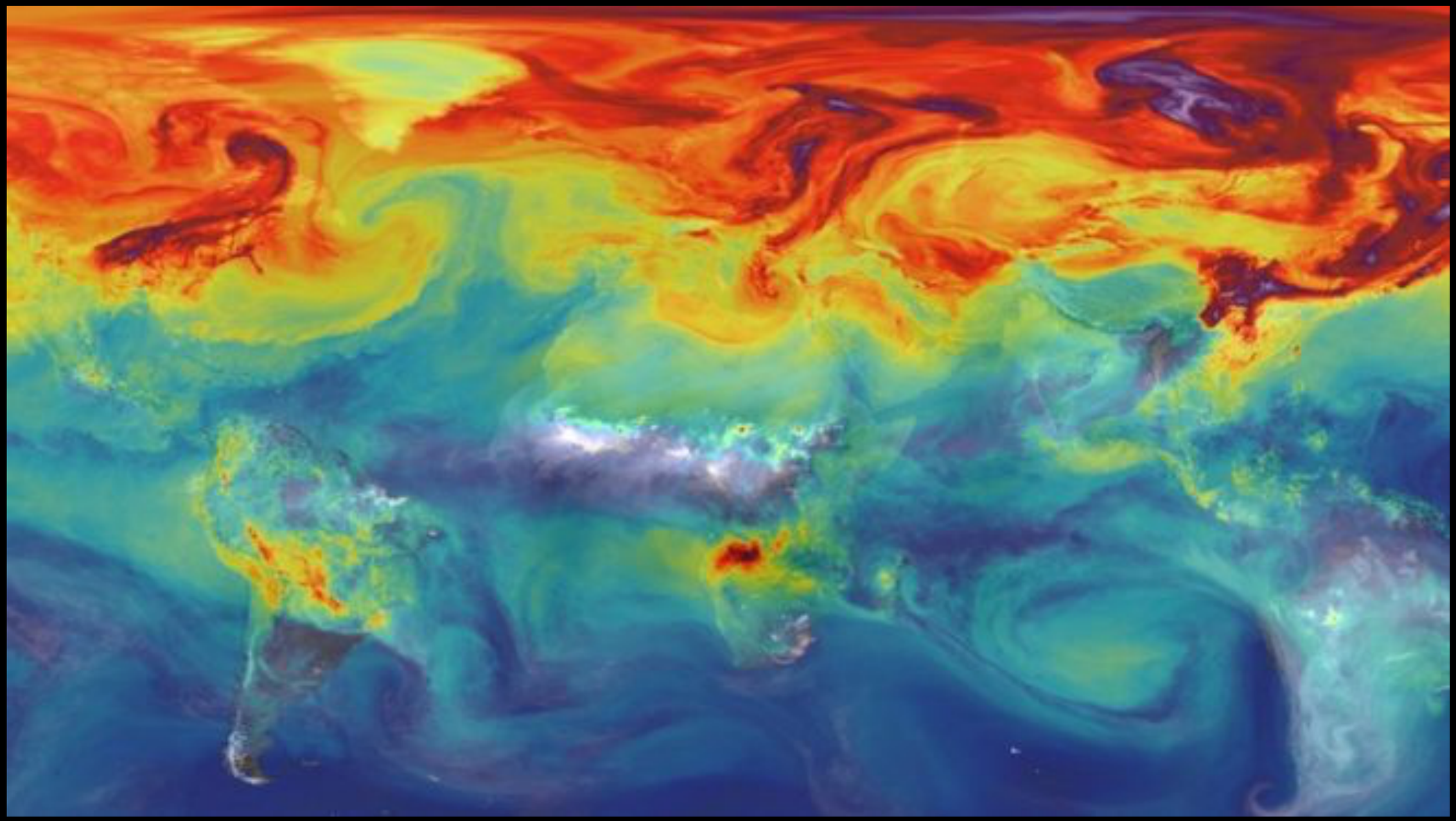
SUSTAINABILITY OF PASTA AND CLIMATE CHANGE



Prof. Riccardo Valentini
University of Tuscia, Italy
CMCC- Euromediterranean Centre for Climate Change, Italy
Far East Federal University – Vladivostok, Russia

theguardian

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Climate change Guardian Environment Network

The world passes 400ppm carbon dioxide threshold. Permanently

We are now living in a 400ppm world with levels unlikely to drop below the symbolic milestone in our lifetimes, say scientists. Climate Central reports

telam

MEDIO AMBIENTE

24/10/2016 CALENTAMIENTO GLOBAL

La cantidad de gases del efecto invernadero en la atmósfera batió récord en 2015

El informe de la Organización Mundial de la Meteorología advirtió también que los niveles de CO2 se dispararon de nuevo en 2016, alcanzando nuevos récords como consecuencia del fenómeno de El Niño.

La cantidad de gases de efecto invernadero presente en la atmósfera batió un nuevo récord en 2015, por lo que continúa el aumento incesante que alimenta el cambio climático, advirtió este lunes la Organización Mundial de la Meteorología (OMM).

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EXPAND

Science & Environment

CO2 levels mark 'new era' in the world's changing climate

By Matt McGrath
Environment correspondent

24 October 2016 | Science & Environment Share

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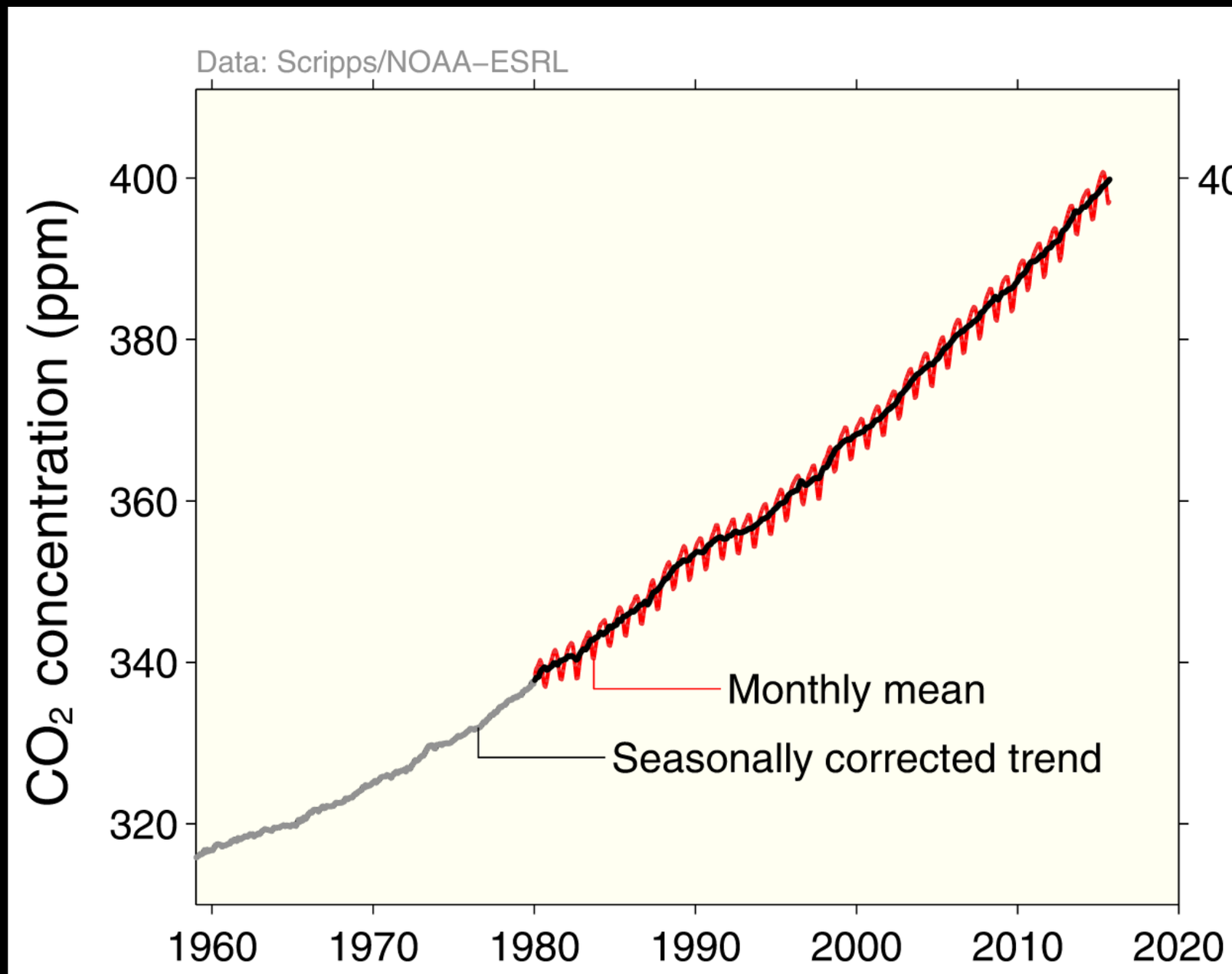
Surprise talks set over Venezuela crisis

