

SIXTH ASSESSMENT REPORT

Working Group II – Impacts, Adaptation & Vulnerability

10 March 2022

IPCC Working Group II Report Climate change impacts and adaptation in the Pacific

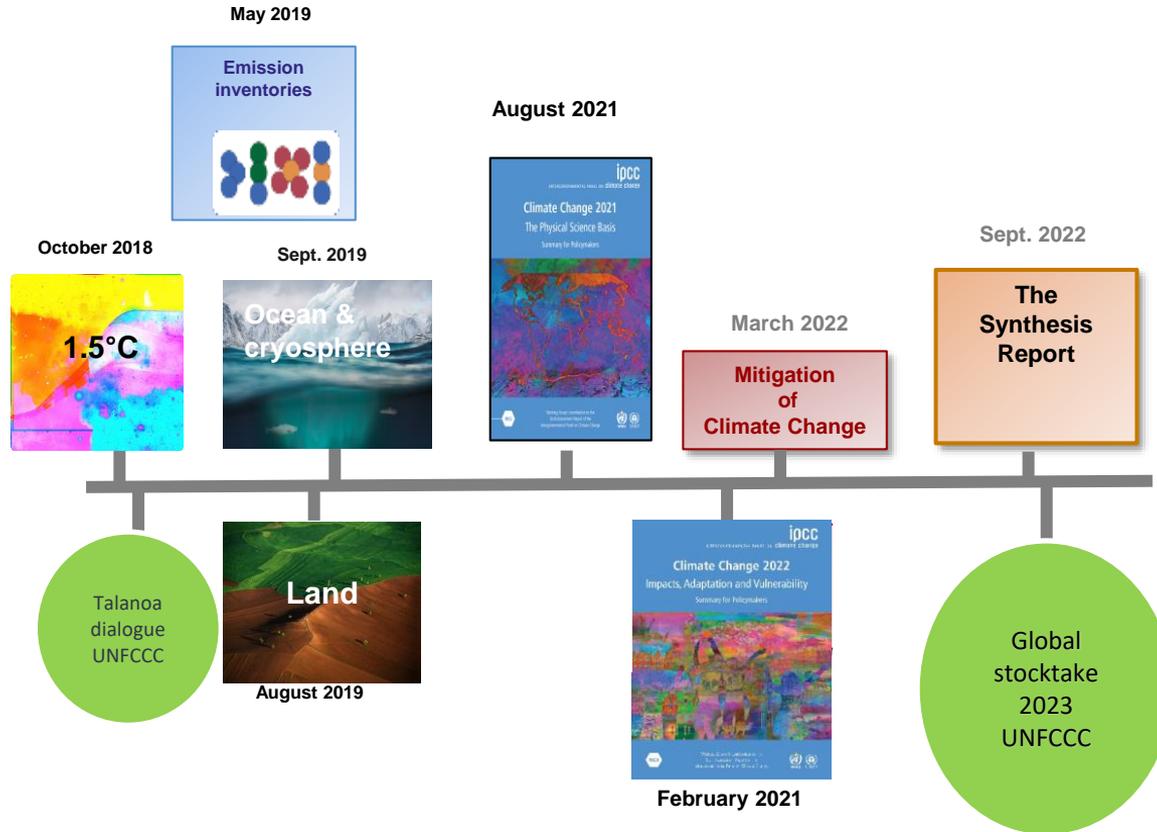
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<https://iceds.anu.edu.au/public-policy-outreach/ipcc-pacific/factsheets>



The 6th IPCC Assessment Cycle



Report by numbers



270 Authors



67 Countries



43 % Developing countries
57 % Developed countries



41 % Women / 59 % Men



675 Contributing authors



More than
34,000 scientific papers



62,418
Review comments

- The best understanding to date
- Increased data etc since AR5
- Increased experience: of the 8 years since AR5 – at least 7 were the hottest on record

Detection and attribution of change

Confidence in the detection & in the attribution of observed impacts of climate change on tropical small islands

- Natural systems
- Human systems

		<ul style="list-style-type: none"> • Coral reef bleaching • Submergence & flooding of marine & coastal areas • Species geographic range shifts • Phenological changes 	High
	<ul style="list-style-type: none"> • Degradation of mangroves • Changes in ecosystem services • Changes in ecosystem structure • Wealth & wellbeing 	<ul style="list-style-type: none"> • Settlements & infrastructure damage & loss from erosion & sea level rise • Relocation & migration • Water stress from drought • Fisheries decline • Economic & Livelihood loss • Casualties, settlements & infrastructure loss & damage 	Medium
<ul style="list-style-type: none"> • Fresh water stress 	<ul style="list-style-type: none"> • Degradation of seagrass • Agriculture production decline 		Low
Low	Medium	High	Confidence in the attribution
Confidence in the detection			

The human mind is not equipped to deal with climate change...

