CLIMATE CHANGE

Vulnerability, Impacts, and Adaptation : ....in support of the global stocktake

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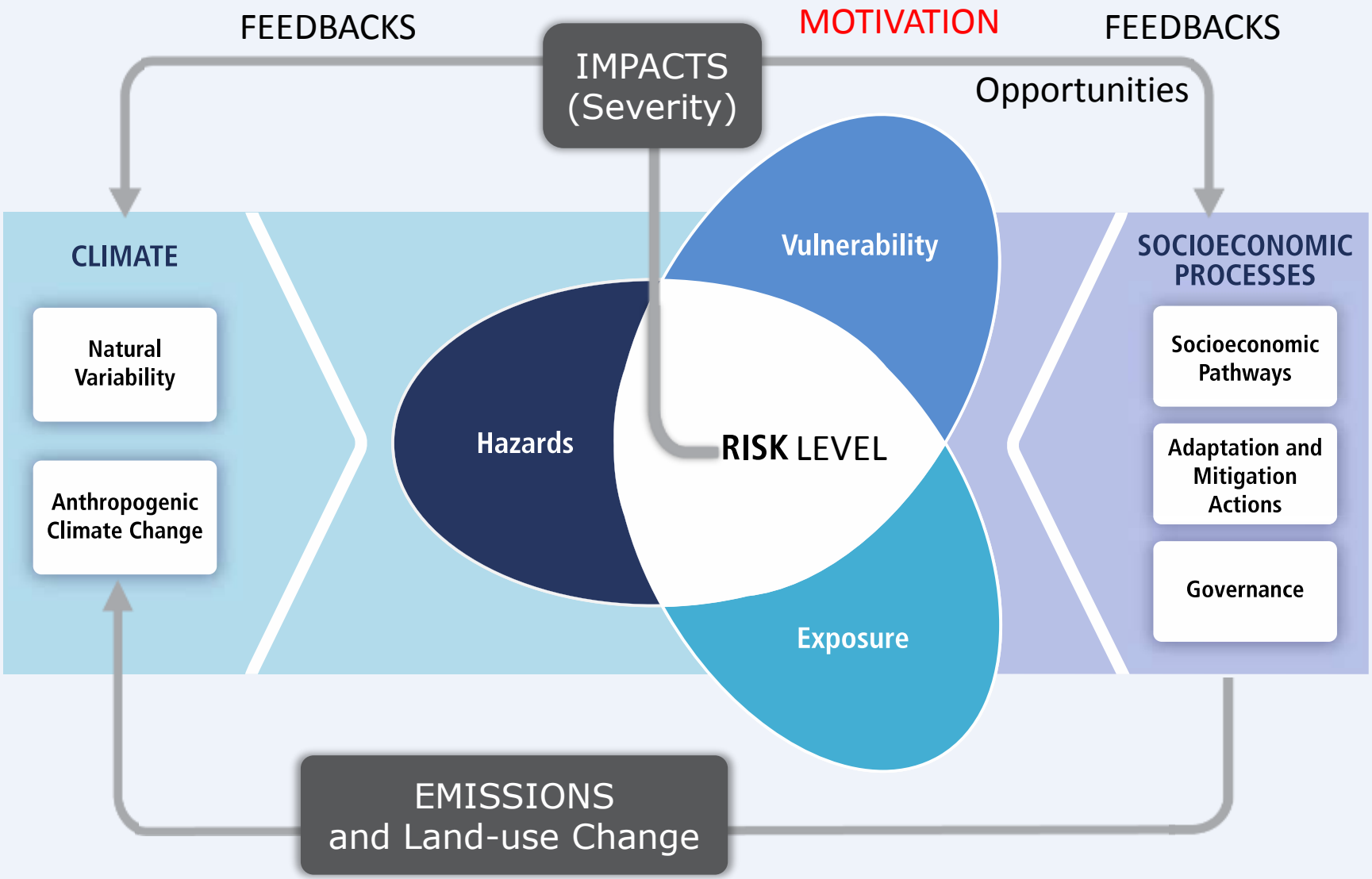
Co-chairs AR6 WGII

