Impacts of climate change, including on humans in cities
...validating the Paris agreement
...putting Latvia/Europe into a global context

Hans-O. Pörtner
Co-chair IPCC WGII

Paris Agreement: “aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty”... “**pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels**”… “**increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience**”.

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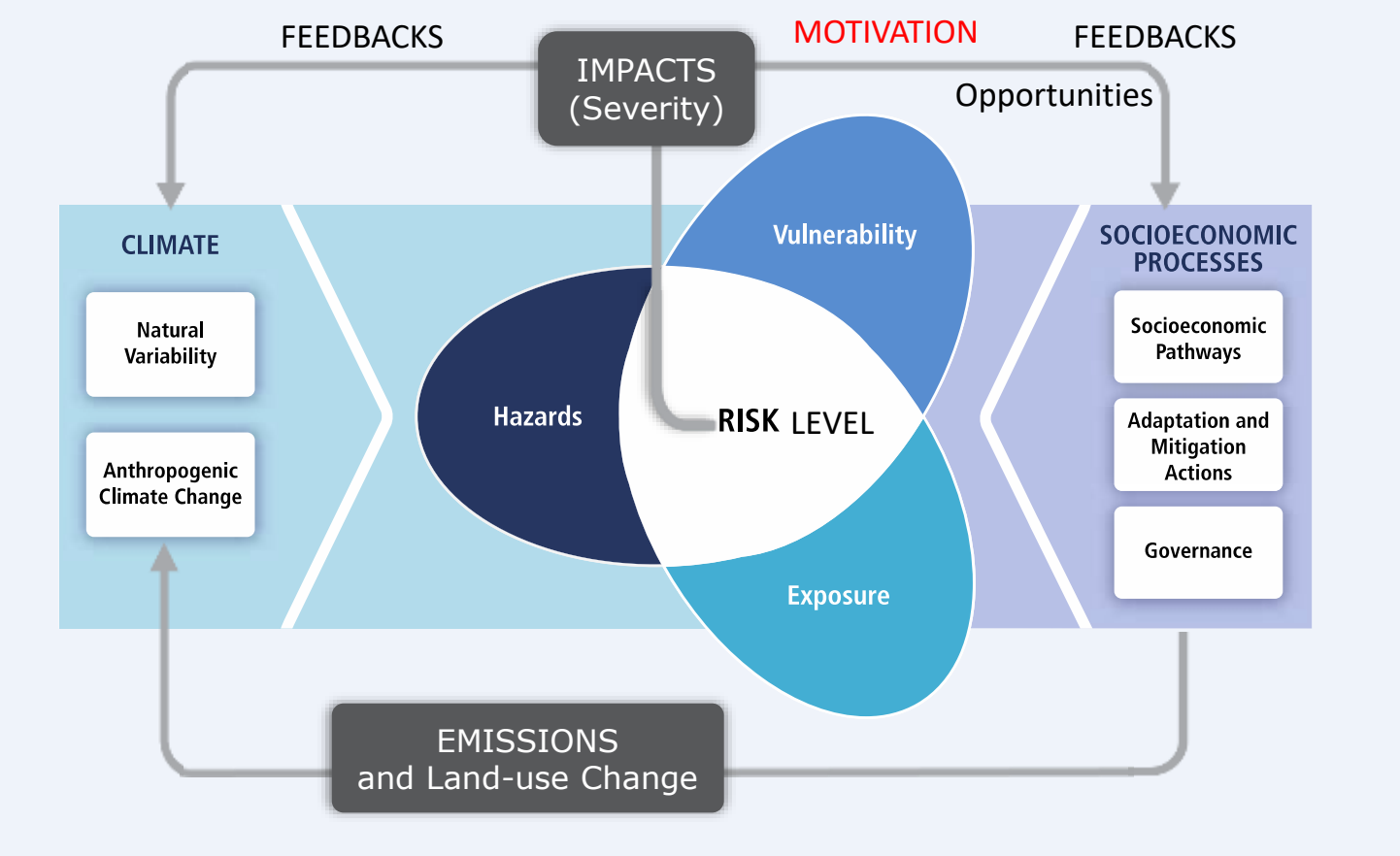
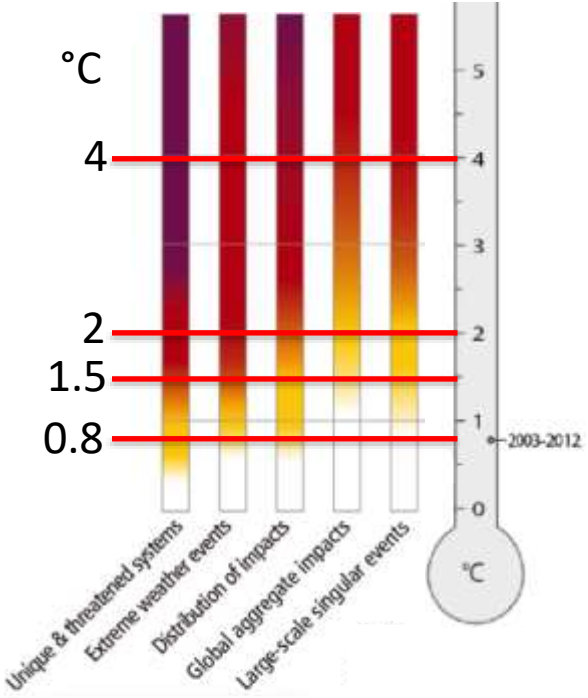
How to widely compare climate impacts (risks)?

