SIXTH ASSESSMENT
Working Group II- Impacts, Adaptation and Vulnerability

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Small Islands

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Small Islands

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Climate change poses an existential threat to humanity

This statement resonates across Small Islands as the IPCC 6th Assessment Report noted that small islands are increasingly affected by:

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

All these changes are already detectable across both the natural and human systems (***very high confidence***) for our islands that share the Caribbean Sea.

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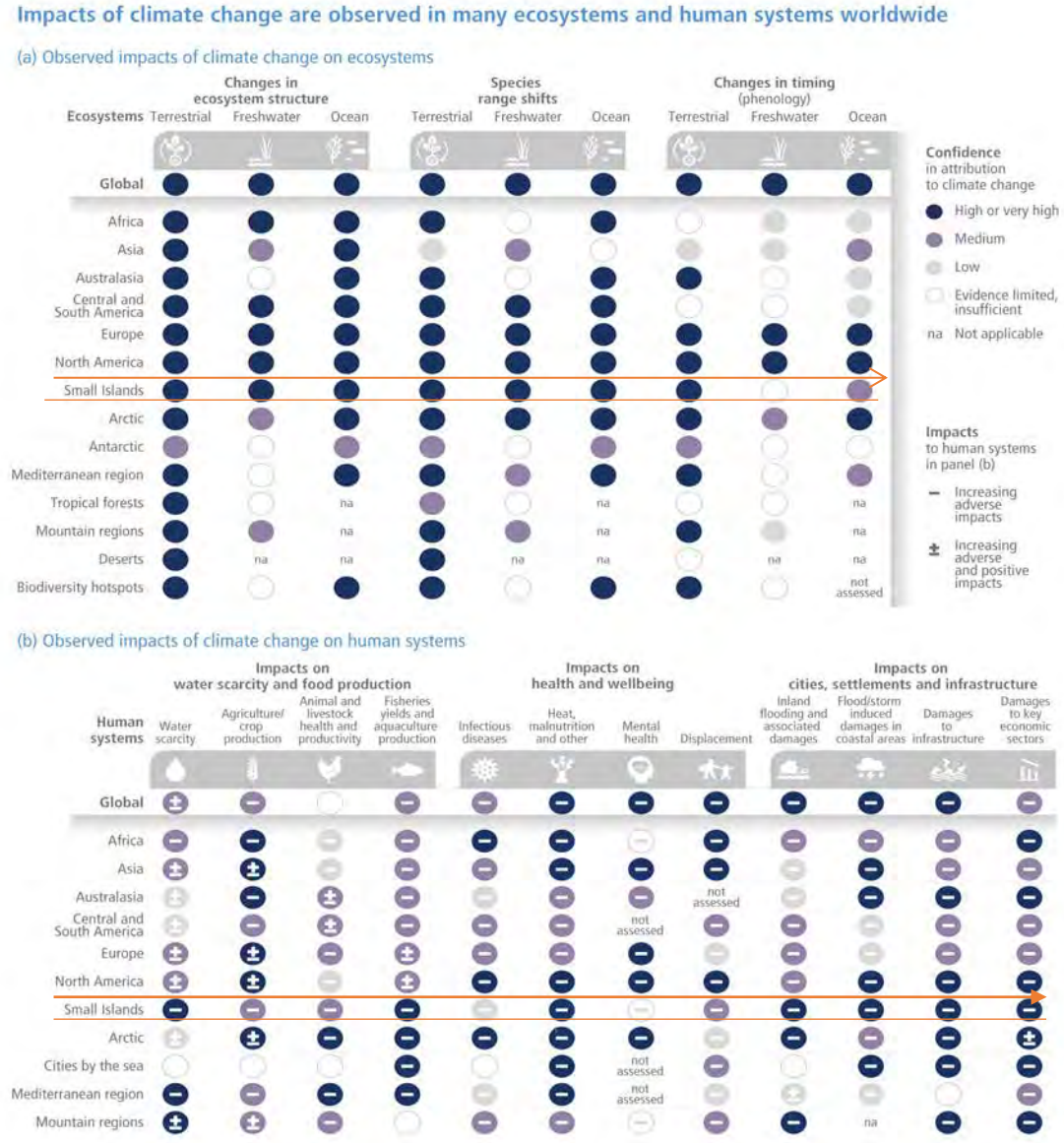
CODE RED
Small islands face an existential threat if global warming rises above 1.5°C.

