

Impacts and Options for Adaptation – (how) can society and nature adjust?

- validating the Paris agreement -

Hans-O. Pörtner

Co-chair IPCC WGII: Impacts, adaptation and vulnerability

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”.

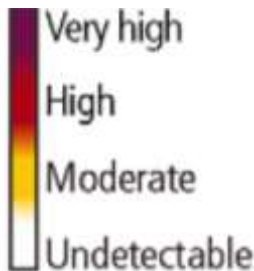
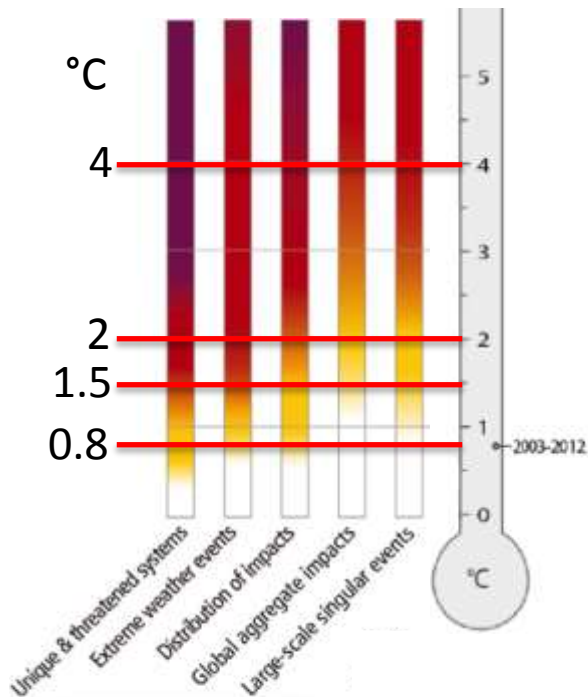
IPCC Working Group II

Taking the Paris agreement seriously:

- **Identifying impacts** (observed and projected) in relation to the degree of climate change
- **Defining the „brickwall“**: when dangerous climate change begins and which climates to avoid

- **Identifying adaptation options and capacity and the limits to acclimation and adaptation**
- **Setting the Long Term Global Climate Goal: guiding ambition in mitigation**