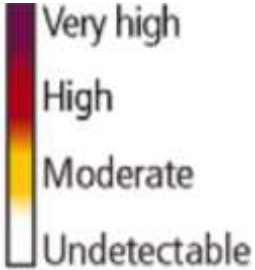


…. the risk concept of IPCC WGII, liaising to WGI and WGIII approaches

…. linking to Article 2, UNFCCC

LTGG Risk assessment IPCC WGII: How to widely compare climate impacts?





Level of additional risk due to climate change

A **role for natural and human systems and their interdependencies** .....to guide and validate the setting of **long-term global goals** (LTGG, relative to preindustrial), considering levels of **risk**

LTGG
4°C
2°C
1.5°C
0.8°C

...comparing LTGGs, identifying... Key risks of impacts .... Risks to be avoided

Climate-related health risks already exist

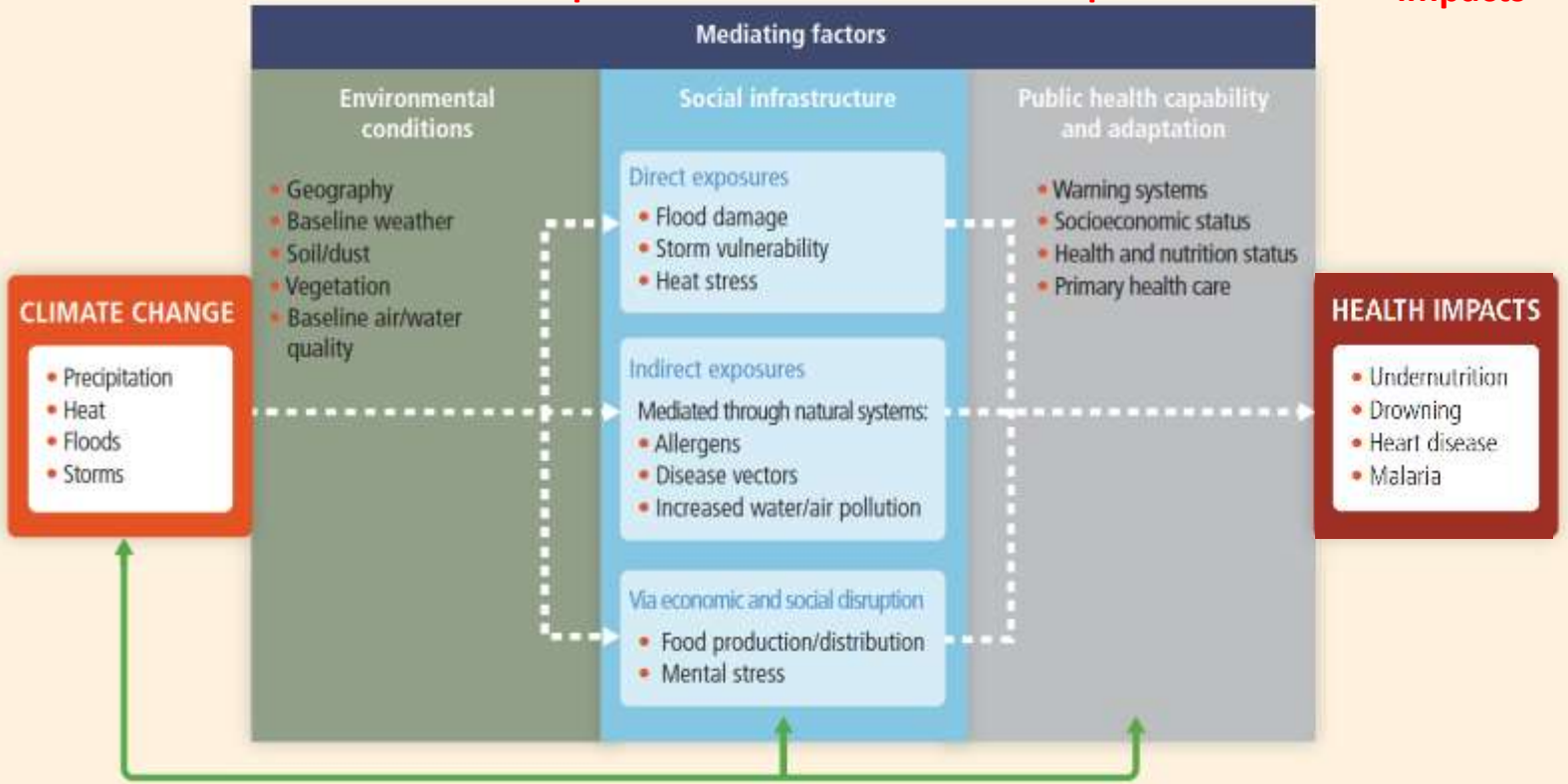
+0.8°C

Climate and Environment

Exposure

Adaptation

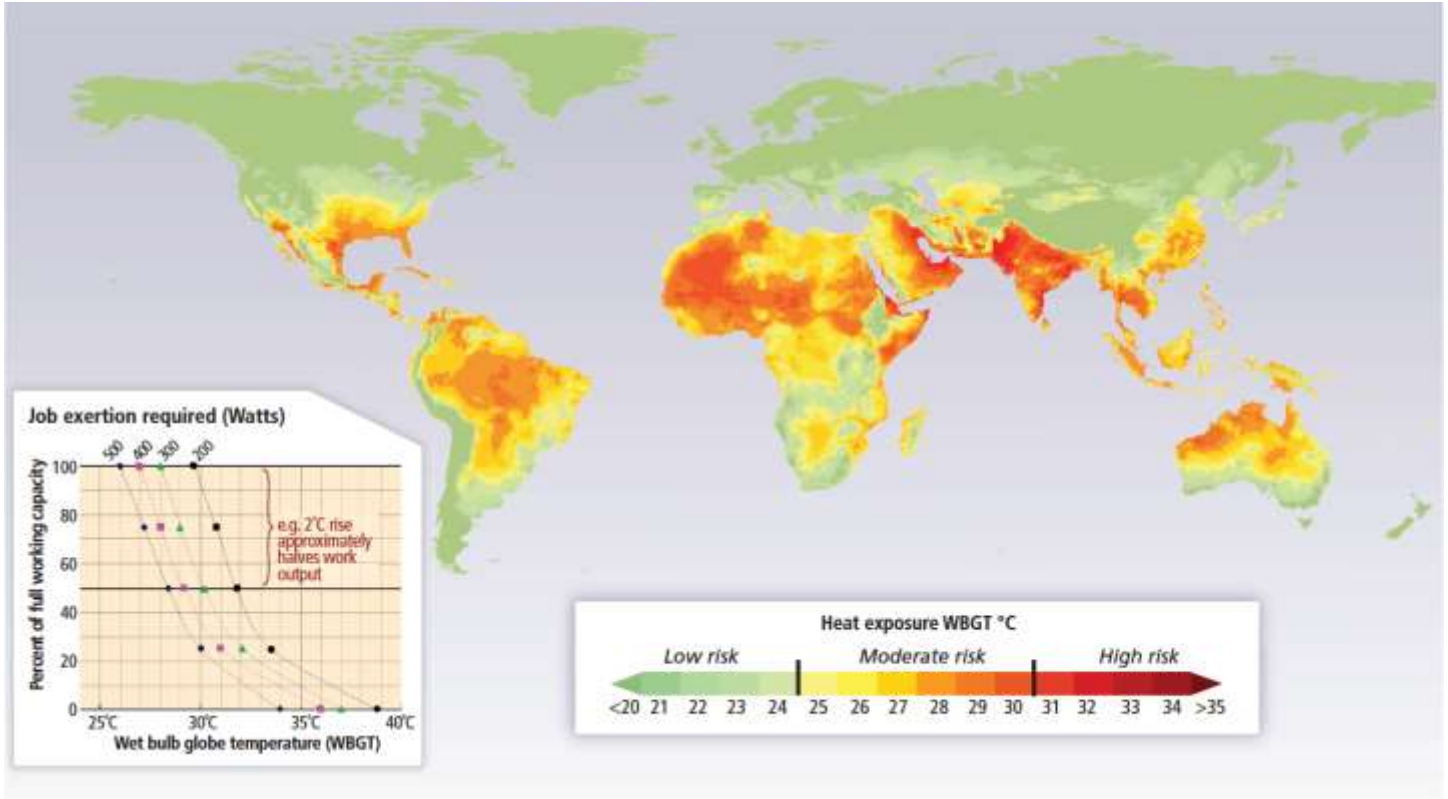
Health impacts



IPCC AR5 WGII Fig. 11-1