30 minutes ago

Deadly attack on Pakistan police college

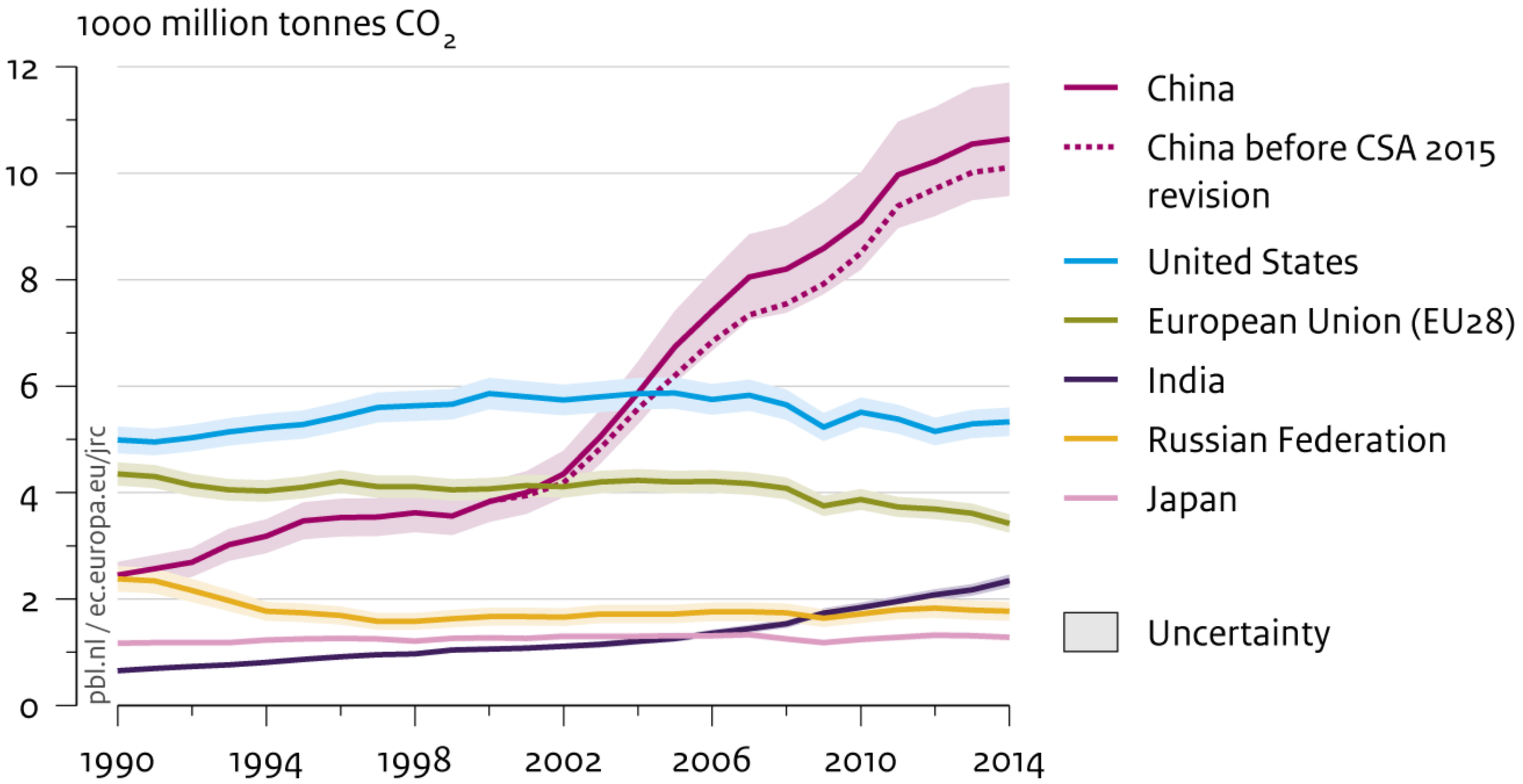
The global CO_2 concentration increased from ~277ppm in 1750 to 397ppm in 2014 (up 43%) Mauna Loa registered the first seasonally-corrected monthly mean over 400ppm in March 2015



22.10.2016

401.72 ppm

CO_2 emissions from fossil-fuel use and cement production in the top 5 emitting countries and the EU



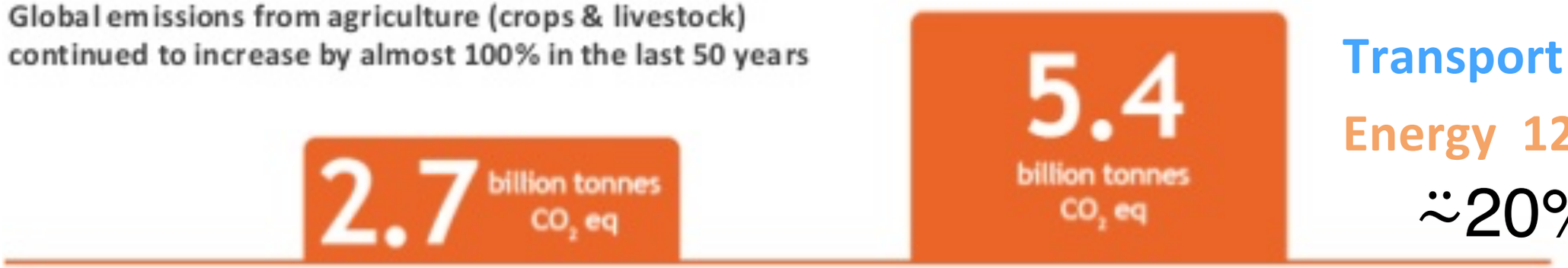
Source: EDGAR 4.3 (JRC/PBL, 2015) (1970-2012; notably IEA 2014 and NBS 2015);
EDGAR 4.3FT2014 (2013-2014): BP 2015; GGFR 2015; USGS 2015; WSA 2015

www.pbl.nl

1.6. Increasing GHG emissions from agriculture

Over the last few decades, there has been a significant **increase in global GHG emissions from agriculture**, while emissions from deforestation are decreasing (IPCC, 2014a).

Global emissions from agriculture (crops & livestock) continued to increase by almost 100% in the last 50 years



Source: FAOSTAT, 2014.

Transport 6.76

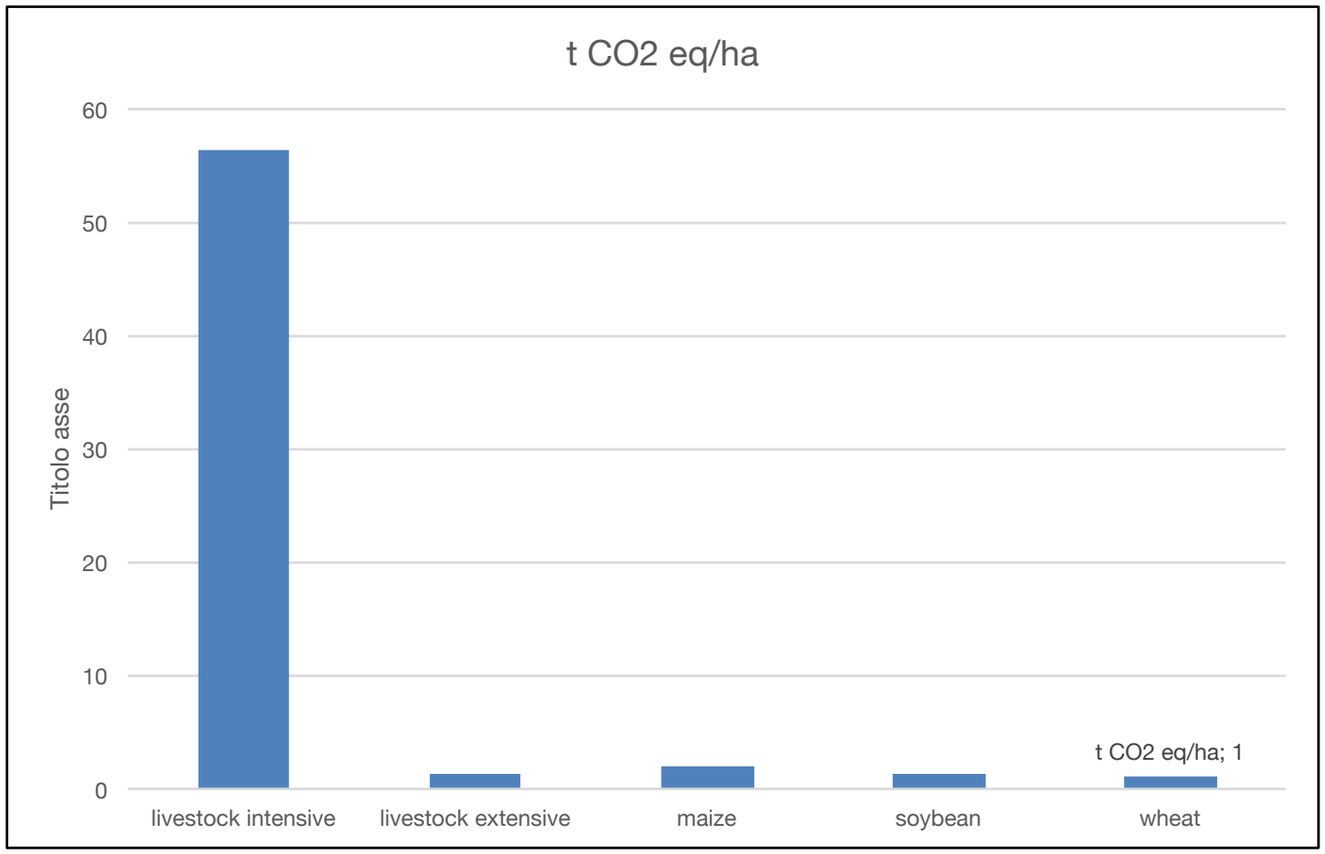
Energy 12.48

≈20%

Examples of increases in emissions from 1961 to 2010	
Source	**Percent (%)**
Synthetic fertilizers	900
Manure (either organic fertilizer on cropland or manure deposited on pasture)	73
Enteric fermentation	50
Paddy rice cultivation	41

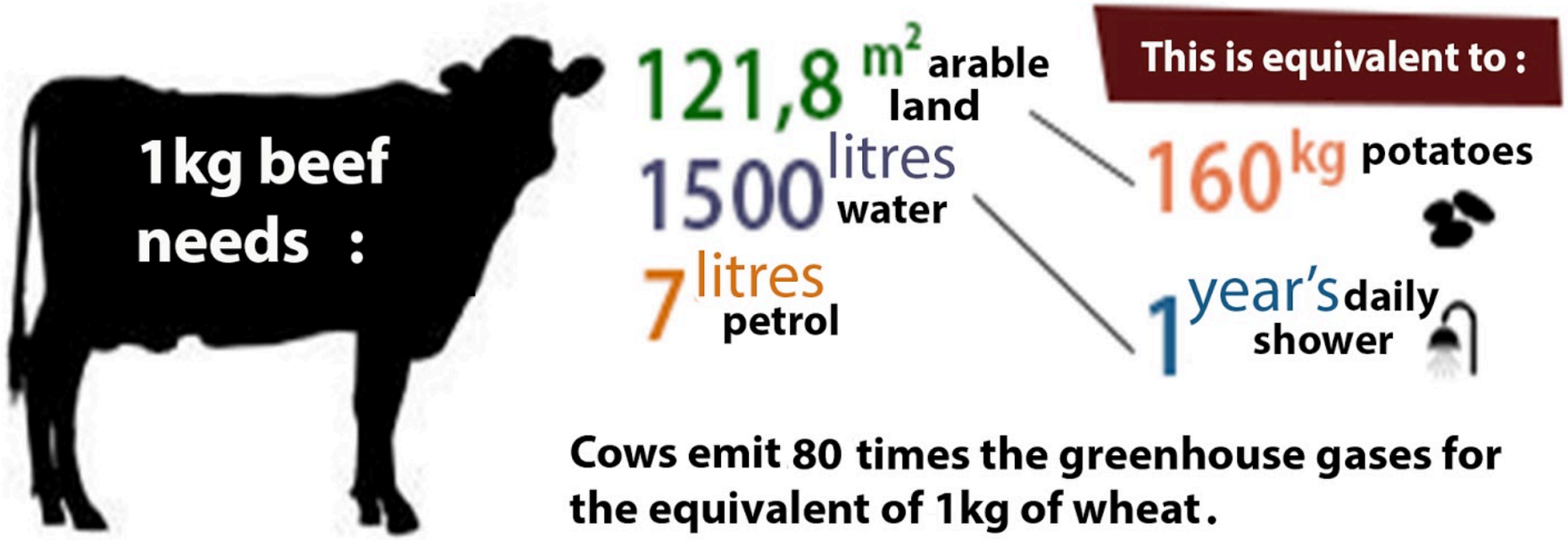
Source: Tubiello *et al.*, 2013; FAOSTAT, 2014.