ipcc
INTERGOVERNMENTAL PANEL ON climate change

Photo ©H.O. Pörtner

Comparing long term global goals (LTGG) through climate induced risks



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

…. linking to Article 2, UNFCCC

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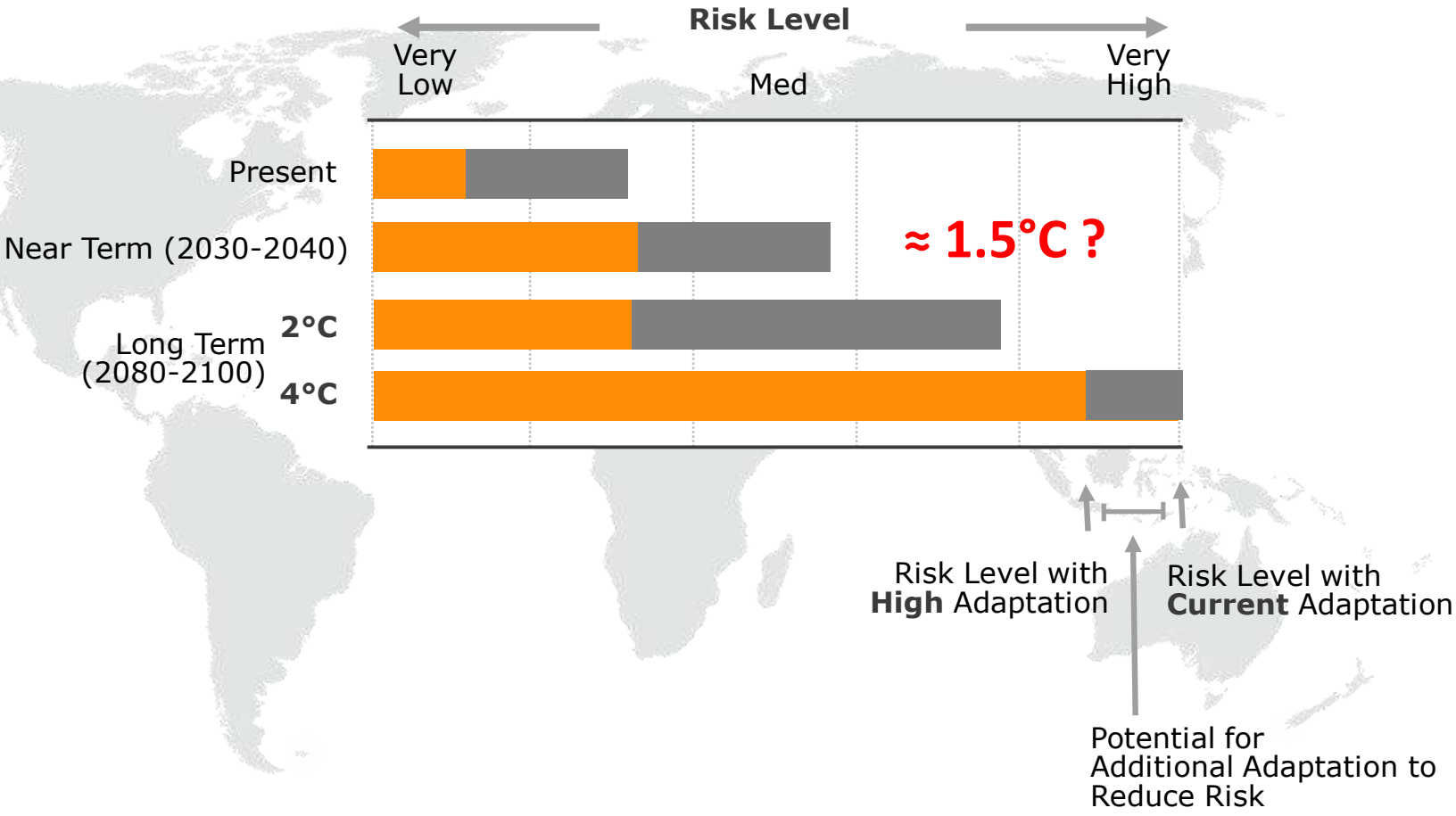
Climate change….causing risks