Heat limits to outdoor work capacity exceeded during summer months (1980 -2009)
further expansion projected (low adaptation capacity in human physiology)

+0.8°C



For every 1°C that ambient Tmax goes up, the Wet Bulb Globe T goes up by about 0.9°C,
Fatigue reached at core body temperature close to 40°C

IPCC AR5 WGII Figure 11-5

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+0.8°C

Impacts of thermal extremes (heat waves)

Photo: CBS News 2002

The health impacts of thermal extremes include significant adverse social impacts with reduced worker productivity

Photo: BBC News 2000

RCP2.6

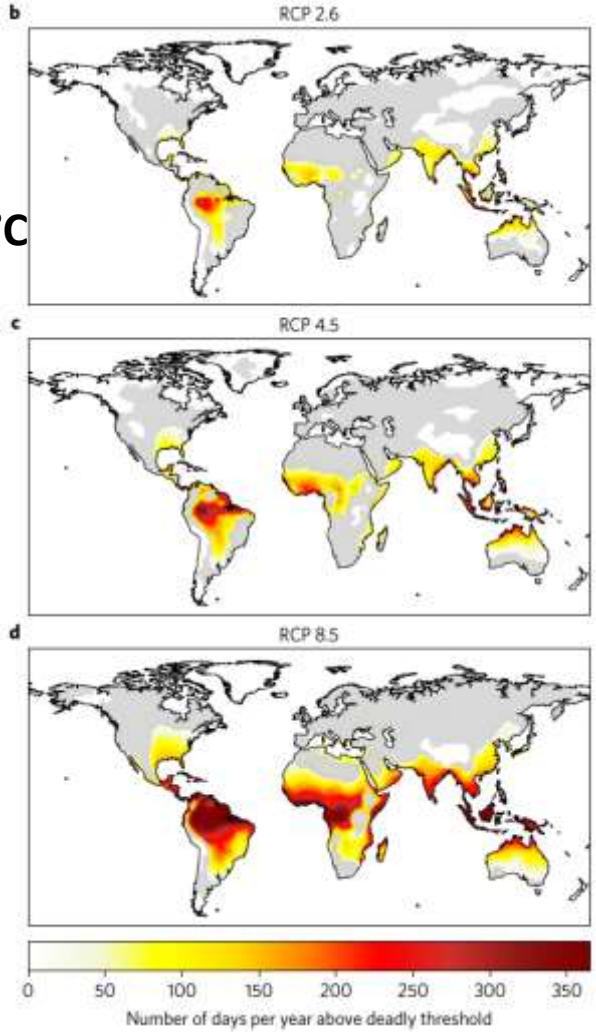
~+1.5°C

RCP4.5

~+2°C

RCP8.5

~+4°C



Depending on the **degree of climate change** conditions, some parts of the planet may become intolerable outdoors for humans and other mammals (e.g. livestock)

exposure aggravated by an ageing population (higher vulnerability) and increasing urbanization (heat-island effects).

Mora et al., NCC 2017

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>1.5°C

...warming, droughts

Food security constrained on land ….Crops

>1.5°C: high risk of more severe impacts after 2050

Key risk	Adaptation issues & prospects
Reductions in mean crop yields because of climate change and increases in yield variability. (*high confidence*) [7.2, 7.3, 7.4, 7.5, Box 7-1]	With or without adaptation, negative impacts on average yields become *likely* from the 2030s with median yield impacts of 0 to –2% per decade projected for the rest of the century, and after 2050 the risk of more severe impacts increases.