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

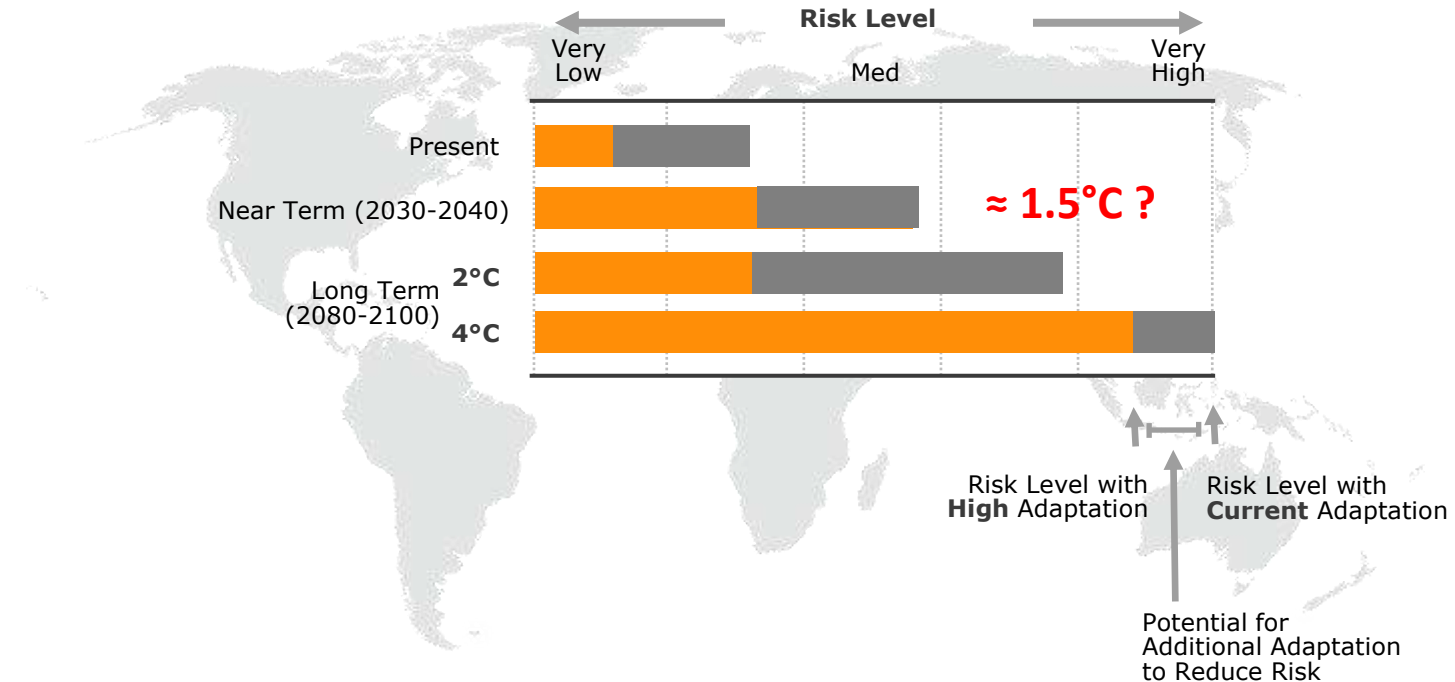
Climate change....causing risks

....which were assessed in AR5, with open questions for AR6:

1.5°C not fully covered and compared

(key risks are those relevant to article 2, UNFCCC:

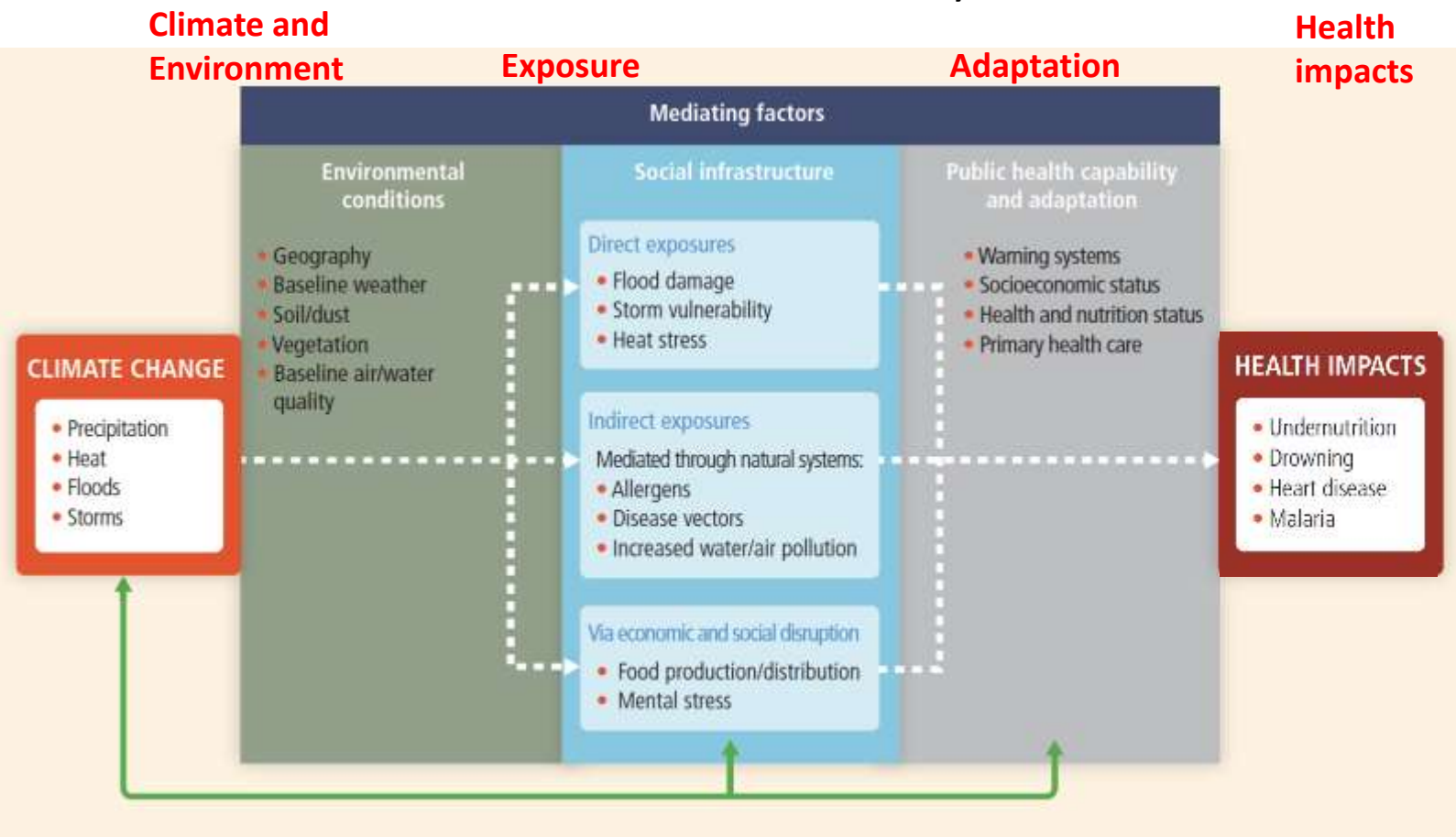
“avoid dangerous anthropogenic interference with the climate system”)



