SIXTH ASSESSMENT REPORT
Working Group II – Impacts, Adaptation and Vulnerability

ipcc
INTERGOVERNMENTAL PANEL ON climate change

WMO UNEP

Impacts, Adaptation and Vulnerability

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Chapter 1, Point of Departure and Key Concepts
Cross-Chapter Paper 4, Mediterranean Region

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What is new in the 6th Assessment Report?


[Renan / Unsplash]

1. Working Group II Context and Concept

IPCC (Intergovernmental Panel on Climate Change) is the United Nations body for assessing the science related to climate change.

6th Assessment Cycle (2014-2022)

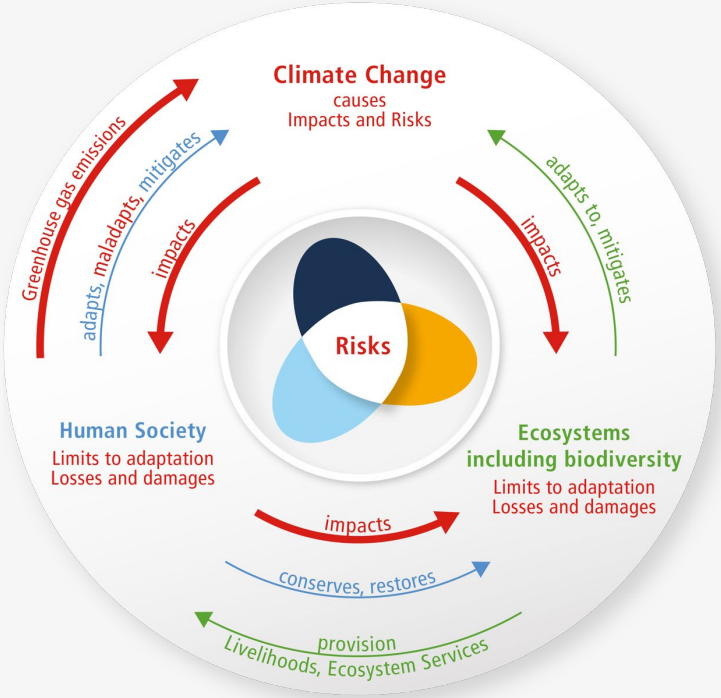
Working Group I
The Physical Science Basis
(August 7, 2021)

Working Group II
Impacts, Adaptation and Vulnerability
(February 28, 2022)

Working Group III
Mitigation of Climate Change
(Early April, 2022)

Synthesis Report
(September 2022)

New understanding of interconnections



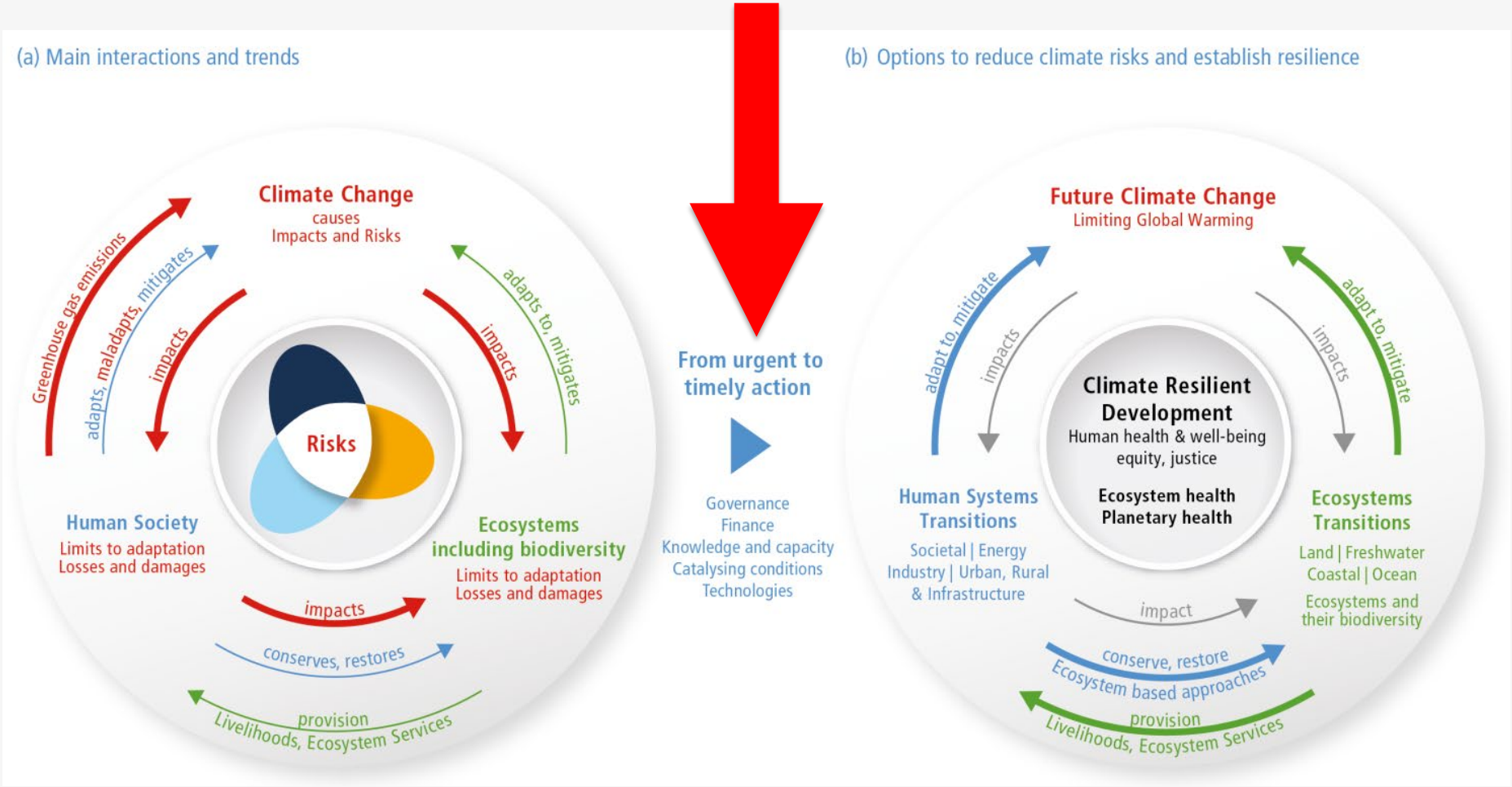
Climate change combines with unsustainable use of natural resources, habitat destruction, growing urbanization and inequity.

The risk propeller shows that risk emerges from the overlap of:

- Climate hazard(s)
- Vulnerability
- Exposure

...of human systems, ecosystems and their biodiversity

[Axel Guibourg CC BY-NC-ND 2.0; Hugh Han / Unsplash; Axel Fassio/CIFOR CC BY-NC-ND 2.0]



IPCC WG2 2022

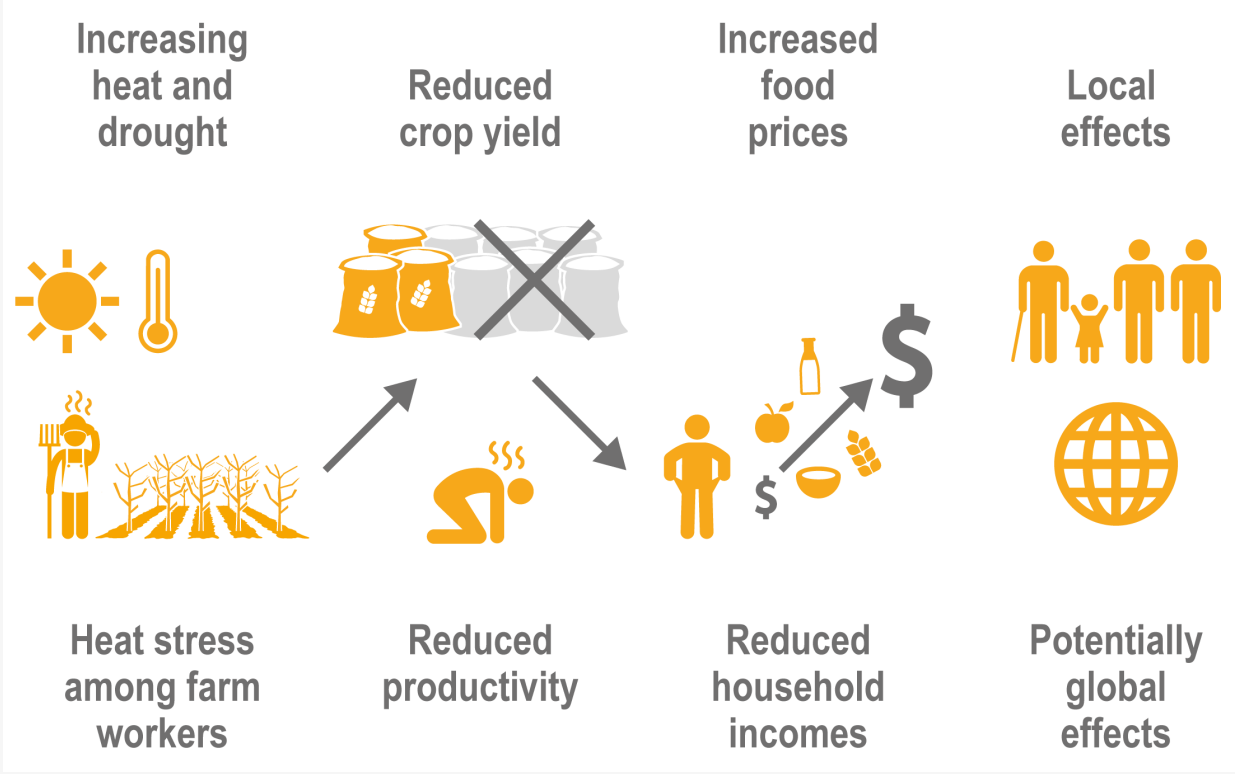
Extreme events in combination with steady trends

