UWI
ST. AUGUSTINE CAMPUS

Caribbean Small Island Developing States on the Frontline: The Urgency for Climate Action

Professor Michelle Mycoo

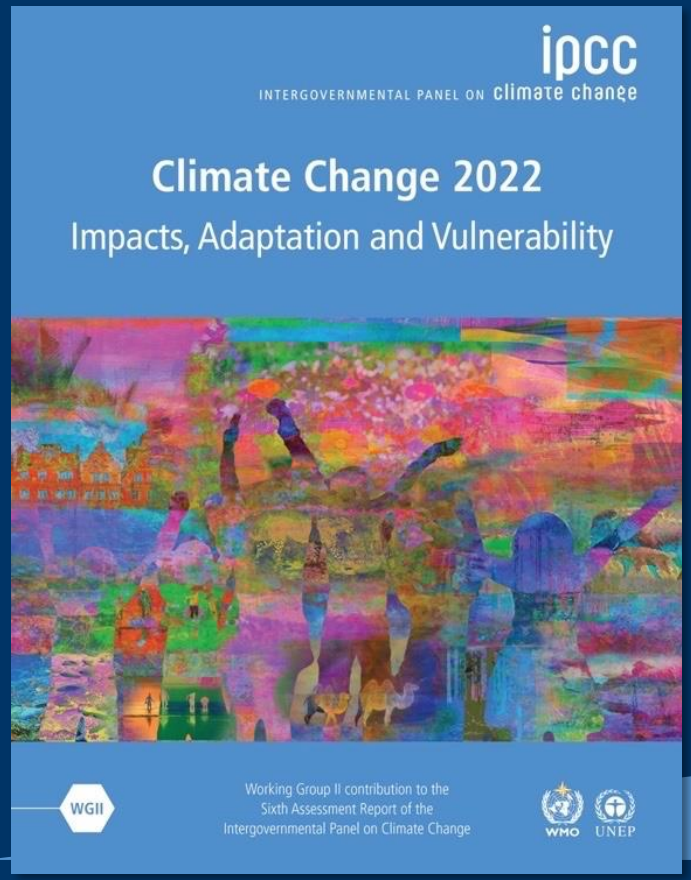
Department of Geomatics Engineering and Land Management

The University of the West Indies

23rd June 2023

ONE PLANET: EARTH

Key Message WGII Report:



"The scientific evidence is unequivocal: climate change is a threat to human well-being and the health of the planet.

Any further delay in concerted global action will miss the brief, rapidly closing window to secure a livable future.

[Credit: NASA]

"Recent changes in the climate are widespread, rapid, and intensifying, and unprecedented in thousands of years.

ipcc
INTERGOVERNMENTAL PANEL ON climate change

WMO UNEP

The challenges we face are driven by us

- The way we use land, over-consumption of natural resources, unhealthy diets, the way we plan our cities.

