

Maritime Spatial Planning Forum

# Global Meets Regional



## The Ocean and Cryosphere in a Changing Climate

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European Union

#SROCC

# The Ocean and Cryosphere in a Changing Climate

Riga

19 November 2019

ipcc

INTERGOVERNMENTAL PANEL ON climate change





# The Role of the IPCC is...

“... to **assess** on a comprehensive, objective, open and transparent basis the **scientific, technical and socio-economic information** relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation.”

“IPCC reports should be **neutral with respect to policy**, although they may need to **deal objectively with scientific, technical and socio-economic factors** relevant to the application of particular policies.”

*Principles Governing IPCC Work, paragraph 2*

Source: <http://www.ipcc.ch/pdf/ipcc-principles/ipcc-principles.pdf>

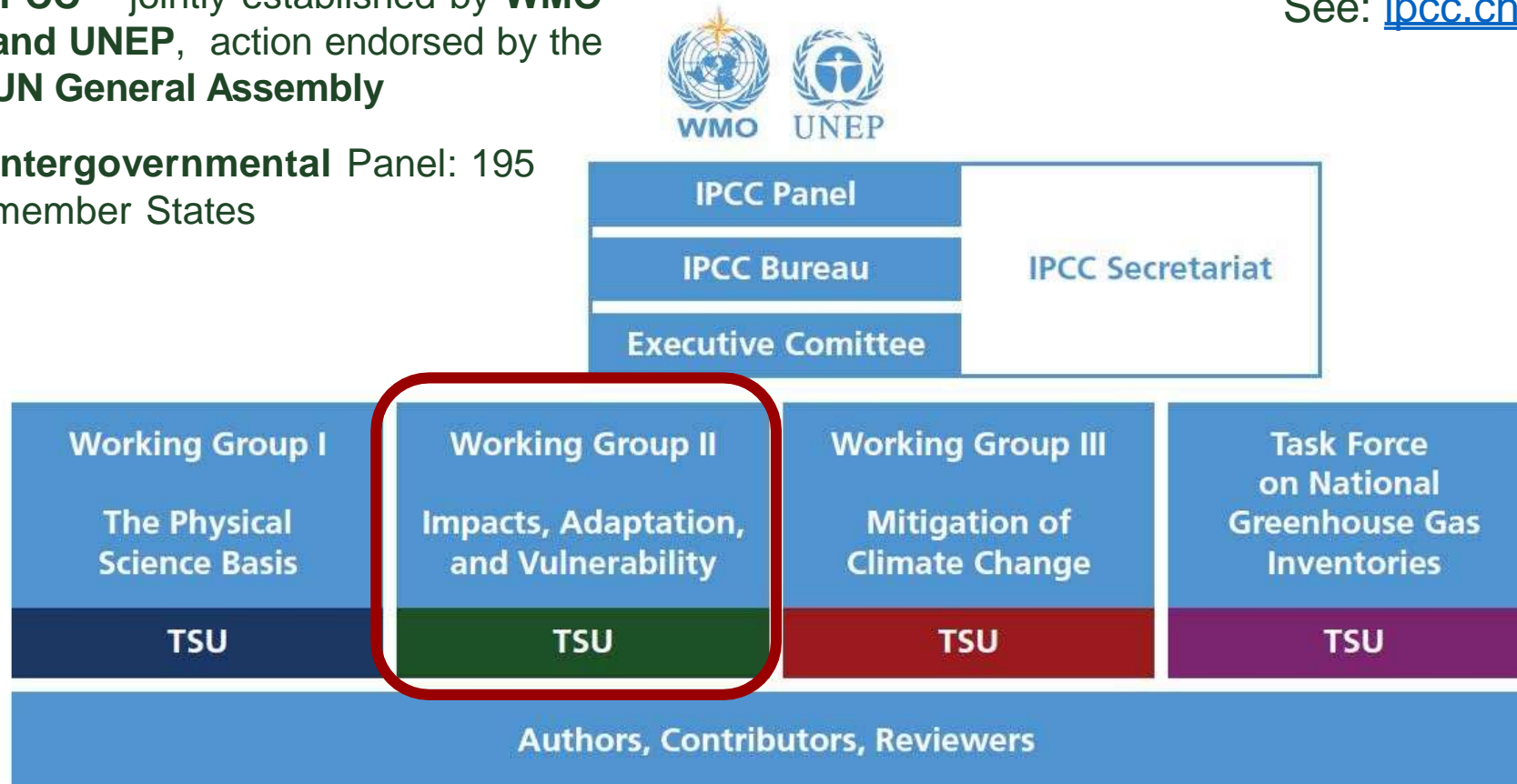




# IPCC Structure

- **IPCC** – jointly established by **WMO** and **UNEP**, action endorsed by the **UN General Assembly**
- **Intergovernmental** Panel: 195 member States