‘If you were to design a problem that the mind is not equipped to deal with, you know, climate change would fit the bill. It's distant. It's abstract. It's contested.’

Dan Kahneman in *Hidden Brain*, 2018

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Impacts on the Pacific



Climate stressors and extreme events

The Pacific is already being impacted by slow onset stressors as well as extreme events brought on by climate change.

Slow Onset Stressors



increase in air temperature



changes in rainfall patterns



increase in ocean temperature



sea level rise



ocean acidification



Extreme events

more frequent strong
tropical cyclones



increased storm surges



more droughts and
extreme rainfall



increased climate variability

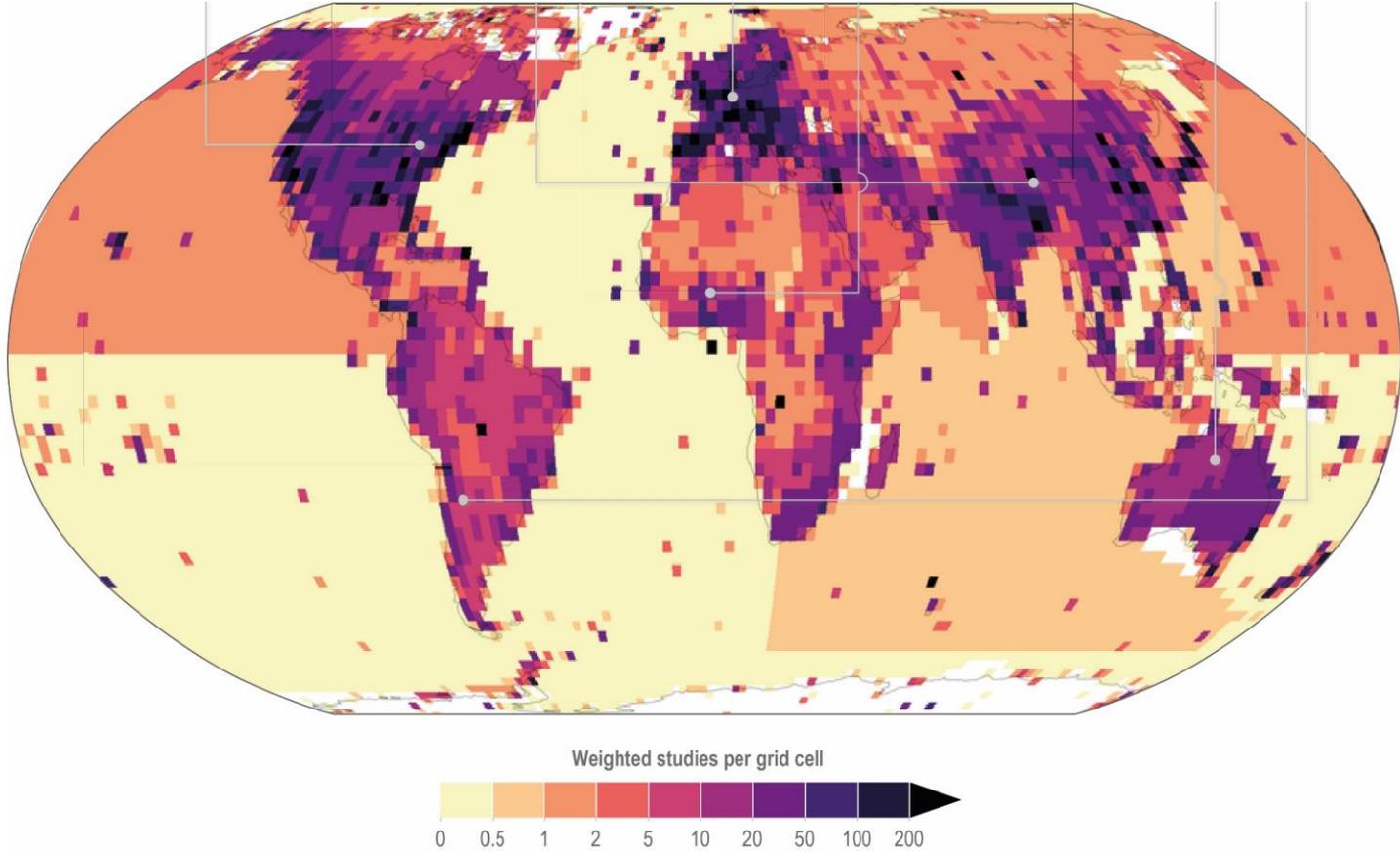


more frequent and
severe heatwaves





Climate change: evidence of impacts



Impacts on human systems

(b) Observed impacts of climate change on human systems

Human systems	Impacts on water scarcity and food production				Impacts on health and wellbeing				Impacts on cities, settlements and infrastructure			
