Findings of the Special Report on Global Warming of 1.5 °C

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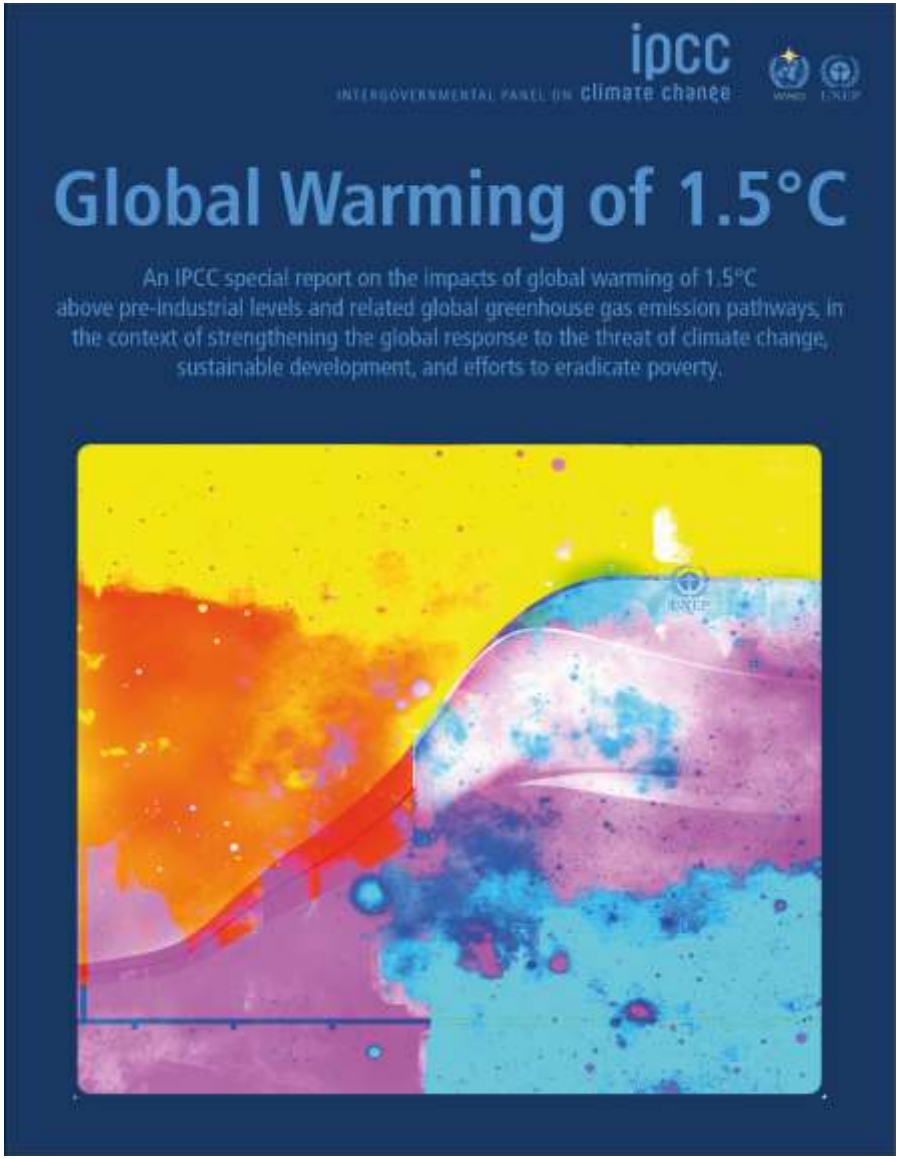
Global Warming of 1.5°C

An IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of *strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.*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Global Warming of 1.5°C
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The report in numbers

