Introduction to Climate Change: Science and Impacts

Dr. Golam Rabbani

Head of Climate Bridge Fund Secretariat

THE LANCET

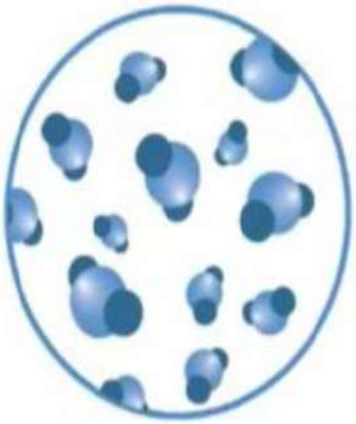
Volume 373 · Number 9676 · Pages 1659-1734 · May 16-22, 2009 www.thelancet.com

"Climate change is the biggest global health threat of the 21st century."

See The Lancet Commissions page 1693

£5.00 Registered as a newspaper · ISSN 0140-6736
Founded 1823 · Published weekly

CO_2 concentration



Highest

in at least

2 million years

Sea level rise

Fastest rates

in at least

3000 years

Arctic sea ice area

Lowest level

in at least

1000 years

Glaciers retreat

Unprecedented

in at least

2000 years

Extreme heat

More frequent

More intense

Heavy rainfall

More frequent

More intense

Drought

Increase in some regions

Fire weather

More frequent

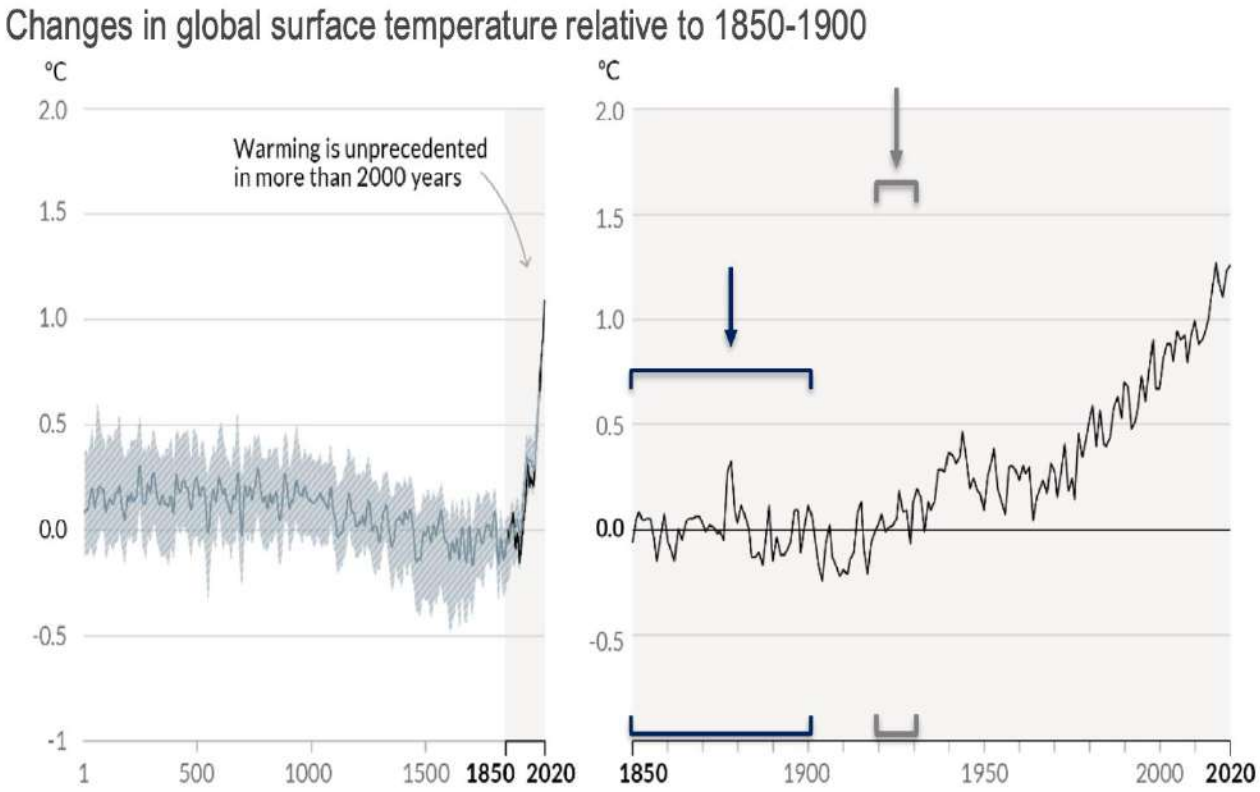
Ocean

Warming

Acidifying

Losing oxygen

Temperature pattern in the last 2000 years (IPCC, 2021)