	Water scarcity	Agriculture/crop production	Animal and livestock health and productivity	Fisheries yields and aquaculture production	Infectious diseases	Heat, malnutrition and other	Mental health	Displacement	Inland flooding and associated damages	Flood/storm induced damages in coastal areas	Damages to infrastructure	Damages to key economic sectors
												
Global	±	-	○	-	-	-	-	-	-	-	-	-
Africa	-	-	-	-	-	-	-	-	-	-	-	-
Asia	±	±	-	-	-	-	-	-	-	-	-	-
Australasia	±	-	±	-	-	-	-	not assessed	-	-	-	-
Central and South America	±	-	±	-	-	-	-	not assessed	-	-	-	-
Europe	±	±	-	±	-	-	-	-	-	-	-	-
North America	±	±	-	±	-	-	-	-	-	-	-	-
Small Islands	-	-	-	-	-	-	-	-	-	-	-	-
Arctic	±	±	-	-	-	-	-	-	-	-	-	±
Cities by the sea	○	○	○	-	○	-	-	not assessed	○	-	-	-
Mediterranean region	-	-	-	-	-	-	-	not assessed	±	-	○	-
Mountain regions	±	±	-	○	-	-	-	-	-	na	-	-



Heat stress

Exposure to heat waves will continue to increase with additional warming.



Water scarcity

At 2°C, regions relying on snowmelt could experience 20% decline in water availability for agriculture after 2050.



Food security

Climate change will increasingly undermine food security.

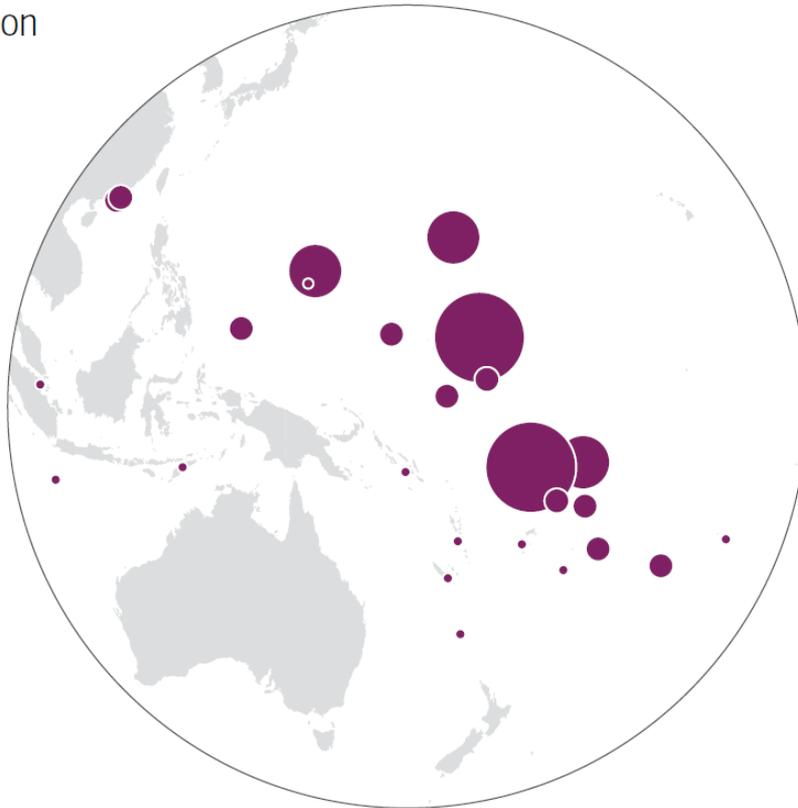
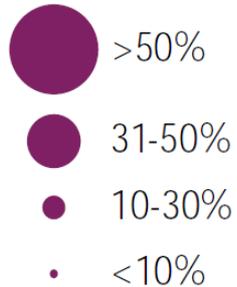