The need to act with a sense of urgency to combat **climate change and to promote adherence to the Paris Agreement to limit global warming to 1.5°C above pre-industrial levels.**

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



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- Modelling of both temperature and ocean acidification effects under future climate scenarios suggest that **some small islands are likely to experience severe coral bleaching on an annual basis before 2040**

- Under a worse case emissions scenario, atoll islands could experience **annual wave driven flooding over their entire surface from 2060**

Drought risk projections for the Caribbean indicate severe water resources stress from 2043–2071

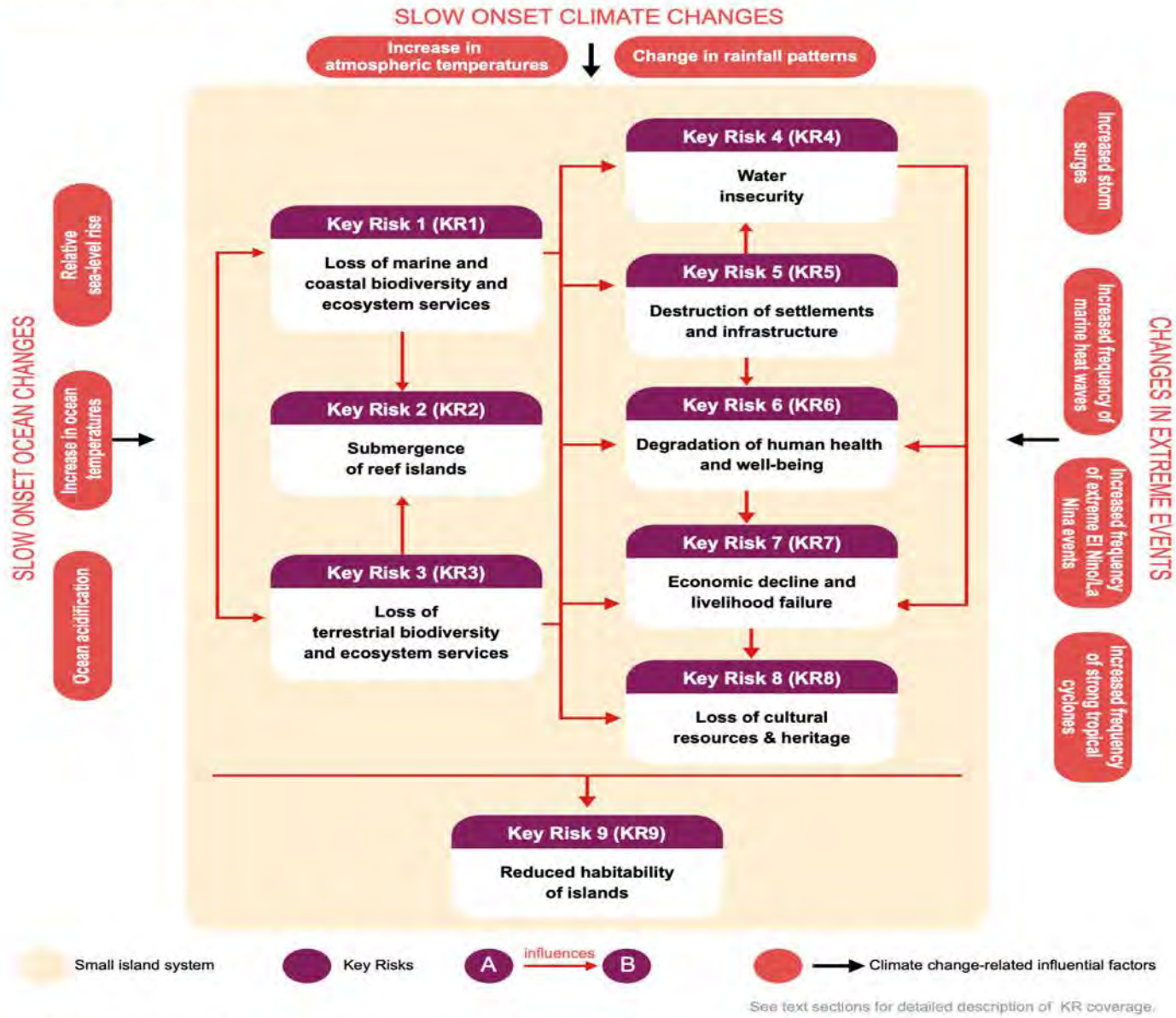

Figure 15.5 | Key risks in small islands. KR1 to KR8 are interconnected as shown by *arrows*, which causes risk accumulation leading to reduced island habitability. The main interconnections are shown in this figure: for example, loss of marine and coastal and terrestrial biodiversity and ecosystem services (KR1 and KR3, respectively) are projected to cause the submergence of reef islands (KR2), water insecurity (KR4), destruction of settlements and infrastructure (KR5), degradation of human health and well-being (KR6), economic decline and livelihood failure (KR7), and loss of cultural resources and heritage (KR8). Importantly, KRs result from both direct effects (e.g., decrease in rainfall will increase water insecurity) and indirect effects (e.g., loss of terrestrial biodiversity and ecosystem services will increase water insecurity, which will in turn cause the degradation of human health and well-being).

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Damage and Loss

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Large population reductions and 100% of island endemics face extinction by 2100 for > 3°C warming.






Islands cover only ~2 - 4% of Earth's Land Area BUT support >20% of extant terrestrial species

- Observed:
  - 80% of historical extinctions
  - host ~ 1/2 all species currently at risk of extinction

- Projections:
  - Substantial losses of insular species
  - 100% of island endemics to face extinction @ GWL 3˚C

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MARINE ECOSYTEMS: CORAL REEFS

- Under future climate scenarios, some small islands will experience severe coral bleaching on an annual basis before 2040.
- Above 1.5°C, globally inclusive of small islands, it is projected there will be further loss of 70–90% of reef-building corals, with 99% of corals being lost under warming of 2°C or more above the pre-industrial period.
- If global warming transiently exceeds 1.5°C in the coming decades or later (overshoot) damage will be irreversible.

ADAPTATION RESPONSES

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

Caribbean:

- Protection
- Accommodation
- Retreat

Adaptation measures implemented to reduce coastal risks in small islands

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No response

- **Indian Ocean:** common
- **Pacific Ocean:** common
- **Caribbean:** common

Hard Protection

- **Indian Ocean:** Male', Maldives; Comoros
- **Pacific Ocean:** South Tarawa, Kiribati; Majuro, Marshall Islands; Fiji; Tubuai, French Polynesia; Samoa
- **Caribbean:** Barbados; Cuba; Puerto Rico

Accommodation (e.g. raising of dwellings and infrastructure)

- **Indian Ocean:** /
- **Pacific Ocean:** Tuamotu atolls, French Polynesia; Tubigon, Philippines; Jakarta area, Indonesia
- **Caribbean:** Puerto Rico; Jamaica

Planned retreat

- **Indian Ocean:** Mauritius
- **Pacific Ocean:** Carteret Islands, Papua New Guinea; Nuatambu Island & Taro, Solomon Islands
- **Caribbean:** /

Advance with land or island raising

- **Indian Ocean:** Hulhumale' and other inhabited islands, Maldives; Eden and Perseverance Islands, Seychelles
- **Pacific Ocean:** /
- **Caribbean:** /

Ecosystem-based measures

- **Indian Ocean:** Mauritius (mangrove planting, beach restoration); Ihuru resort, Maldives (artificial reef)
- **Pacific Ocean:** Tuvalu (beach restoration); Samoa & Vanuatu (restoration of beach vegetation)
- **Caribbean:** Dominican Republic, Grenada (artificial reefs); Barbados (beach nourishment); Haiti, Bahamas (mangroverepianting)