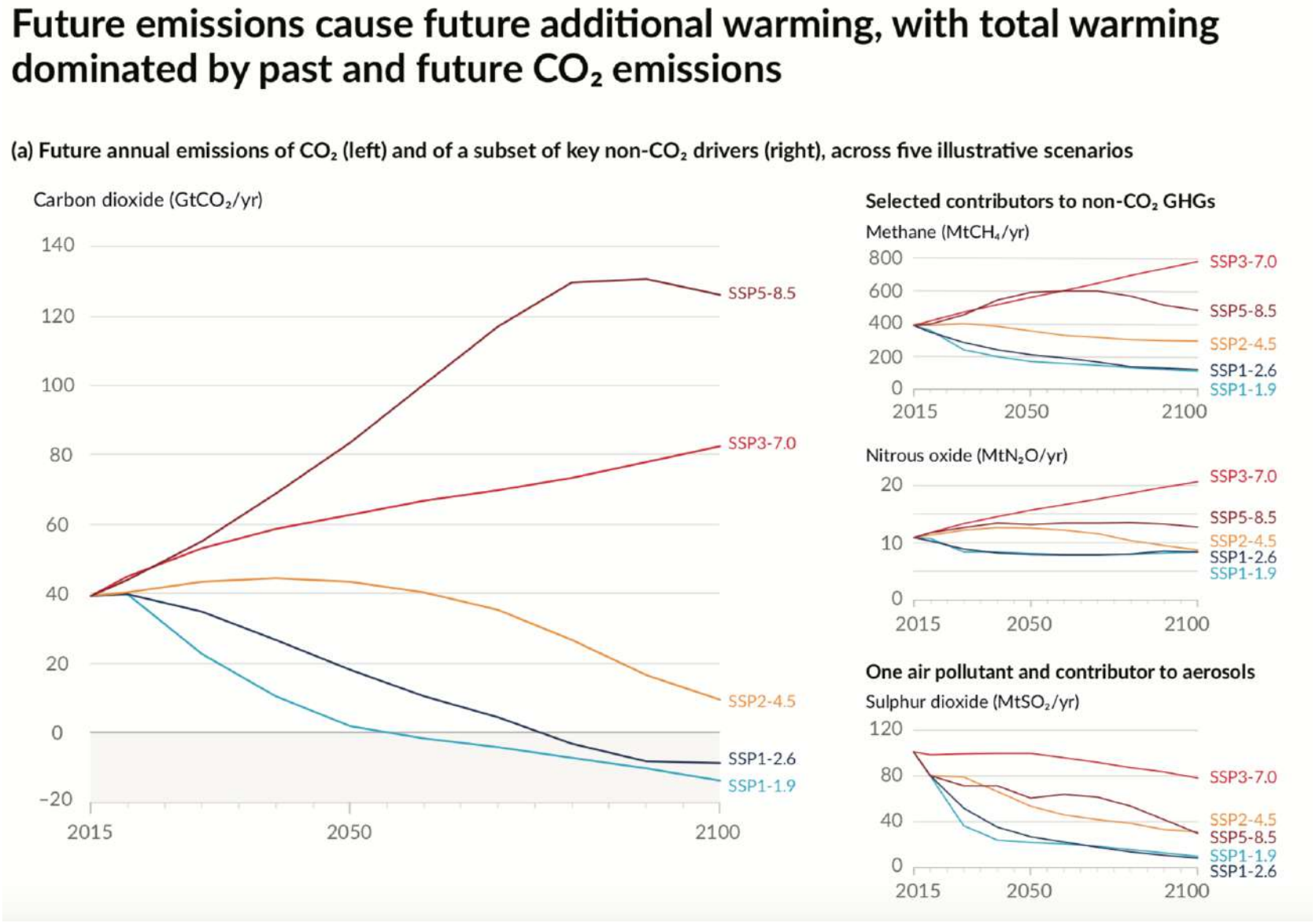


Global surface temperature was 0.99°C higher in 2001-2020 than 1850-1900.