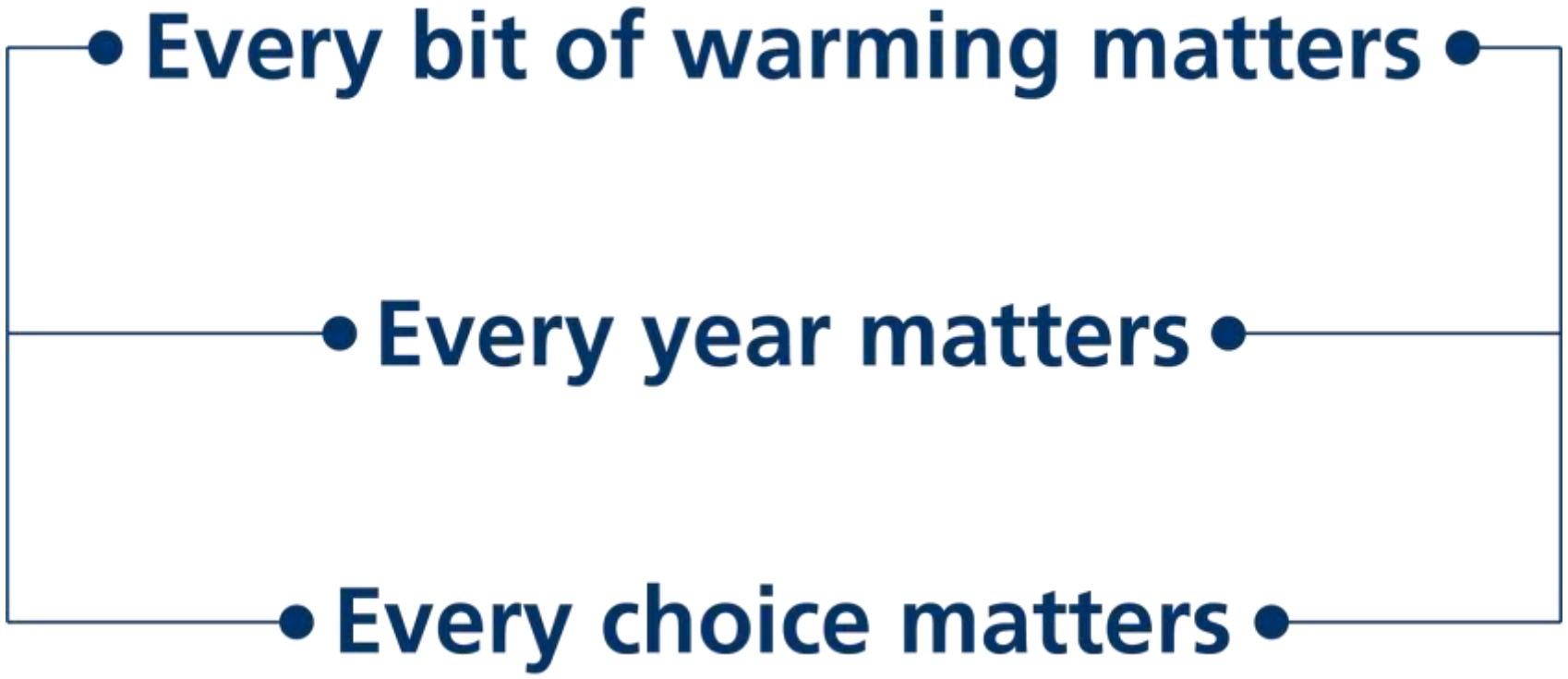
91 Authors from **40** Countries

133 Contributing authors

6000 Studies

1 113 Reviewers

42 001 Comments


Every bit of warming matters
Every year matters
Every choice matters

Where are we now?

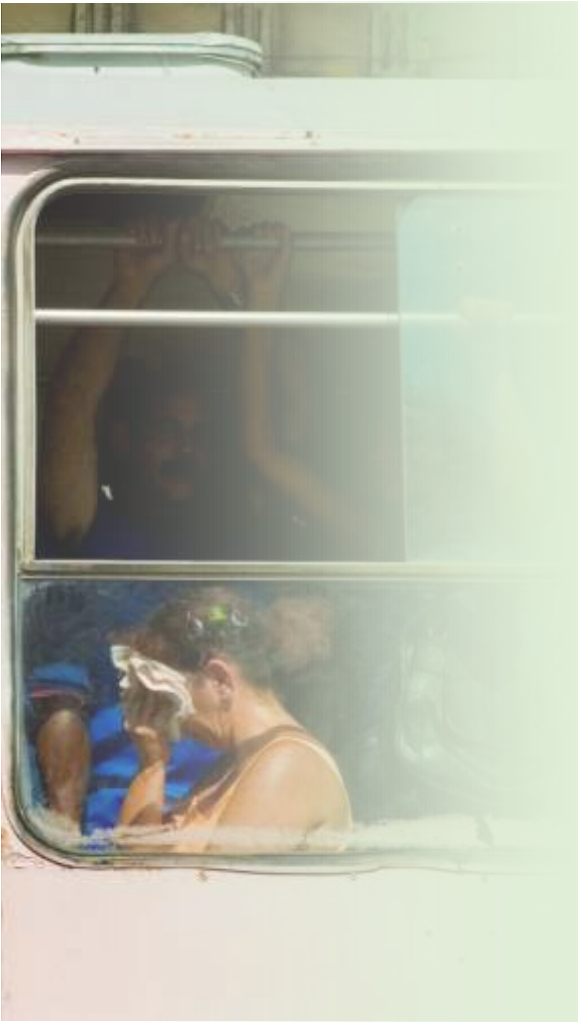
Where are we now?

Since pre-industrial times, human activities have caused approximately 1.0°C of global warming

- At current rate, would reach 1.5°C between 2030 and 2050
- Past emissions alone do not commit the world to 1.5°C
- Already seeing consequences for people, nature and livelihoods

Ashley Cooper / Aurora Photos

Where do we want to go?