SLR: sea-level rise **IWE:** increased wave energy

Explore Travel

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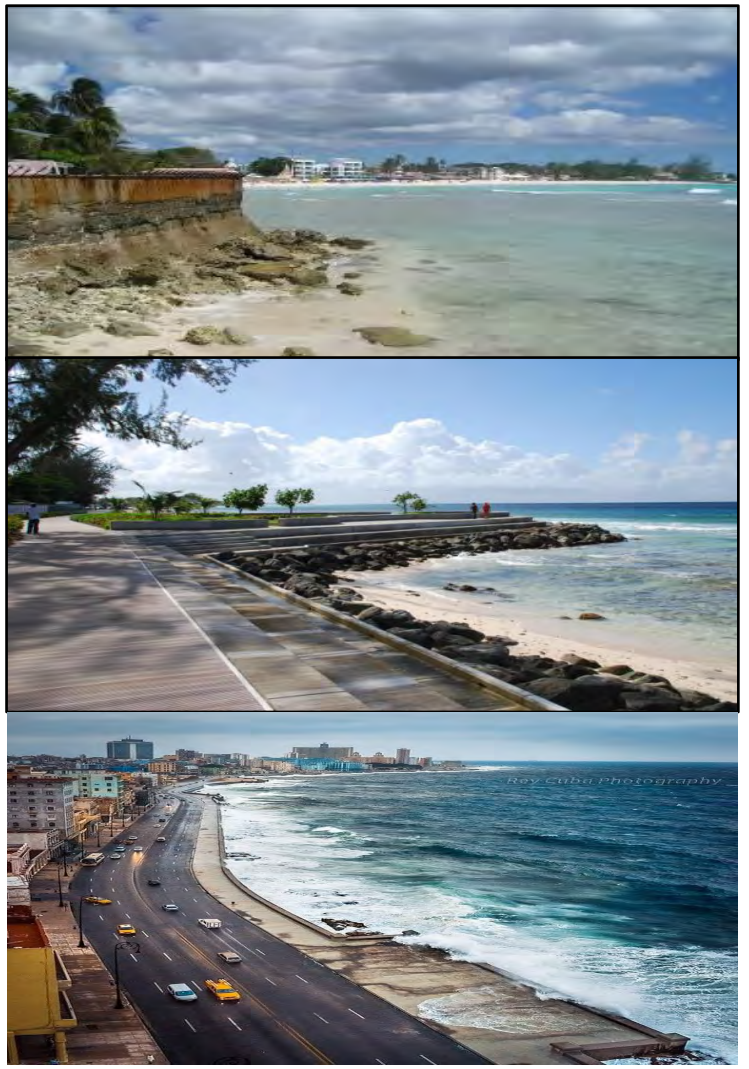
Coastal Protection

- Engineering: Coastal protection measures e.g., seawalls
- Can cause damage to ecosystems if poorly designed and built
- Protection of economic assets and key economic sectors for development of economy, livelihoods and poverty reduction



Accommodation

Ecosystem-Based Adaptation

Ecosystem-based adaptation:

Watershed management

Re-afforestation

Mangrove replanting

Coral reef restoration

Co-benefits: Food, Water Security, Health Benefits

Adaptation Responses

- Ecosystem-based adaptation approaches and other nature-based solutions are increasingly being used.. **Restoring or conserving coastal and marine ecosystems.**

- **Integrated watershed management using the '*ridge to reef*'** approach is being adopted to improve water security and erosion control in coastal settlements.

- **Hybrid options** of nature-based (if space & environmental conditions allow) & protection measures (on wealthy, densely populated islands) could reduce risk for low SLR in the next few decades.