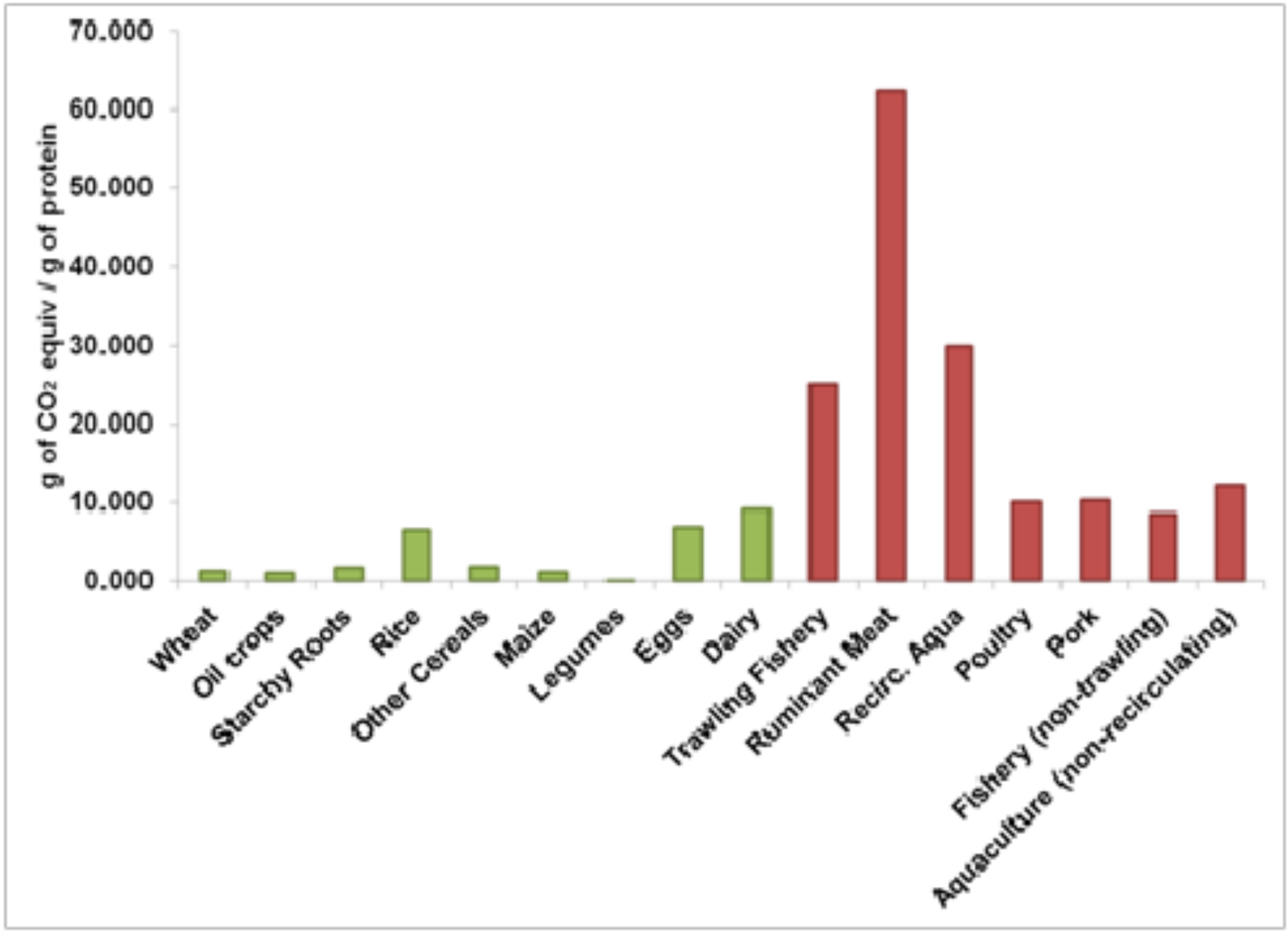
LAND USE GHG EMISSIONS



land use	t CO2 eq/ha
livestock intensive	**56,5**
livestock extensive	**1,4**
maize	**2**
soybean	**1,3**
wheat	**1**

GHG EMISSIONS BY KG PRODUCT




70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.000
g of CO₂ equiv / g of protein
Wheat
Oil crops
Starchy Roots
Rice
Other Cereals
Maize
Legumes
Eggs
Dairy
Trawling Fishery
Ruminant Meat
Recirc. Aqua
Poultry
Pork
Fishery (non-trawling)
Aquaculture (non-recirculating)

Do you know the Water Footprint of…?

water footprint

Potato (100 g)

Egg (40 g)

Bag of potato chips (200 g)

Slice of cake (80 g)

Sheet of A4 paper (80 g/m²)

Tomato (70 g)

Piece of cheese (100 g)

Piece of chocolate (50 g)

T-shirt (250 g)

Slice of bread (30 g)

Orange (100 g)

Apple (100 g)

Hamburger (150 g)

Pair of a leather shoes

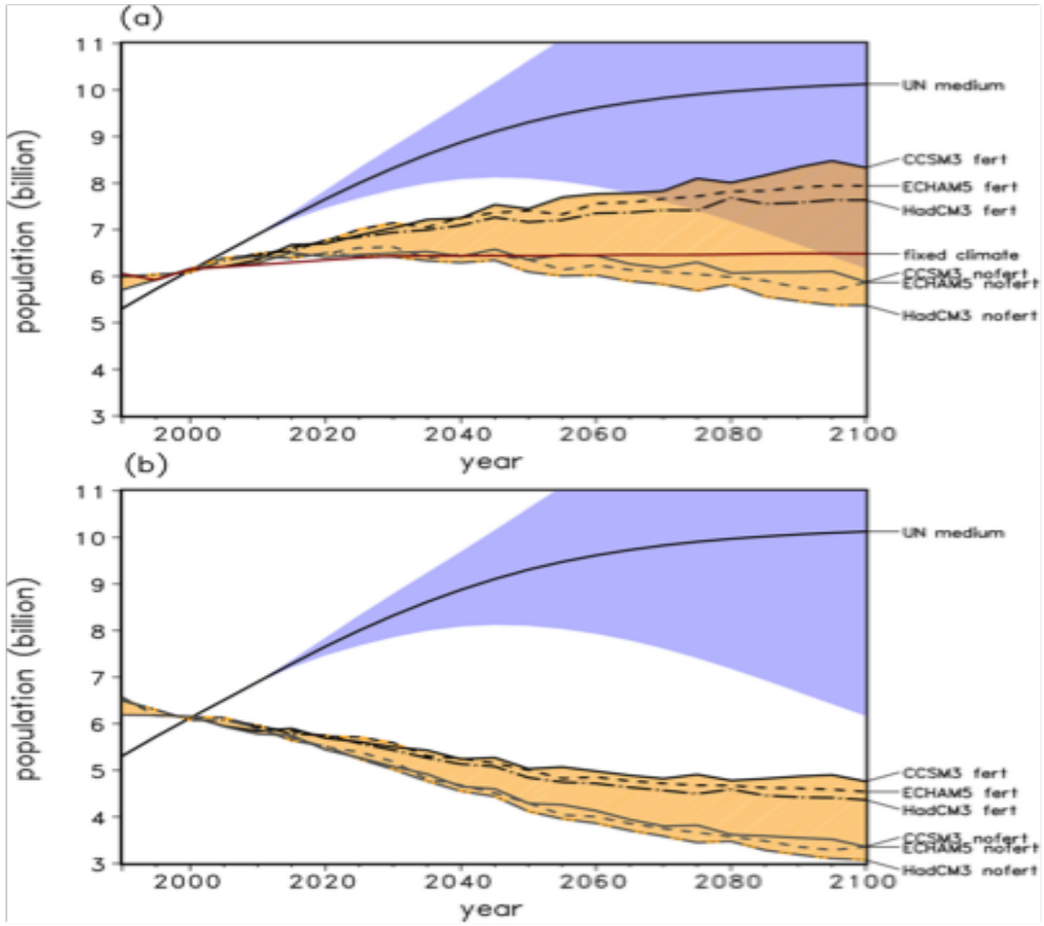
Global average Water Footprint of some types of commonly used products (expressed in liters)