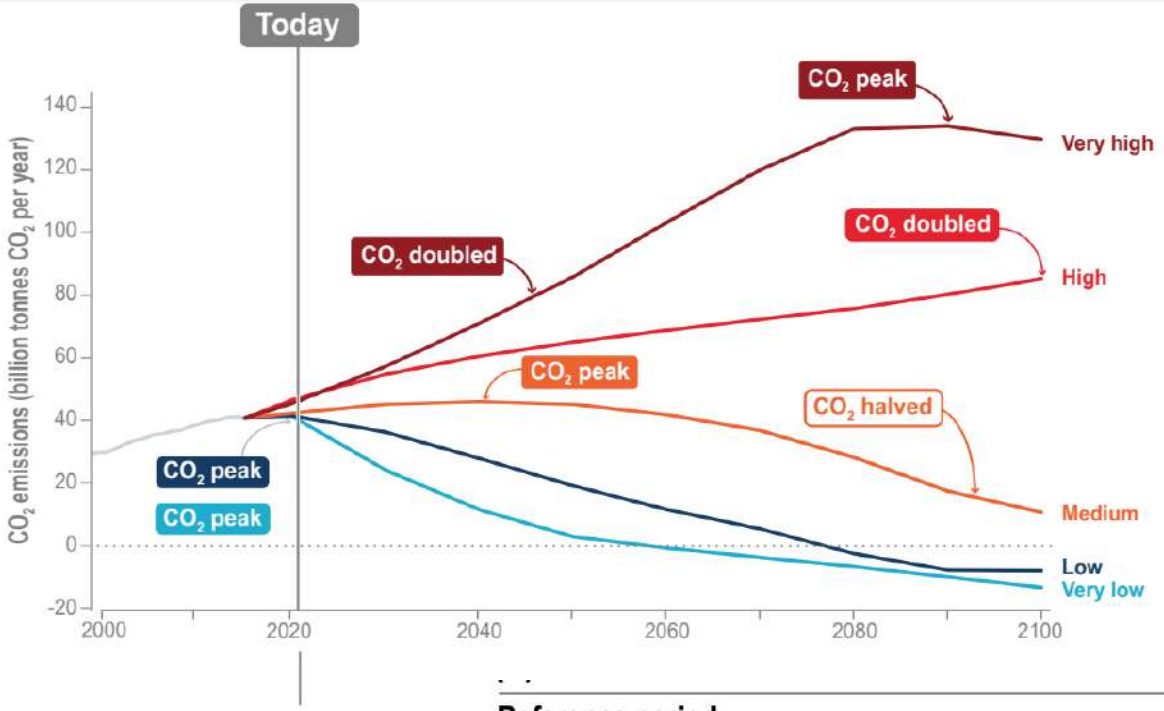
Global surface temperature was 1.09 °C higher in 2011–2020 than 1850–1900

Global surface temperature has increased faster since 1970 than in any other 50-year period over at least the last 2000 years.

GHG Emission Scenario: 2015-2100 (IPCC, 2021)

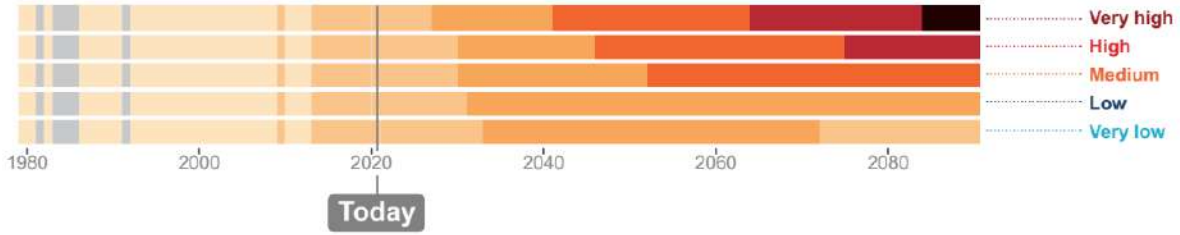


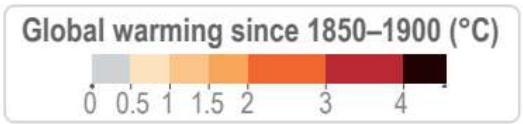
GHG Emission Scenario and Temperature Pattern (IPCC, 2021)