CO_2 Concentrations

Highest in at least 2 million years

Sea level rise

Fastest in at least 3000 years

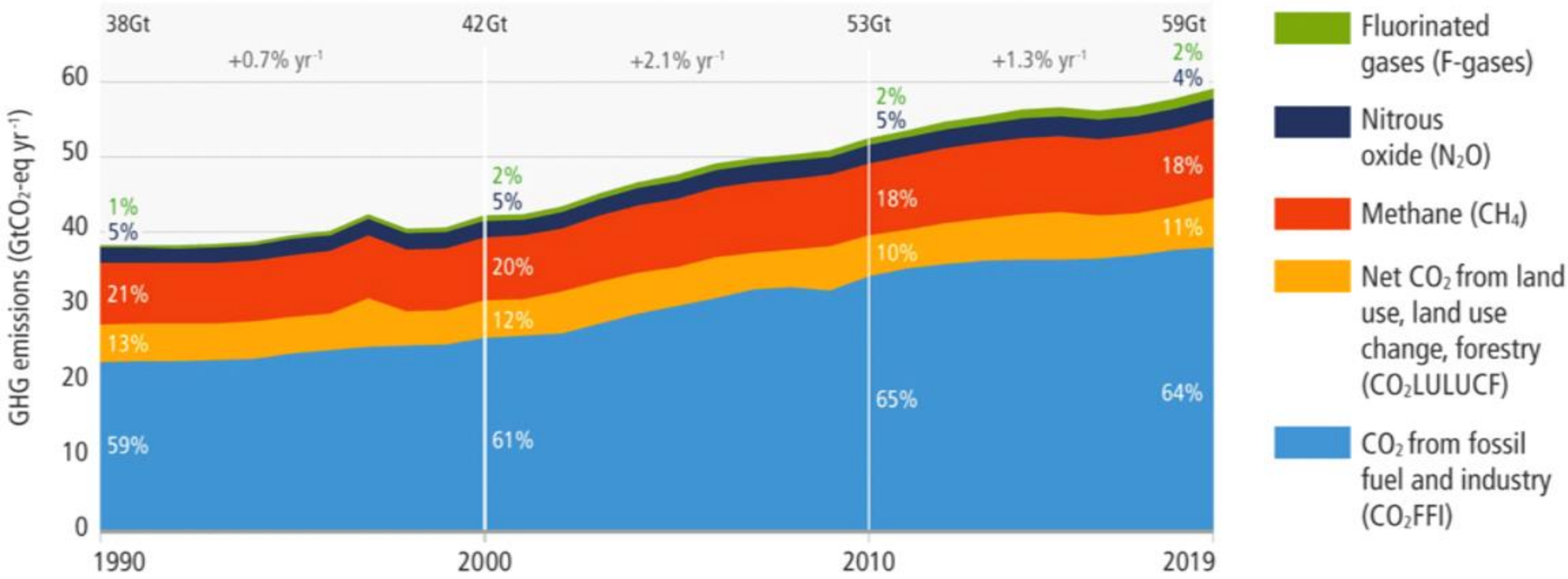
Arctic Sea Ice

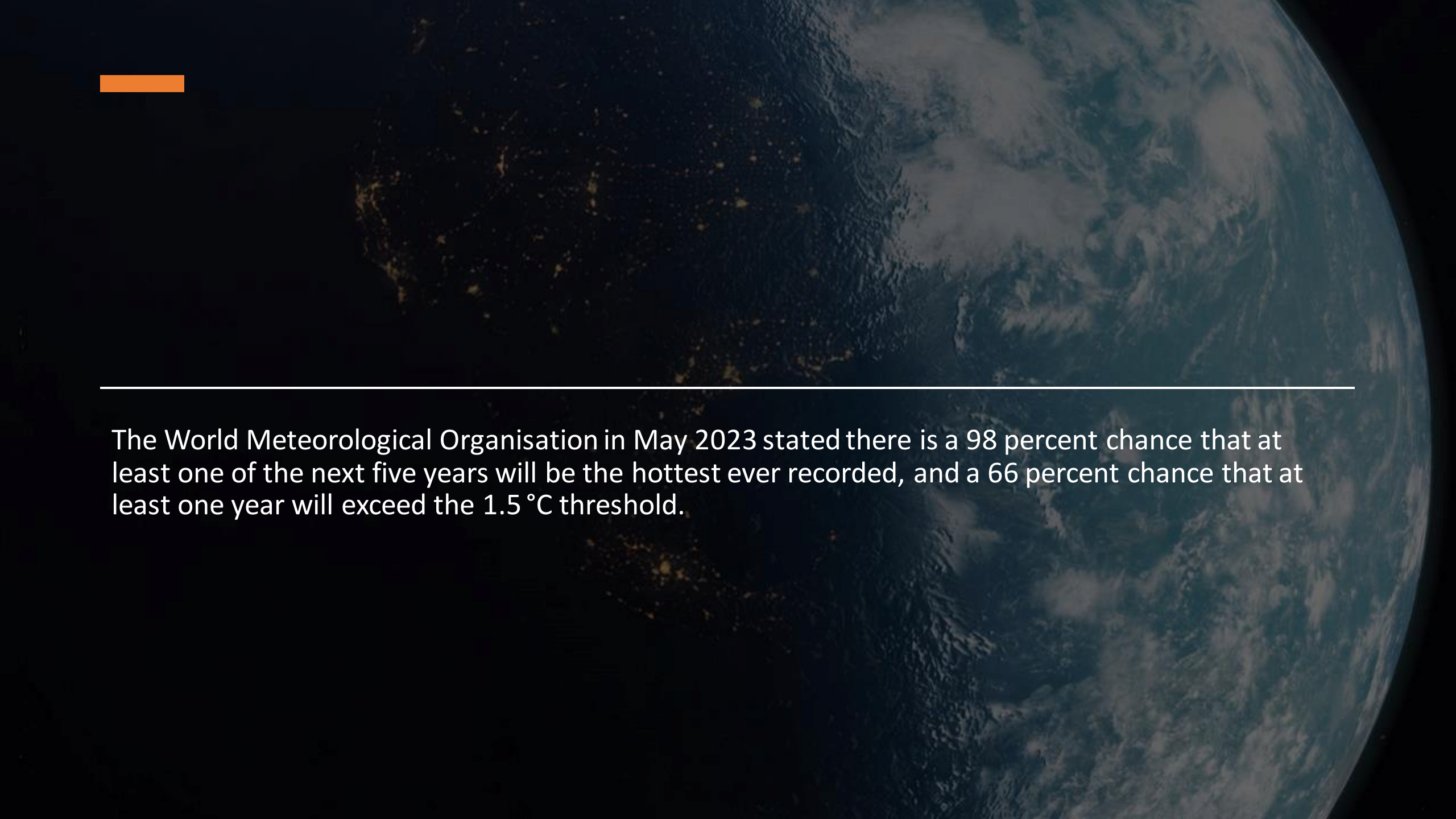
Lowest level in at least 1000 years

Glacier Retreat

Unprecedented in at least 2000 years

We are not on track to limit warming to 1.5 °C.