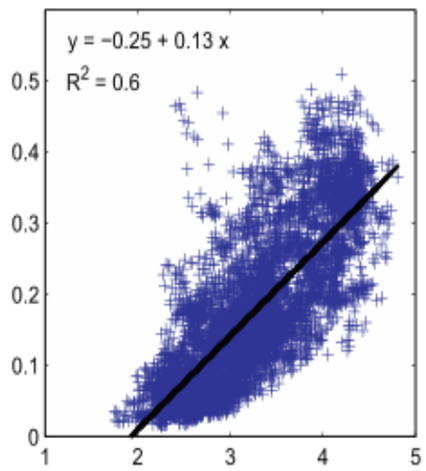
Food security under climate changes

2050

2-5 billions

4-7 billions





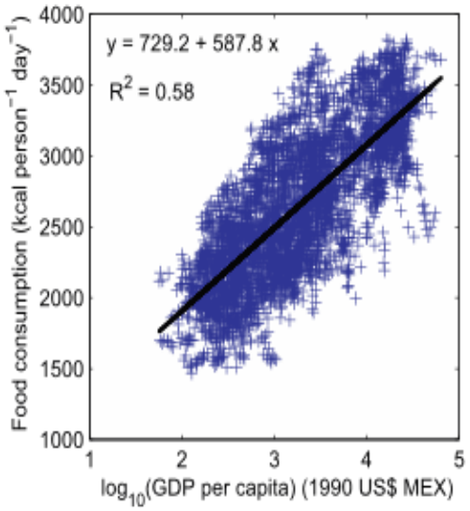


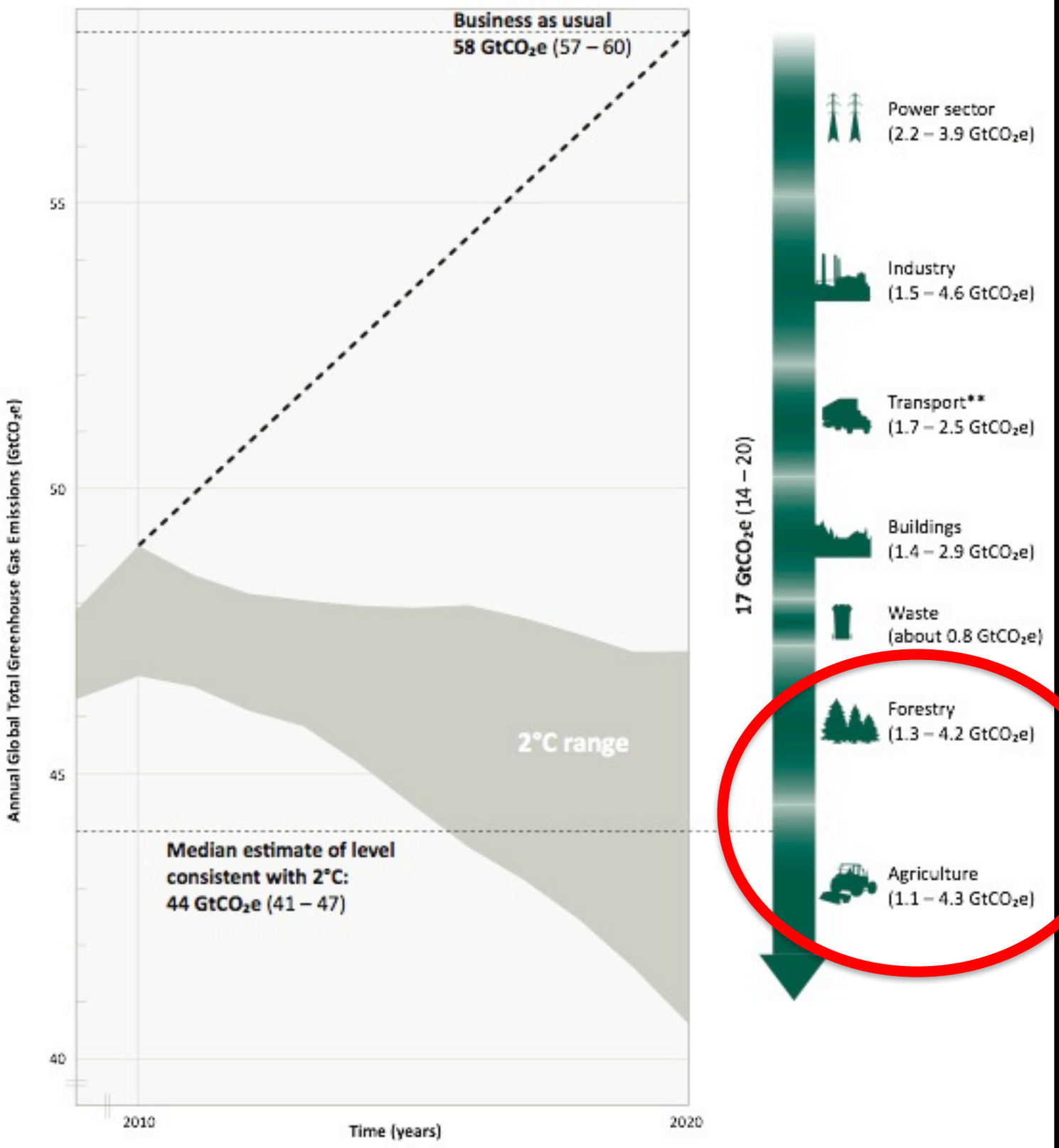
Fig. 5. 5-year running means of K_C estimates from 1990 to 2100 (orange corridor) under different GCM-climate forcing (CCSM3, ECHAM5, HadCM3) and different CO_2 fertilization effect (fert: maximal CO_2 fertilization; nofert: CO_2 levels of 2000) based on caloric demands of 2000 (a) and changing caloric demands (b). The blue corridor indicates the low and high fertility variant boundaries of the population projections of the United Nations (2011) with the medium fertility variant highlighted as black solid line. The red line in panel (a) indicates K_C under constant yields and per capita demands of the year 2000. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

PARIS2015

UN CLIMATE CHANGE CONFERENCE

COP21·CMP11

How to bridge the gap: results from sectoral policy analysis*



*based on results from Bridging the Emissions Gap Report 2011
**including shipping and aviation

ON THE ROAD TO PARIS 2015

RUSSIAN FEDERATION

CLIMATE PLEDGE

25%-30%
REDUCTION IN
GHG EMISSIONS BY **2030**
COMPARED TO **1990** LEVELS

HOW TO ACHIEVE IT?

KEY MITIGATION ACTIONS:

1. FOREST CONSERVATION AND MANAGEMENT
2. REDUCTION OF ENERGY INTENSITY
   (IN RESIDENTIAL BUILDINGS, LIGHTING AND APPLIANCES)
3. SUBSIDIES FOR RENEWABLE ENERGY

SHARE IN GLOBAL CO_2 EMISSIONS **5.1%**

WORLD RANK **5th**

CO_2 EMISSIONS (2013) **1803 Mt**

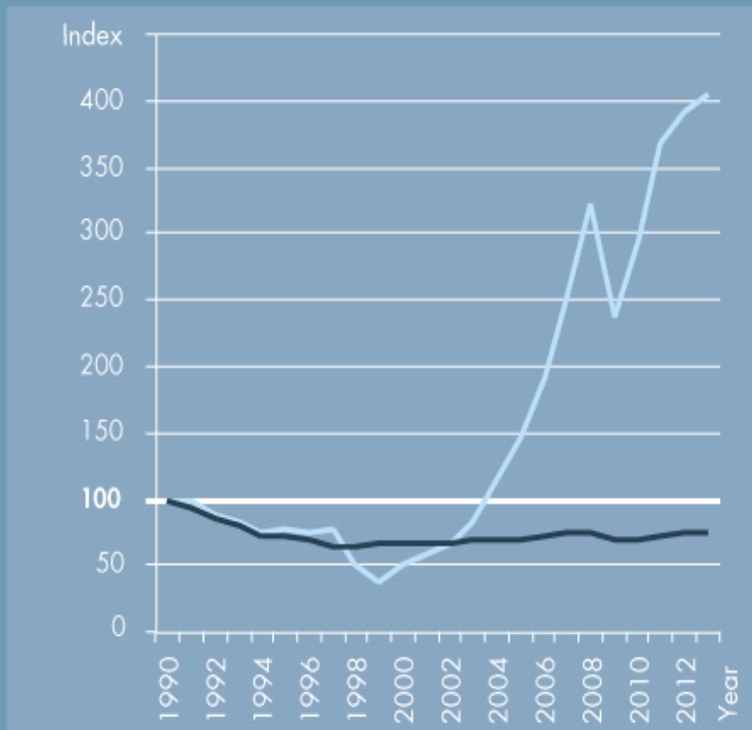
CO_2 EMISSIONS PER CAPITA (2013) **12.6 kt/capita**

PEAKING YEAR FOR CO_2 EMISSIONS **1990***

*ALL THE USSR

GDP AND CO_2 EMISSIONS TRENDS

(1990-2013)

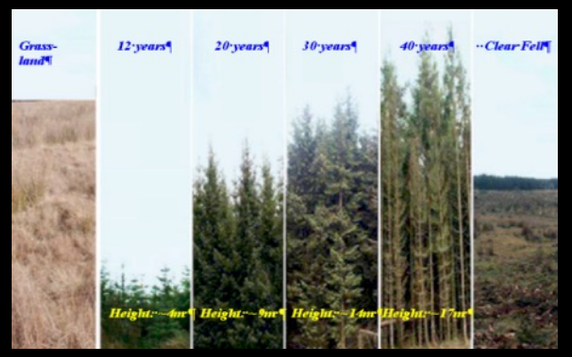


Gross Domestic Product (GDP) (Index:1990=100%)

CO_2 emissions (Index:1990=100%)