See: [ipcc.ch](http://ipcc.ch)

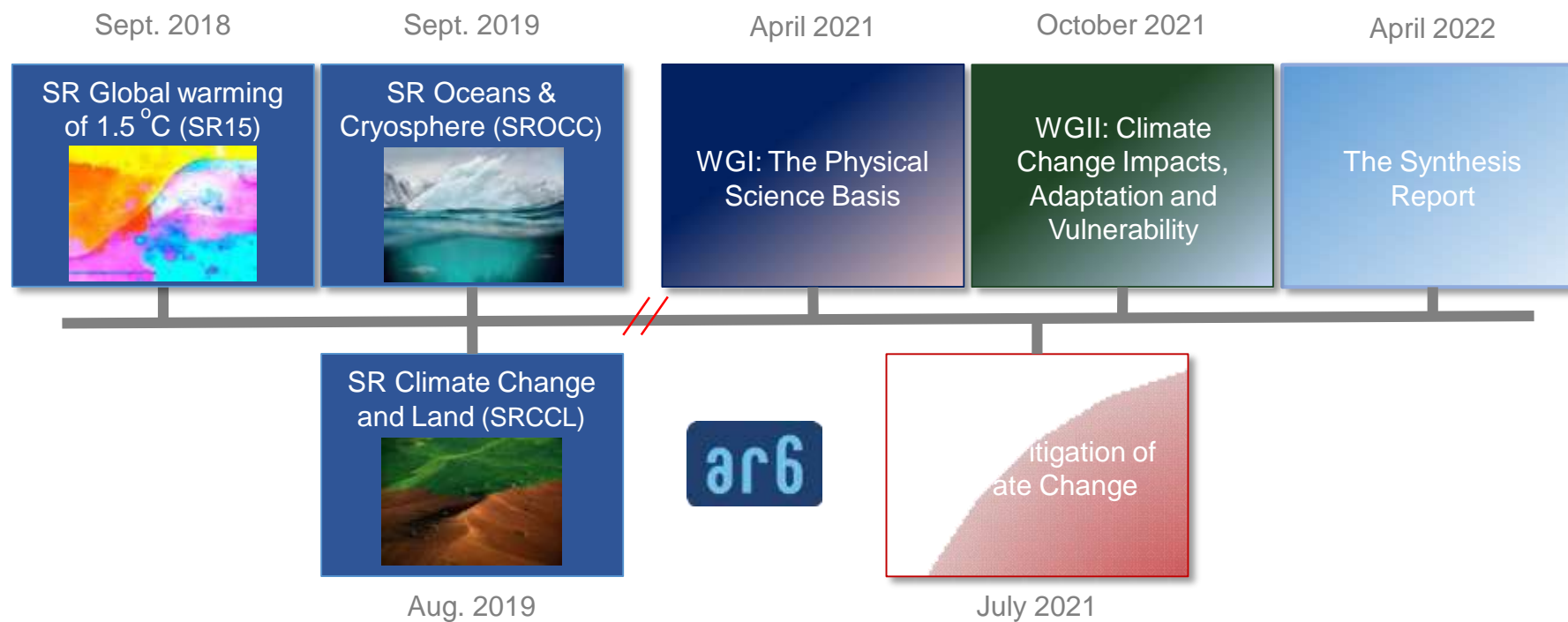


Hundreds of **scientists and experts from around the world** are involved in the preparation of IPCC reports