The World Meteorological Organisation in May 2023 stated there is a 98 percent chance that at least one of the next five years will be the hottest ever recorded, and a 66 percent chance that at least one year will exceed the 1.5 °C threshold.

Caribbean Small Island Developing States

ON THE FRONTLINE

IMPACTS OF CLIMATE CHANGE

- The UWI Global Institute for Climate Smart and Resilient Development, and the Caribbean Institute for Meteorology and Hydrology, in May 2023, cautioned that El Niño will contribute to very hot days and nights, more heat waves, and dry to very dry conditions.

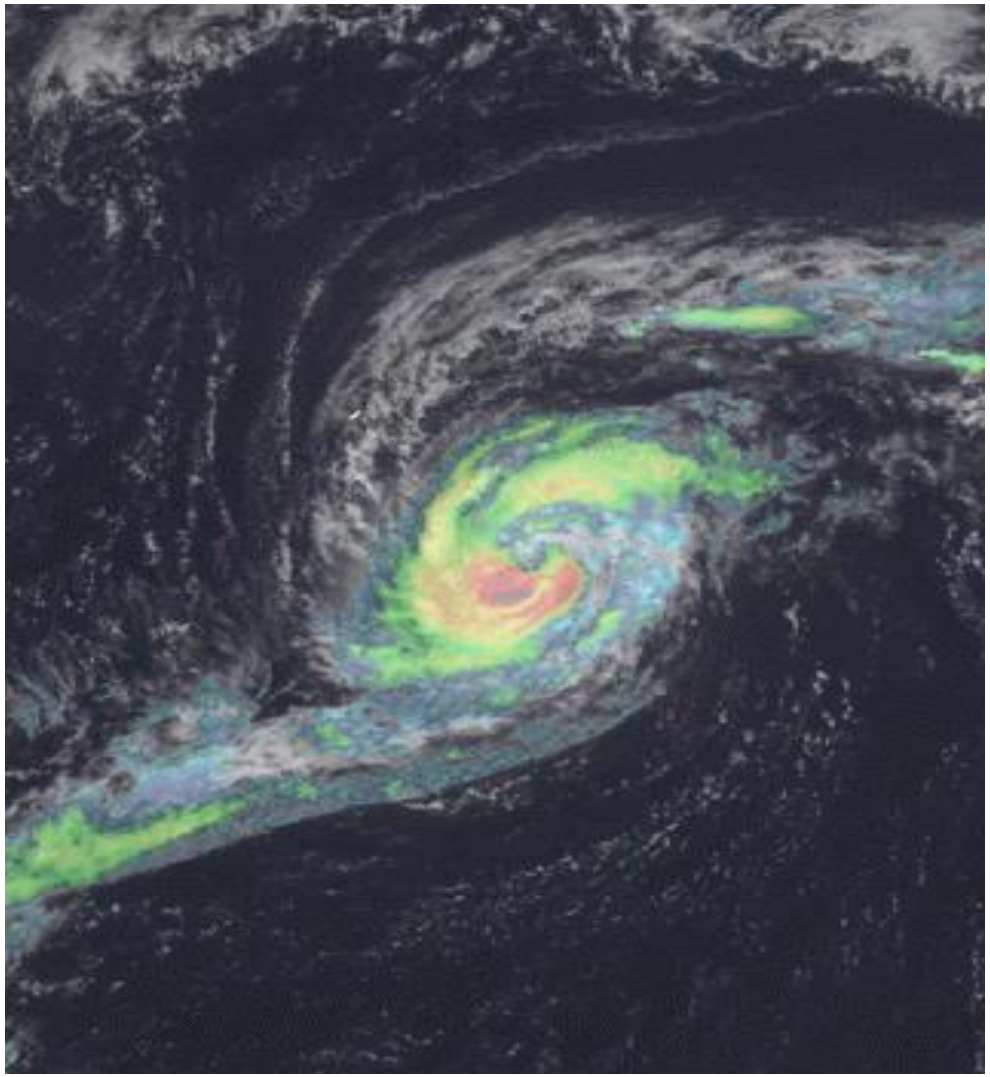
- Moreover, the very warm Caribbean Sea could provide ideal conditions for a very strong hurricane to develop in the Caribbean.

- Is the Caribbean population ready to cope with hotter temperatures?

Climate change poses an existential threat to Small Island Developing States:

HOTSPOTS

- Temperatures increases;
- Growing impacts of tropical cyclones and storm surges, droughts and changing precipitation patterns;
- Rising sea levels;
- Coral bleaching and entry of invasive species.



Catastrophe and Costs

- Tropical Cyclone Maria, in 2017 destroyed nearly all Dominica's infrastructure, and losses amounted to more than 225% of the annual GDP (Eckstein et al., 2018).