Fire weather conditions

Sea-level rise and costal storms

Marine heat waves and acidification

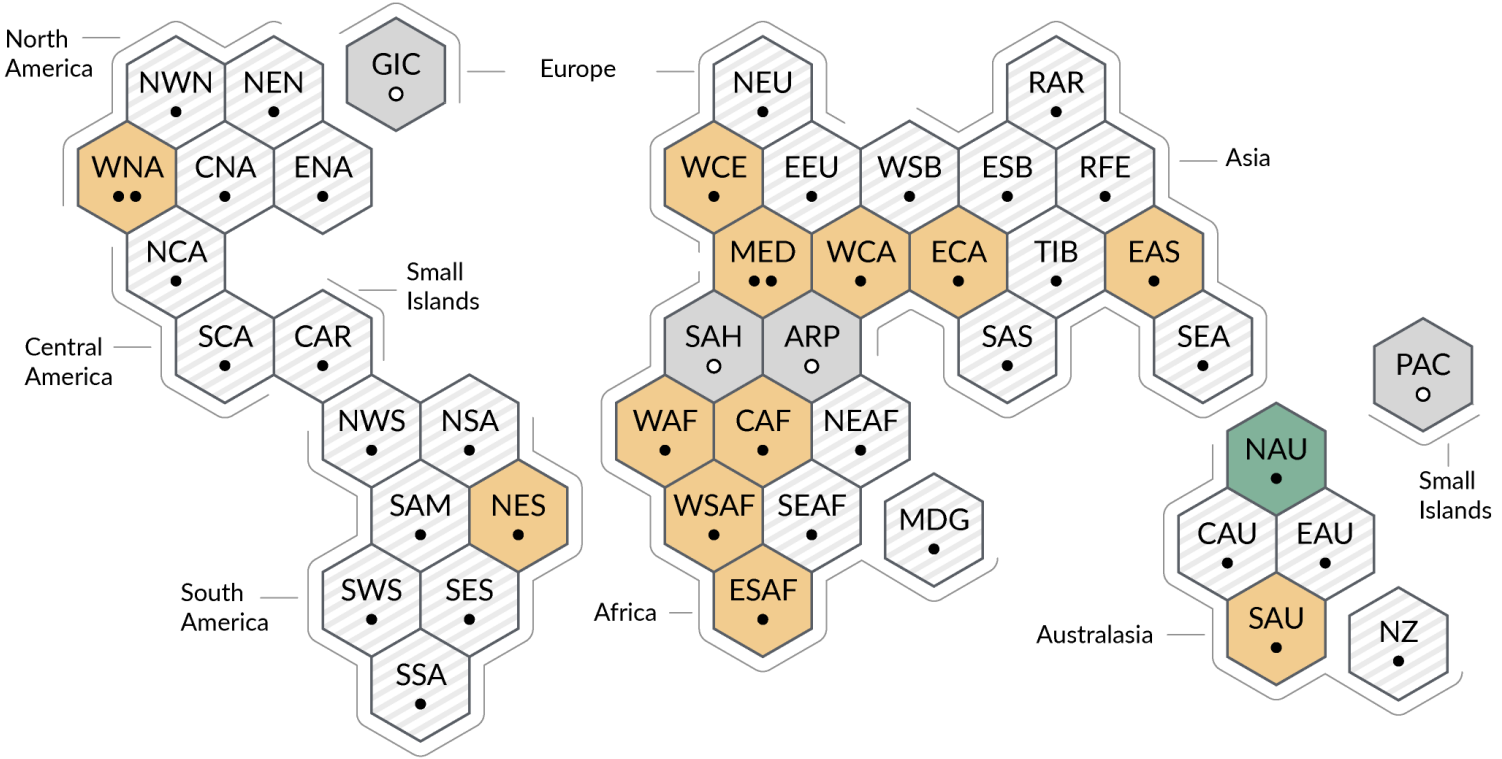
Compound impacts and risks



2. Observed impacts and attribution

Drought

Observed increase since 1950s



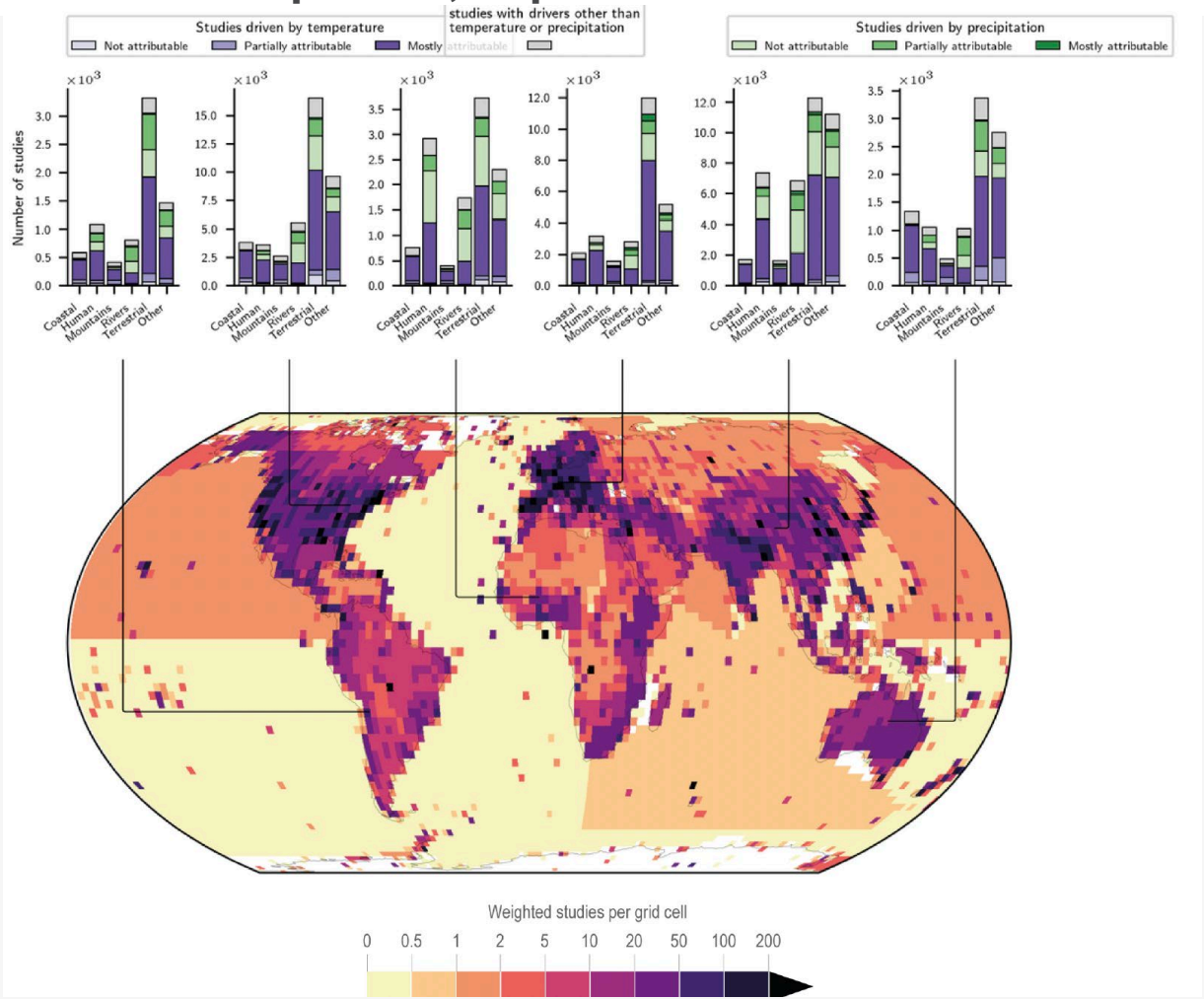
Human-induced climate change, including extreme events, has caused widespread adverse impacts to nature and people.