# IPCC Reports in the Sixth Assessment Cycle



IPCC Special Reports

IPCC Main Working Group Reports



# The Ocean and Cryosphere in a Changing Climate



WG I × WG II



WG I × WG II



# SROCC Report by the numbers



104 authors



31% of authors  
are women



36 countries



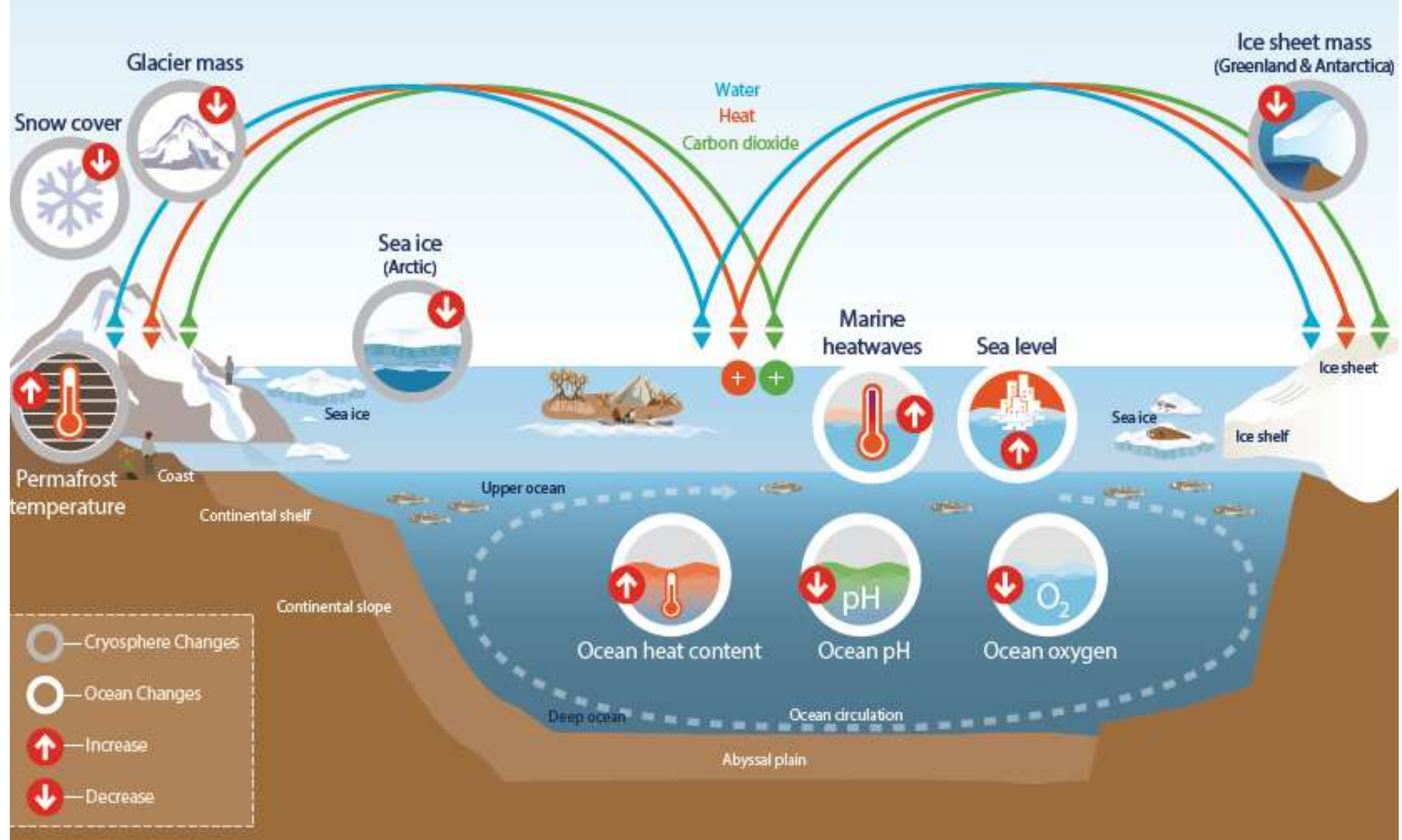
6981 Studies




31,176  
Comments











The world's ocean and cryosphere have been  
'taking the heat' from climate change for  
decades.

Consequences for nature and humanity are  
sweeping and severe.



## High Mountains

Photo: Yungdrung Tsewang





# Changes in the mountain cryosphere

- **Smaller glaciers** found, for example, in Europe, eastern Africa, the tropical Andes and Indonesia are projected to lose **more than 80%** of their current ice mass by 2100 if emissions continue to increase strongly.
- As glaciers melt and snow cover shrinks, warm-adapted plant and animal species migrate upslope. Cold- and snow-adapted species decrease and risk eventual extinction, especially without conservation.
- The retreat of the cryosphere will continue to adversely affect recreational activities, tourism and cultural assets.