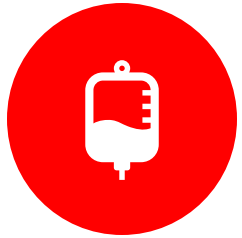
Loss and Damage

Impacts on Sectors

ECONOMY

AGRICULTURE

WATER



HEALTH

BUILT ENVIRONMENT AND INFRASTRUCTURE

Agriculture and Food security

- **Drought risk projections for the Caribbean indicate** severe water resources stress from **2043–2071.**
- Wetter wet seasons can result in flooding and destroy crops.
- Caribbean Institute for Meteorology and Hydrology: Climate Information Services for farmers

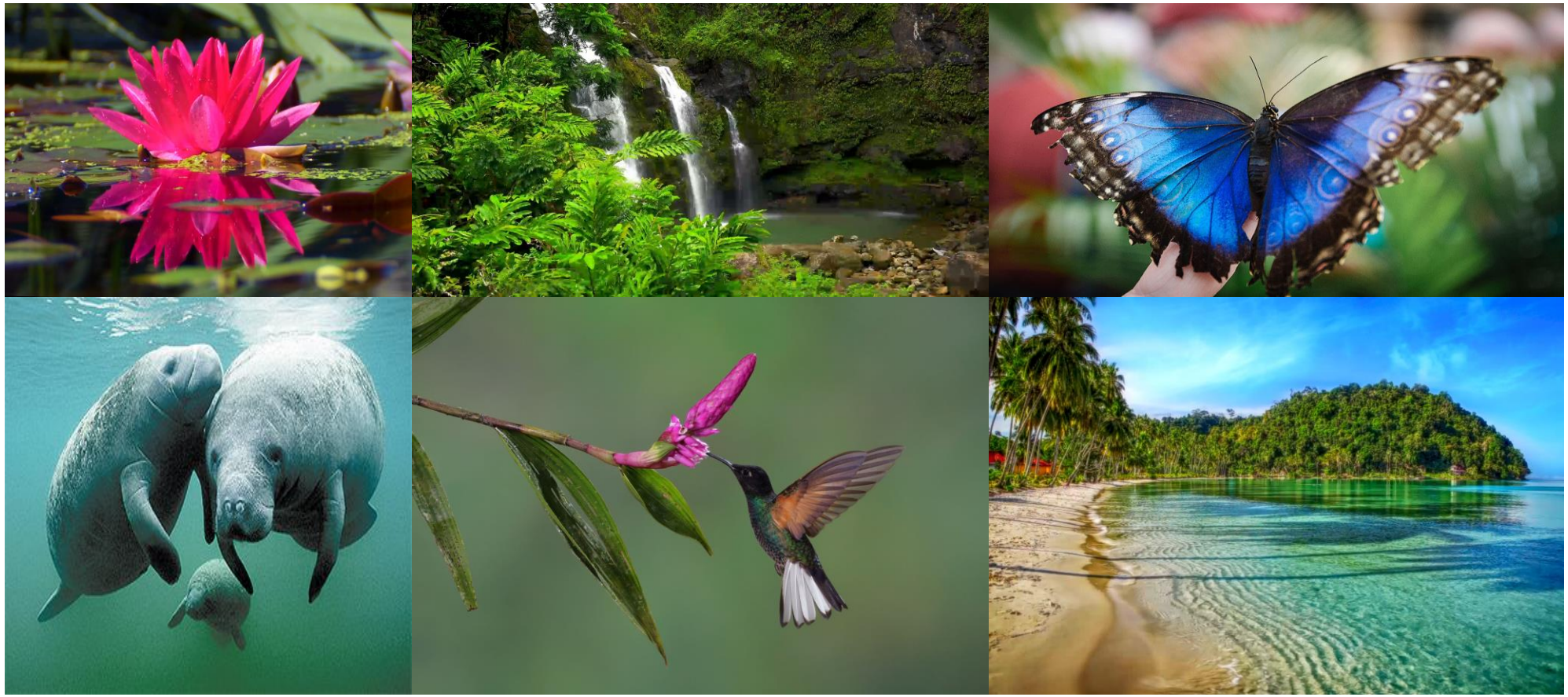
Fisheries & Food Security

Observed impacts of climate change:

- Declines in reef-associated species due to coral bleaching or cyclone damage;
- Oceanic-scale shifts in the distribution of large pelagic fish;
- **Future, local species extinction and/or migration.**

SMALL ISLANDS: ECOSYSTEMS & BIODIVERSITY

Islands cover only about 2% - 4% of Earth's Land Area, BUT support >20% of species on land