15 years friends of europe les amis de l'europe

Soil greening

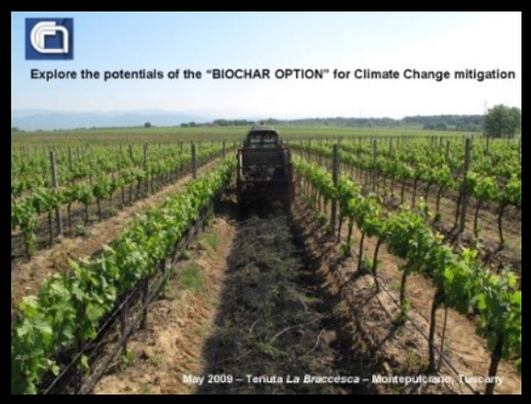


Reforestation

Green Chemistry

Organic farming

Minimum tillage



Biochar

Bioenergy

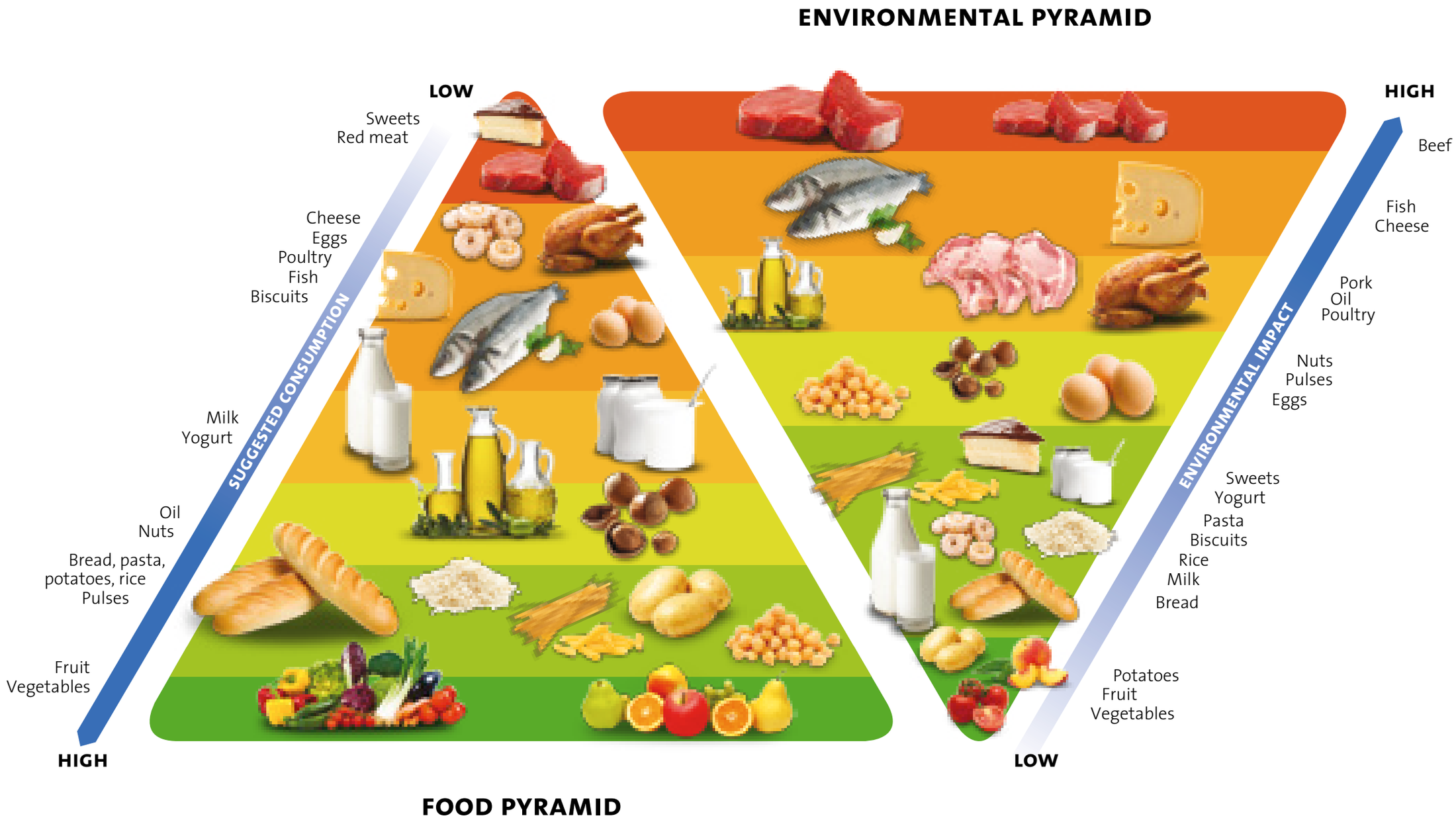


FIGURE 3.1

The food and environment Double Pyramid Model

Source: BCFN Foundation, 2015.

SUSTAINABLE DIETS (BCFN)

FIGURE 3.8

Footprint & food choices
Source: BCFN, 2015.

VEGETARIAN MENU IMPACT

17.3 global m²
2,549 g CO_{2eq}
2,793 litres

VEGETARIAN MENU

2,016 total kcal

PROTEINS 14%
FATS 32%
CARBOHYDRATES 55%

Breakfast	Snack	Lunch	Snack	Dinner
1 Glass of milk 5 Slices of rusks Jam	1 Fruit 1 Pack of crackers	1 Portion of pasta (Casarecce Siciliane type) with fennel and pumpkin and leek flan 1 Portion of raw vegetables Oil Bread	1 Fruit	1 Portion of chickpea soup 1 Portion of steamed French beans and potatoes with parmesan shavings 1 Fruit
2.2 global m² 338 g CO_{2eq} 348 litres	0.7 global m² 108 g CO_{2eq} 172 litres	4.2 global m² 766 g CO_{2eq} 668 litres	0.5 global m² 74 g CO_{2eq} 140 litres	9.7 global m² 1,262 g CO_{2eq} 1,456 litres

MEAT MENU IMPACT

30.9 global m²
5,803 g CO_{2eq}
4,672 litres

MEAT MENU

2,031 total kcal

PROTEINS 15%
FATS 27%
CARBOHYDRATES 58%

Breakfast	Snack	Lunch	Snack	Dinner
1 Glass of milk 5 Slices of rusks Jam	1 Fruit	1 Pizza with tomato and mozzarella 1 Portion of raw vegetables Oil	1 Fruit	1 Fillet steak Oil 1 Portion of rocket and tomato salad 1 Fruit Bread
2.2 global m² 338 g CO_{2eq} 348 litres	0.5 global m² 74 g CO_{2eq} 140 litres	6.6 global m² 1,139 g CO_{2eq} 647 litres	0.5 global m² 74 g CO_{2eq} 140 litres	21 global m² 4,387 g CO_{2eq} 3,349 litres

McKinsey Commodity Price Index[1]
Index: 100 = years 1999–2001[2]

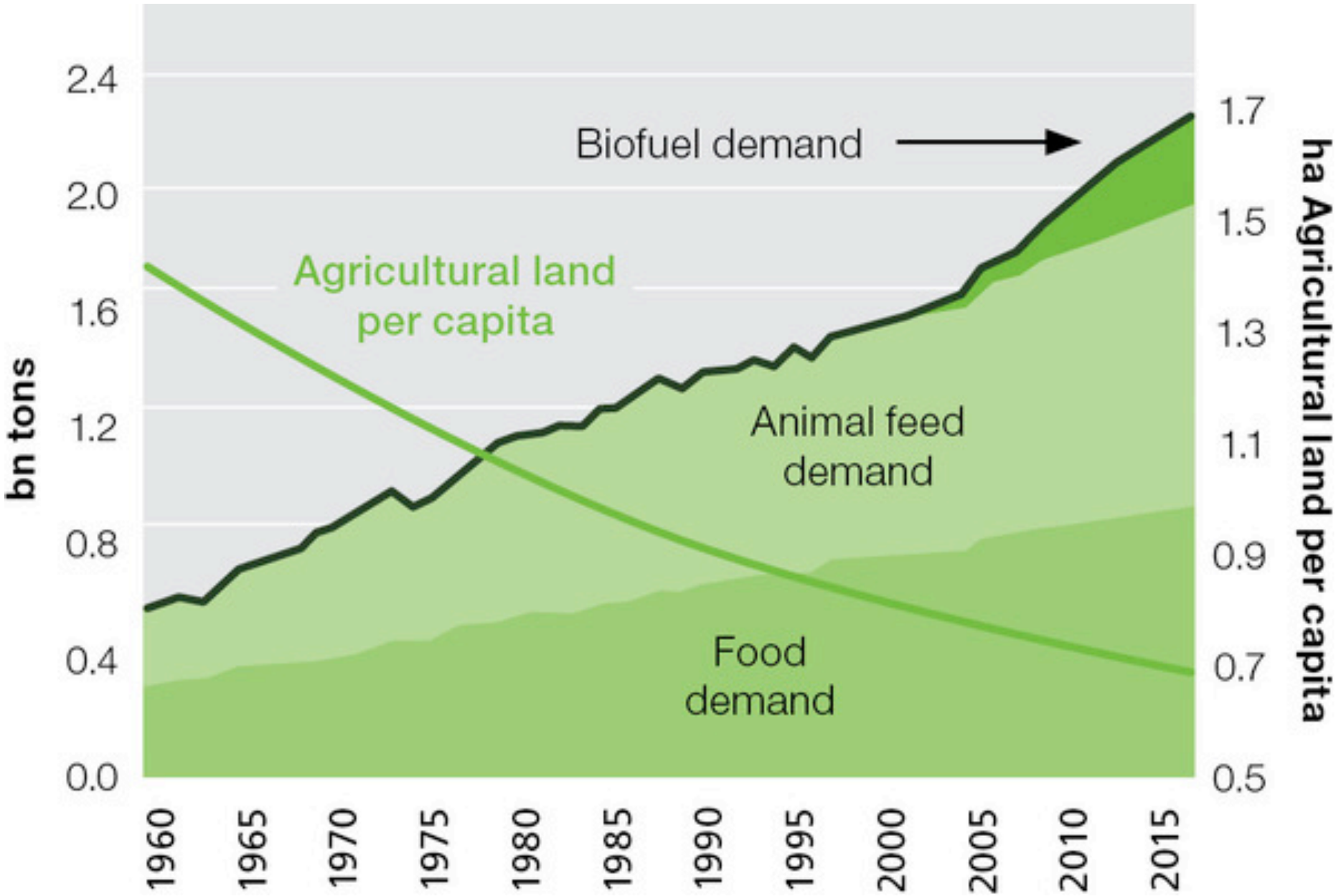
1 Based on the arithmetic average of four commodity sub-indexes: food, non-food agricultural

items, metals, and energy.

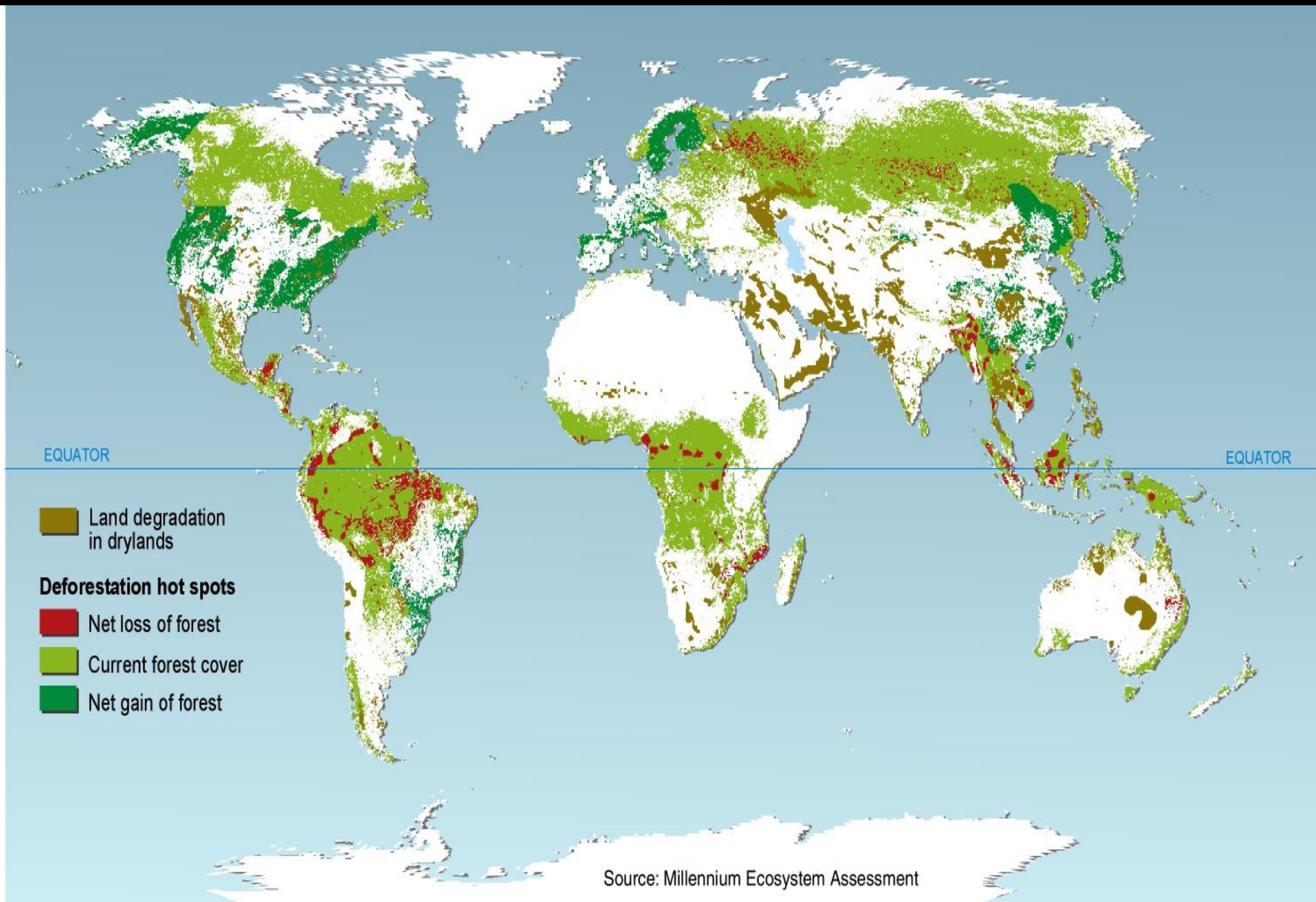
2 Data for 2013 are calculated based on the average of the first three months of 2013.