Despite enhanced adaptation, impacts are observed worldwide

+1,1°C

impact evidence, derived by machine-learning from 77,785 studies

Callaghan et al. 2O21



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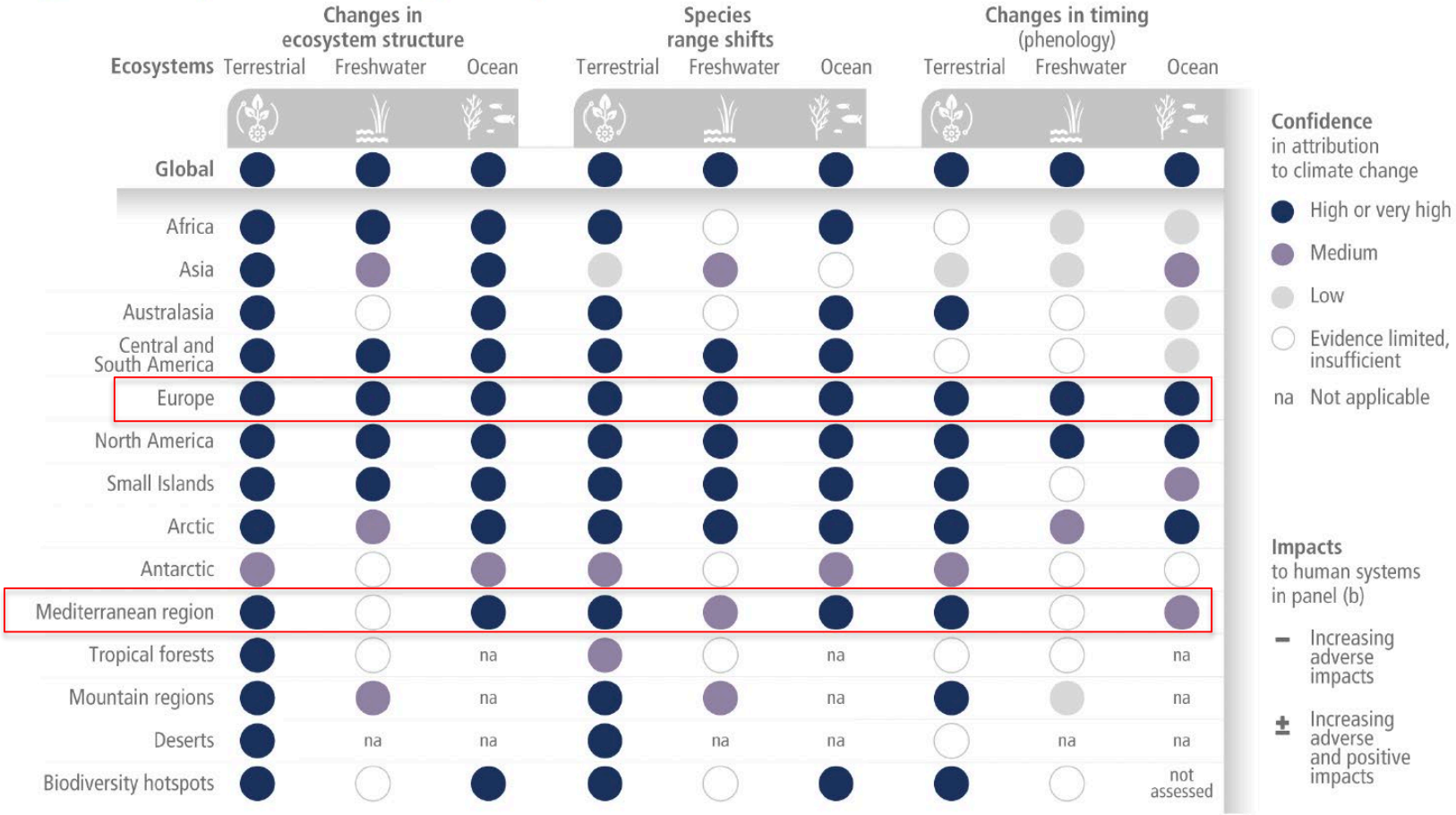
Global warming has caused dangerous and widespread disruption in nature…

[Pacific Southwest Forest Service, USDA CC BY 2.0]

Impacts of climate change are observed in many ecosystems and human systems worldwide

(a) Observed impacts of climate change on ecosystems



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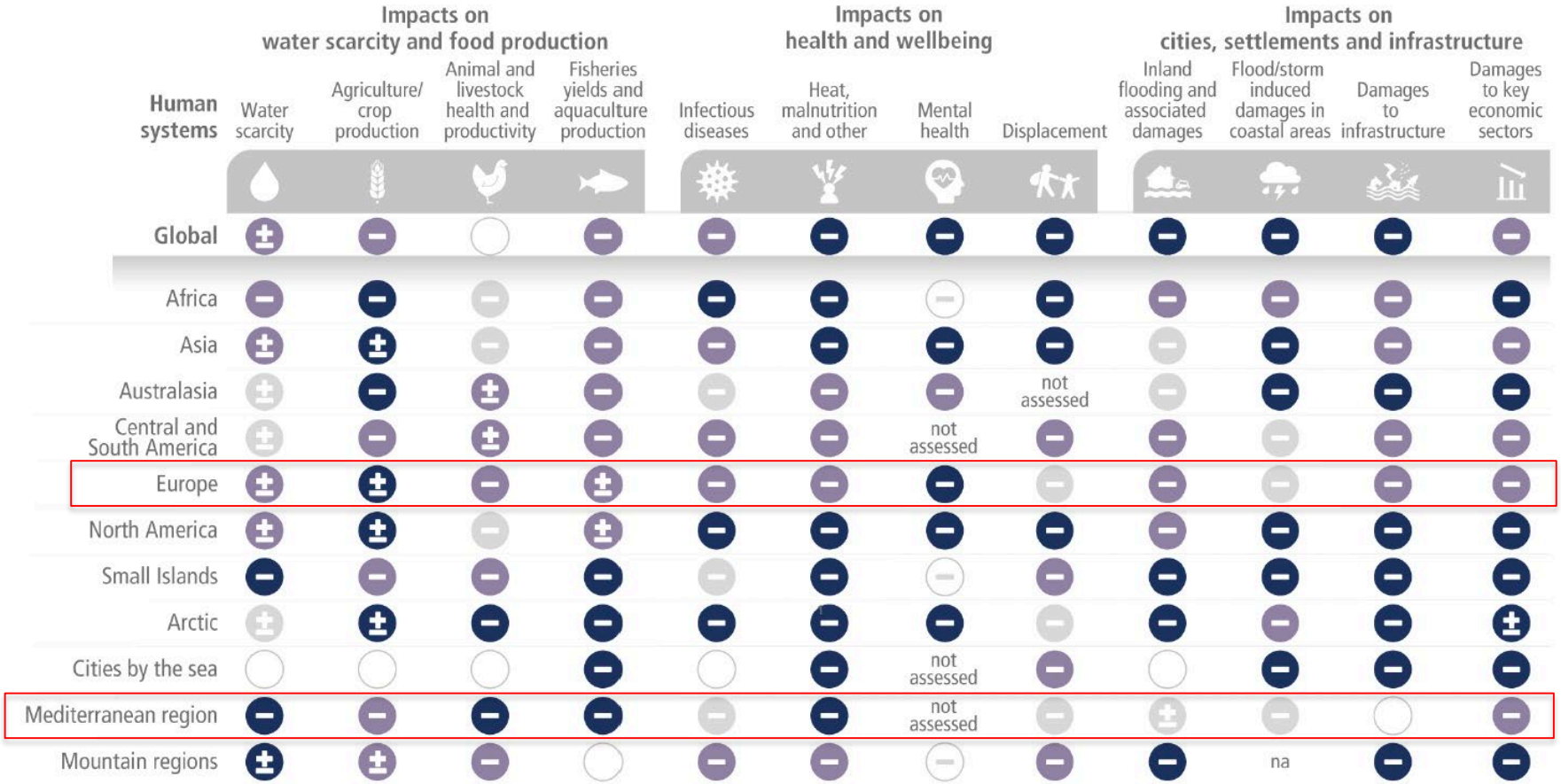
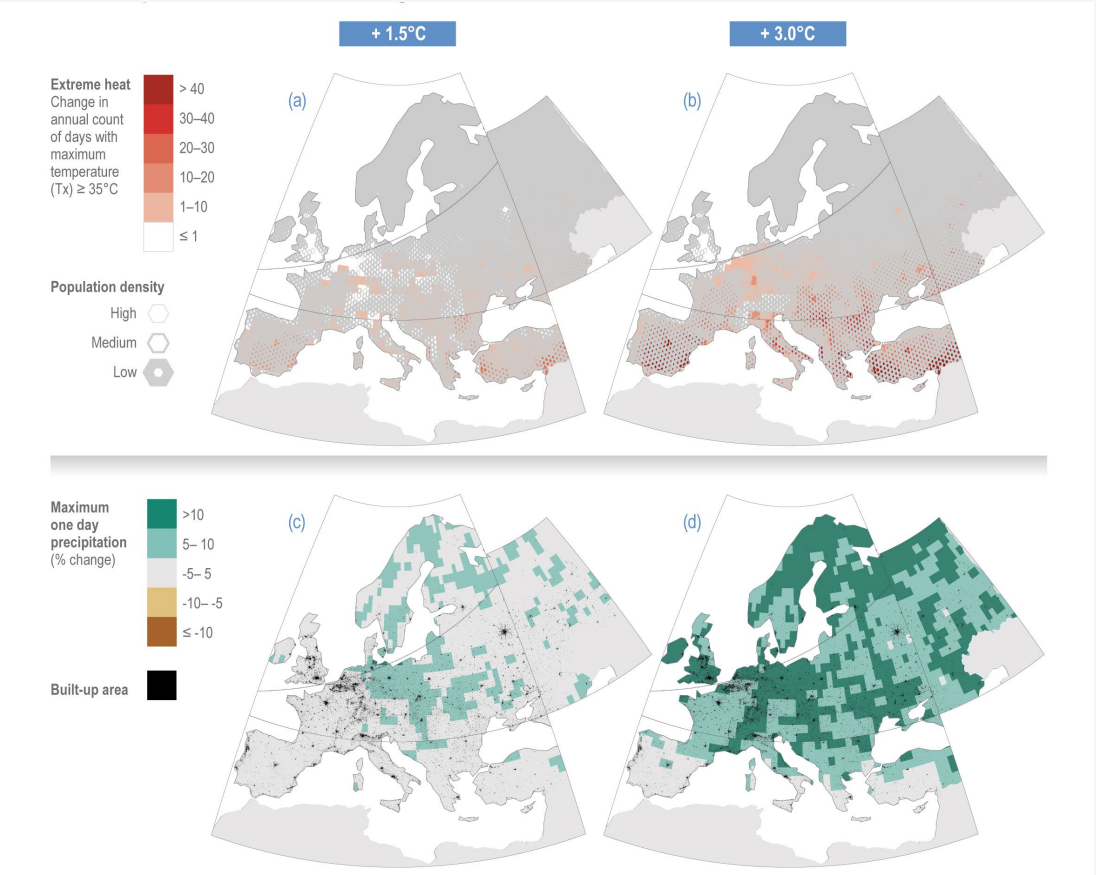
…and climate change is affecting the lives of billions of people, despite efforts to adapt.