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

1.5°C not fully covered and compared

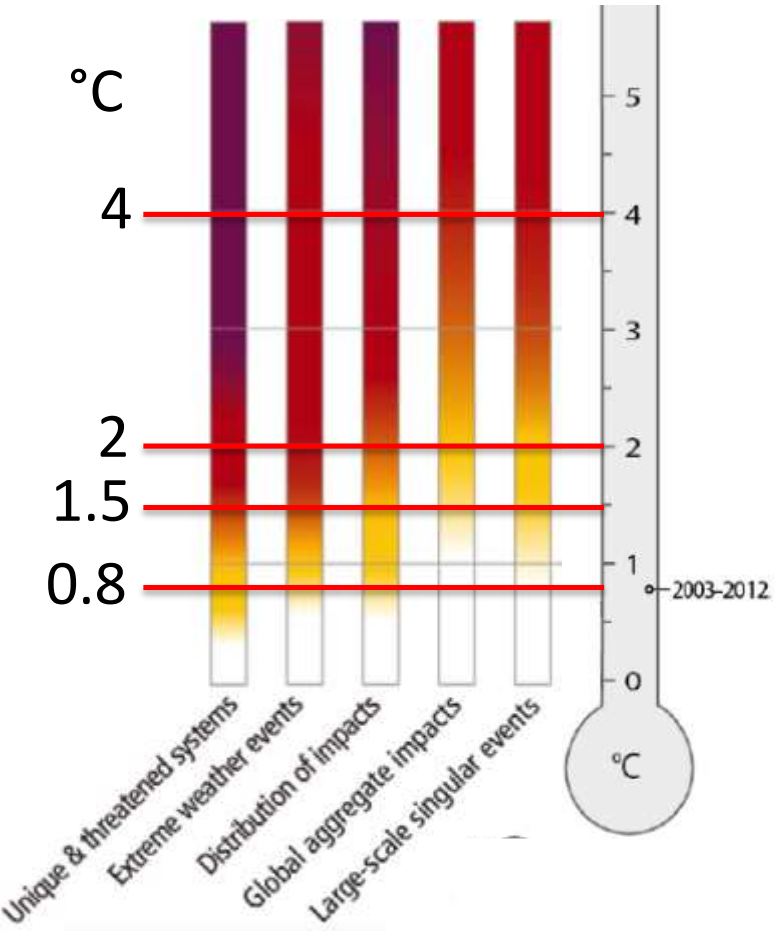
(key risks are those relevant to article 2, UNFCCC:

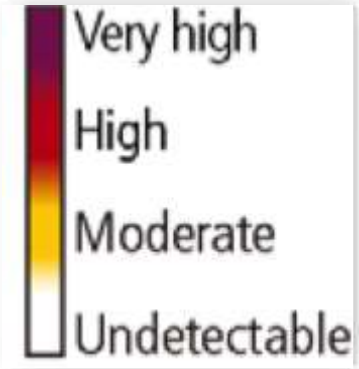
"avoid dangerous anthropogenic interference with the climate system")



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

LTGG Reasons for concern





Level of additional risk due to climate change

UNFCCC Article 2:

.....allow ecosystems to adapt naturally...

.....ensure that food production is not threatened...