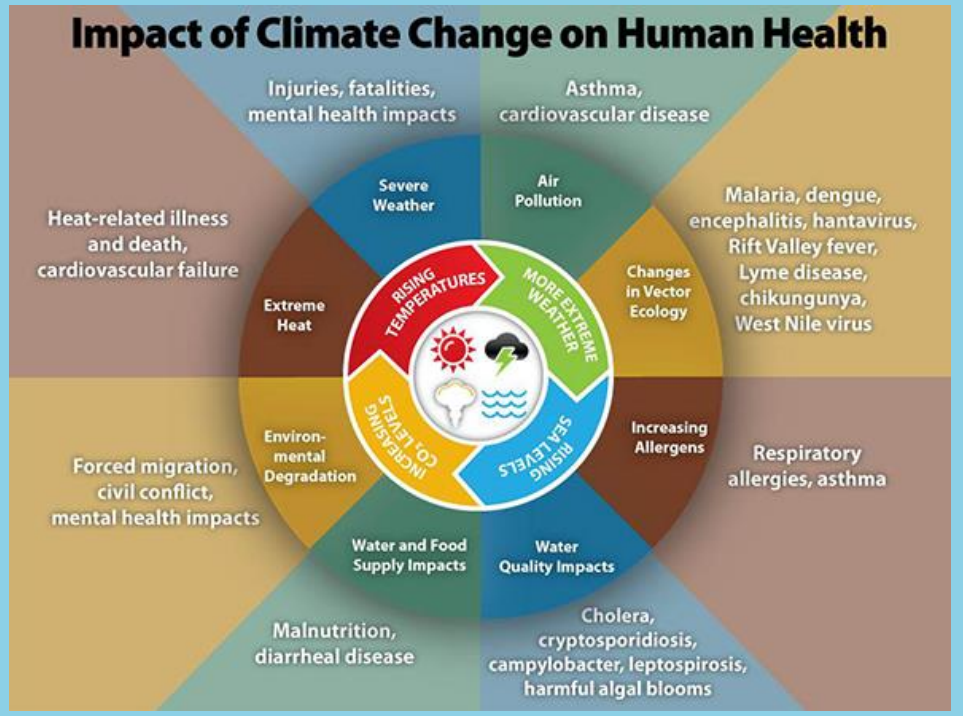
- **100%** of island endemics (species found no where else) face extinction at global warming level of 3°C.
- Nature based tourism will be impacted.

PROJECTIONS:
MARINE ECOSYTEMS: CORAL REEFS: SARGASSUM

- Above **1.5°C**, globally inclusive of small islands, it is projected there will be further loss of **70–90%** of reef-building corals.
- **99%** of corals being lost under warming of **2°C** or more above the pre-industrial period.
- If global warming temporarily exceeds 1.5°C in the coming decades or later (overshoot) damage will be **irreversible**.

Health: US$2b-4b per year by 2030

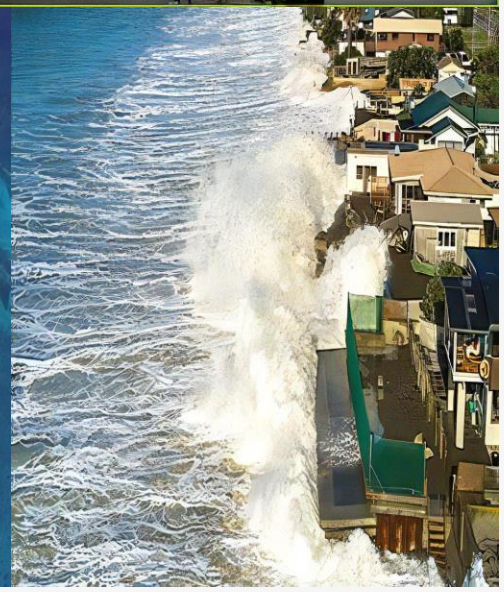
- Increases in temperature and precipitation are found to impact vector distribution and increase vector development and biting rates.
- Floods and rising sea levels can contaminate drinking water with fecal-oral pathogens leading to an in increase in water borne diseases. WASH
- Farmers using unclean water to irrigate crops
- Sahara Dust
- Dehydration among children
- Mental health
- Build Health Resilient System




ONLY
BUS
ONLY
BUS
ONLY
BUS
ONLY
BUS
ONLY

Cities and Infrastructure

- 40 million people live in the Caribbean
- 22 million people in the Caribbean live below 6 metres elevation.



Human Settlements

- High-density coastal urban development in the low-elevation coastal zone of below 10 metres elevation.
- Population, buildings and infrastructure are currently exposed to sea-level rise, heavy precipitation events, tropical cyclones and storm surges.
- Human settlements in atoll islands face the most threats.

The most rapid growth in urban vulnerability and exposure is in Caribbean cities and settlements where adaptive capacity is limited, especially in unplanned and informal settlements.