...includes effects of redistributed precipitation, heat and drought events

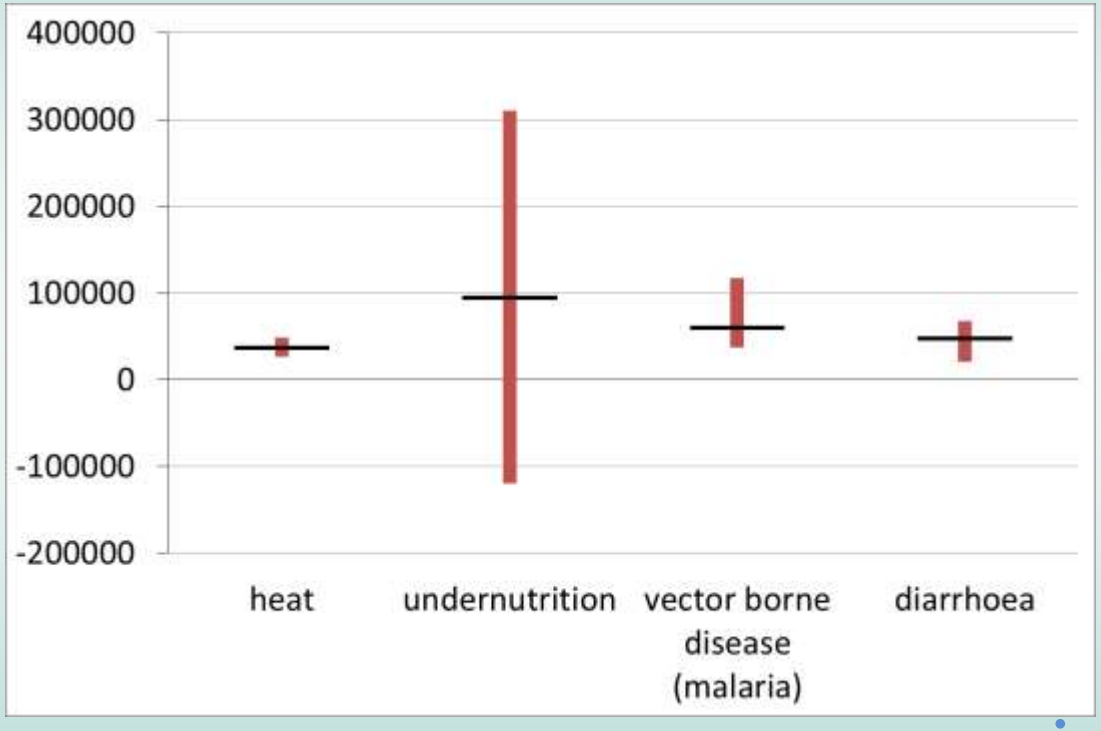
WGII, Table TS.4, SYR Table 2.3

~ +1.5°C

Estimates of mortality due to climate change, 2030s:

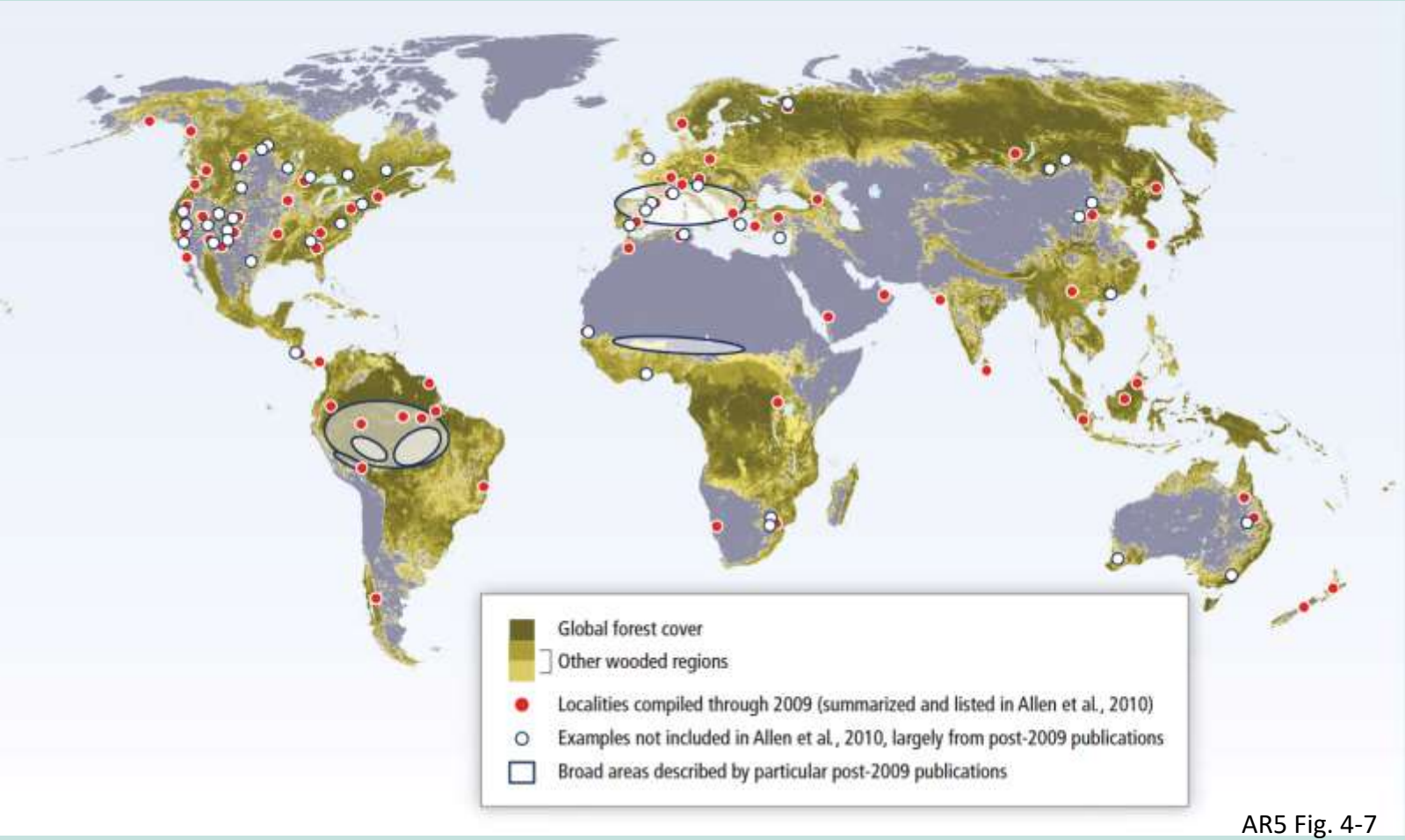
approximately 250,000 excess deaths/year