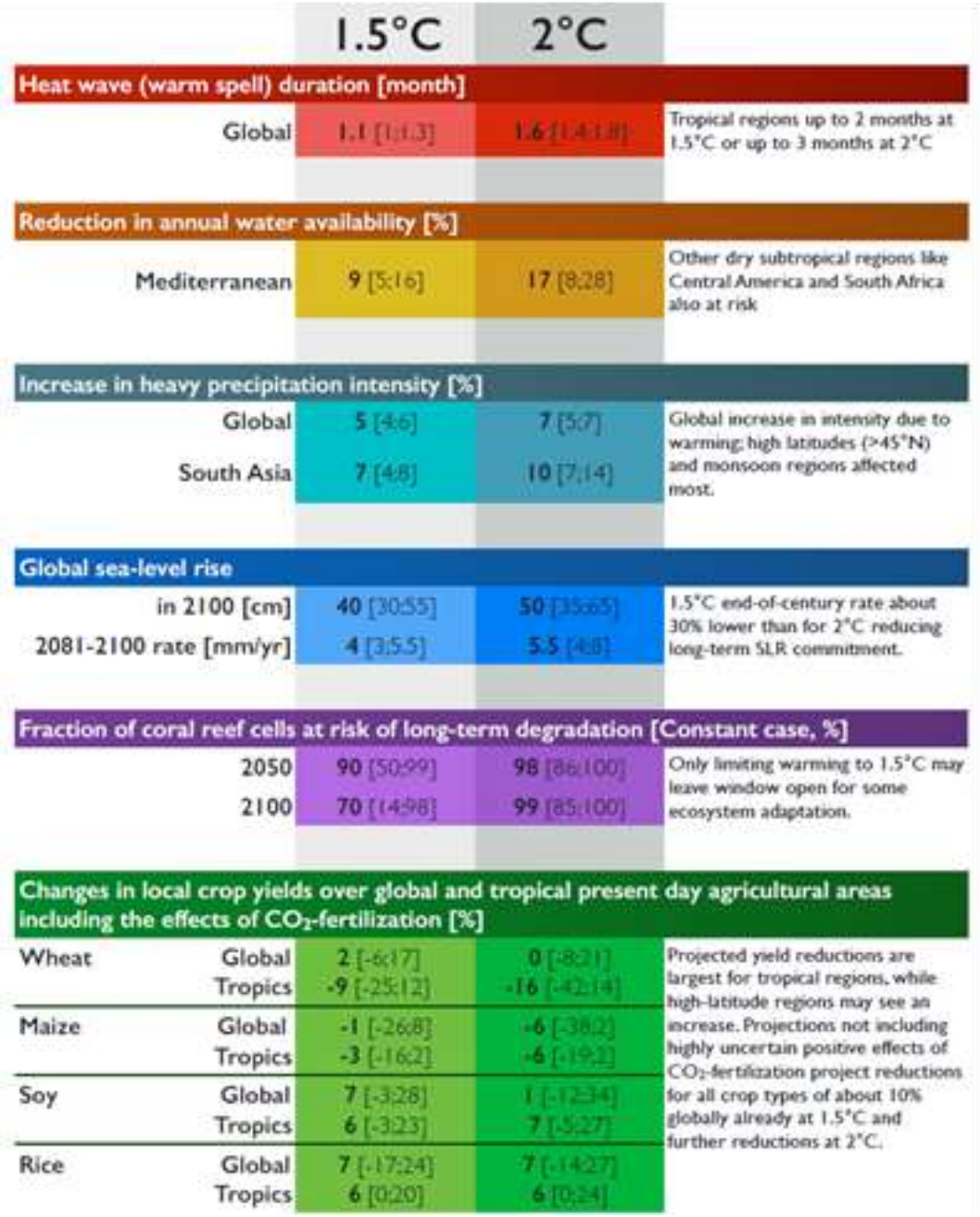
.....enable sustainable economic development...

UNFCCC Structured Expert Dialogue, 2013 -2015:

...comparing 1.5 and 2°C,

identifying... Key risks of impacts

Avoided impacts



		1.5°C	2°C	
Heat wave (warm spell) duration [month]				
	Global	1.1 [1;1.3]	1.6 [1.4;1.8]	Tropical regions up to 2 months at 1.5°C or up to 3 months at 2°C
Reduction in annual water availability [%]				
	Mediterranean	9 [5;16]	17 [8;28]	Other dry subtropical regions like Central America and South Africa also at risk
Increase in heavy precipitation intensity [%]				
	Global	5 [4;6]	7 [5;7]	Global increase in intensity due to warming; high latitudes (>45°N) and monsoon regions affected most.
	South Asia	7 [4;8]	10 [7;14]	
Global sea-level rise				
	in 2100 [cm]	40 [30;55]	50 [35;65]	1.5°C end-of-century rate about 30% lower than for 2°C reducing long-term SLR commitment.
	2081-2100 rate [mm/yr]	4 [3;5.5]	5.5 [4;8]	
Fraction of coral reef cells at risk of long-term degradation [Constant case, %]				
	2050	90 [50;99]	98 [86;100]	Only limiting warming to 1.5°C may leave window open for some ecosystem adaptation.
	2100	70 [14;98]	99 [85;100]	
Changes in local crop yields over global and tropical present day agricultural areas including the effects of CO_2-fertilization [%]				
Wheat	Global	2 [-6;17]	0 [-8;21]	Projected yield reductions are largest for tropical regions, while high-latitude regions may see an increase. Projections not including highly uncertain positive effects of CO_2-fertilization project reductions for all crop types of about 10% globally already at 1.5°C and further reductions at 2°C.
	Tropics	-9 [-25;12]	-16 [-42;14]	
Maize	Global	-1 [-26;8]	-6 [-38;2]	
	Tropics	-3 [-16;2]	-6 [-19;2]	
Soy	Global	7 [-3;28]	1 [-12;34]	
	Tropics	6 [-3;23]	7 [-5;27]	
Rice	Global	7 [-17;24]	7 [-14;27]	
	Tropics	6 [0;20]	6 [0;24]	