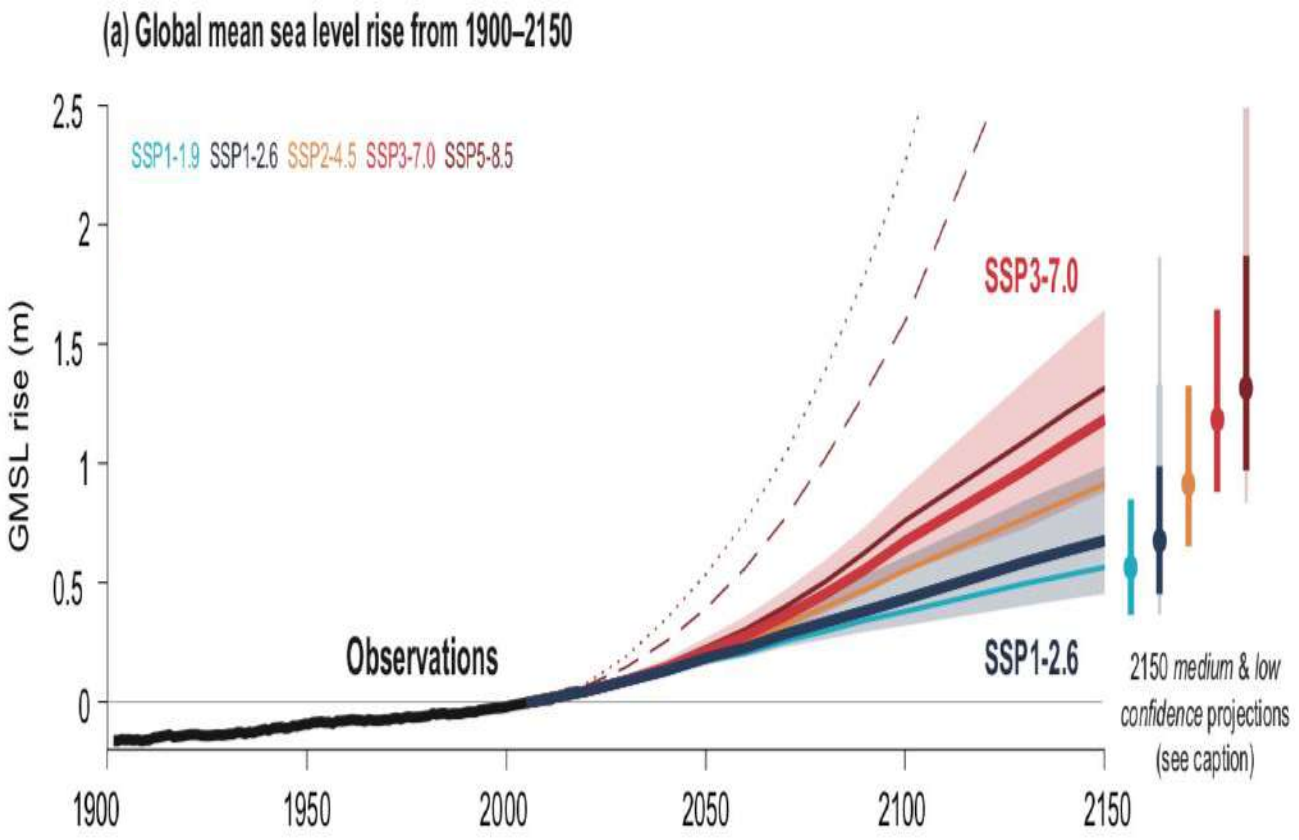
Emission Pathways: Effects on surface temperature

Reference period	Age	CO_2 (ppm)	Temperature (°C)	Sea level (m)
Recent past	1995–2014 CE	360 ⟶ 397	0.66 to 1.00	0.15 to 0.25
Approximate pre-industrial	1850–1900 CE	286 ⟶ 296	–0.15 to +0.11	–0.03 to 0.00
Last Millennium	850–1850 CE	278 to 285	–0.14 ~ 0.24	–0.05 to 0.03