(b) Observed impacts of climate change on human systems





Our current 1.1ºC warmer world is already affecting natural and human systems in Europe, including health, floods, crop production and natural ecosystems

As impacts vary both across and within European regions, sectors, and societal groups, inequalities have deepened.

Impacts may propagate between regions

e.g. global implications of flood damage in Thailand

3. Quantifying human vulnerability

3.3 – 3.6 billion people live in hotspots of high vulnerability to climate change.

[Denis Onyodi / KRCS CC BY-NC 2.0]

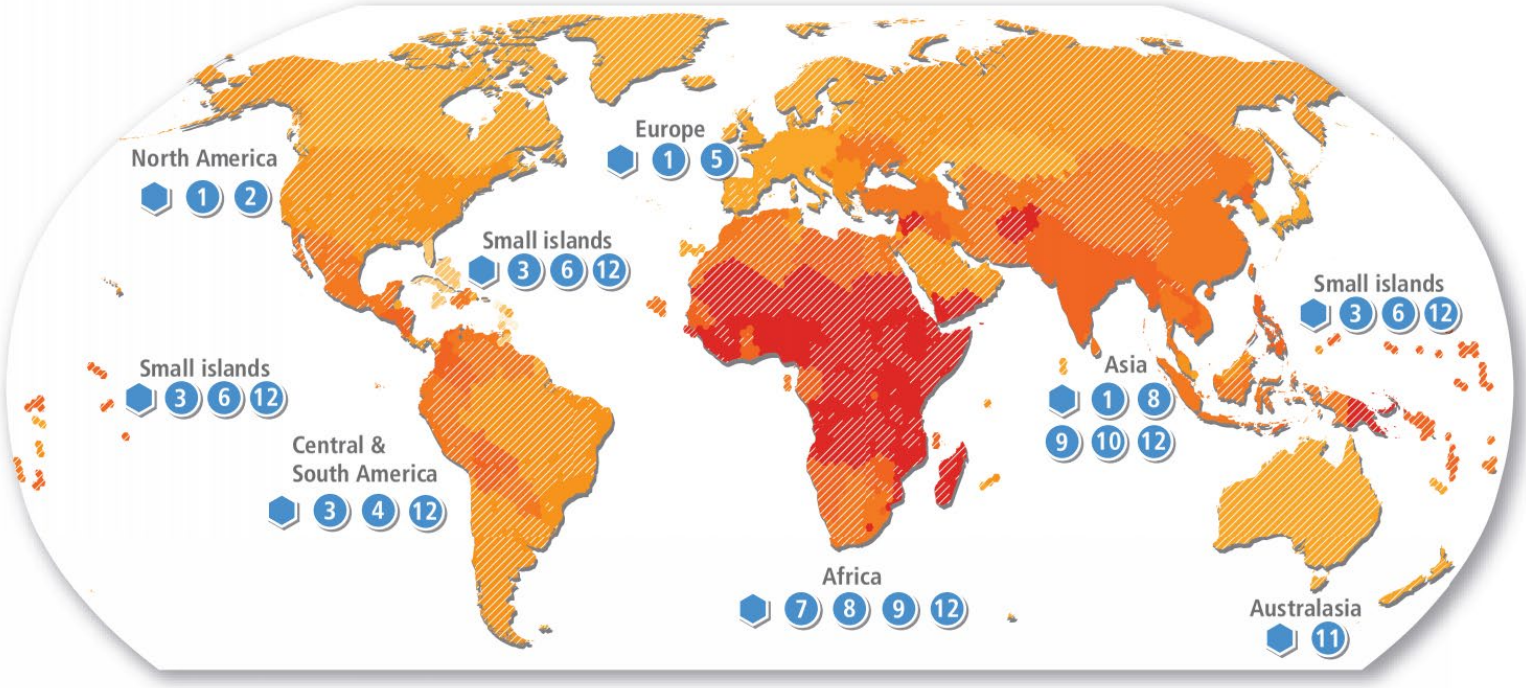
India and Pakistan heatwave is 'testing the limits of human survivability,' expert says

By Rhea Mogul, Esha Mitra, Manveena Suri and Sophia Saifi, CNN

Updated 0101 GMT (0901 HKT) May 3, 2022

Observed human vulnerability differs between and within countries and strongly determines how climate hazards impact people and society

(a) Map of observed human vulnerability based on two comprehensive global indicator-systems using national data, plus examples of selected local vulnerable populations and Indigenous Peoples