.... should be complemented by Potential for Mitigation to Reduce Risk

Climate-related health risks already exist

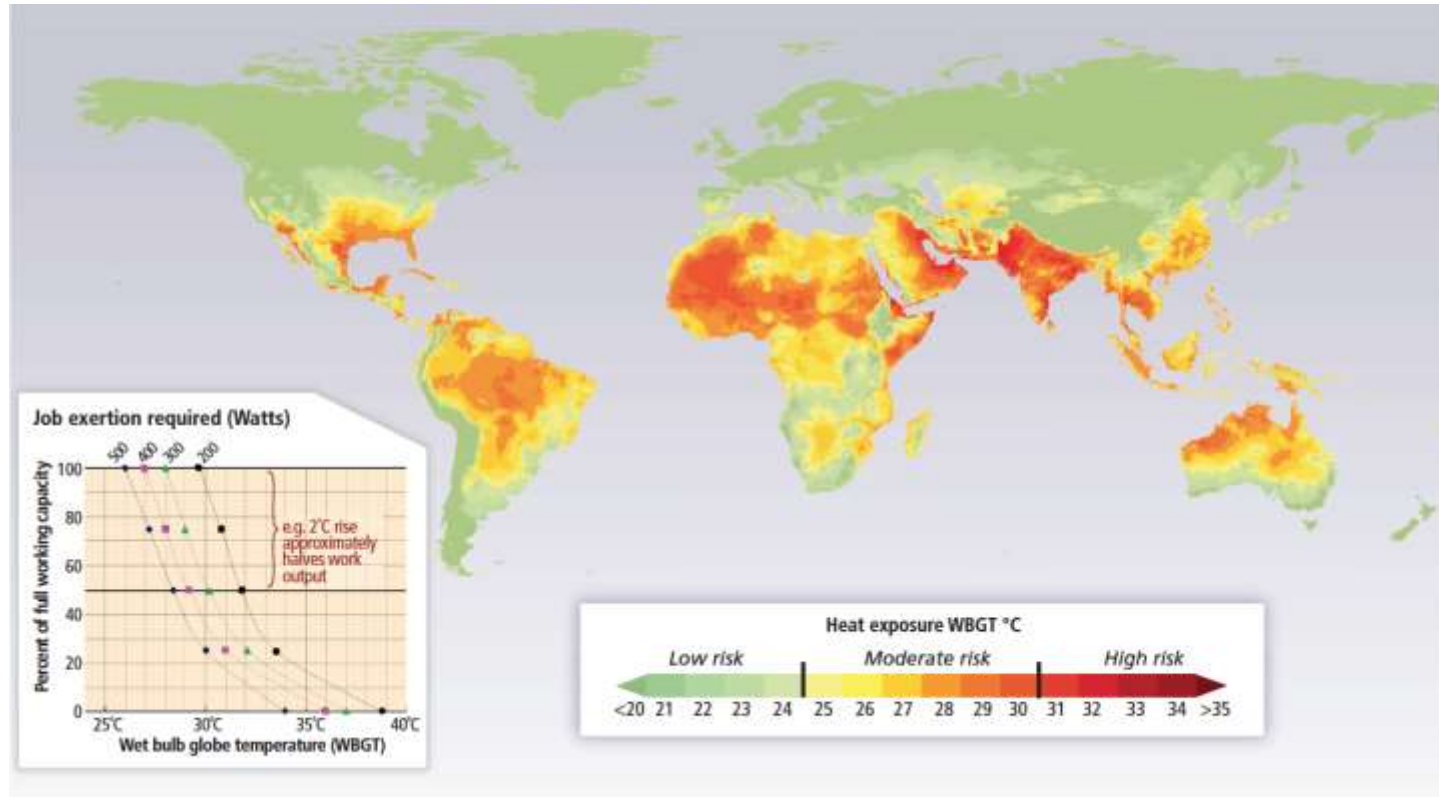
+0.8°C



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

Impacts of thermal extremes (heat waves)

+0.8°C

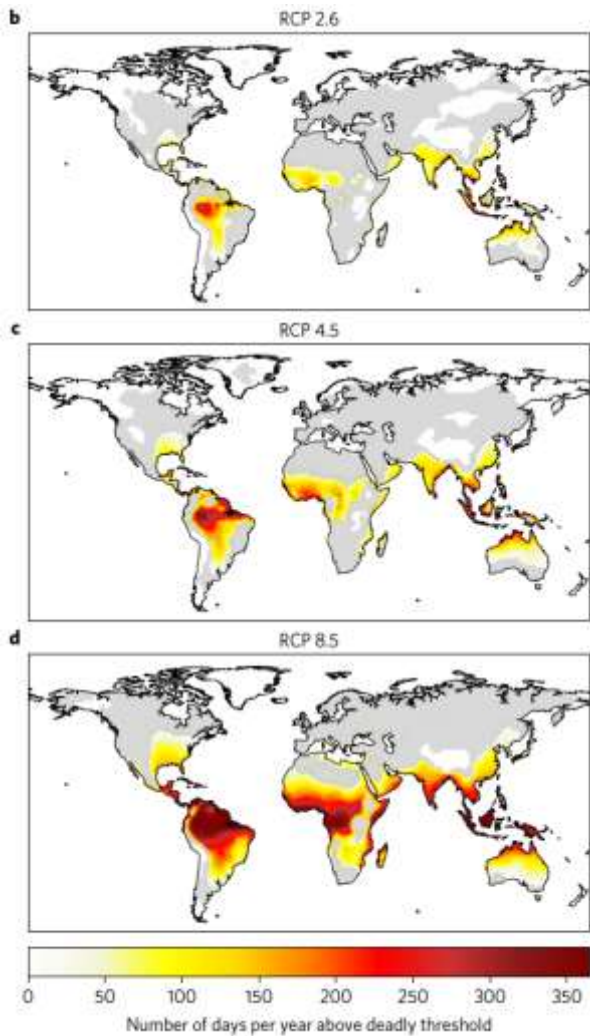
The health impacts of thermal extremes include significant adverse social impacts with reduced worker productivity



Photo: CBS News 2002

Photo: BBC News 2000





Depending on the degree of climate change conditions in some parts of the planet may become intolerable outside 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