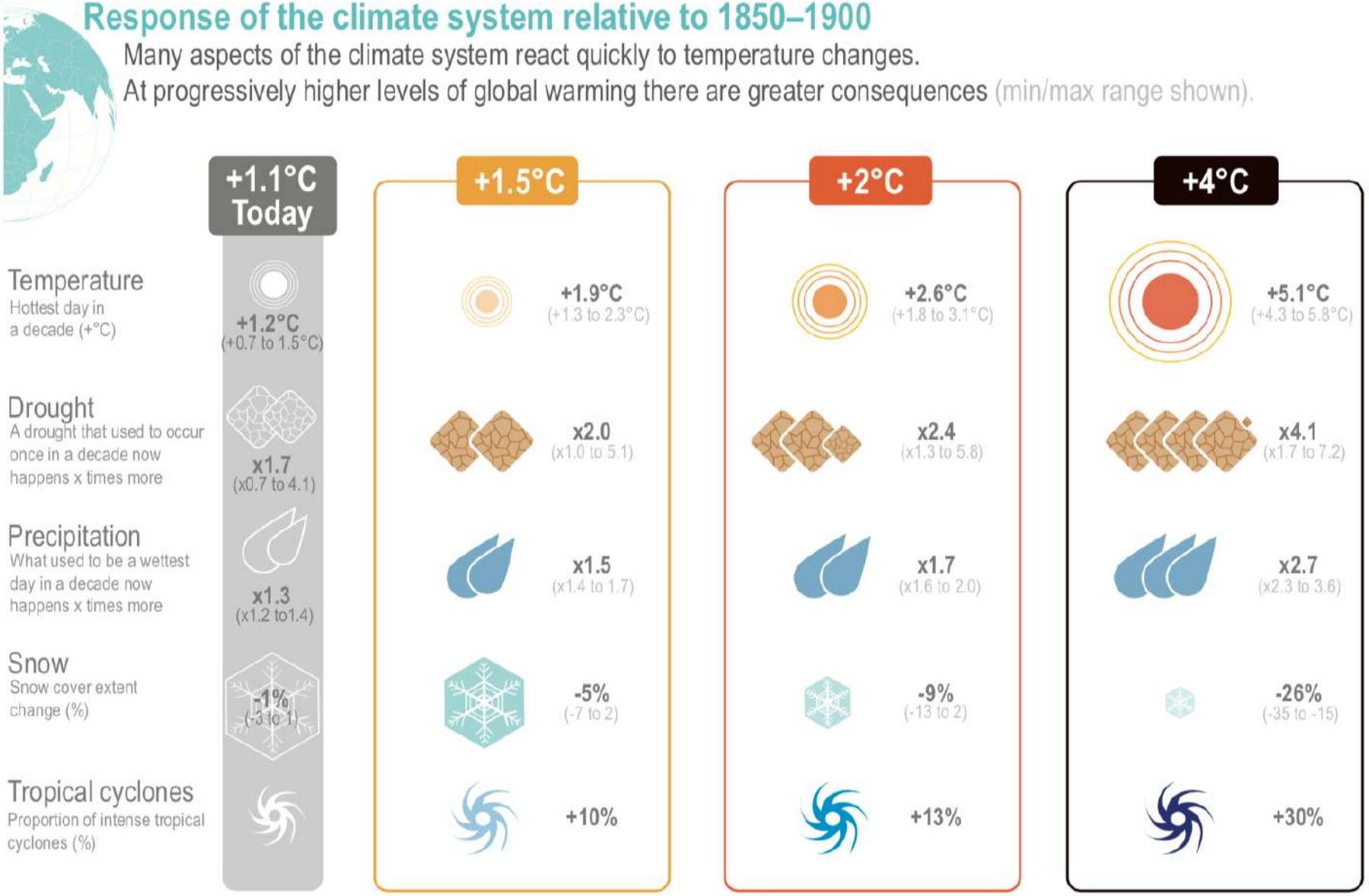
GHG Emission Scenario and Global Mean SLR (IPCC, 2021)