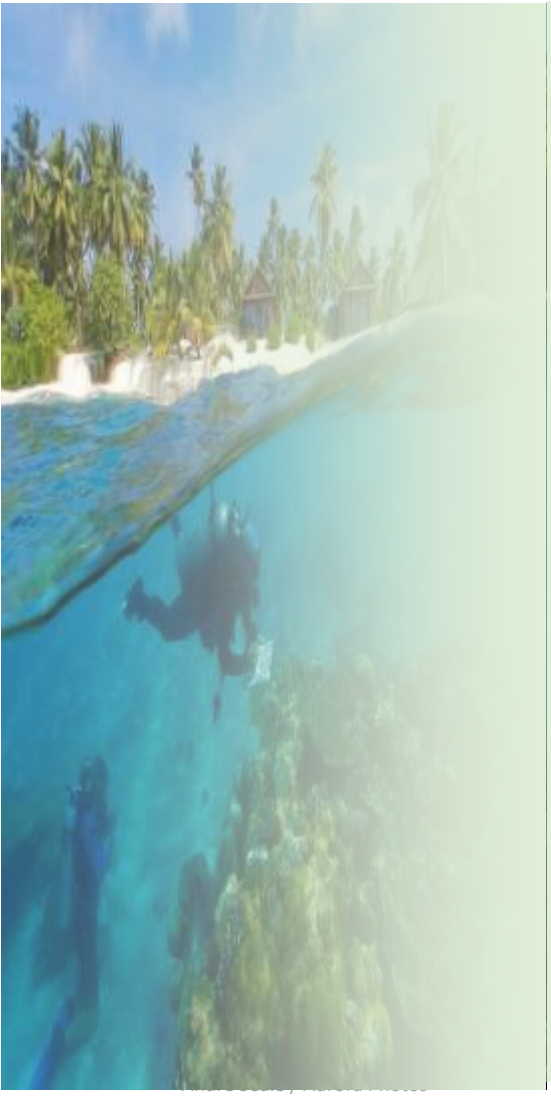


Where do we want to go?

There are clear benefits at 1.5°C compared to 2°C:

- Less extreme impacts from extreme weather where people live
- By 2100, global mean sea level rise will be around 10 cm lower but will continue to rise for centuries
- 10 million fewer people exposed to risk of rising seas and less coastal ecosystems exposed

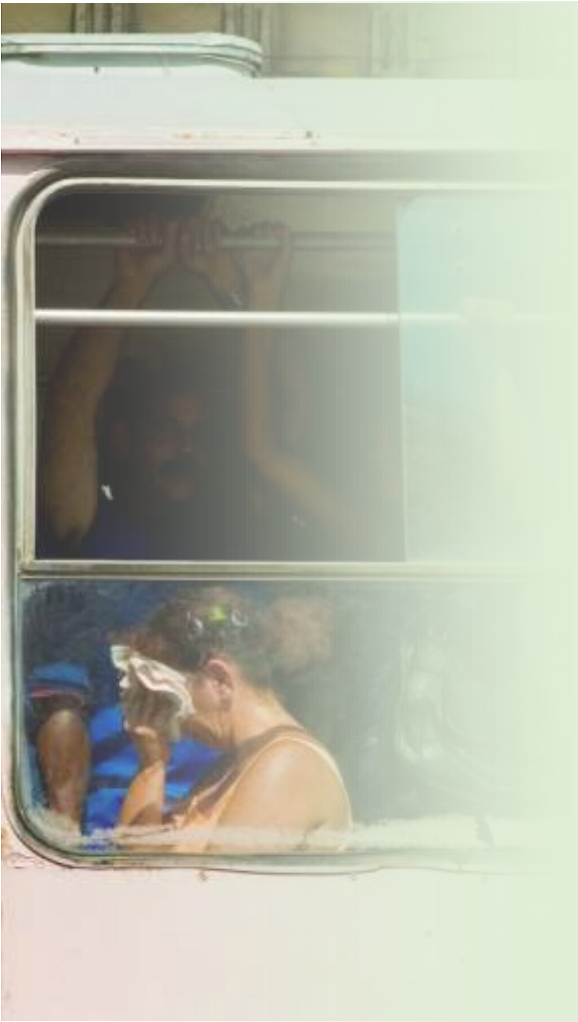
Jason Florio / Aurora Photos



Where do we want to go?

At 1.5°C compared to 2°C:

- Smaller reductions in yields of maize, rice, wheat and sorghum
- Global population exposed to water stress is up to 50% less, also less water stress for ecosystems
- Up to several hundred million fewer people exposed to climate-related risk and susceptible to poverty by 2050
- Lower impact on biodiversity and species



Where do we want to go?