# Changes in the mountain cryosphere

- Hazards for people, for example through **landslides, snow avalanches or floods** will increase as glaciers and permafrost decline.
- **Changing water availability and quality** affects households, agriculture, energy systems, and people both in the region and beyond.
- Limiting warming to 1.5°C would help people to adjust to changes in **water supplies** and **limit risks related to mountain hazards**.
- **Integrated water management and transboundary cooperation** provide opportunities to reduce the impacts of climate-related cryosphere changes on water resources.





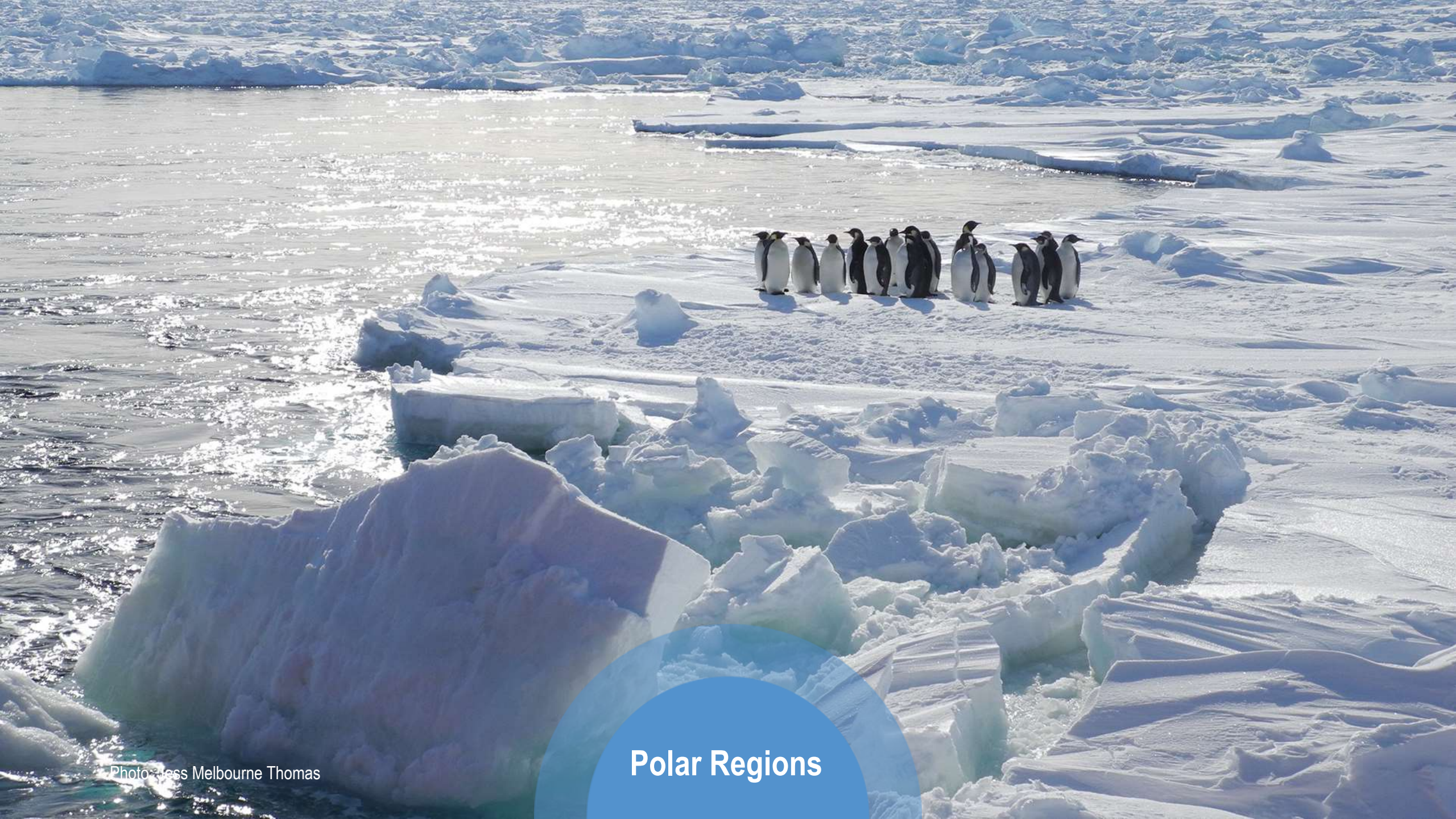


Photo: Jess Melbourne Thomas

**Polar Regions**





# Changes in polar regions

- The Greenland and Antarctic ice sheets are losing mass, accelerating global sea level rise. They will continue to melt, committing the planet to **long-term** global sea level rise.
- **Arctic sea ice is declining in every month of the year**, and is getting thinner.
- At global warming of 1.5°C, the Arctic Ocean will **rarely be free of sea ice** in September. At 2°C warming, this will occur **up to one year in three**.