AR6:

Compare impacts under different climate scenarios

Significant differences between impacts under 1.5 and 2°C LTGG

"[T]he additional 0.5C increase in global-mean temperature marks the **difference between events at the upper limit of present-day natural variability and a new climate regime**, particularly in tropical regions."

Schleusner et al. 2016

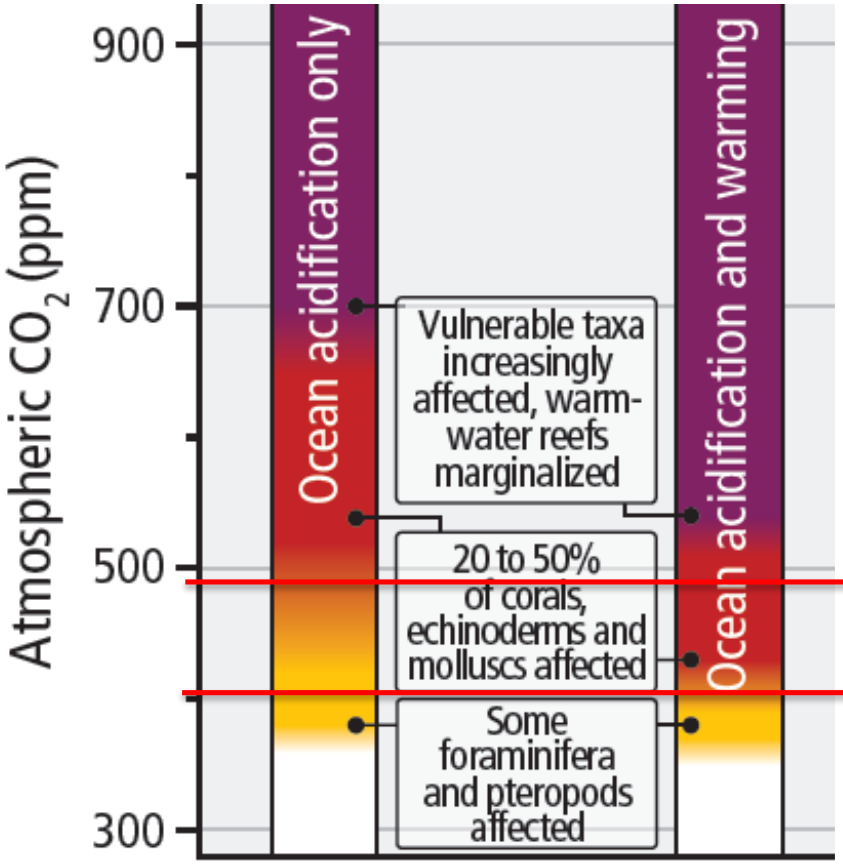
TO BE ASSESSED IN AR6

AN EXAMPLE: COMBINED IMPACTS OF CLIMATE DRIVERS:

ocean warming and acidification,

a comparative view across LTGGs based on risk

1.5°C
vs. 2°C
vs. >>2°C



LTGG
~ 4°C

~ 2°C

~1.5°C

~0.6°C

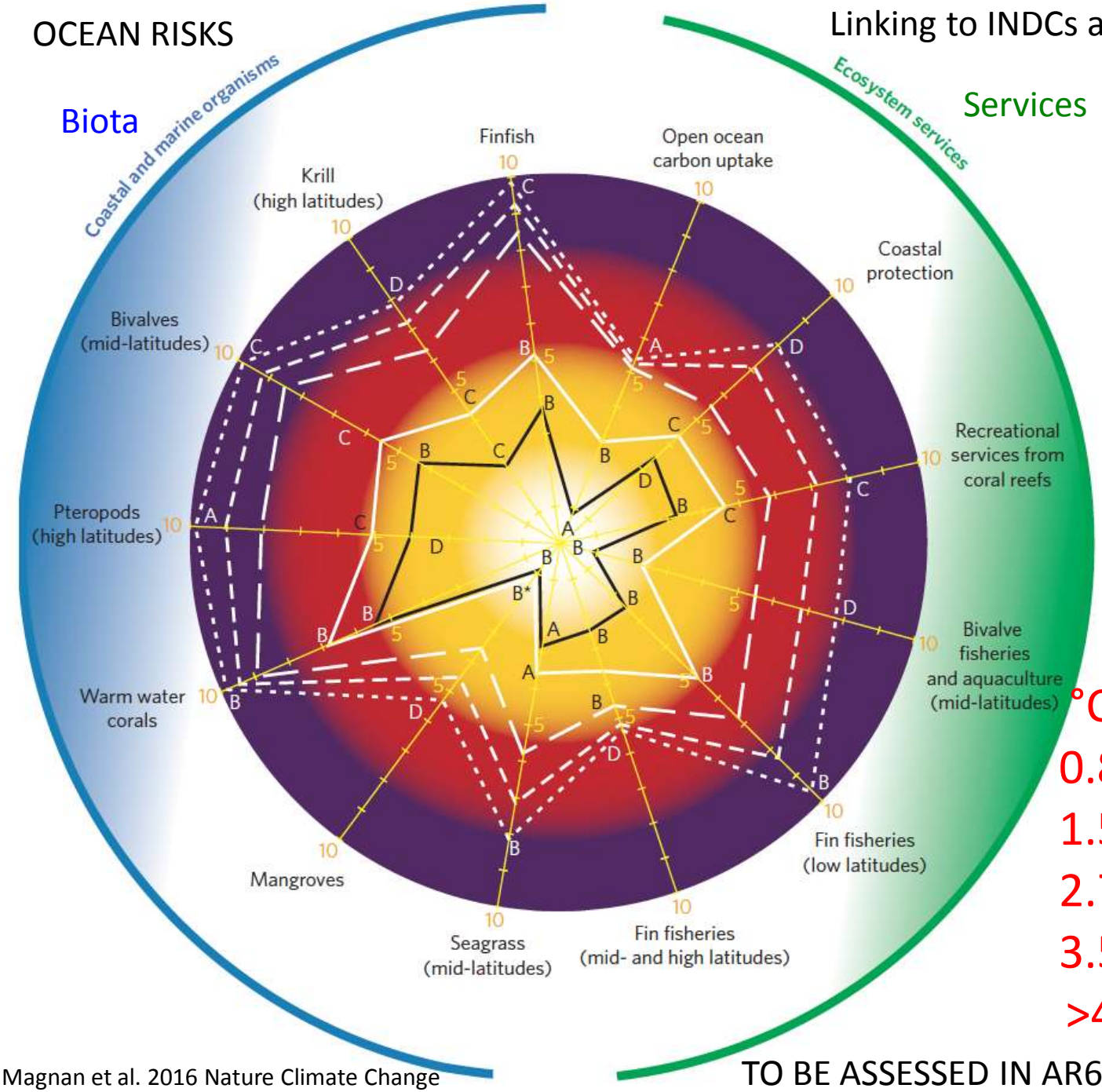
Additional risk due to climate change

OCEAN RISKS

Linking to INDCs and Global Stocktake

Biota

Services



Risk of impact

Undetectable
Moderate
High
Very high

0 5 10

Confidence levels for the present day and the RCPs

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

Emission scenarios

- Present day
- IPCC RCP 2.6
- Climate Action Tracker 2015 estimate (+2.7 °C)
- Climate Interactive 2015 estimate (+3.5 °C)
- IPCC RCP 8.5

TO BE ASSESSED IN AR6

Magnan et al. 2016 Nature Climate Change

REGIONAL ADAPTATION IS ALREADY OCCURRING

- **Ocean acidification:** Defending oyster cultures at the US Westcoast against inflow of acidified water.