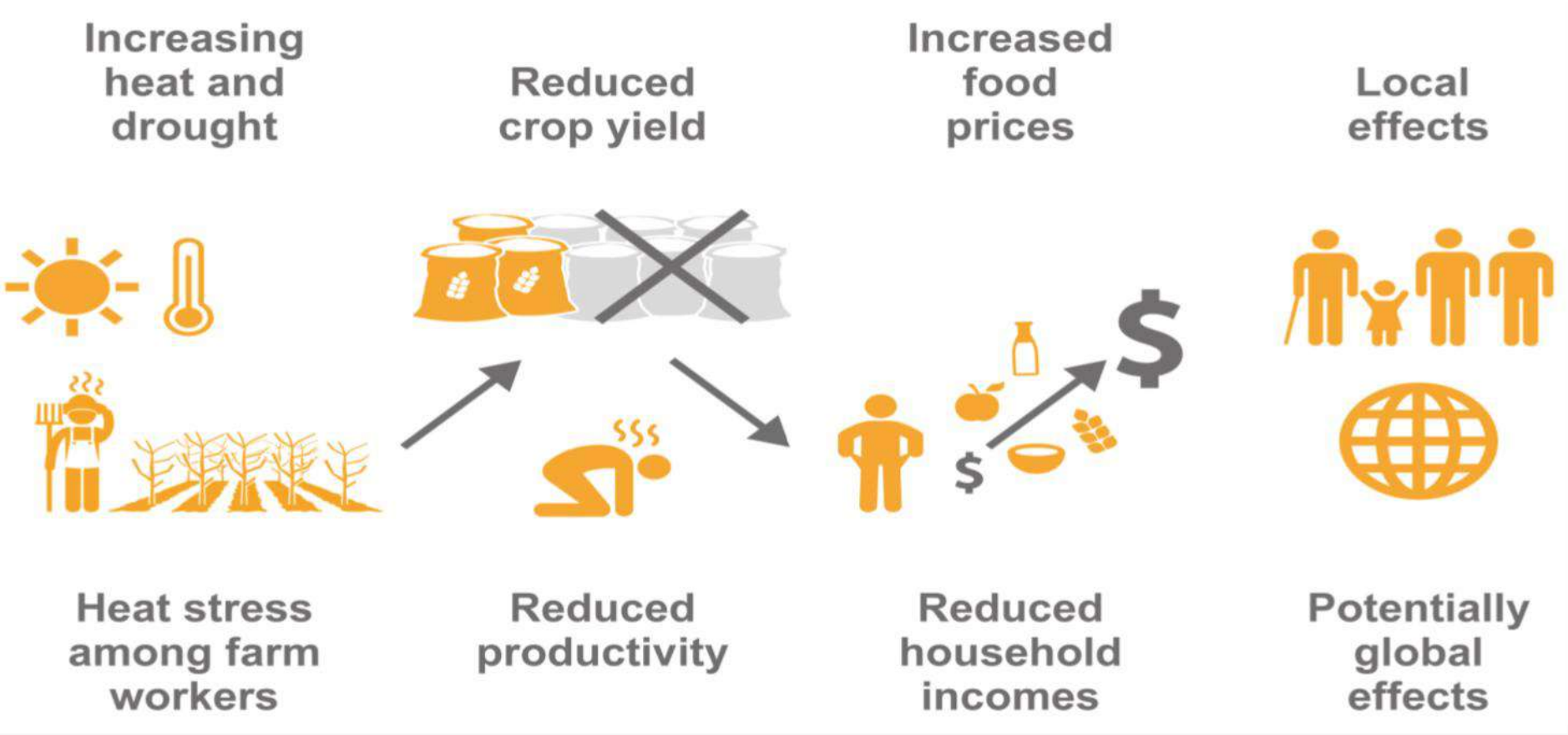
The average rate of sea level rise was

- 1.3 mm yr–1 between 1901 and 1971
- increasing to 1.9 mm yr–1 between 1971 and 2006, and
- further increased to **3.7 mm yr–1 between 2006 and 2018**