Source: Grilli and Yang; Pfaffenzeller; World Bank; International Monetary Fund; Organisation for Economic Cooperation and Development (OECD) statistics; Food and Agriculture Organization of the United Nations (FAO); UN Comtrade; McKinsey Global Institute analysis

Available agricultural land is shrinking



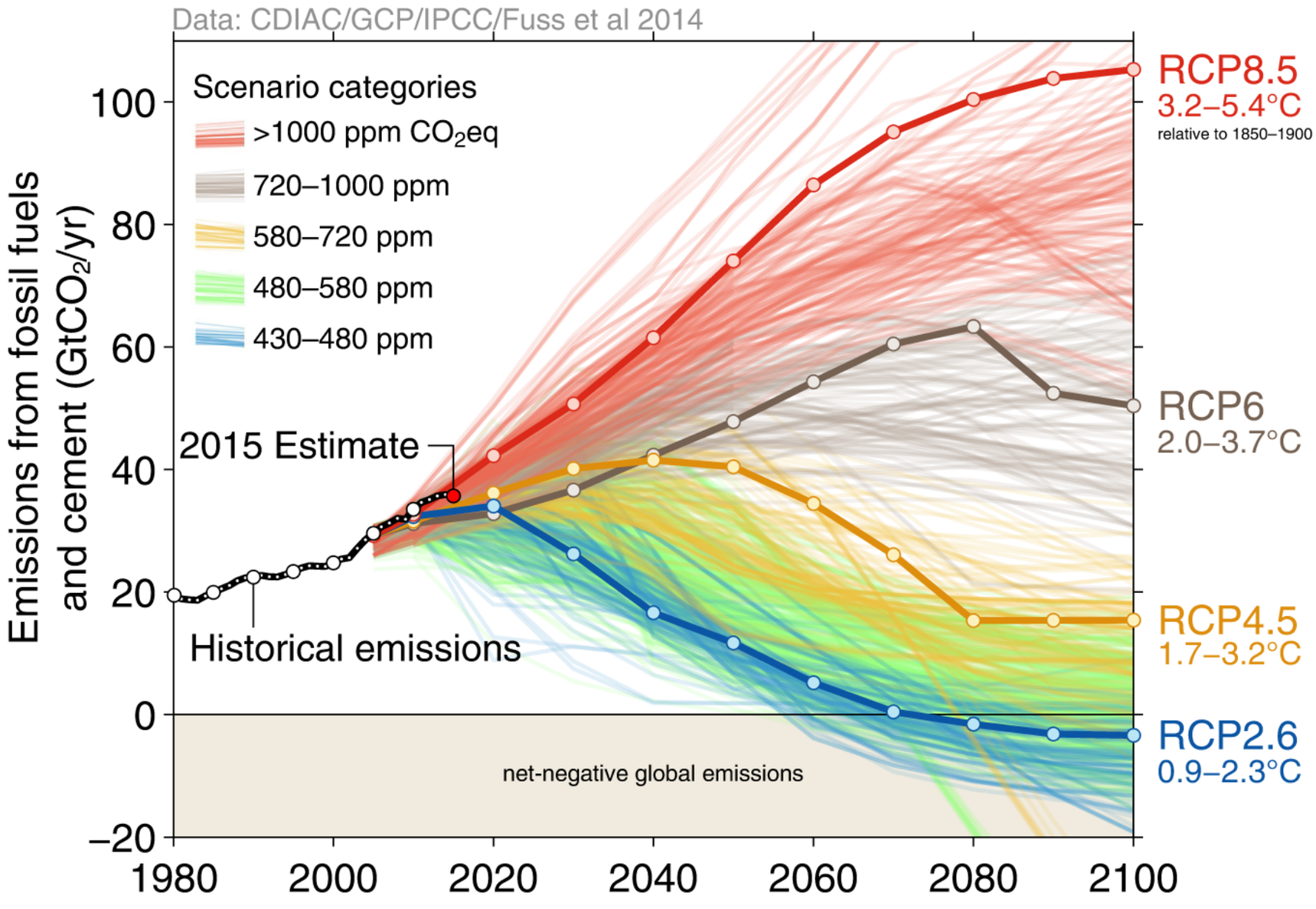
Deforestation Map (approx13 Mha/year)



CLIMATE CHANGE

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

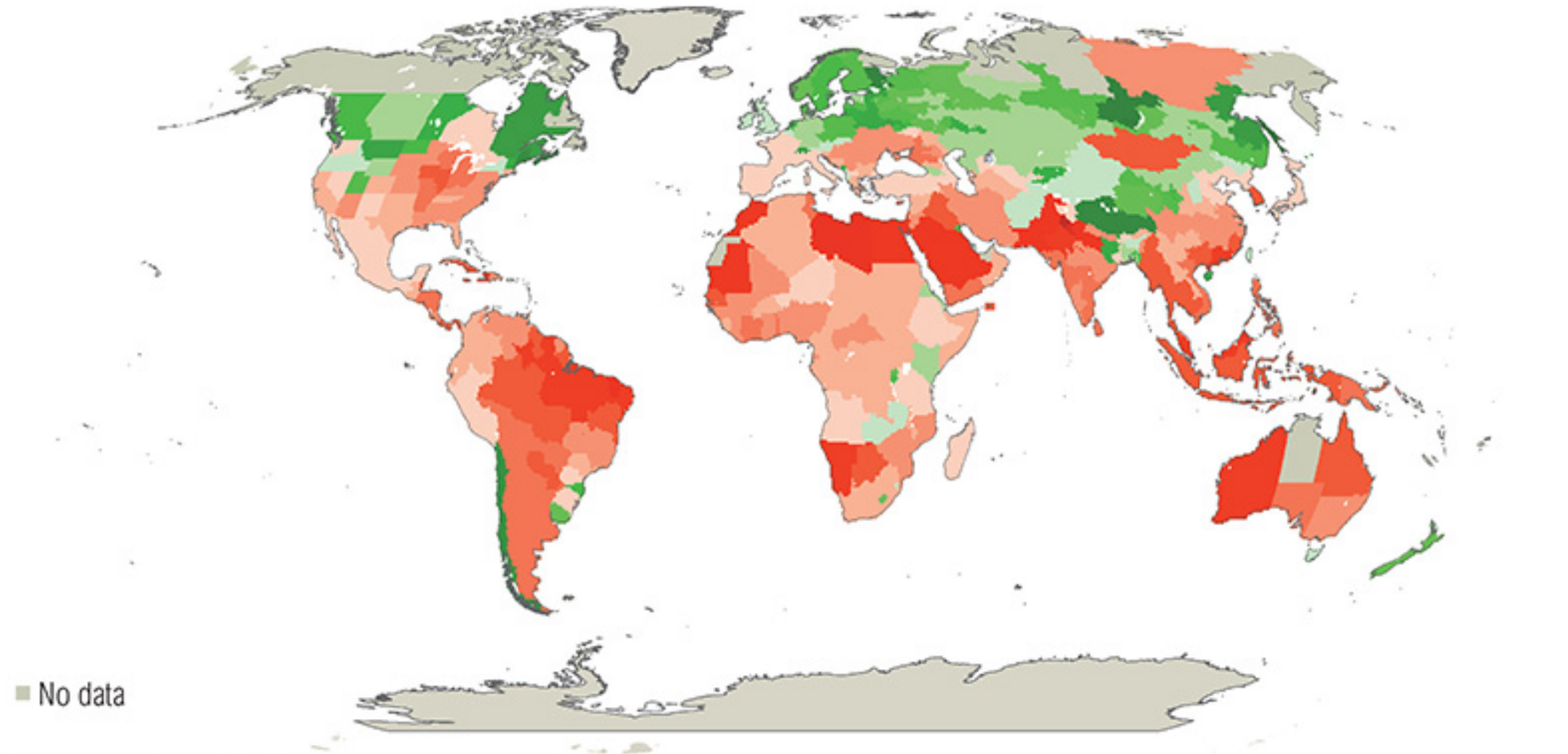
Source: Fuss et al 2014; CDIAC; Global Carbon Budget 2015

Met Office

The impact of a global temperature rise of 4°C (7 °F)

HM Government

Most studies now project adverse impacts on crop yields due to climate change (3°C warmer world)