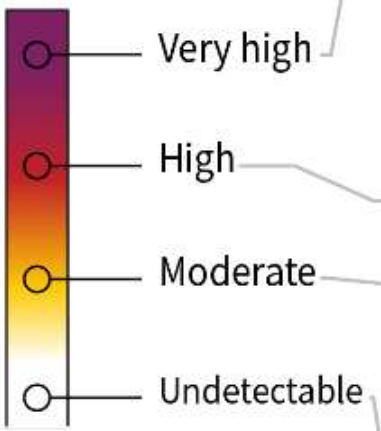
At 1.5°C and even more so at 2°C, there is disproportionately high risk for Arctic, dryland regions, small island developing states and least developed countries

At 1.5°C compared to 2°C:

- Lower risk for health, livelihoods, food security, water supply, human security and economic growth
- A wide range of adaptation options can reduce climate risks; less adaptation needs at 1.5°C

Jason Florio / Aurora Photos

SPM2 | How the level of global warming affects impacts and/or risks associated with the Reasons for Concern (RFCs) and selected natural, managed and human systems



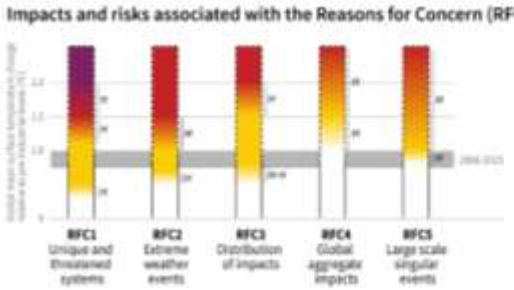
Level of additional impact/risk due to climate change

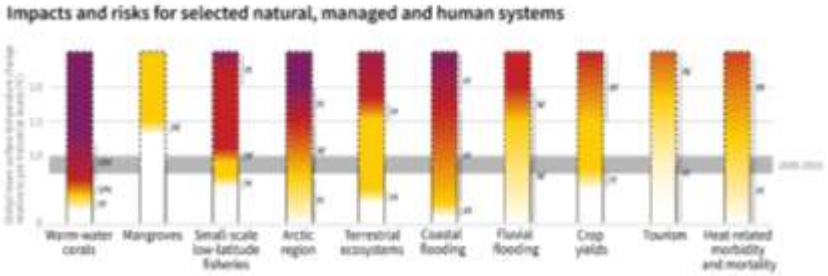
Purple indicates very high risks of severe impacts/risks and the presence of significant irreversibility or the persistence of climate-related hazards, combined with limited ability to adapt due to the nature of the hazard or impacts/risks.

Red indicates severe and widespread impacts/risks.

Yellow indicates that impacts/risks are detectable and attributable to climate change with at least medium confidence.

White indicates that no impacts are detectable and attributable to climate change.





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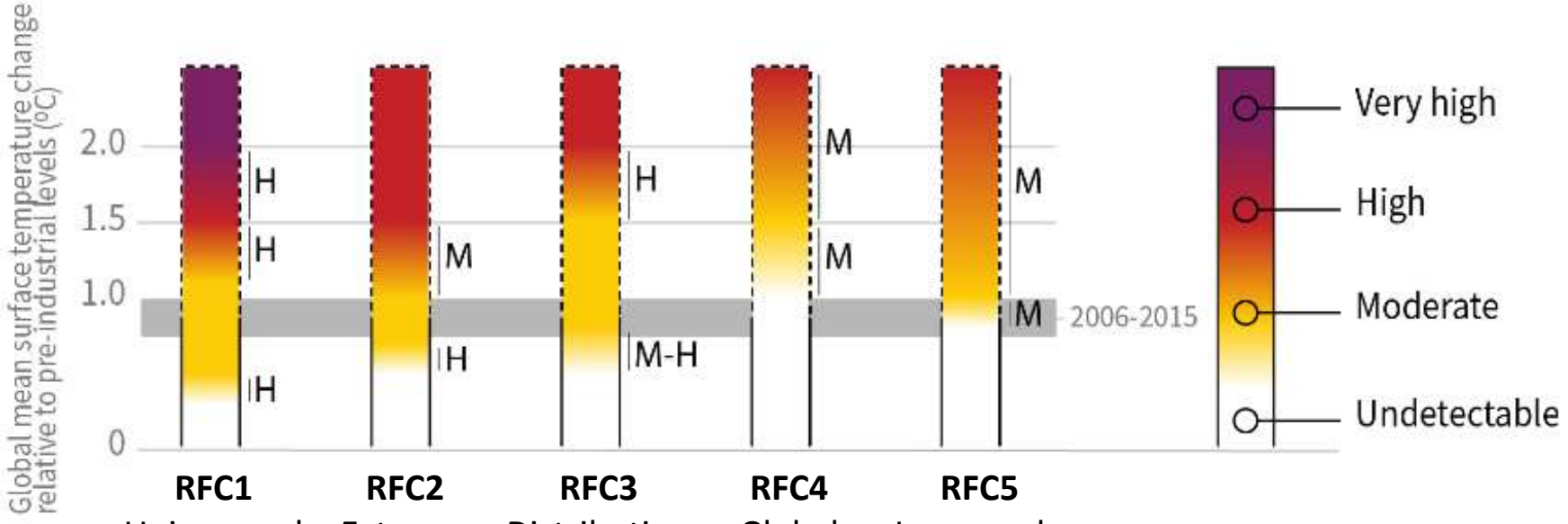
SPM2 | How the level of global warming affects impacts and/or risks associated with the Reasons for Concern (RFCs) and selected natural, managed and human systems