Ecosystem Damage and Land Use Changes

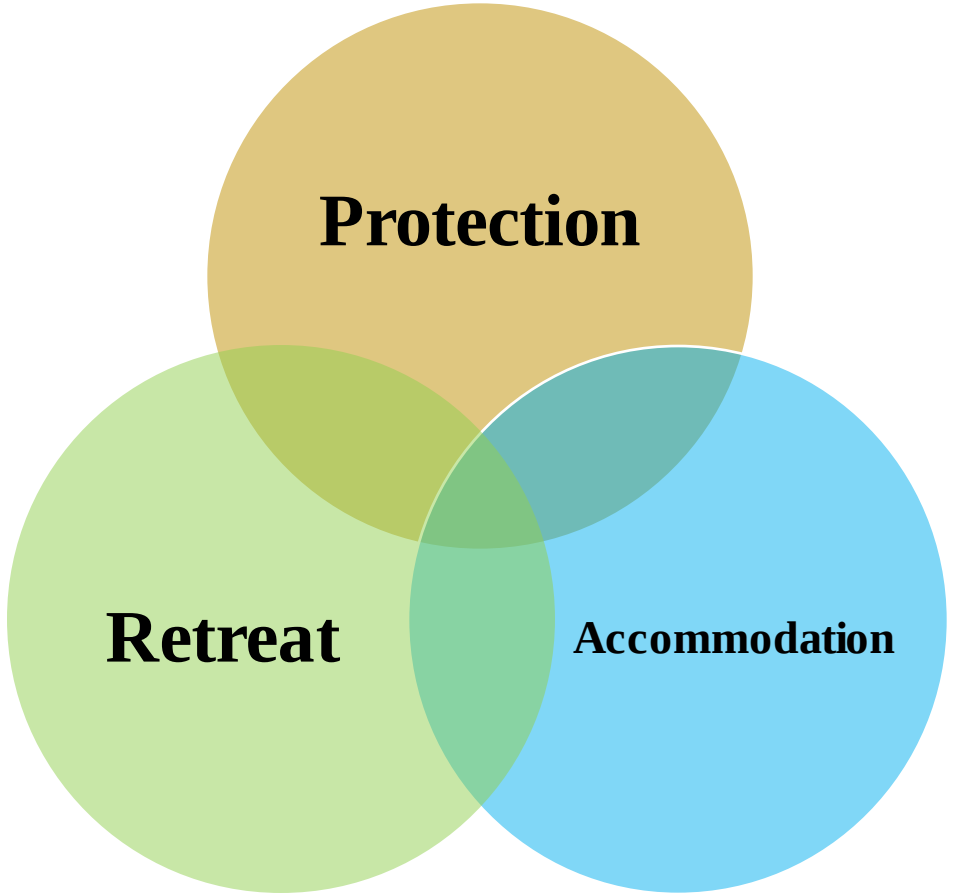
- Terrestrial and coastal ecosystem damage has left settlements highly vulnerable to climate change.
- Unsustainable land use practices and difficulties enforcing land use zoning and building guidelines in informal settlements make them highly vulnerable to extreme events.

ADAPTATION RESPONSES

What can we do as islanders?

ADAPTATION RESPONSES: Caribbean

No single adaptation response is a complete solution to reducing risks to people, nature & economies



Coastal Protection

- Engineering: Seawalls and revetments
- Protection of economic assets
- Damage ecosystems if poorly designed and built
- High costs to construct and maintain

Accommodation

Nature offers significant untapped potential to reduce climate risks.

Adaptation Responses: Ecosystem-based Adaptation

Ridge to Reef

Mangroves

Water Security

- ✓Watershed management (Planning)
- ✓Rainwater harvesting
- ✓Protection of groundwater aquifers (mangrove replanting) (Planning)
- ✓Desalinisation
- ✓Water saving devices
- ✓Water recycling
- ✓Water Pricing

Agriculture and Food Security: Emerging Innovative Science

- On November 28th, the farmer's crop of lettuce was affected by rainfall that weekend.
- The crop was not affected by flood waters, but was wilted by high soil moisture.
- The farmer saved 90% of his crop by applying Bio Forge as a soil drench.

Adaptation opportunities in SIDS Urban Planning, Architecture and Urban Design

Urban Planning and Sustainable Resilient Settlements

- Implementation of land use zoning plans and policies
- Slope and height restriction policies
- Site selection to avoid hazard prone areas
- Revisit building codes to achieve disaster risk reduction
- Informal settlement upgrading aimed at reducing low-income household vulnerability to climate change

Building Back Better: Post Hurricane

Future Adaptation: Retreat and Relocation

Land use planners need to use projected sea level rise scenarios in zoning plans and policies.