TO BE ASSESSED IN AR6

ipcc

INTERGOVERNMENTAL PANEL ON climate change



...warming, droughts

Food security constrained on landCrops

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

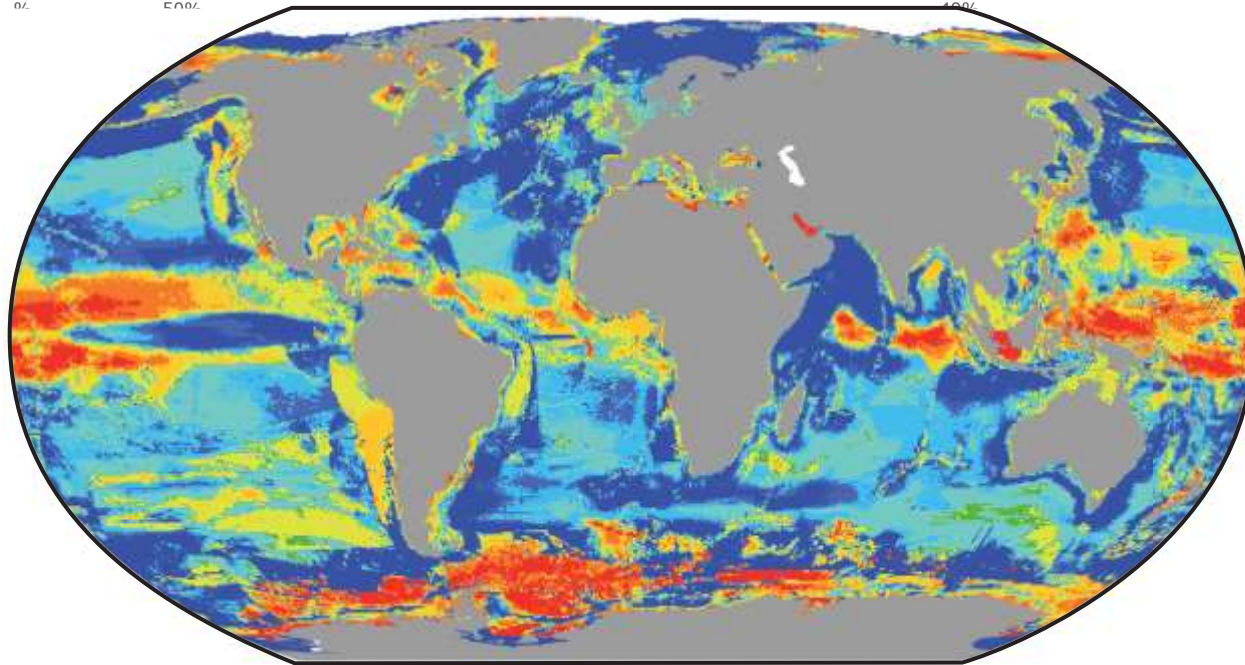
Key risk	Adaptation issues & prospects
<p>Reductions in mean crop yields because of climate change and increases in yield variability. <i>(high confidence)</i></p> <p>[7.2, 7.3, 7.4, 7.5, Box 7-1]</p>	<p>With or without adaptation, negative impacts on average yields become likely from the 2030s with 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.</p> <p>...includes effects of redistributed precipitation, heat and drought events</p>

... ocean warming

+2°C

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

CHANGE IN MAXIMUM CATCH POTENTIAL (2051-2060 COMPARED TO 2001-2010, SRES A1B, 2°C warming of global surface T, 0.7°C warmer Sea Surface T)



...exacerbated by ocean acidification and oxygen loss

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

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.