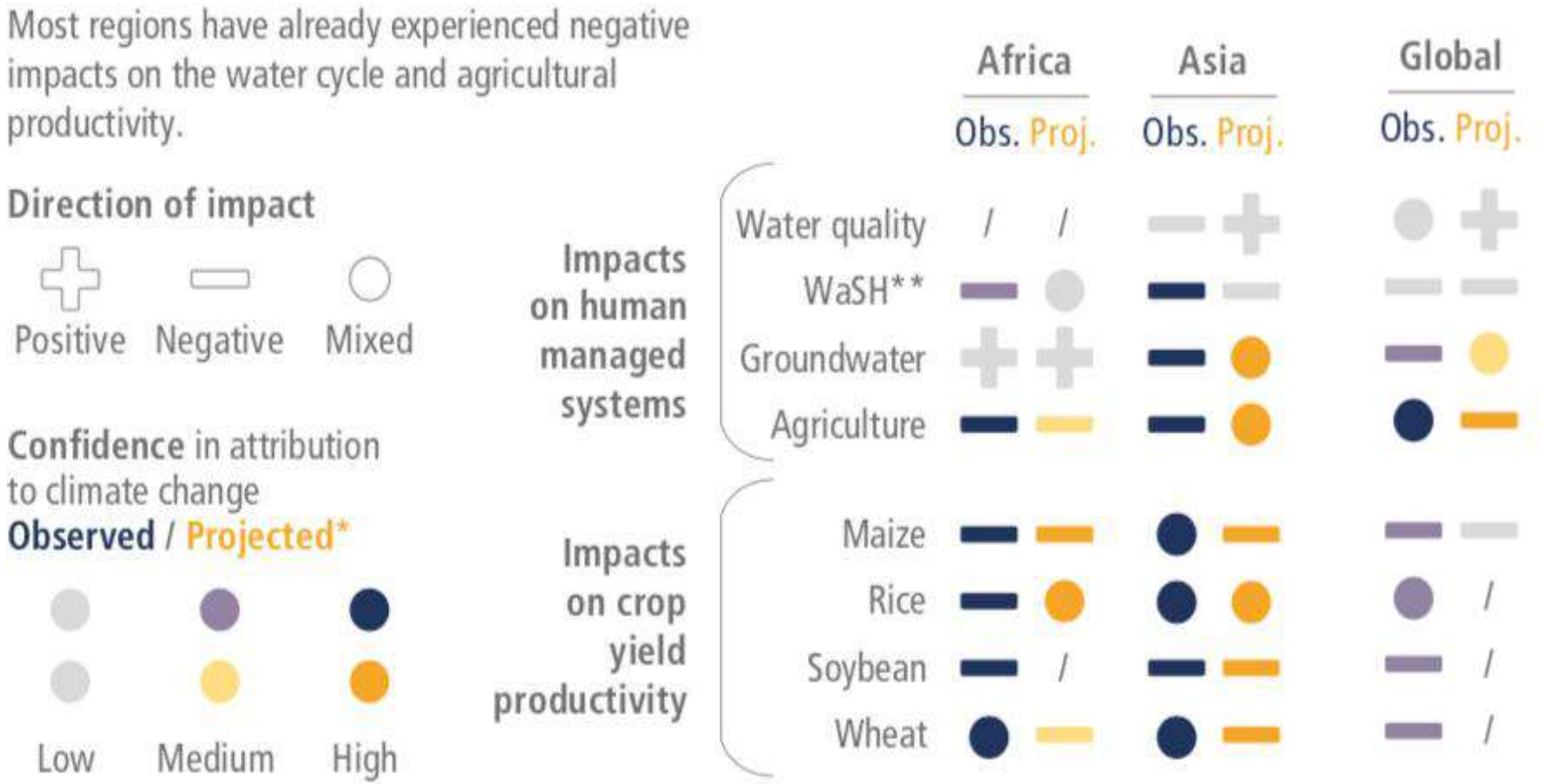
Climate Futures: Changes in Projections (IPCC, 2021)



Observed and projected impacts from climate change in the water cycle for human managed systems and crop yield productivity (IPCC, 2022)



Observed and projected impacts from climate change in the water cycle for human managed systems and crop yield productivity (IPCC, 2022)