Credit: Photos from World Atlas and Tribune 2022

Urban Green Open Space : Carbon Sequestration and Beating Urban Heat

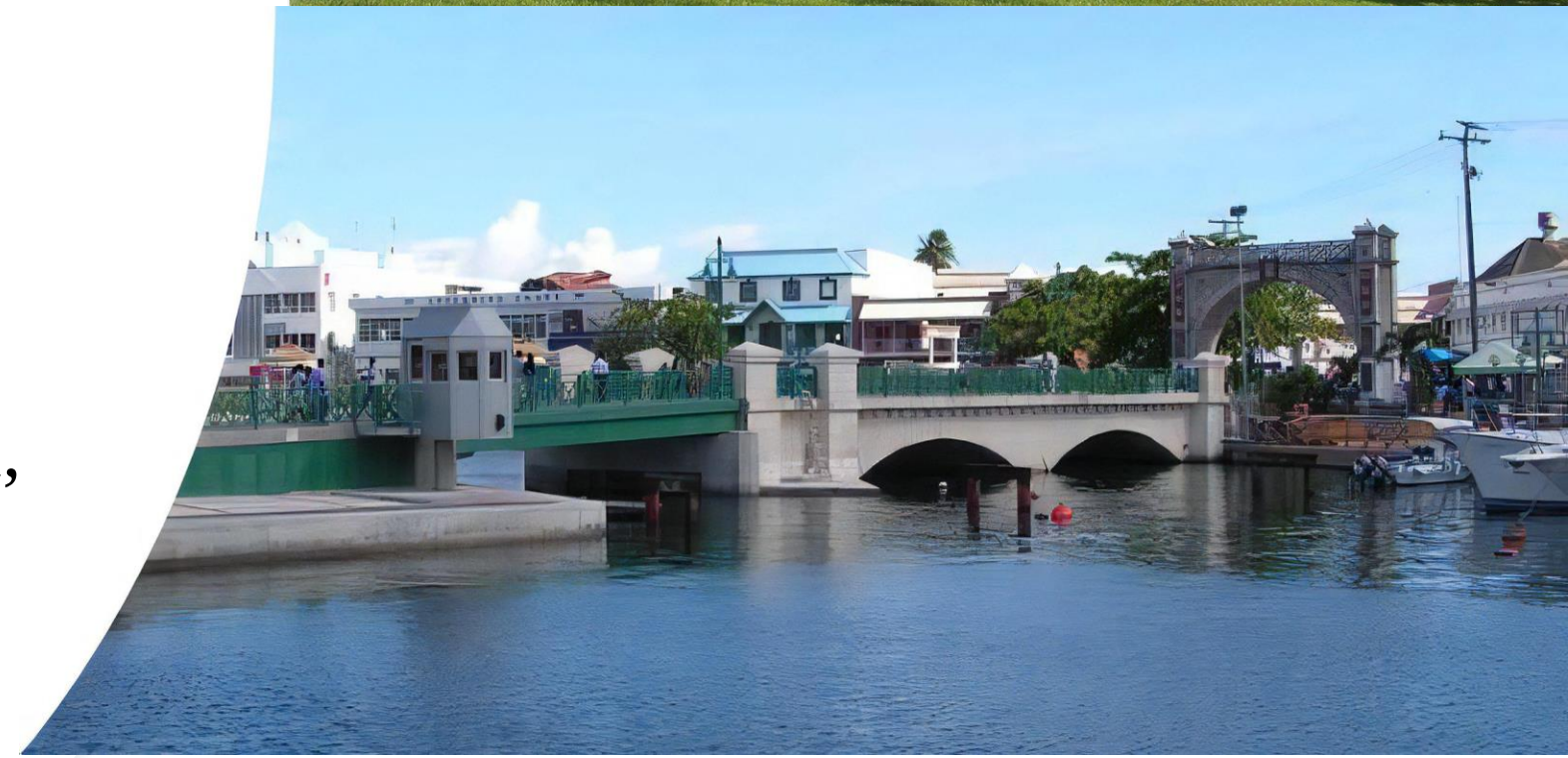
- Havana

- Havana

Waterfronts & Public Gardens

- The Savannah, Port of Spain, Trinidad

- The Careenage, Bridgetown, Barbados



Elevate buildings on stilts

- Hip roofs & Vaulted Ceilings
- Jalousie windows
- Verandahs
- Gable windows

Caribbean SIDS: Navigating Finance

- Limited access to climate finance. Global climate fund
- Upper-middle to high-income status makes them ineligible for development assistance and international debt relief.
- Inadequate domestic finance to satisfactorily respond to climate change impacts.
- Vulnerable to external shocks in particular natural disasters and require funds for relief and reconstruction, which significantly increases government borrowing and debt which restricts their capacity to borrow (Mohan and Strobl, 2021).

Governance:

- Improve inter-agency coordination;
- Build technical capacity;
- Improve data availability and quality;