Heat waves cause increased mortalities even in Scandinavia or UK



WHO 2014

+0.8°C



AR5 Fig. 4-7

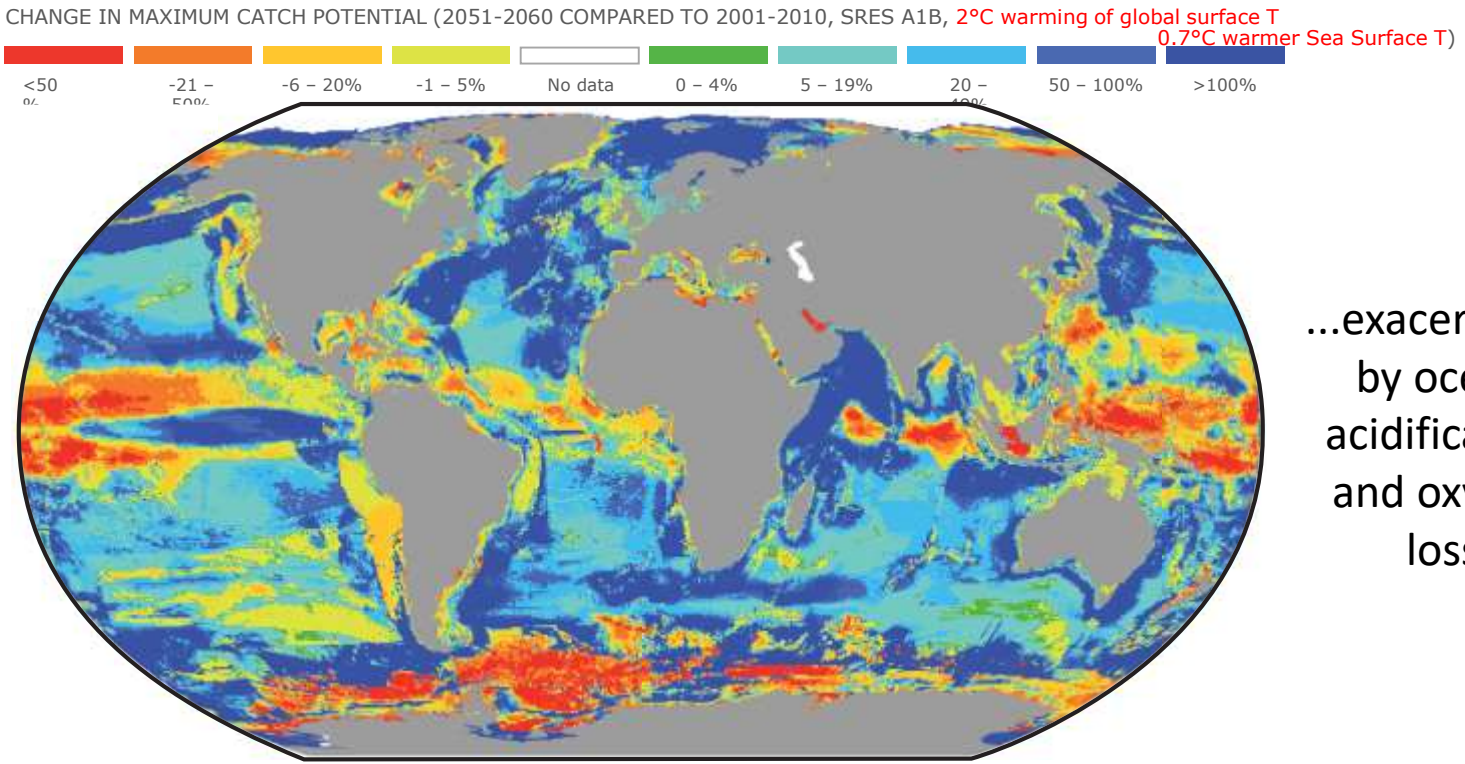
Tree mortality related to drought and heat