Flood risk

About a billion people in low-lying cities by the sea and on Small Islands at risk from sea level rise by mid-century.

Coastal inundation increasing

Percentage of island's population
exposed to coastal inundation



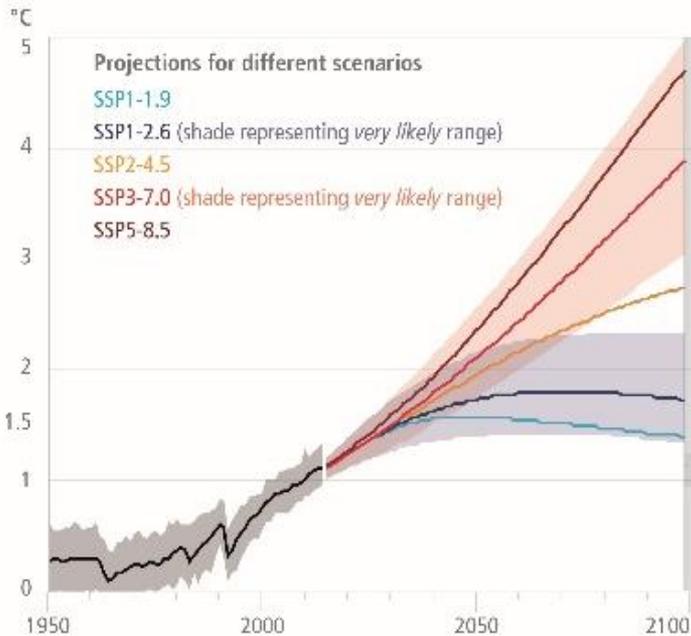
The percentage of current population that may be exposed to coastal inundation either by permanently falling below the highest tides, or temporarily falling below the local annual flood height (in 2100 under a mid-range emissions scenario)

adapted from Kulp and Strauss (2019)