# Changes in polar regions

- Permafrost is **thawing**, with the potential of adding **more greenhouse gases to the atmosphere**.
- With global warming limited to well below 2°C, **around one quarter** of near-surface permafrost will thaw by 2100. If emissions continue to increase strongly, **around 70% near-surface permafrost could be lost**.
- People living in the Arctic, especially indigenous peoples, are already **adjusting their travel and hunting activities** to the seasonality and safety of land, ice and snow conditions. Their success in adapting depends on **funding, capacities and institutional support**.







Photo: Glenn R. Specht

Sea Level Rise





# Sea level rise and coastal extremes

- During the 20th century, the global mean sea level rose by about **15cm**.
- Sea level is currently rising **more than twice as fast** and will further **accelerate** reaching up to 1.10m in 2100 if emissions are not sharply reduced.
- Extreme sea level events which now occur rarely during high tides and intense storms will become more common.
- Many low-lying coastal cities and small islands will be exposed to risks of flooding and land loss annually by 2050, especially without strong adaptation.







# Sea level rise and coastal extremes

- Various adaptation approaches are already being implemented, including:
  - protection
  - accommodation
  - ecosystem-based adaptation
  - coastal advance
  - managed relocation
- People with the highest exposure and vulnerability are often those with the lowest capacity to respond.







Ocean and  
Marine Life





# Changes in the ocean

- To date, the ocean has taken up **more than 90%** of the excess heat in the climate system. By 2100, the ocean will take up **2 to 4 times** more heat if global warming is limited to 2°C and **up to 5 to 7 times** at higher emissions.
- Ocean warming reduces mixing between water layers and therefore the supply of **oxygen and nutrients for marine life**.
- **Marine heatwaves** are becoming more frequent and severe, especially harming warm-water corals, kelp forests and the distribution of marine life.
- By absorbing human-induced carbon emissions, the ocean is becoming **more acidic**. It has taken up 20 to 30% of these emissions and continued uptake will exacerbate this.







# Changes in the ocean

- Changes in the ocean cause **shifts in fish populations**. This has reduced the global catch potential. In the future some regions will see further decreases but there will be increases in others.
- Communities that depend highly on seafood may face **risks to nutritional health and food security**.
- Reducing other pressures such as **pollution** will further help marine life deal with changes in their environment.
- Policy frameworks for **fisheries management** and **marine protected areas** offer opportunities for people to adapt.



## Changes in the ocean & cryosphere

Ocean warming | Ocean acidification |  
Extreme storm events | Ocean-deoxygenation