Relative vulnerability

- Very high
- High
- Medium
- Low
- Very low

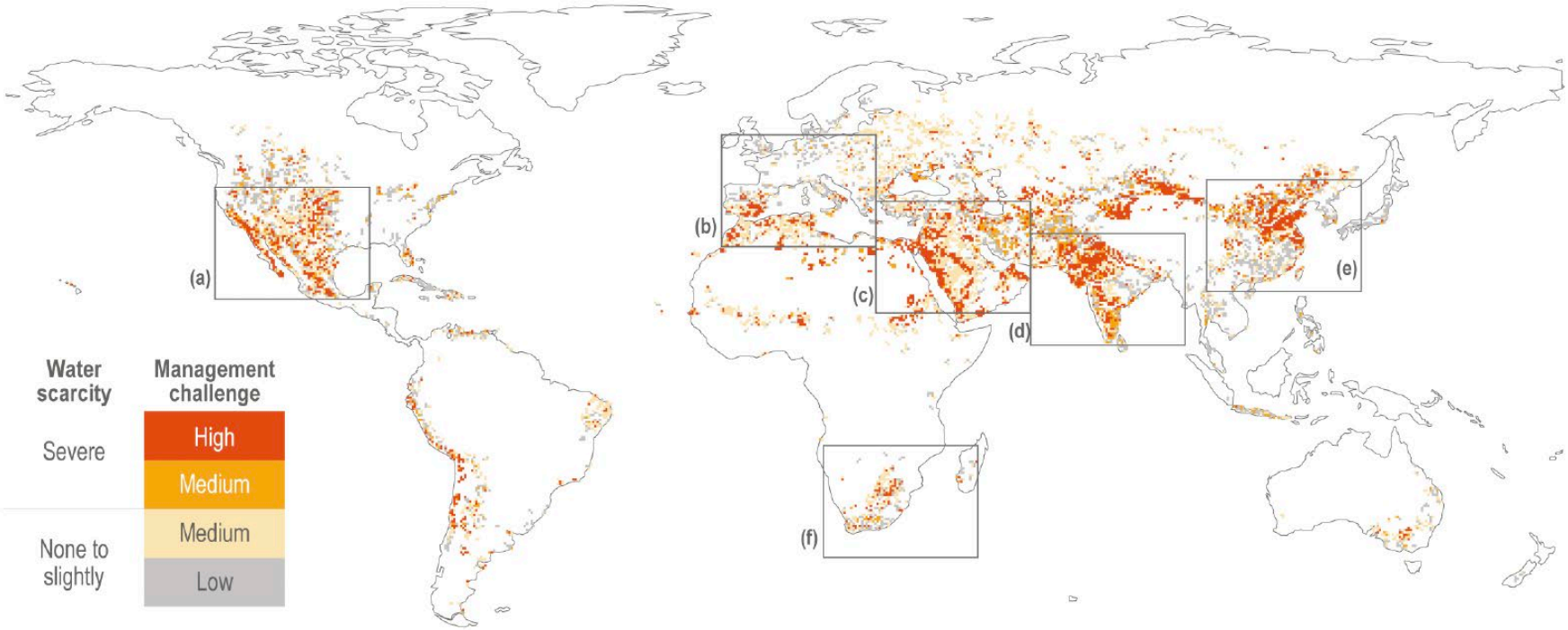
Population density

- High
- Low

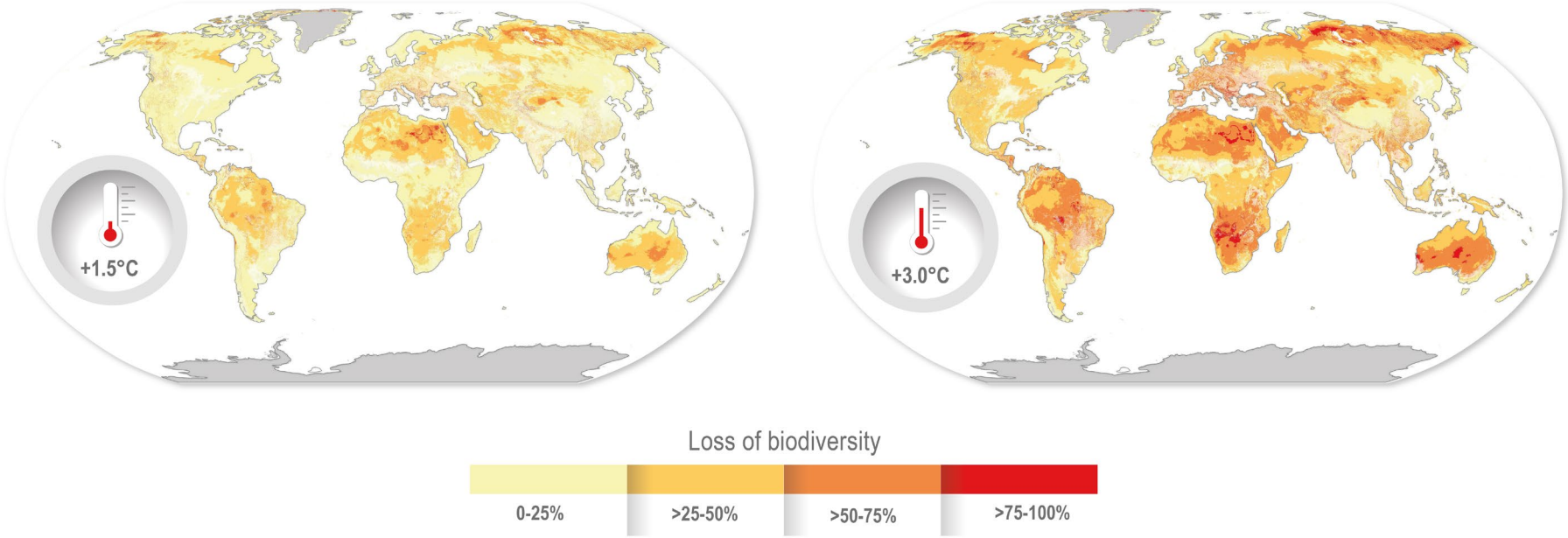
Examples of Indigenous Peoples with high vulnerability to climate change and climate change responses (4.3.8, 5.10.2, 5.13.5, Box7.1, 8.2.1, 15.6.4) and the importance of Indigenous Knowledge (Box9.2.1, 11.4, 14.4, Cross-Chapter Box INDIG)

4. Risk projections

Drought is exacerbating water management challenges which vary across regions with respect to anticipated water scarcity conditions by 2050



Land biodiversity loss at different warming levels



Projected impacts - HEALTH & WELLBEING

Climate change and related extreme events will significantly increase ill health and premature deaths from the near- to long-term ***

- Population exposure to heatwaves: increase with additional warming, strong geographical differences in heat-related mortality ****
- Food-borne, water-borne, and vector-borne diseases: increase under all levels of warming without additional adaptation ***
  - Dengue risk: increase with longer seasons and a wider geographic distribution, billions of people at risk by the end of the century ***
- Mental health (including anxiety and stress): increase in assessed regions ****

Levels of confidence: **** *Very high*; *** *High*; ** *Medium*; * *Low*

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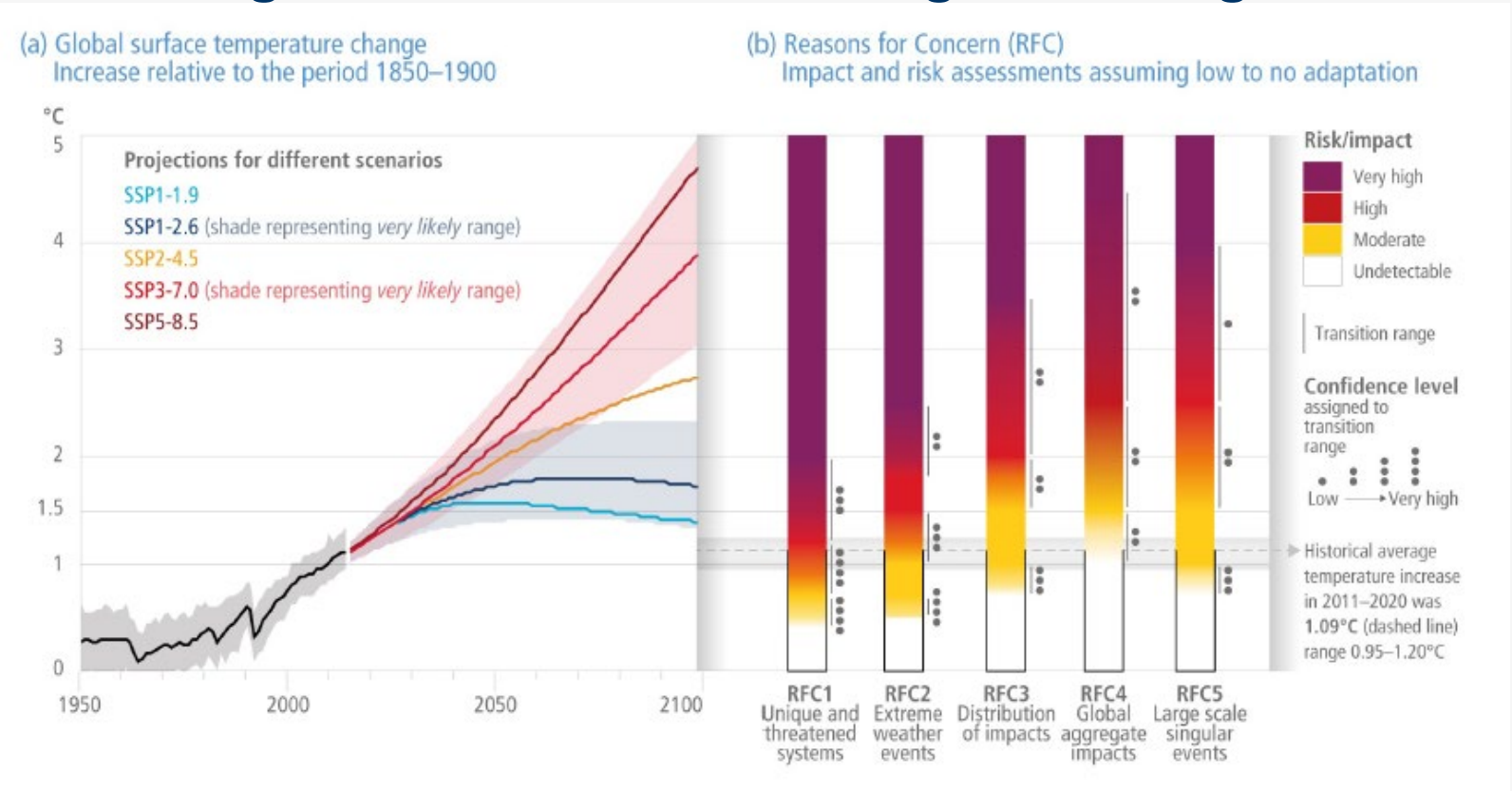
Every small increase in warming will result in increased risks.

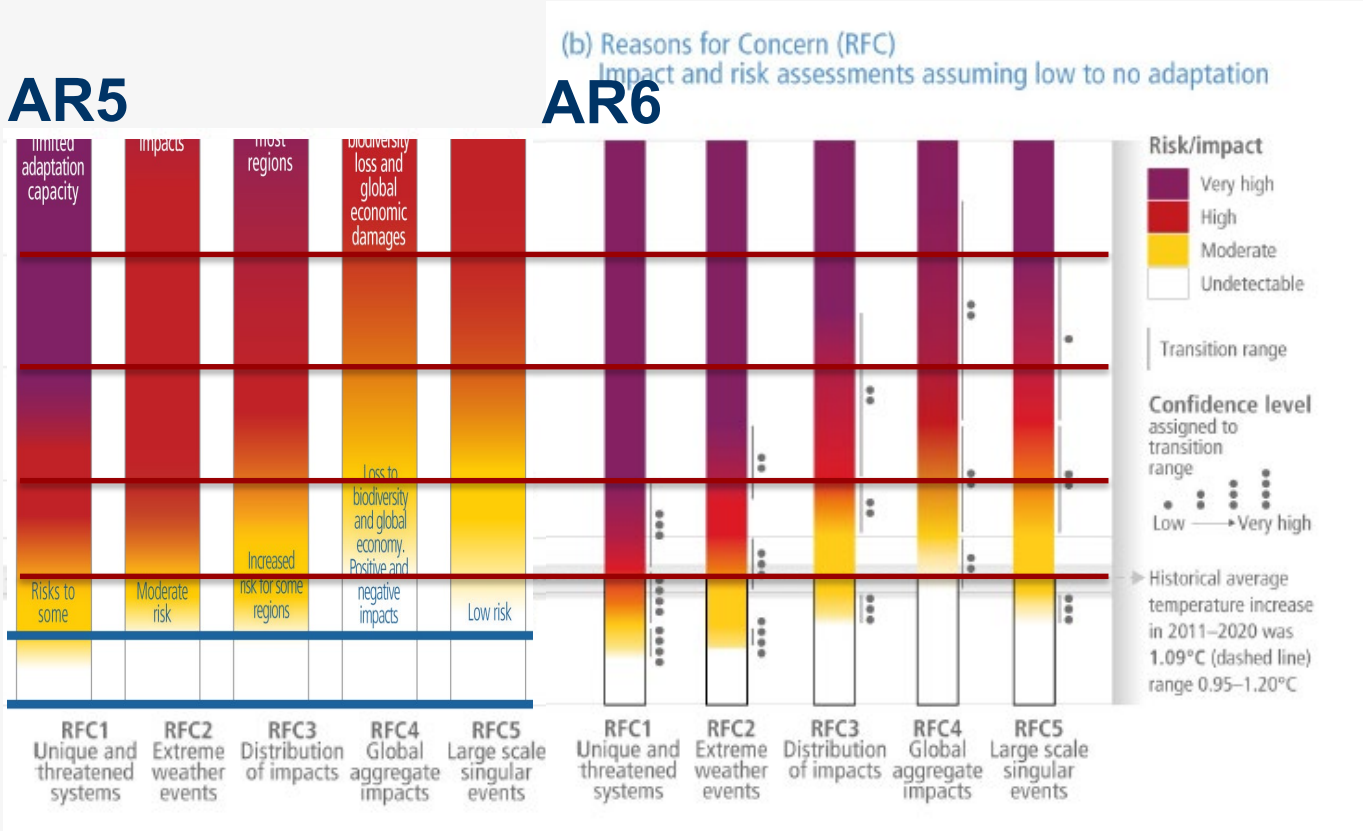
[Ocean Image Bank / The Ocean Agency]