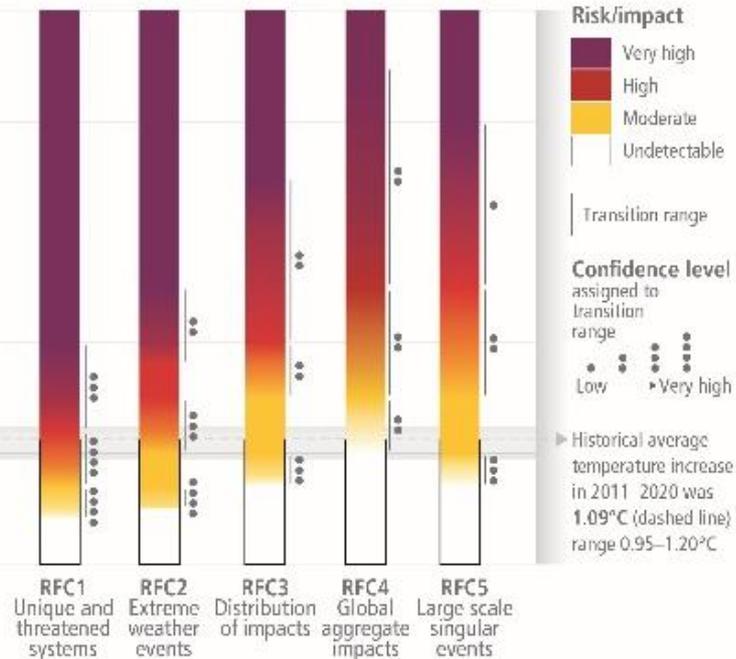
Global risks: burning ember diagrams

Global and regional risks for increasing levels of global warming

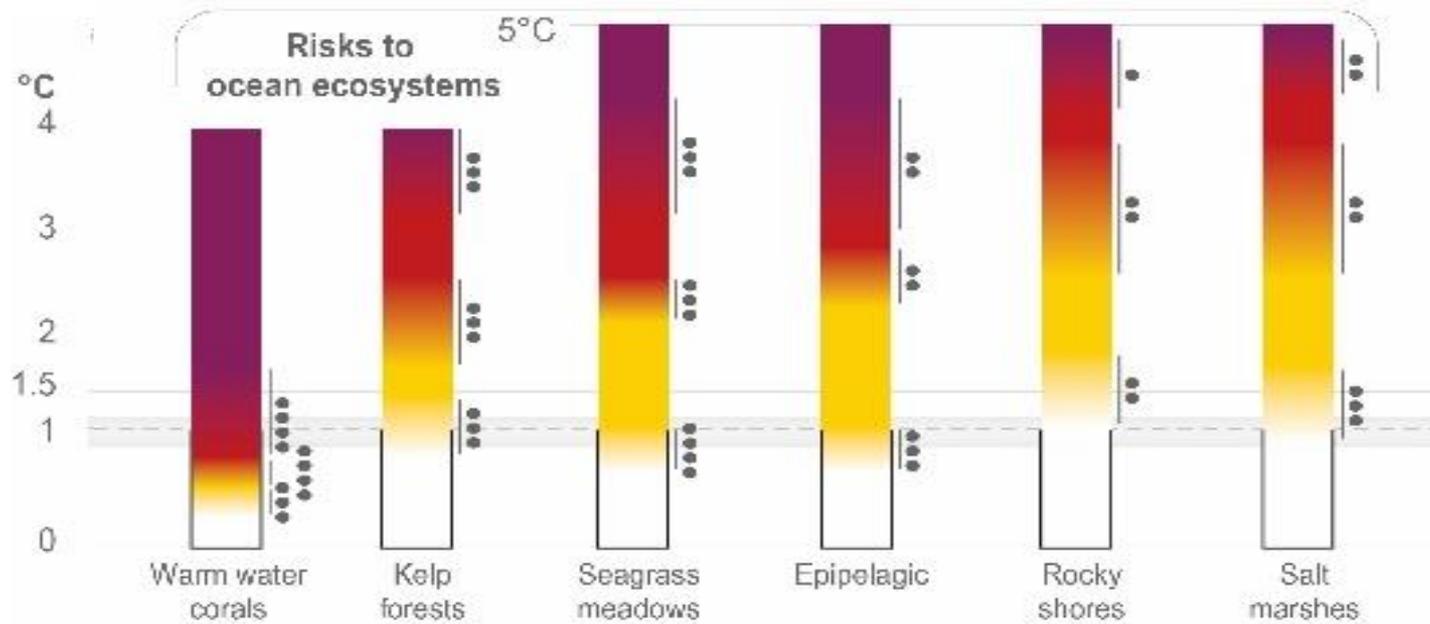
(a) Global surface temperature change
Increase relative to the period 1850–1900



(b) Reasons for Concern (RFC)
Impact and risk assessments assuming low to no adaptation



Ocean systems: risks



- Also addressed complex and cascading risks

Future of coral reefs

A. Historical coral reef



high coral cover and diversity; high physical complexity and reef growth; high fish biomass and diversity

B. Low-diversity reef



moderate cover composed of few, heat-tolerant taxa; lower complexity and growth rate; lower fish diversity