Adaptation options in arid areas

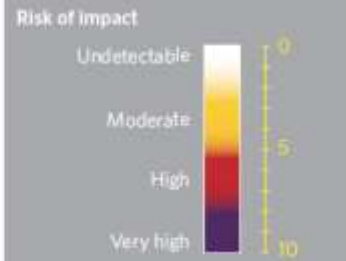
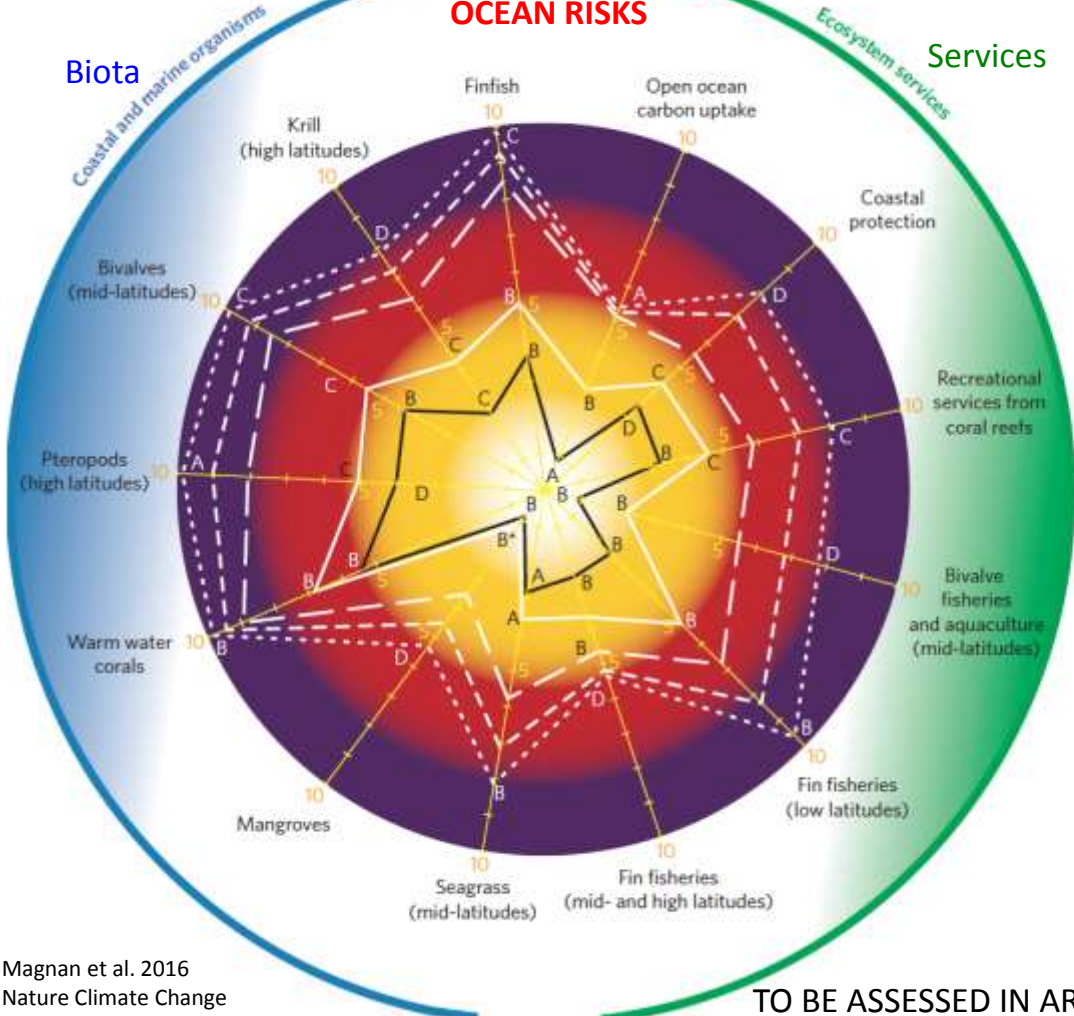
Enhance water management across sectors

- Reduce unsustainable groundwater exploitation (e.g. fossil aquifers)
- Reduce water intensive crops
- Enhance irrigation efficiency
- Enhance Rainwater harvesting
- Enhance Solar driven desalination systems
- Ensure access to safe drinking water and adequate sanitation
- Establish water efficient growing of crops and vegetables
- Restore ecosystems and their services (mangroves, blue carbon)
- **Reduce likelihood of heatwaves and heat induced human failures and mortalities**
 - Reduce degree of climate change by keeping to the Paris agreement
 - Enhance cooperative and multidisciplinary international efforts

Planetary boundaries

Linking to INDCs and Global Stocktake

OCEAN RISKS



Confidence levels for the present day and the RCPs

E	Very low
D	Low
C	Medium
B	High
A	Very high

Emission scenarios: °C

	Present day	0.8
	IPCC RCP 2.6	1.5
	Climate Action Tracker 2015 estimate (+2.7 °C)	2.7
	Climate Interactive 2015 estimate (+3.5 °C)	3.5
	IPCC RCP 8.5	>4

Adaptation capacity of ecosystems is very limited....

....suggesting a precautionary approach in line with the Paris agreement.

The Paris agreement provides a sense of urgency:
Overcoming societal inertia and inaction in transformation....

NOT WANTING TO
LISTEN TO SCIENCE...



A common response even
among those who (should)
know better...!?

- Strengthen the UNFCCC process and global stocktake.
- enhance and exploit **the science basis of solution** options:
 - Protected areas (terrestrial and marine)
 - Identify capacity and limits to adaptation
 - Blue growth (conservation/restoration)
 - Sustainable development

THANK YOU FOR YOUR ATTENTION!

For more information:

Website: <http://ipcc.ch/>

IPCC Secretariat: ipcc-sec@wmo.int

IPCC Press Office: ipcc-media@wmo.int

IPCC WGII

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