Global and regional risks for increasing levels of global warming

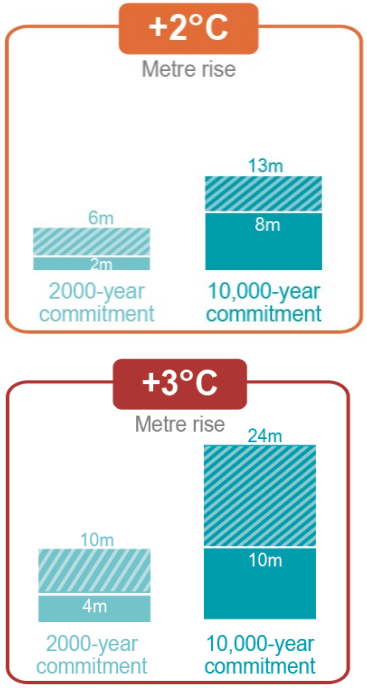


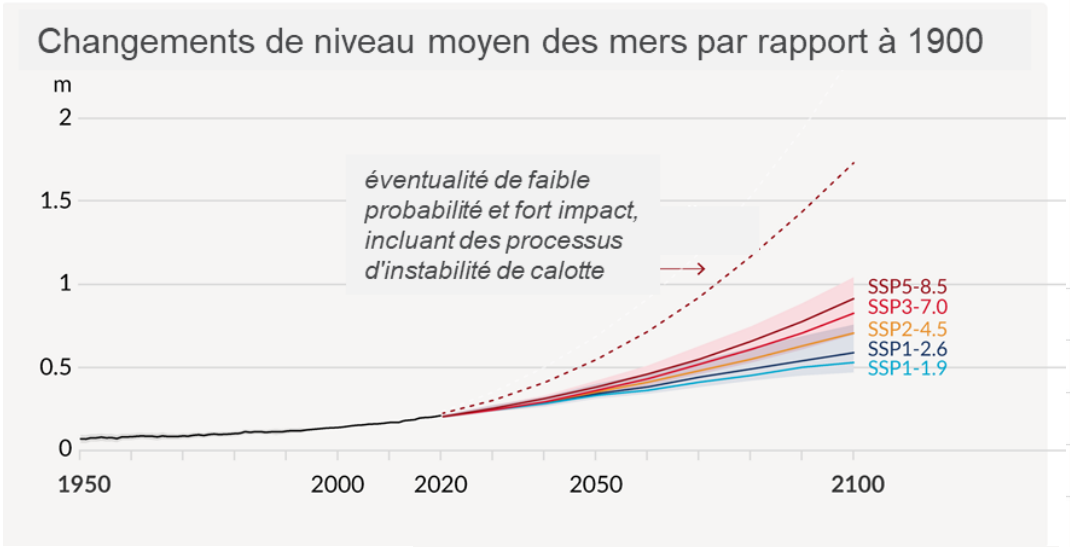
Risks materialise earlier than expected

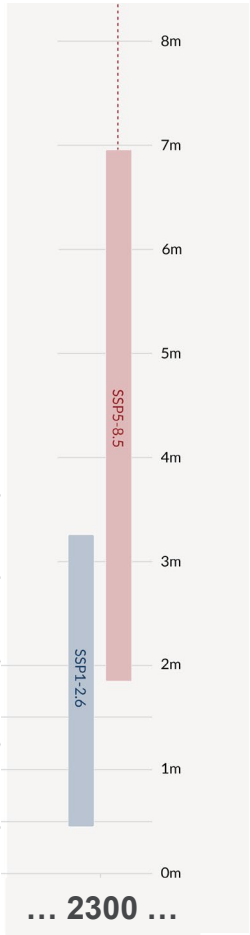
- Risks are turning higher earlier than previously assessed
- All reasons for concern



Sea-level rise includes a long-term commitment







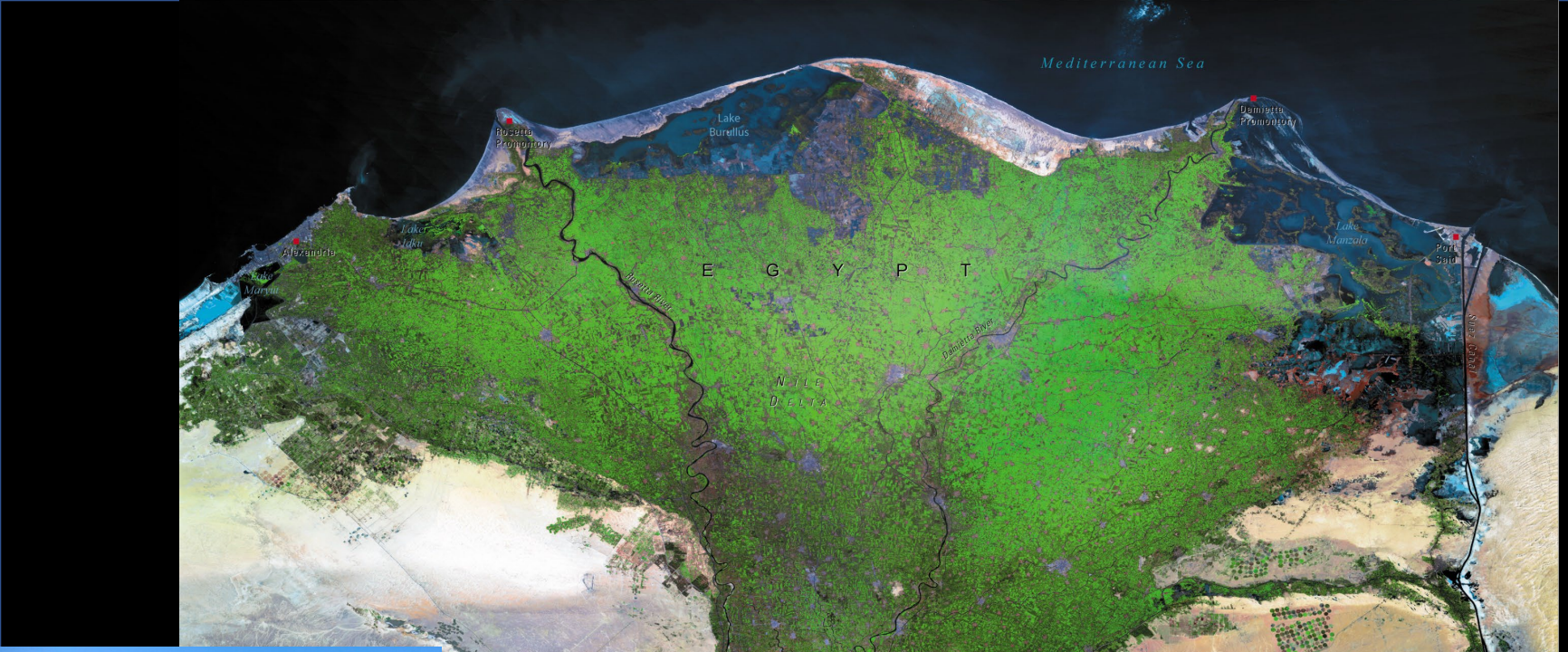

Mediterranean Sea
Rosetta Promontory
Lake Burullus
Damietta Promontory
Lake Idku
Alexandria
Lake Maryut
Lake Manzala
Port Said
E G Y P T
Rosetta River
Damietta River
Suez Canal
NILE DELTA
Nile River
CAIRO
20
40
Kilometres
N
1984 to1990 Mosaic

image commons.wikimedia.org/wiki/File:Venezia_acqua_alta_notte_2005_modificata.jpg

5. Adaptation – the closing window of opportunity

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Action on adaptation has increased but progress is uneven and we are not adapting fast enough.

[Boskalis / Rijkswaterstaat]

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Climate change combines with unsustainable use of natural resources, habitat destruction, growing urbanization and inequity.