Adaptation Measures

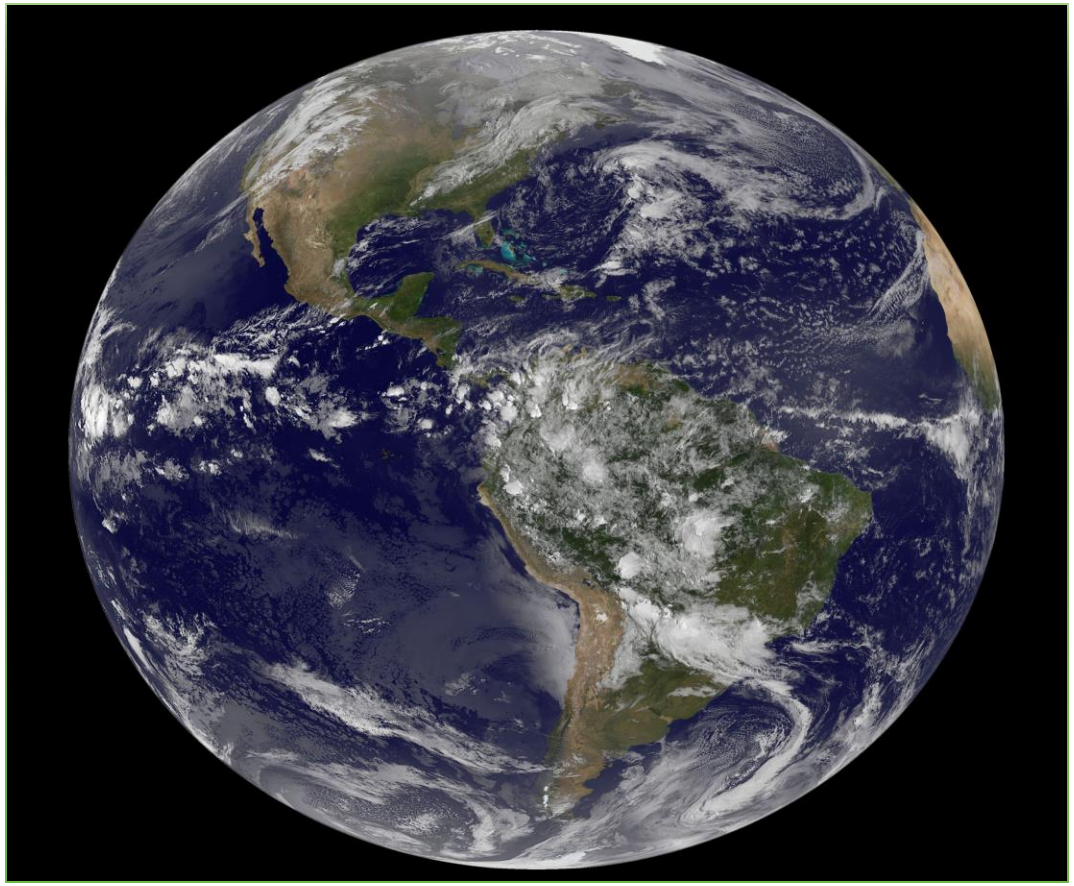
- Education and awareness: lack of climate change literacy and knowledge

Adaptation and Mitigation

URGENT ACTION

- To avoid mounting loss of life, biodiversity and infrastructure, ambitious, accelerated action is required to adapt to climate change, at the same time as making rapid, deep cuts in greenhouse gas emissions.

- **Our immediate future**: The impacts and risks we face today will increase substantially over the **next two decades**.



X

Small islands face an existential threat if global warming rises above 1.5°C.

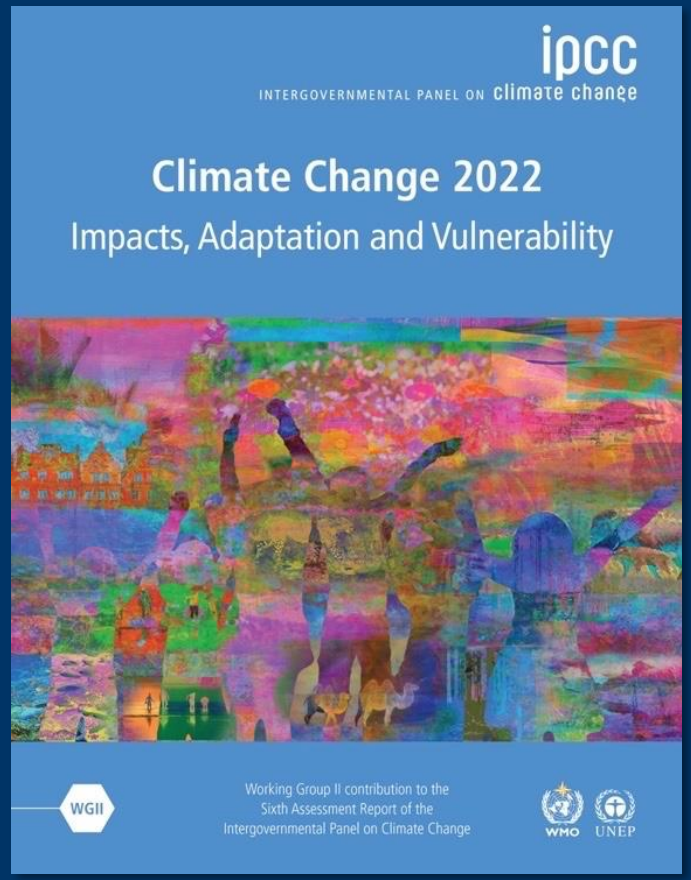
Key Messages: Environmental and Social Responsibility

Growing risks: How do accountants mainstream climate risks, extreme events into work plans.

High debt burden and limited finance in region. Loss and Damage

Support investment in science that is accelerating innovative technology (solar etc.) and nature based solutions.

Key Message WGII Report:



"

The scientific evidence is unequivocal: climate change is a threat to human well-being and the health of the planet.

Any further delay in concerted global action will miss the brief, rapidly closing window to secure a livable future.

- No human is an island.
- Collective action.
- Small islands, Big challenges.
- Urgent Action: Be Bold and innovative

Change for Climate Change