## Other human impacts

Pollution | Sedimentation | Extraction |  
Other impacts

## Resulting consequences

Ecological | Economical | Human wellbeing



Coral reefs



Coral bleaching



Erosion in coral reef structure



Storm damage



Algal proliferation



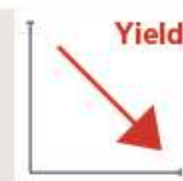
Destructive (blast) fishing



Smothering & burial of coral polyps



Loss of habitat / biodiversity



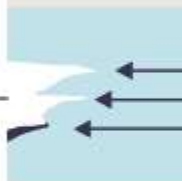
Reduced fishing yields



Loss of coastal protection



Polar seas



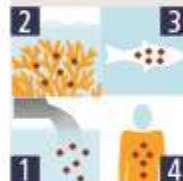
Loss of sea ice / habitat



Range changes due to warming



Changes in primary production



Accumulation of Persistent Organic Pollutants



Seabed mining



Industrial fishing



Loss of charismatic mega species



Increased traffic / reduced cost of transport



Reduced nutritional health for indigenous populations



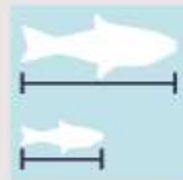
Fisheries



Species migrations / invasions



Erosion in shell-building organisms



Size reductions



Fish mortalities



Overfishing



Coastal development



Ecological disruption

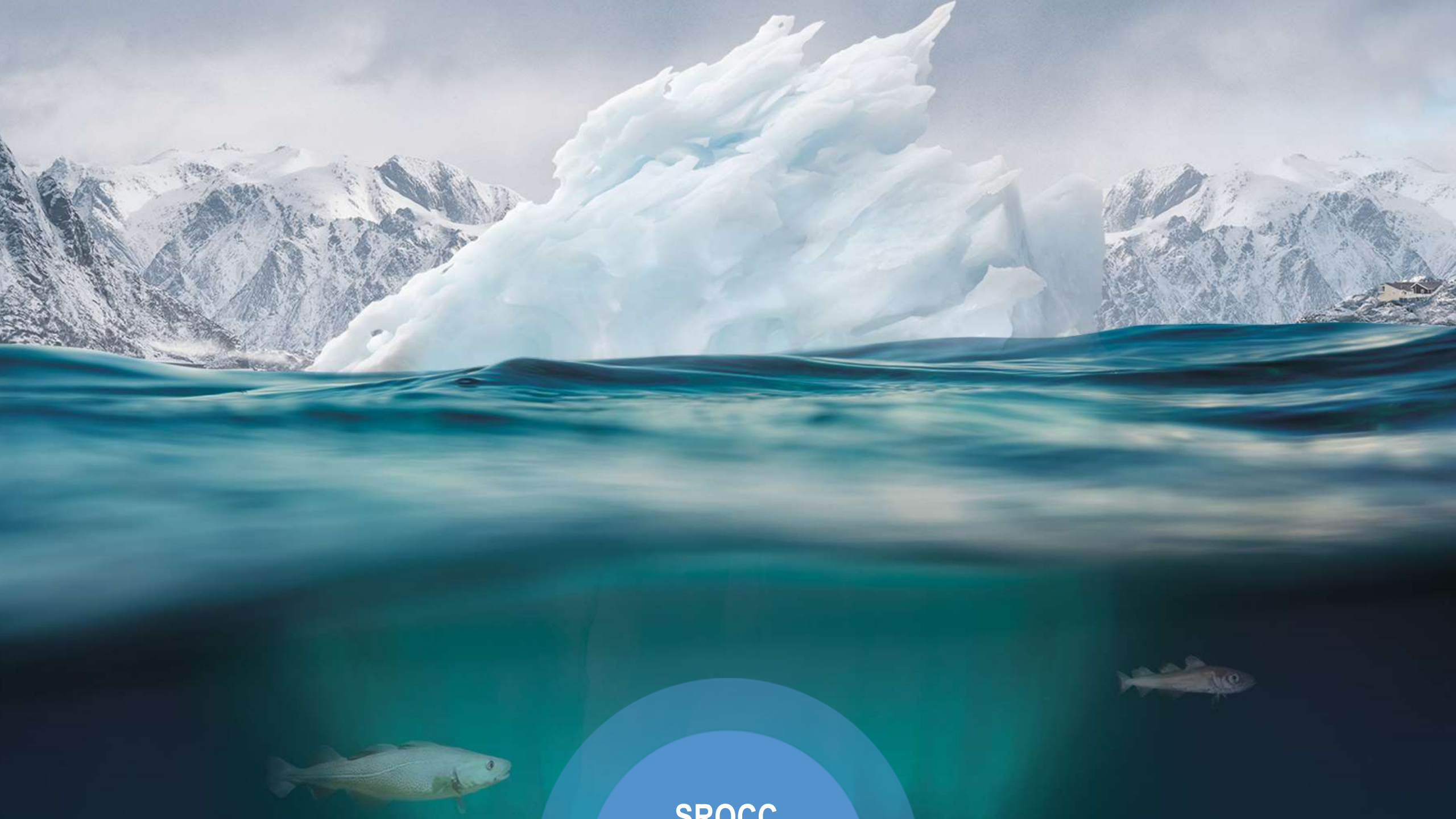


Higher operation costs