[Youssef Abdelwahab / Unsplash]

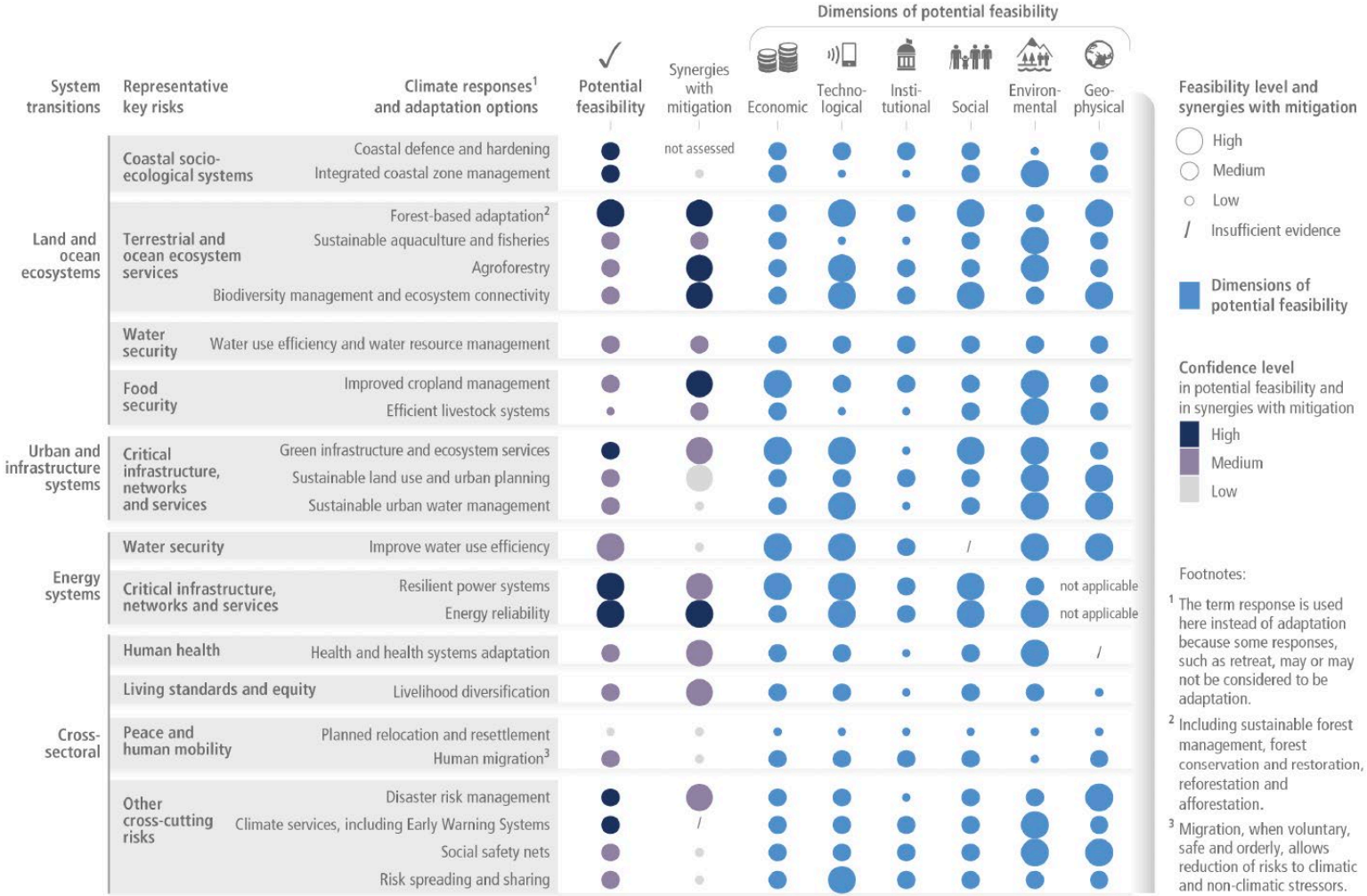
“There are increasing gaps between adaptation action taken and what’s needed.

These gaps are largest among lower income populations.

They are expected to grow.

Diverse feasible climate responses and adaptation options exist to respond to Representative Key Risks of climate change, with varying synergies with mitigation

Multidimensional feasibility and synergies with mitigation of climate responses and adaptation options relevant in the near-term, at global scale and up to 1.5°C of global warming

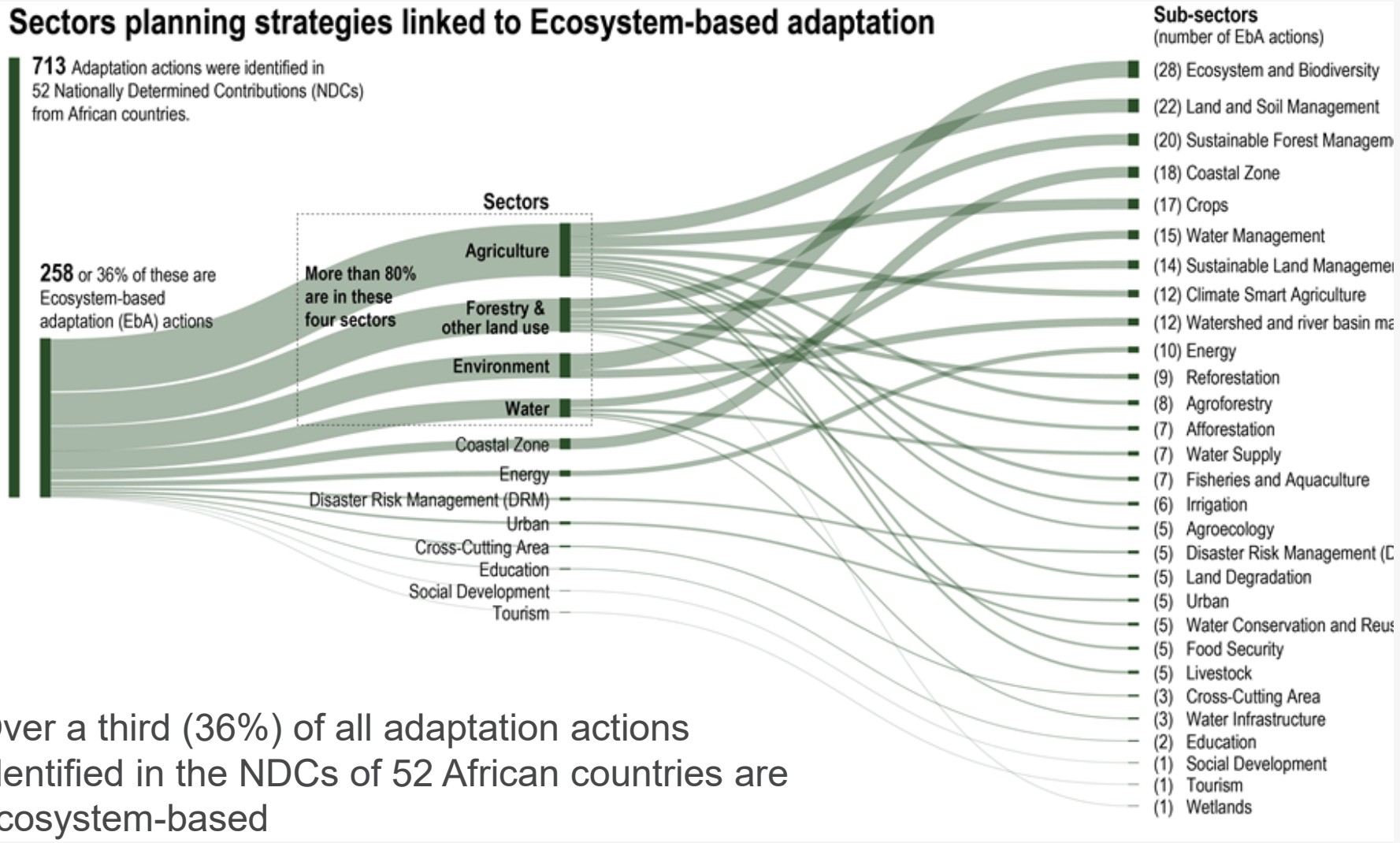


Footnotes:

[1] The term response is used here instead of adaptation because some responses, such as retreat, may or may not be considered to be adaptation.

[2] Including sustainable forest management, forest conservation and restoration, reforestation and afforestation.

[3] Migration, when voluntary, safe and orderly, allows reduction of risks to climatic and non-climatic stressors.



Over a third (36%) of all adaptation actions identified in the NDCs of 52 African countries are ecosystem-based

Improving food security

Effective options:

- Cultivar improvements
- Agroforestry
- Farm and landscape diversification
- Community-based adaptation
- Strengthening biodiversity

Wider benefits:

- Food security and nutrition
- Health and well-being
- Livelihoods

[Jacquelyn Turner / CCAFS CC BY-NC-SA 2.0; FAO / Riccardo De Luca]

[Chuttersnap, Jordan Brierley / Unsplash; SDOT Photos CC BY-NC 2.0]

Transforming cities

By 2050 urban areas could be home to two-thirds of the world's population.

Effective options

- Nature-based and engineering approaches together
- Establishing green and blue spaces
- Urban agriculture
- Social-safety nets for disaster management

Wider benefits

- Public health improvements
- Ecosystem conservation

Urban adaptation gap

Maladaptation

Adaptation that results in unintended consequences

The most disadvantaged groups are most affected by maladaptation.

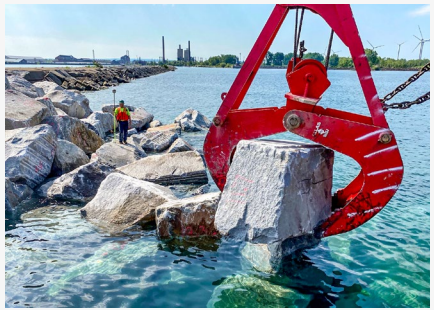
[Denis Onyodi / KRCS CC BY-NC 2.0]

There are limits to adaptation

- Even effective adaptation cannot prevent all losses and damages
- Above 1.5°C some nature-based solutions may no longer work.
- Above 1.5°C, lack of fresh water could mean that people living on small islands and those dependent on glaciers and snowmelt can no longer adapt.
- By 2°C it will be challenging to farm multiple staple crops in many current growing areas.