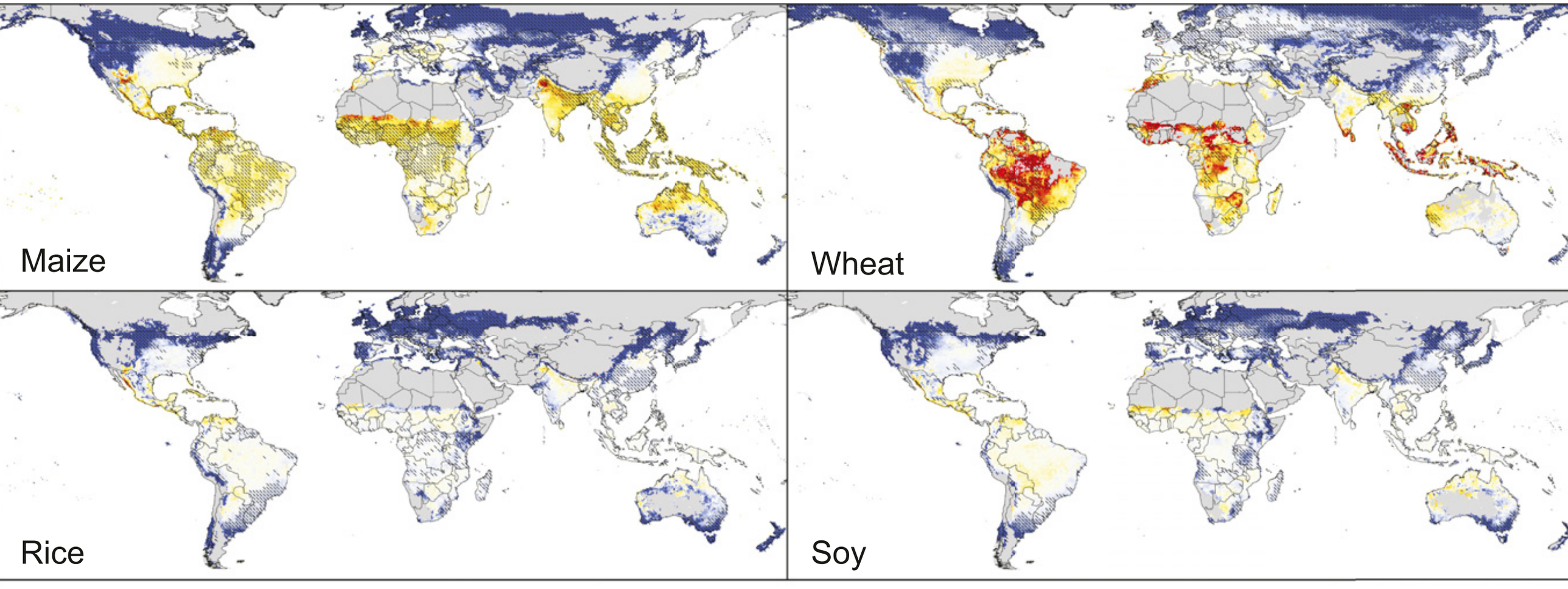


WORLD RESOURCES INSTITUTE

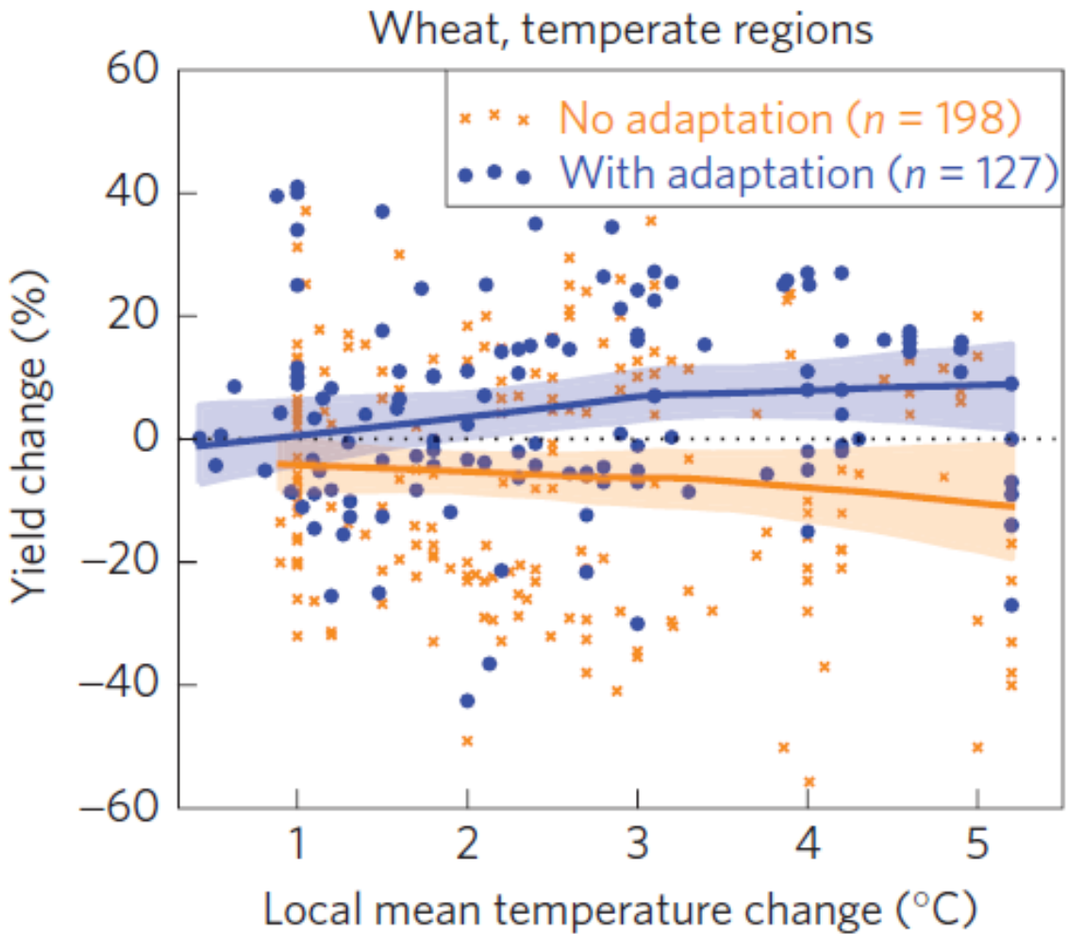
Sources: http://ow.ly/rpfMN

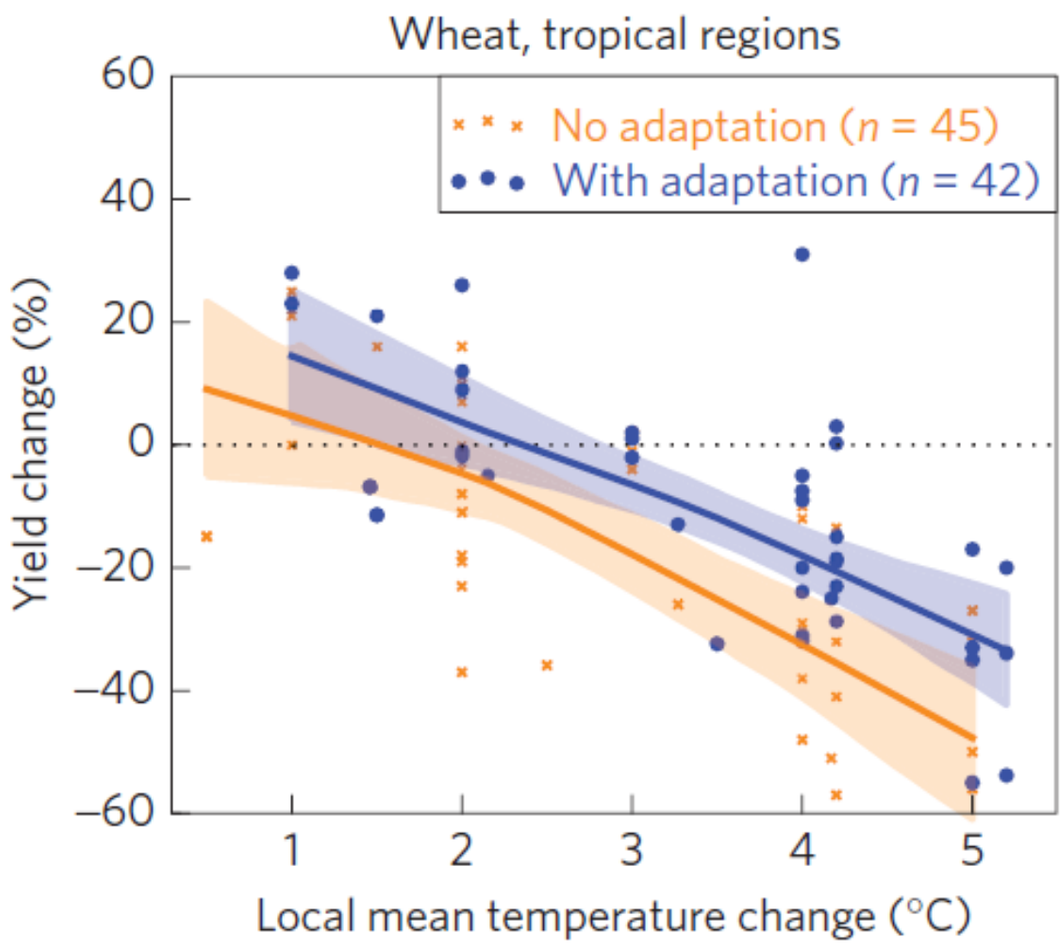
FUTURE CROP YIELD SCENARIOS IN CLIMATE CHANGE