- **Marine Protected Areas:** Enhancing the resilience of coral reefs and their fish stocks against warming and acidification.

- **Restoration** of Mangrove Forests

…but adaptation capacity is highest under moderate climate change,
≤ 1.5°C

Spinoff: Quantifying the scope and limits to adaptation, e.g. in cities

CITY RESOURCES: CLIMATE RISK ADAPTATION FRAMEWORK & TAXONOMY

- Establish a standard for measuring & reporting climate risk and vulnerability
- Establish a common "framework" for adaptation planning

Profile the city

*How can I find cities with **similar CCA characteristics**?*

*How can I find cities that can **inform CCA planning** in my city?*

Understand the problem

Vulnerability

*What is **affecting the adaptive capacity of my** city?*

Hazard

Which hazards occur in my city currently?

*How is **future climate change** likely to affect these hazards?*

Exposure and impacts

***Which city sectors are exposed** to climate hazards and trends?*

*How will the city's **current adaptive capacity** affect the seriousness of the possible impacts?*

*What is the **timeframe and frequency** of possible impacts?*

Plan, respond and monitor

Adaptation

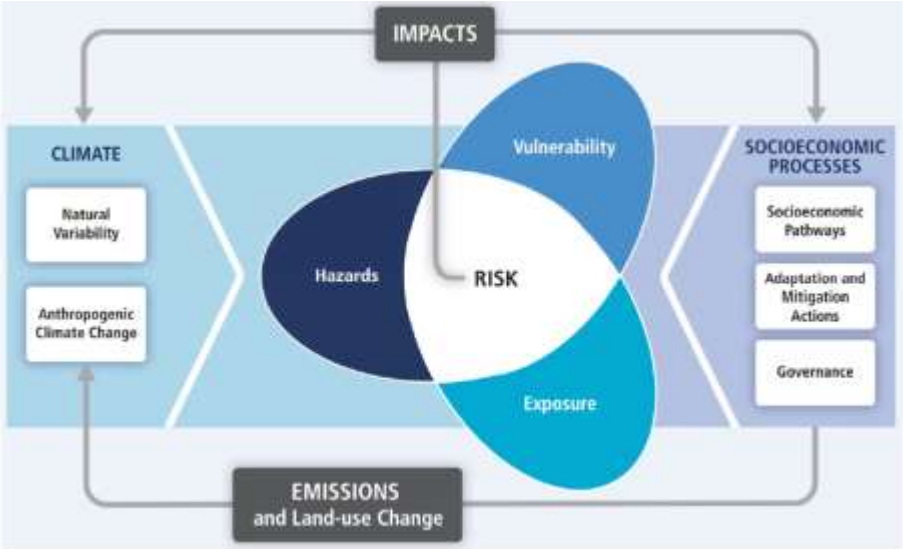
***How far along is my city** in climate adaptation planning?*

*How **robust** is our adaptation planning process?*

***What actions** is my city taking to address potential impacts?*

*How can I ensure that **adaptation** is connected to existing city planning and operational processes?*

*How can I **measure** the success of my plan and actions?*



COMPACT of MAYORS

The questionnaire

CRAFT REPORTING FRAMEWORK FOR CLIMATE CHANGE ADAPTATION AND RESILIENCE

- Adaptation & Resilience

Mandatory fields left to complete on this sheet: 3

Assessment

Has your jurisdiction undertaken a climate risk or vulnerability assessment?	
Risk or vulnerability assessment *	Yes
Boundary of assessment *	TO BE DEFINED
Primary author of assessment *	Regional / state / provincial government
Publication title *	...
Year of publication *	2016
Upload risk or vulnerability assessment in pdf format *	

If applicable, please describe the scope of your jurisdiction's climate risk or vulnerability assessment	
Climate hazards identified / mapped *	City has assessed the most frequent hazards (standalone)
Critical assets identified / mapped *	City has considered all critical assets, including interdependencies
Vulnerable populations identified / mapped *	City has considered some vulnerable populations