Impacts and risks associated with the Reasons for Concern (RFCs)



RFC1 Unique and threatened systems

RFC2 Extreme weather events

RFC3 Distribution of impact

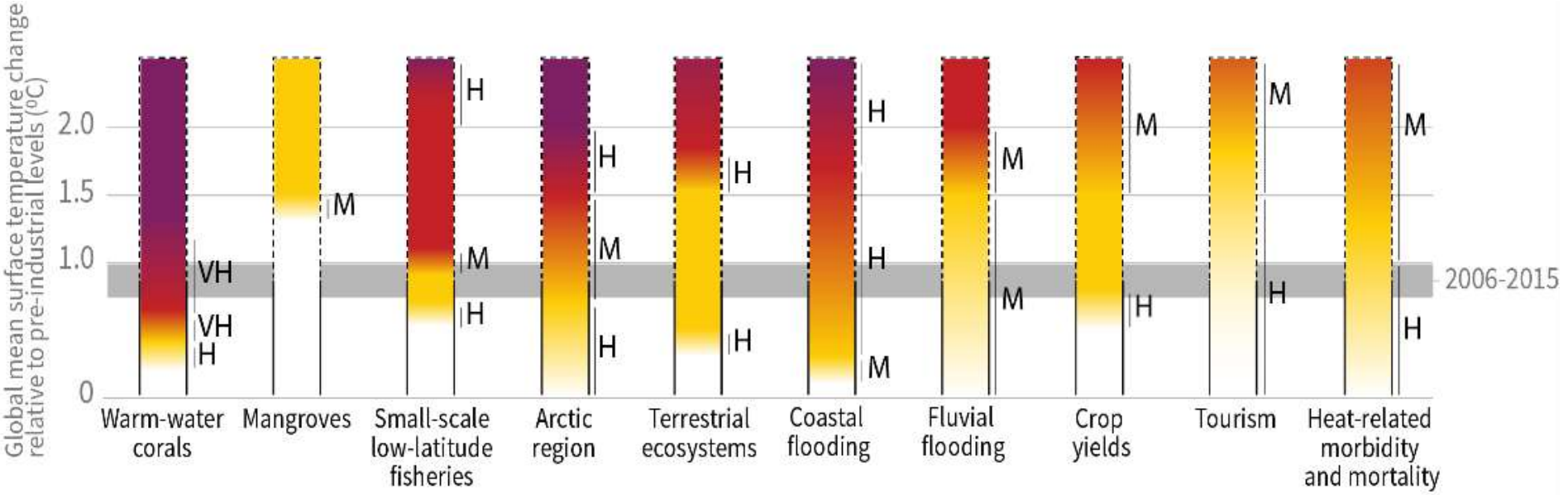
RFC4 Global aggregate impacts

RFC5 Large scale singular events

Confidence level for transition: L=Low, M=Medium, H=High and VH=Very high

SPM2 | How the level of global warming affects impacts and/or risks associated with the Reasons for Concern (RFCs) and selected natural, managed and human systems

Impacts and risks for selected natural, managed and human systems



Confidence level for transition: L=Low, M=Medium, H=High and VH=Very high

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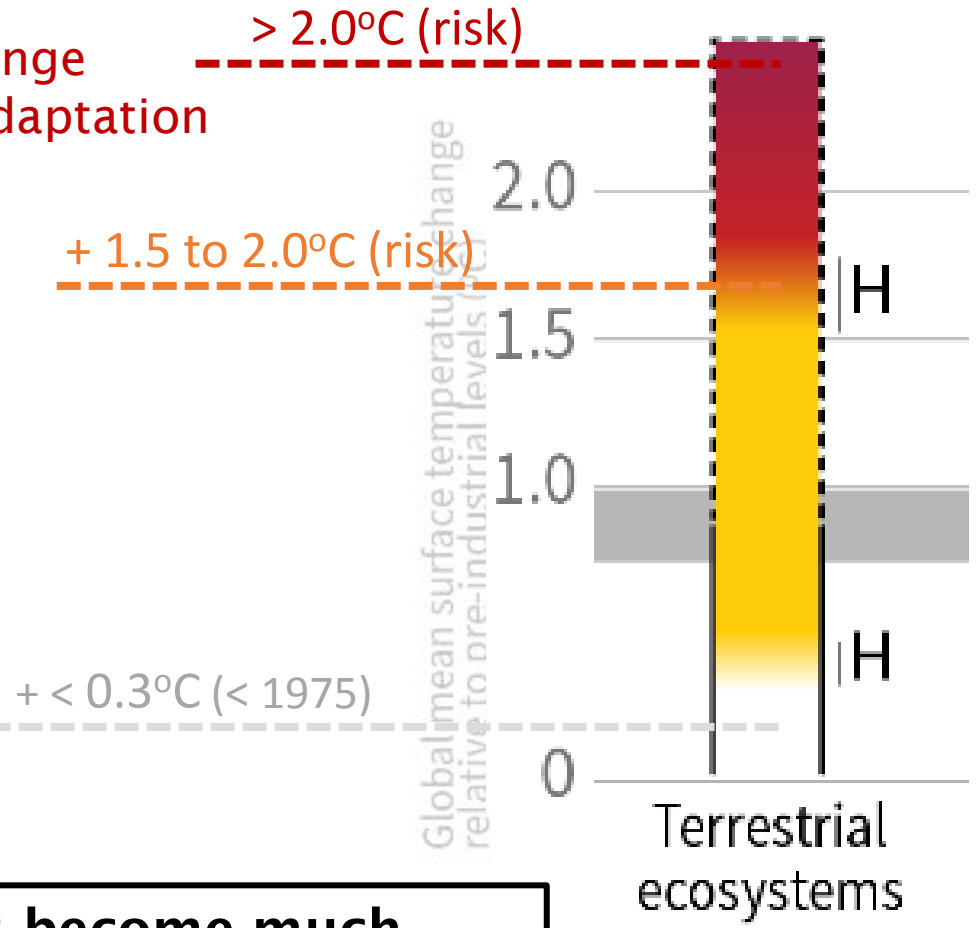
SPM2 | Example : Terrestrial ecosystems