C. Degraded coral reef

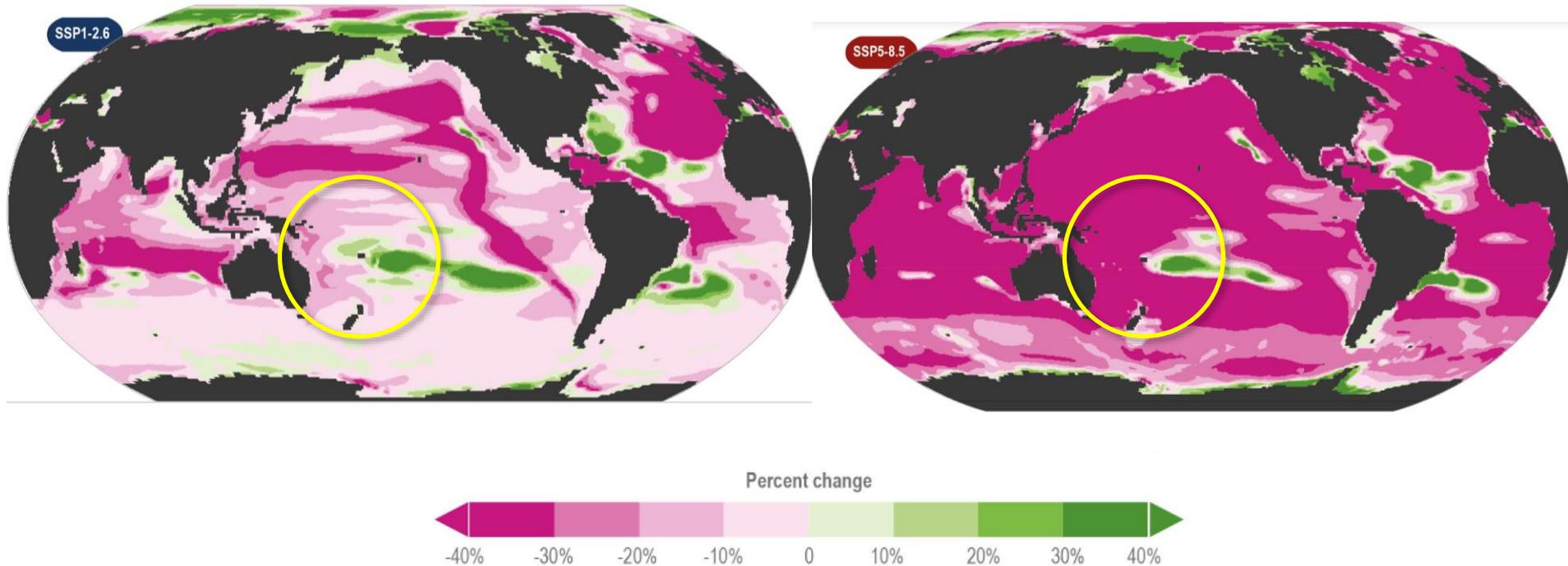


limited cover with few species; low complexity with limited growth; low fish biomass and diversity

- snapshots of coral reef conditions at time-points in the future each with different levels of warming