If applicable, please describe the update / revision process for your jurisdiction's climate risk or vulnerability assessment	
Formal schedule for update *	Do not know
If yes, what is the time period for update (years)	
If no, or don't know, do you have an alternative update schedule or trigger? *	
Status of current update *	Not intending to undertake
Number of times previously updated *	6

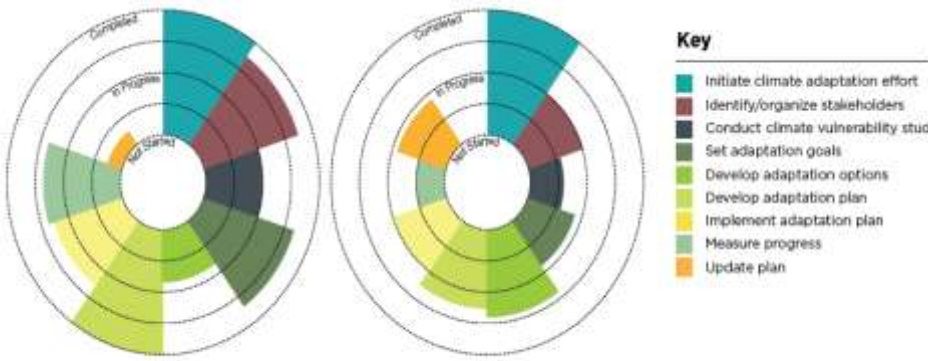
COMPACT of MAYORS

Current and future climate hazards

	Please identify the most significant climate hazards currently faced by your jurisdiction. Indicate the CURRENT probability of occurrence and POSSIBLE consequence for each		Please identify how you expect climate change to affect the frequency and intensity of the hazards you face, and when you FIRST expect to experience those changes			Please describe the overall impact of future ha	
Current hazards	*Probability of hazard*	*Consequence of hazard*	*Change in frequency*	*Change in intensity*	*Timescale*	*Magnitude of impact*	*Description*
Rain storm						Extremely serious	
Monsoon	Do not know	Low	Decreasing	Decreasing	Current	Extremely serious	
Heavy snow	Medium high					Extremely serious	
Hail						Extremely serious	
Severe wind			Do not know			Extremely serious	
Tornado		Medium high				Extremely serious	
Cyclone (Hurricane / Typhoon)	Do not know			None		Extremely serious	
Extratropical storm						Extremely serious	
Tropical storm						Extremely serious	
Lightning / thunderstorm						Extremely serious	
Fog	Medium low		Decreasing			Extremely serious	
Extreme winter conditions						Extremely serious	

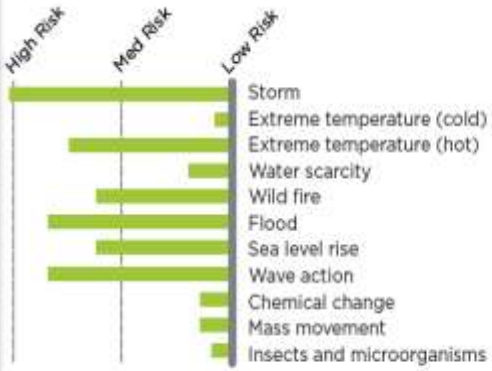
Facilitates better analysis

Benchmarking adaptation planning



City Data | Global Benchmark

Identify cities with shared climate risks



City Data

Cities with Similar Hazard Risk Profiles

COMPACT of MAYORS

…related decisions IPCC/XLIII-6.
Sixth Assessment Report (AR6) Products: Special Reports

2. …to accept the invitation from the UNFCCC to provide a **Special Report in 2018 on the impacts of global warming of 1.5 °C** above pre-industrial levels….

3. To prepare a Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems.

4. To prepare a **Special Report on climate change and oceans and the cryosphere**.

5. To recommend, within the AR6 scoping processes, **a stronger integration of the assessment on the impacts of climate change on cities and their unique adaptation and mitigation opportunities,** …. including through the enhanced engagement of urban practitioners.

6. That the AR7 cycle will include a **Special Report on climate change and cities**.

7. To consider working with academia, urban practitioners, and relevant scientific bodies and agencies, to organize an **international scientific conference on climate change and cities** early in the AR6 cycle, in order to stimulate scientific reports and peer reviewed publications on this subject.

Thank you!