By 2.5˚C, **biome shifts** and species range losses escalate to very high levels – adaptation options are very limited (*irreversible*).

Key transition between 1.5ºC to 2.0ºC due to extensive shifts of biomes and a doubling or tripling of the number of plants, animals or insects losing over half of their climatically determined geographic ranges

No detection and attribution of impacts of global warming on terrestrial ecosystems



<u>Differences</u> become much larger between 1.5ºC and 2.0ºC

How do we get there?

Greenhouse gas emissions pathways

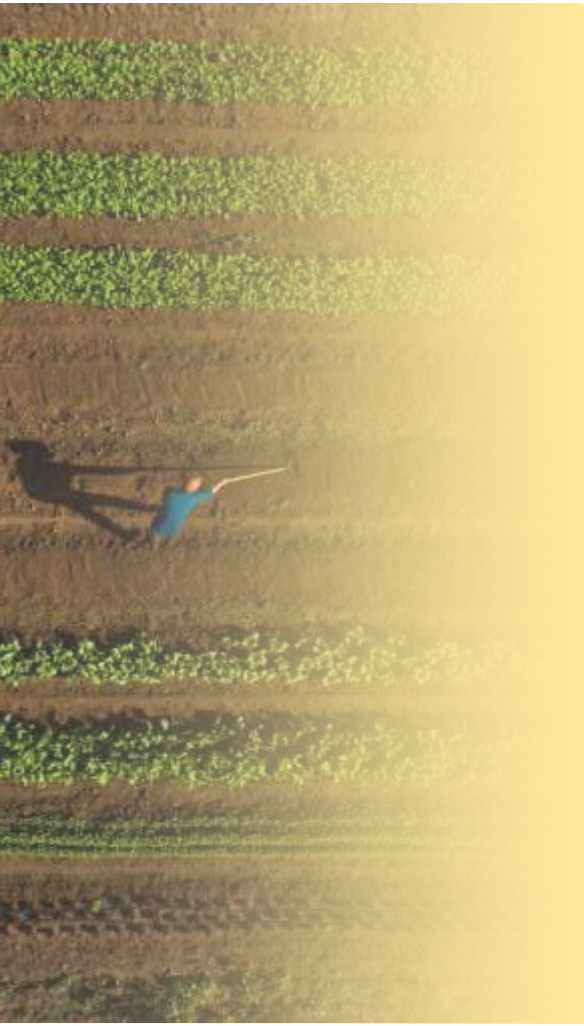
- To limit warming to 1.5˚C, CO_2 emissions fall by about 45% by 2030 (from 2010 levels)
  - ↳ Compared to 25% for 2˚C
- To limit warming to 1.5˚C, CO_2 emissions would need to reach 'net zero' around 2050
  - ↳ Compared to around 2070 for 2˚C
- Reducing non-CO_2 emissions would have direct and immediate health benefits

Robert van Waarden / Aurora Photos

Greenhouse gas emissions pathways

- Limiting warming to 1.5°C would require changes on an unprecedented scale
  - Deep emissions cuts in all sectors
  - A range of technologies
  - Behavioural changes
  - Increased investment in low carbon options

Neil Emmerson / Aurora Photos



Greenhouse gas emissions pathways

- Progress in renewables would need to be mirrored in other sectors
- We would need to start taking carbon dioxide out of the atmosphere
- Implications for food security, ecosystems and biodiversity

Peter Essick / Aurora Photos

Greenhouse gas emissions pathways

- National pledges are not enough to limit warming to 1.5°C

- Avoiding warming of more than 1.5°C would require CO_2 emissions to decline substantially before 2030

Gerhard Zwerger-Schoner / Aurora Photos

Four system transitions

"….. require rapid and far-reaching transitions in energy, land, urban and infrastructure (including transport and buildings), and industrial systems."