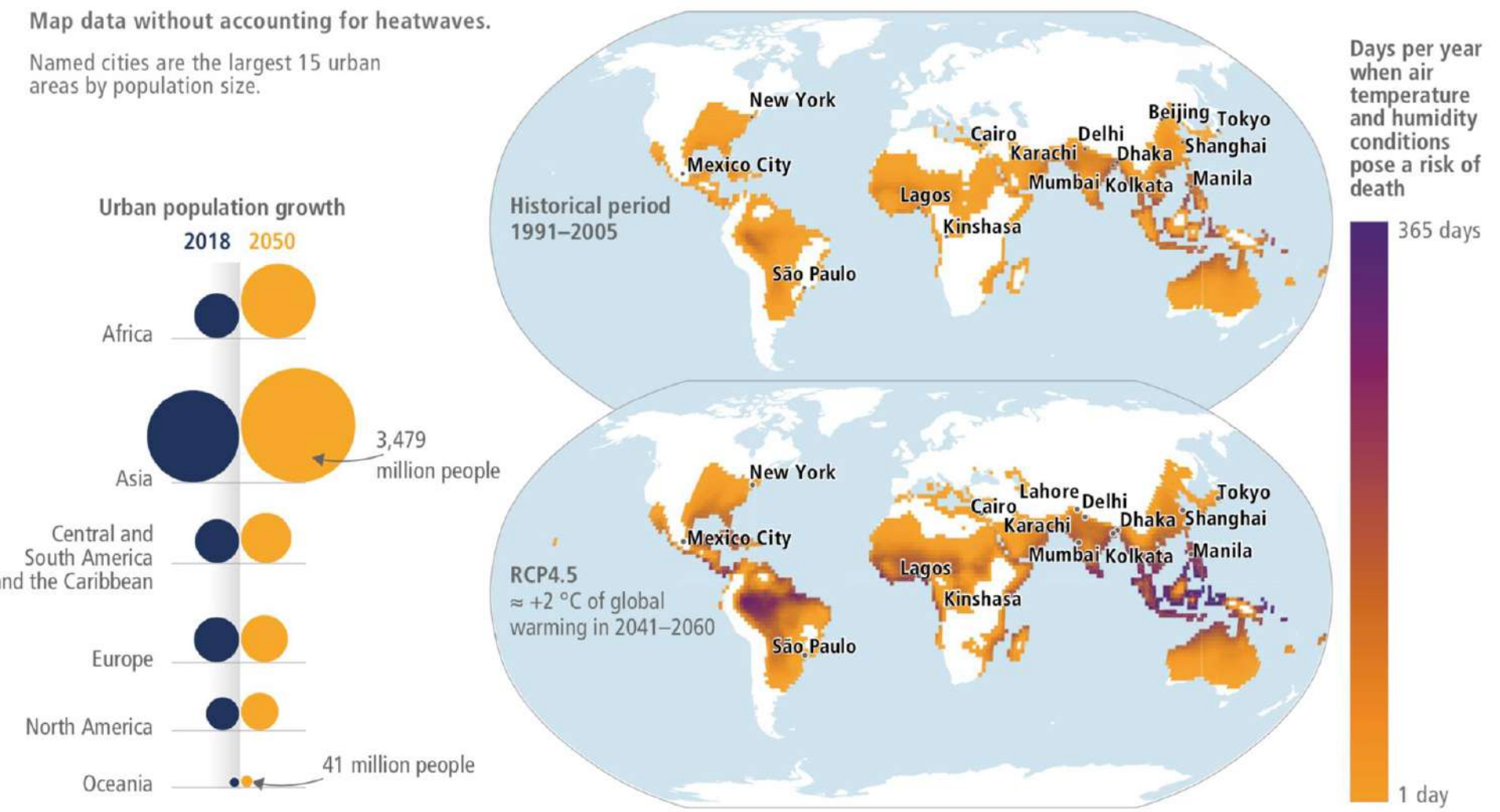


*Mid-century at RCP4.5 (~2°C Global Warming Level)

** = Water, sanitation and hygiene

/ = Not observed or insufficient evidence

Impacts of climate change are observed in many ecosystems and human systems worldwide (IPCC, 2022)



Climate Change Impacts in Asia, South Asia and Bangladesh

- **Urban infrastructure damage** and impacts on human well-being and health due to flooding, especially in coastal cities and settlements
- **Food and water insecurity** due to increased temperature extremes, rainfall variability and drought
- Dec**line in coastal fishery** resources due to sea level rise, decrease in precipitation in some parts and increase in temperature
- **Biodiversity loss and habitat shifts** and disruptions in dependent human systems e.g. freshwater, land and ocean ecosystems
- More frequent and extensive coral bleaching and mortality induced by **ocean warming, acidification & SLR**
- In South Asia, **35.7 million people pushed to extreme poverty** by 2030

Climate Change Impacts in Asia, South Asia and Bangladesh

- **South Asia** will loss 2% of annual GDP due to climate change impacts by 2050 & 9% by 2100 based on BAU – this number is same for Bangladesh.
- **In South Asia,** climate change will cause up to 40 million climate migrations by 2050.
- Nearly 26 million people are currently exposed to very high salinity in shallow groundwater in **coastal Bangladesh**
- From 2012 to 2050, freshwater river area is expected to decrease from 40.8% to 17.1%- 19.7% under different sea-level rise scenarios in the **southwest coastal zone of Bangladesh**
- **In Bangladesh**, approximately one-third of power plants may need to be relocated by 2030 to avoid inundations caused by SLR.

Thank you

Dr. Golam Rabbani
Head, Climate Bridge Fund Secretariat

Contact

rabbani.golam@brac.net

+8801713248362

https://www.brac.net/program/cbf/

Thank you