1st steps toward desertification

... ocean warming

+2°C

2051-60: shifted productivity, fish and invertebrate catch potential



...exacerbated by ocean acidification and oxygen loss

HIGH RISK FOR FISHERIES AT LOW LATITUDES: small human adaptation capacity over time

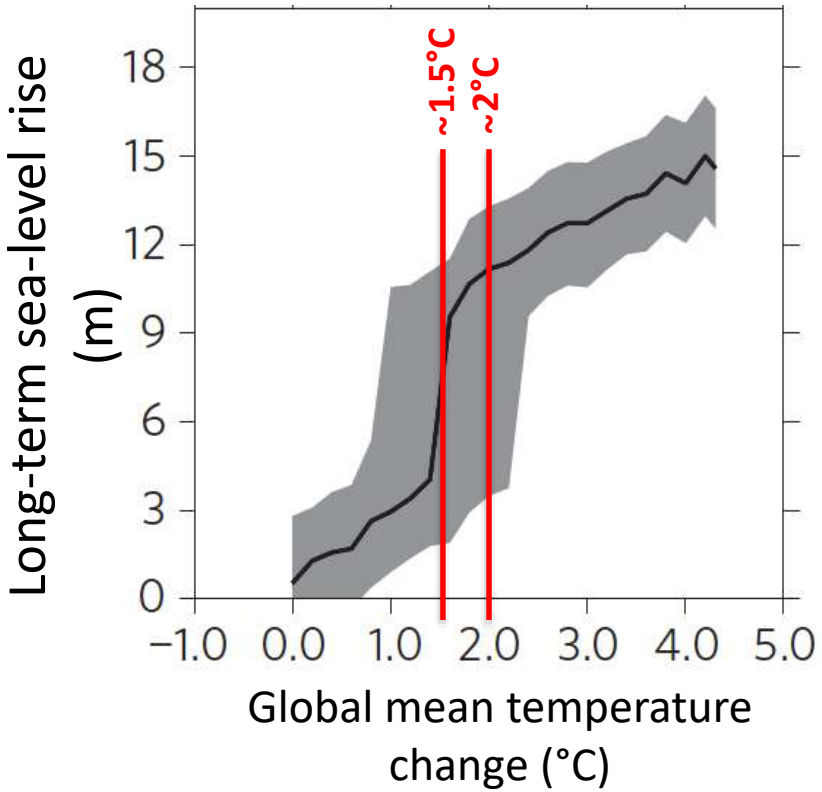
WGII, 6-14, SPM.6, SYR 2.6

Sea level rise beyond 2100 may challenge natural and human systems:

1.5°C

....affecting habitat, freshwater resources, human society through flood events

High ambition mitigation needed



Coming close to Paleo-findings....