Rapid; Far reaching; Unprecedented

Robert van Waarden / Aurora Photos

How do we get there?

1. Energy system transitions

- Decarbonization of electricity
  - Renewable energy
  - Integration of renewables into energy systems
  - Exiting fossil fuel generation
- Electrification of energy end use
  - Vehicles, Industry, Buildings
- Energy efficiency
  - All sectors
- Adaptation of key infrastructure to climate change

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How do we get there?
2. Industrial transitions

- Energy efficiency
- Electrification and hydrogen
- Industrial carbon capture, utilization and storage
- Bio-based industry
- Circular economy

Robert van Waarden / Aurora Photos

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Robert van Waarden / Aurora Photos

How do we get there?

3. Urban and infrastructure transitions

- Land use and urban planning
- Adoption of low–carbon transport fuels (e.g. electricity, hydrogen)
- Shifts to public transportation and sharing. non-motorized transport
- Fuels and technologies that reduce emissions from aviation and shipping
- Smart grids
- Efficient appliances, green infrastructure
- Building codes and standards, Low/zero-carbon buildings

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Robert van Waarden / Aurora Photos

How do we get there?

4. Land and ecosystem transitions

- Afforestation and reforestation
- Agroforestry
- Sustainable intensification of agriculture
- Conservation agriculture
- Soil management , Livestock management
- Ecosystem restoration and biodiversity management
- Wetland management
- Building on indigenous knowledge and local knowledge

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Ashley Cooper/ Aurora Photos

How do we get there? Sustainability

- SD can support enable the systemic transitions and transformation
- Pathways with low energy demand, low material consumption and low carbon food have the highest co-benefits with sustainable development
- Benefits and trade-offs with SD and balancing social well-being, economic prosperity, environmental protection

Ashley Cooper/ Aurora Photos

How do we get there? Ethical and fair transitions

- A **careful mix of policies** will allow mitigation and adaptation to be pursued alongside sustainable development - **climate resilient development pathways**
- **Equity and social justice** are core elements of the societal and systems transitions and transformations
- This implies cooperation, **multi-level governance, innovation** and the **re-direction of investment flows**

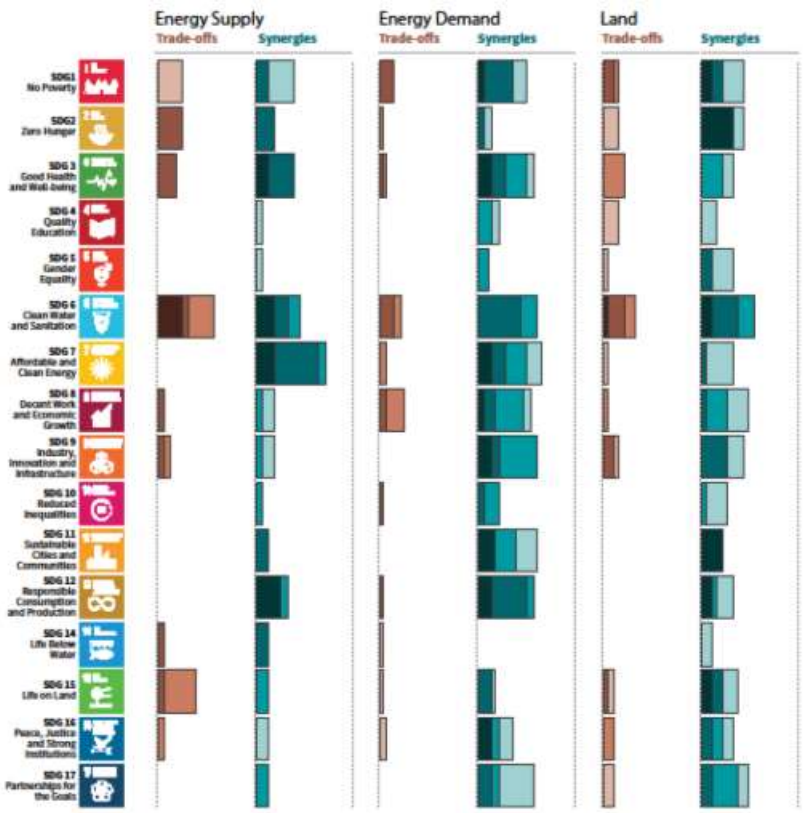
Urgent far reaching action

Ashley Cooper/ Aurora Photos

Urgent and far-reaching action

- Global carbon **emissions peak before 2030** in all pathways compatible with 1.5°C warming
- Emissions of **carbon dioxide fall by 45% by 2030**, reaching **net zero around 2050**, with deep cuts in methane and other emissions
- **Ethical and fair transitions**
- Limiting global warming to 1.5°C is not impossible, but **political and societal will** to accelerate transitions is key

SPM4| Indicative linkages between mitigation and sustainable development using SDGs



Length shows strength of connection

The overall **size of the coloured bars (from 0 to 100%)** depict **the relative potential** for synergies and trade-offs between the sectoral mitigation options and the SDGs.