Target fisheries changes





SPOCC



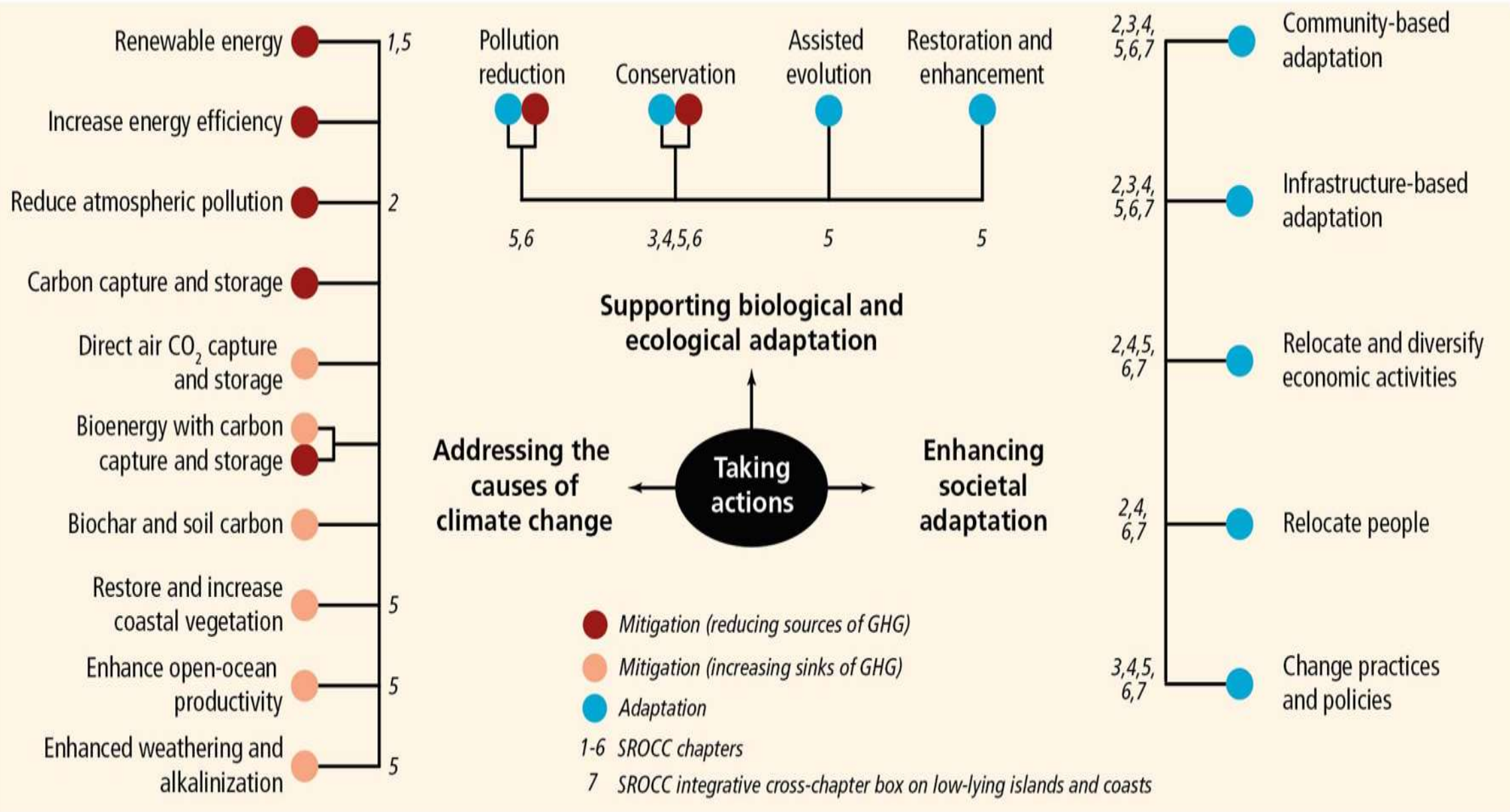
# Knowledge for action

- The IPCC Special Report on the Ocean and Cryosphere in a Changing Climate
- highlights **the urgency** of prioritizing **timely, ambitious and coordinated action** to address **widespread and enduring changes** in the ocean and cryosphere;
- empowers people, communities and governments to tackle the unprecedented transitions in all aspects of society;
- provides evidence of the benefits of combining scientific with local and indigenous knowledge;
- focuses, for the first time, on the importance of education and climate literacy.





**The more decisively and earlier we act, the more able we will be to address unavoidable changes, manage risks, improve our lives and achieve sustainability for ecosystems and people around the world – today and in the future.**





## More Information:

Website: <http://ipcc.ch>

IPCC Secretariat: [ipcc-sec@wmo.int](mailto:ipcc-sec@wmo.int)

IPCC Press Office: [ipcc-media@wmo.int](mailto:ipcc-media@wmo.int)

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## Thank you!



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