Impacts on marine animal biomass

Simulated change by 2090-2099, relative to 1990 - 1999

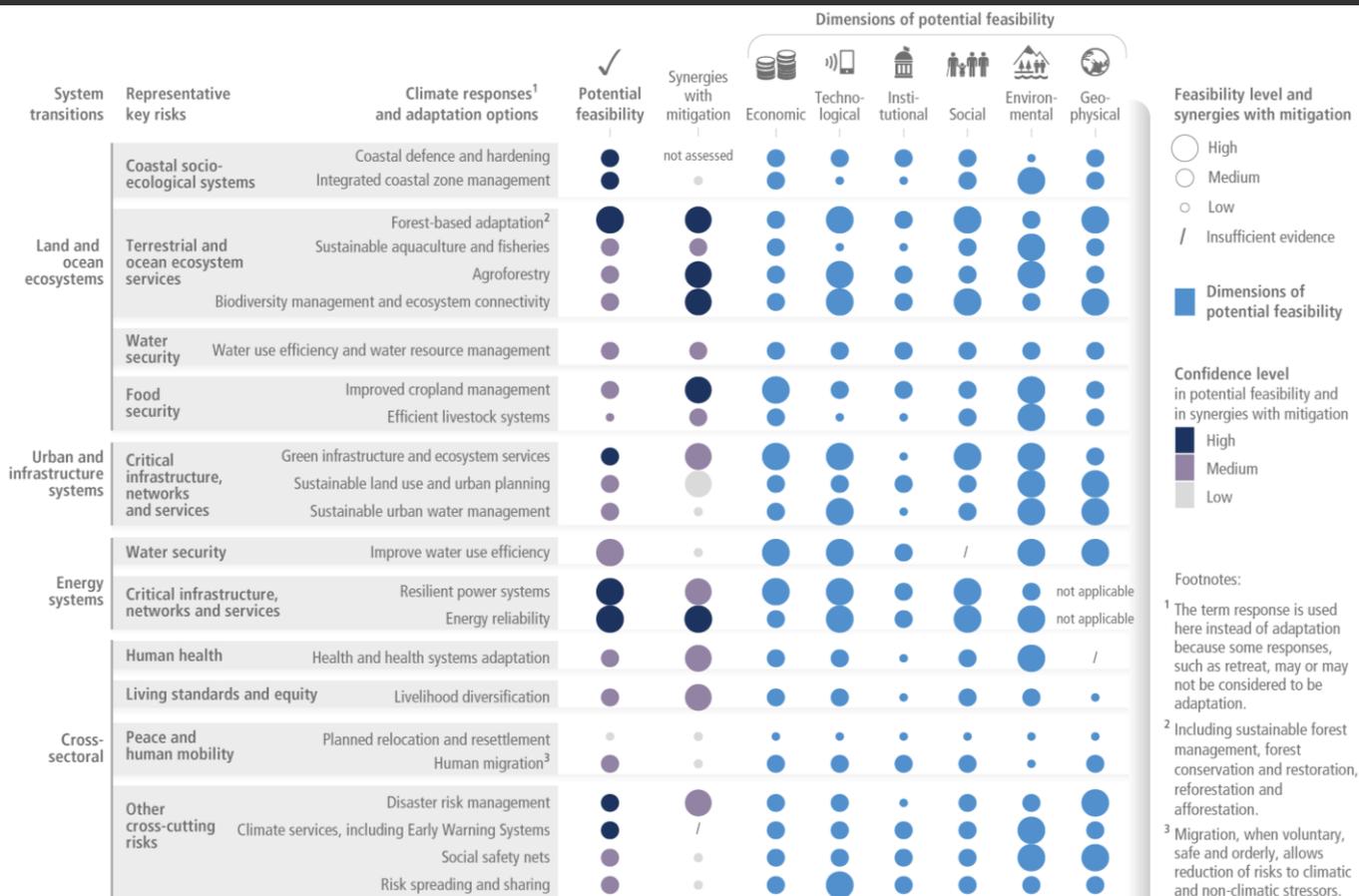




To avoid mounting losses, urgent action is required to adapt to climate change.

At the same time, it is essential to make rapid, deep cuts in greenhouse gas emissions to keep the maximum number of adaptation options open.

Feasibility assessment of adaptations



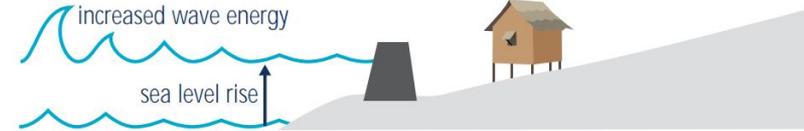
Sea level rise: protect/accommodate/retreat

Future situation

Reduced habitability due to increasing: sea level rise, wave strength, erosion, flooding and storm surges. Impacting on human populations and infrastructure [15.3.4.9.2]



Hard protection



Accommodation (e.g. raising of dwellings)



Ecosystem-based measures



Planned relocation



- These can happen over different timescales and are highly contextual

Adaptation limits and maladaptation

- A narrowing window for action: above 1.5°C some adaptation solutions may no longer work or work as effectively
- Limits: above 1.5°C, people living on small islands and those dependent on glaciers/snowmelt may no longer be able to adapt
 - by 2°C farming challenged in many current growing areas
- Even effective adaptation cannot prevent all losses and damages
- Current global financial flows are insufficient
- Most finance targets emissions reductions rather than adaptation
- Alert to possible maladaptive responses including through additional GHG emissions

“ There are increasing gaps between adaptation action taken and what’s needed.

These gaps are largest among lower income populations.

They are expected to grow.

Accelerating climate adaptation



- Political commitment and follow-through across all levels of government
- Institutional framework: clear goals, priorities that define responsibilities
- Enhanced knowledge of risks & adaptation improves responses
- Monitoring and evaluation of adaptation measures are essential to track progress
- Inclusive governance that prioritises equity, justice and inclusion

Throughout the report, a key theme is:

Participatory inclusion of all social groups is key for positive adaptation outcomes





Climate resilient development is already challenging at current global warming levels.

The prospects will become further limited if warming exceeds 1.5°C and may not be possible if warming exceeds 2°C.

ipcc

INTERGOVERNMENTAL PANEL ON climate change





Australian
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Thankyou

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Every half a degree matters
Every year matters
Every choice matters

Howden and Colvin 2018