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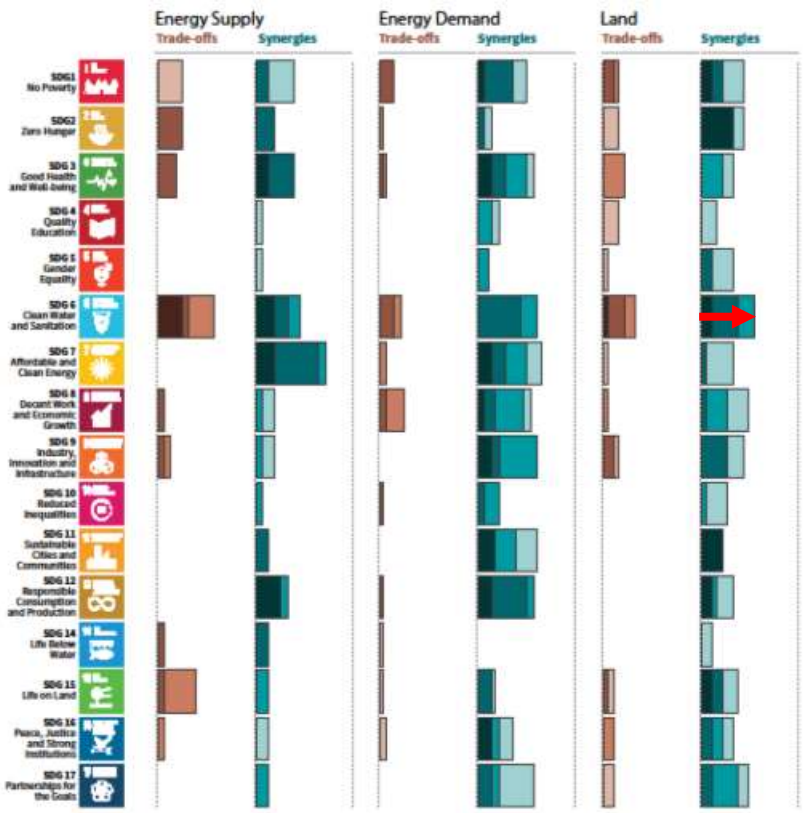

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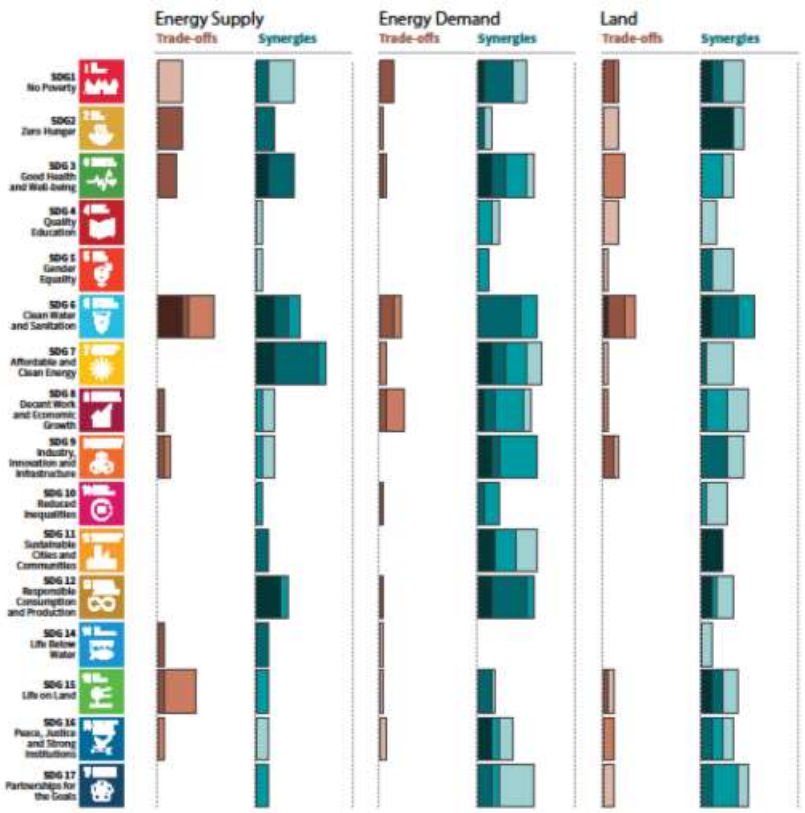

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Shades show level of confidence

The shades depict the level of confidence of the assessed potential for **Trade-offs**/**Synergies**

THANK YOU FOR YOUR ATTENTION!

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