All GGCMs

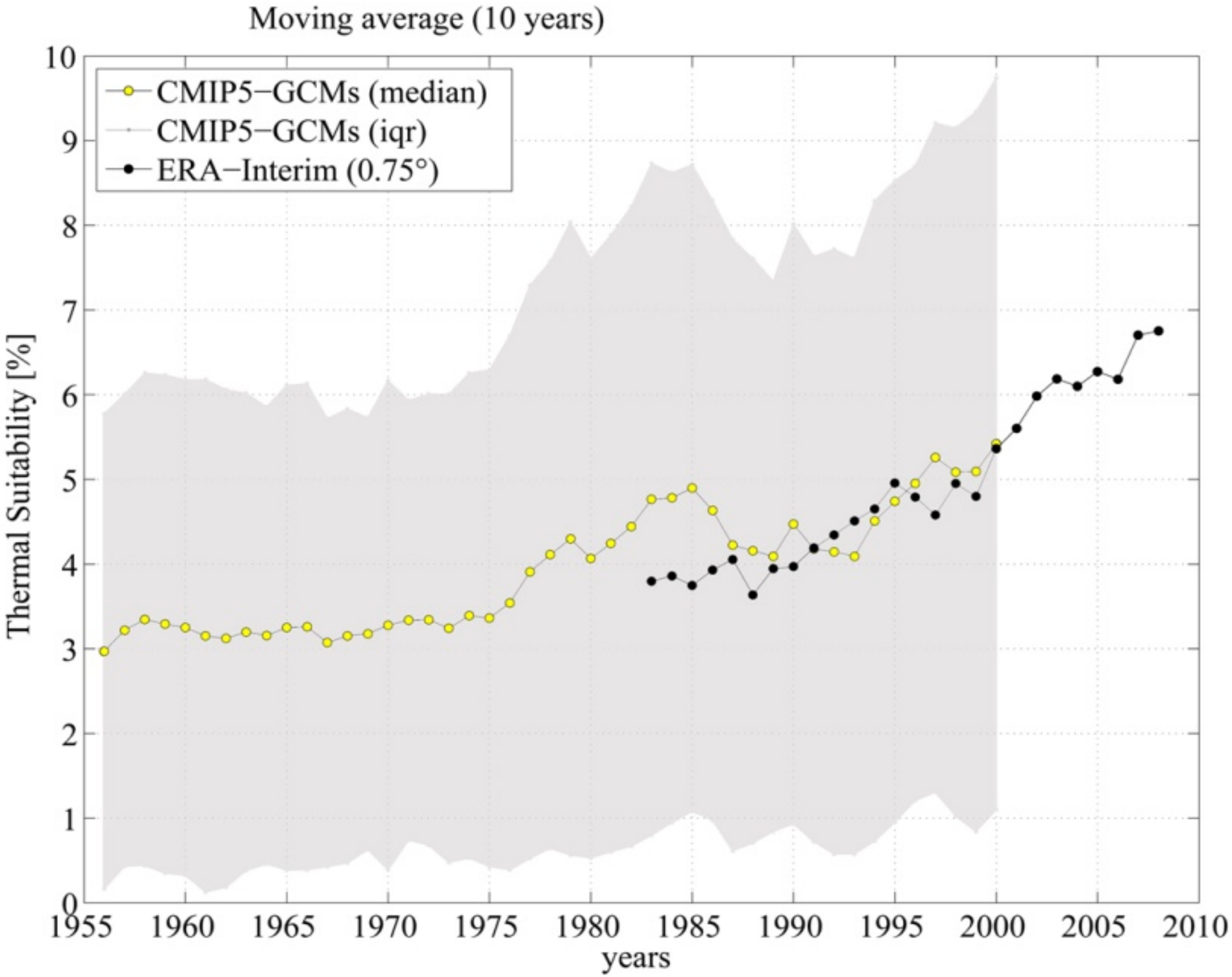


Future impacts vary by region, adaptation important





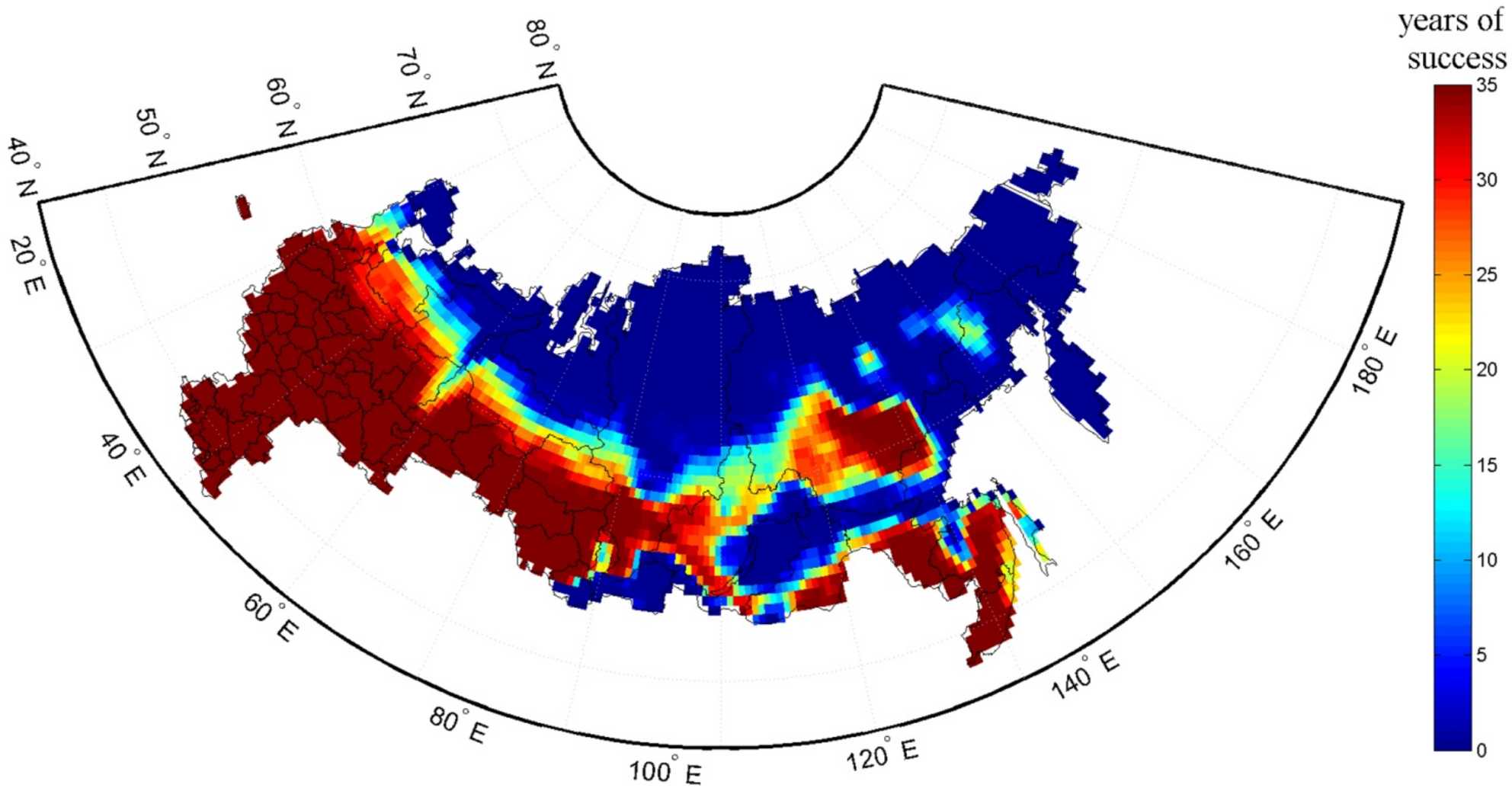
WHEAT SUITABILITY IN RUSSIA- THE GREAT ACCELERATION



Increasing suitability toward the northern regions: **Wheat**

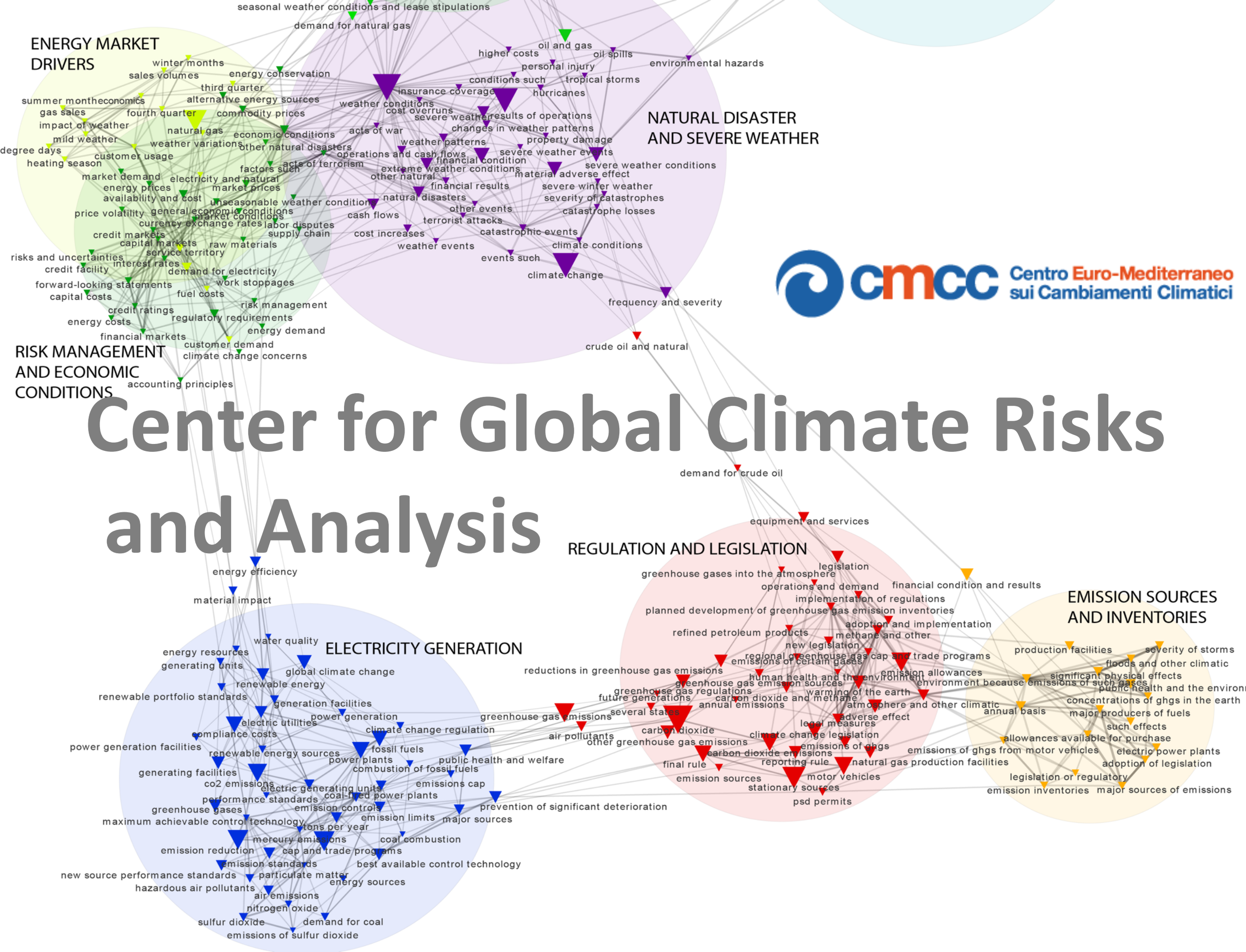
number of years where the thermal requirement was met (success) over the time frames:

2050



An intermediate band of shifting area around 60°N is quite evident.

Projected land by 2050 +40 Milion ha suitable for durum wheat



Center for Global Climate Risks and Analysis

cmcc Centro Euro-Mediterraneo sui Cambiamenti Climatici

PARADIGM SHIFTS

“Climate@risk & Food@risk” BCFN Stakeholder Forum 22 April, 2016 | Rome

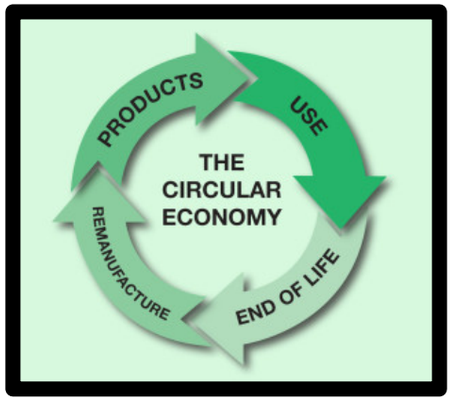
1. Reconnect agriculture and the food system

2. Include true cost of food in business models through negative and positive externalities

3. Focus farm production on urban and peri-urban areas

4. Feature agriculture in climate mitigation and adaptation strategies

5. Full transition to agro-ecology and circular economy in the agro-food system



THANKS PASTA !
THANKS RUSSIA !