5-9 m : ...during the last interglacial (Eemian, 125.000 ya, at 0.7-2°C above pre-industrial)

>7m : ...last time when the atmosphere had 400 ppm CO_2 (in Pliocene, 3-5 Mya)

Knutti et al., Ngeo 2015

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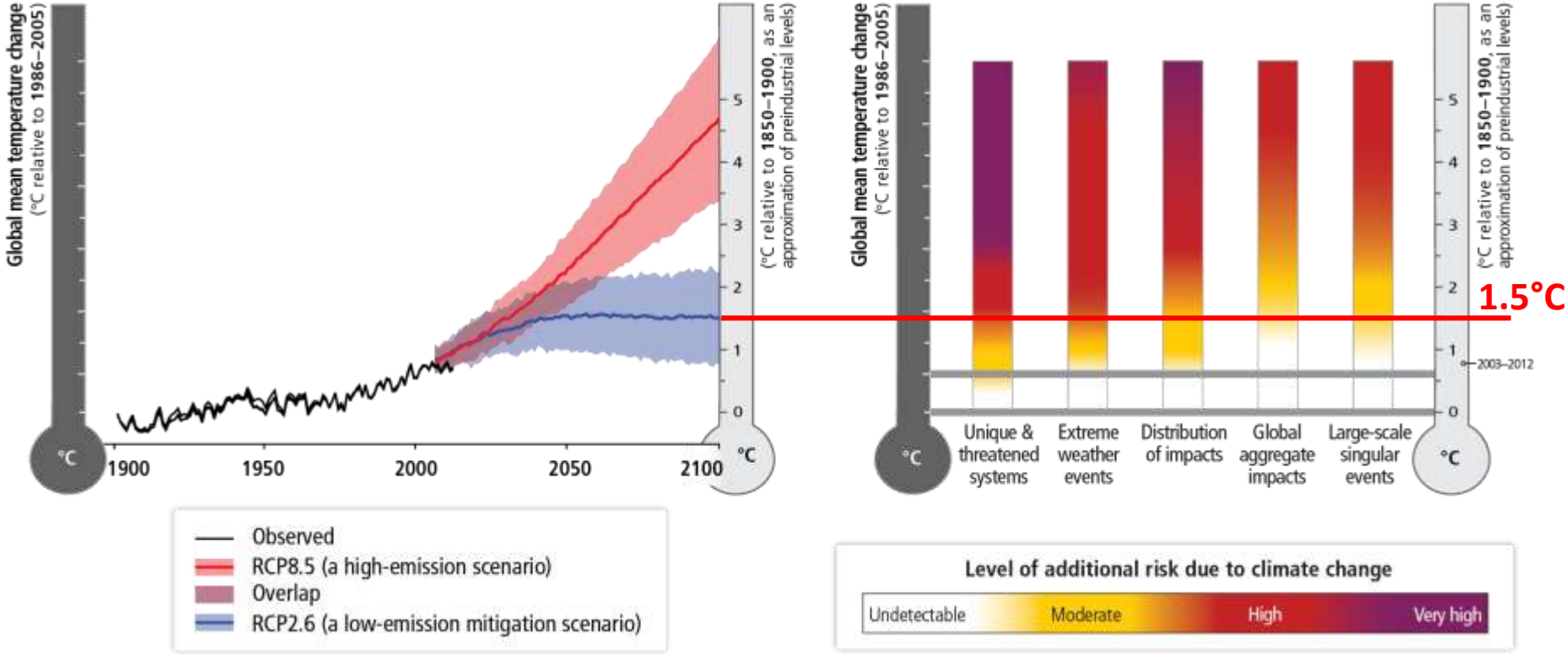
Hazard	Key vulnerabilities in cities	Key health risks	Emerging risks
Air pollution	• High exposure and pollution levels • Vulnerable groups (e.g. very young/old, chronically ill)	• Increased respiratory disease • Lower quality of life	• Compounding health crises • Reduced ability of cities to implement pollution control
Extreme temperatures	• Vulnerable groups (very young/old, pregnant women, chronically ill, immune compromised, low income groups, exposed labourers) • Urban heat island effect	• Ill health due to heat stress or cold spells • Shifts in seasonal patterns	• Heat and air pollution interaction • Growing elderly populations
Temperature (warming)	• Food security • Large urban populations • Shifting patterns of (especially food-, water- and vector-borne) diseases	• Poverty and related health impacts • Household nutritional status • Disease	• Collapsing peri-urban agriculture, economies and ecosystems • Threatened livelihoods and potential conflict • Emergence of new pathogens

AR5 WGII(A) Table KR-1

Risk thresholds help us to define when climate change becomes dangerous: THE PARIS AGREEMENT 2015



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Future Risks

Climate change will amplify existing risks and create new risks for natural and human systems.

Risks are unevenly distributed and are generally greater for disadvantaged people and communities in countries at all levels of development.

Increasing magnitudes of warming increase the likelihood of severe, pervasive, and irreversible impacts for people, species and ecosystems.

THANK YOU FOR YOUR ATTENTION!

For more information:

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IPCC Secretariat: ipcc-sec@wmo.int
IPCC Press Office: ipcc-media@wmo.int

IPCC WGII

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