Financial constraints

- Current global financial flows are insufficient
- Most finance targets emissions reductions rather than adaptation
- Climate impacts can slow down economic growth



Co-benefits of mitigation (e.g. for health)

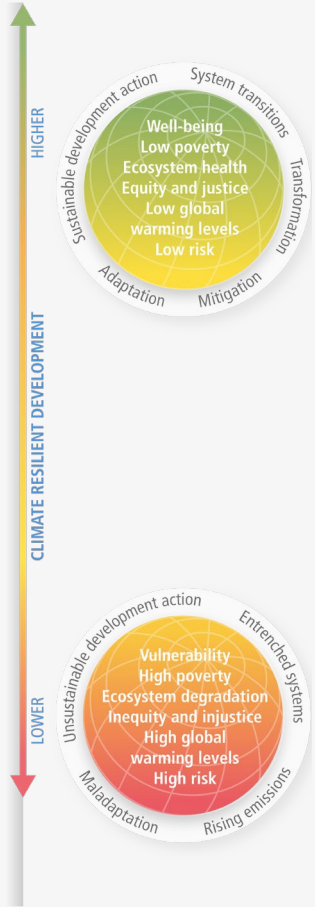
- Mitigation policies to reduce emissions from point sources (e.g., coal-fired power plants) reduce exposures to air pollutants that lead to significant negative health impacts, particularly in marginalized communities and children
- Increasing active transportation (e.g., walking and biking) reduce emissions and increase health through reduced weight, lower blood pressure, mental wellness, and other benefits
- Production of red meat is another significant source of greenhouse gas emissions. Eating only as much meat as your doctor recommends would benefit health while reducing emissions.
- The economic value of the avoided hospitalizations and avoided premature deaths are of the same order of magnitude or larger than the cost of implementing the mitigation polices

6. Climate-resilient development

Climate Resilient Development

The solutions framework:

- Requires scaled-up investment and international cooperation

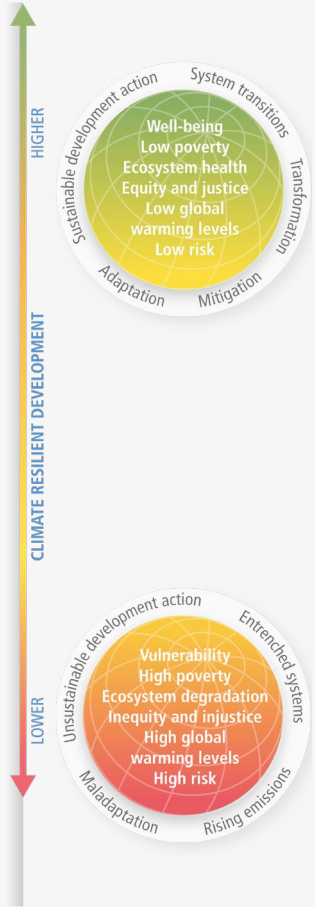


[Kumerra Gemechu/CIFOR CC BY-NC-ND 2.0, Thisisengineering Raeng / Unsplash]

Climate Resilient Development

The solutions framework:

- Involves marginalized groups
- Prioritises equity and justice
- Reconciles different interests, values and world views

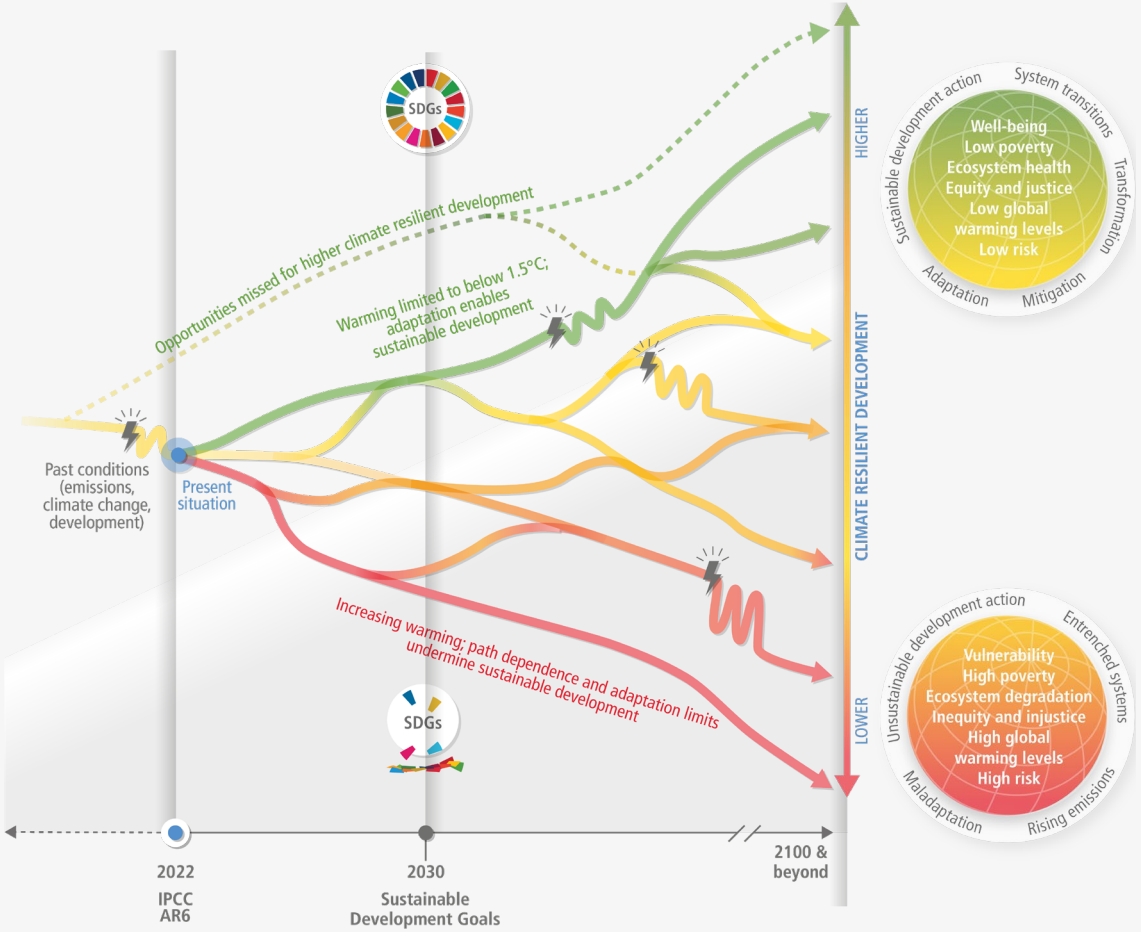


[Mika Baumeister / Unsplash; Aulia Erlangga/CIFOR CC BY-NC-ND 2.0]

Increasing urgency

Starting today, every action, every decision matters.

Worldwide action is more urgent than previously assessed.




Observed relation with sectors and groups at risk
Ecosystems and their services
Ethnic groups
Gender equity
Low-income groups
Relation with Sustainable Development Goals[4, 5]
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
System transitions
Climate responses[1] and adaptation options
Land and ocean ecosystems
Coastal defence and hardening
Integrated coastal zone management
Forest-based adaptation[2]
Sustainable aquaculture and fisheries
Agroforestry
Biodiversity management and ecosystem connectivity
Water use efficiency and water resource management
Improved cropland management
Efficient livestock systems
Urban and infrastructure systems
Green infrastructure and ecosystem services
Sustainable land use and urban planning
Sustainable urban water management
Energy systems
Improve water use efficiency
Resilient power systems
Energy reliability
Cross-sectoral
Health and health systems adaptation
Livelihood diversification
Planned relocation and resettlement
Human migration[3]
Disaster risk management
Climate services, including Early Warning Systems
Social safety nets
Risk spreading and sharing
not assessed
Types of relation
With benefits
With dis-benefits
Not clear or mixed
Insufficient evidence
Confidence level
in type of relation with sectors and groups at risk
High
Medium
Low
Related Sustainable Development Goals
1: No Poverty
2: Zero Hunger
3: Good Health and Well-being
4: Quality Education
5: Gender Equality
6: Clean Water and Sanitation
7: Affordable and Clean Energy
8: Decent Work and Economic Growth
9: Industry, Innovation and Infrastructure
10: Reducing Inequality
11: Sustainable Cities and Communities
12: Responsible Consumption and Production
13: Climate Action
14: Life Below Water
15: Life On Land
16: Peace, Justice, and Strong Institutions
17: Partnerships for the Goals

What drives climate injustice?

- Lack of/limited participation
- Multiple forms of inequality: e.g. gender, racial, income
- Migration – exacerbate pre-existing vulnerabilities
- Historical inequities and injustices
- Inequitable access to basic services
- Limited/lack of focus on equity and justice in climate action reinforces existing injustices

[Marco Dormino_ UN Photo_CC BY-NC-ND 2.0Mike/ Tigas_public domain/maria-teneva-uHDbnG-Avpc-unsplash/humberto-chavez-Ilo0ZD5o-q8-unsplash]

7. What is new?

So what is new in AR6?

- + observed impacts, everywhere
- More structured risk assessment, for ecosystems and society, focus on extreme events
- Better synthesis of adaptation focus on food security, urban and cost, maladaptation, hard limits
- Equity, climate justice, climate-resilient development
- + regional detail and specifics