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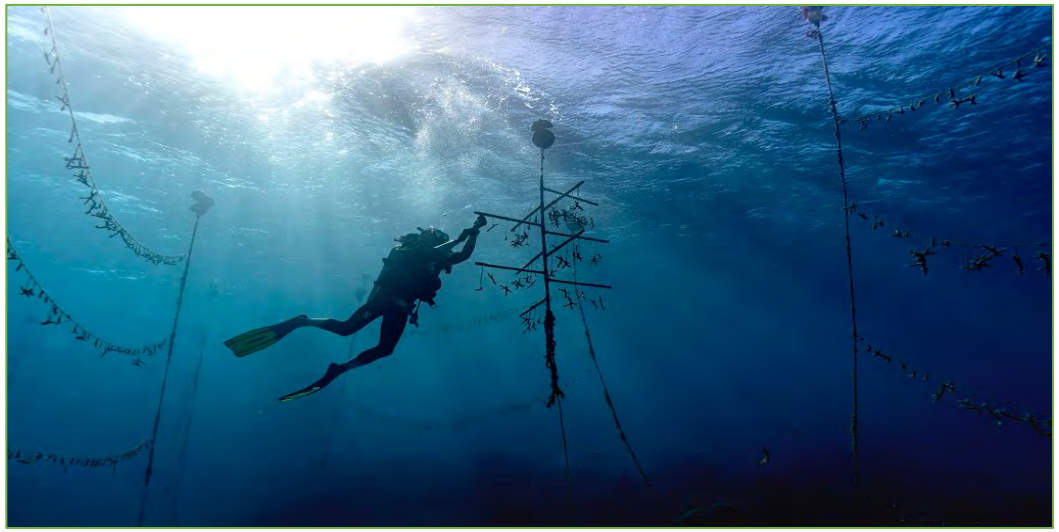
Mangrove replanting

Coral Reef Replanting



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Co-benefits Livelihoods in Fishing and Tourism

As of 2017, an estimated 22 million people in the Caribbean live below 6 metres elevation.

Human Settlements

- The main settlements of small islands are characterised by 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.
- 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.

Settlement Planning/Urban Planning

- Land Use Zoning Plans
- Site selection to avoid hazard prone areas
- Building codes being revisited to address disaster risk reduction
- Informal settlement upgrading aimed at reducing low-income household vulnerability to climate change

Future Adaptation

All human settlement adaptation responses are more effective:

- ✓ If combined and/or sequenced;
- ✓ Planned well ahead;
- ✓ Aligned with sociocultural values and development priorities; and
- ✓ Underpinned by inclusive community engagement processes.

Credit: Photos from World Atlas and Tribune 2022

There are limits to adaptation

- Even effective adaptation cannot prevent all losses and damages
- Above 1.5°C some natural 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.

Limits in Small Islands

- Above 1.5°C some natural solutions such as ecosystem-based approaches may no longer work e.g. coastal species cannot keep up with sea level rise or changing conditions
- Above 1.5°C, ocean acidification and increased temperatures influence coastal and marine adaptation options and livelihoods + water availability
- By 2°C many of these impacts worsen including increased extreme events, damage to infrastructure, health impacts, livelihoods

Adaptation constraints in Small Islands

- Finance and Risk Transfer Mechanisms: limited access to finance, including insurance and other risk transfer mechanisms; climate finance as debts vs grants; role of insurance
- Governance: lack of coordination; short vs long-term financing and planning; absence of climate legislation; low technical capacity and poor data availability and quality; limited regional cooperation and collaboration
- Education and awareness: lack of climate change literacy and knowledge; community-based training and workshops
- Culture: IKLK not incorporated into adaptation programmes and projects; lack of engagement with traditional owners of the land; lack of consideration of gender

Adaptation opportunities in Small Islands

- Understanding what effective adaptation is, how this varies across islands and what successful implementation looks like.
- Increasing investments in early warning systems, adaptation planning, capacity building,
- Direct and indirect evidence on adaptation benefits: eg how to get co-benefits across adaptation actions and sectors; e.g. overall increases in well-being
- Climate Resilient Development Pathways: how do we create sustainable societies?

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ENABLERS TO ADAPTATION

- Innovation: partnerships
- Access to **FINANCE**
- Governance reform

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.
- Progress on adaptation is uneven.
- Increasing gaps between action taken and what is needed to deal with the increasing risks.
- These gaps are largest among lower-income populations.

KEY MESSAGES

- Responses are more effective if combined, planned ahead, aligned with development priorities, and engage communities;
- Feasibility studies;
- The scale of needed action remains limited;
- Research and adaptation financing

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The scientific evidence is unequivocal – climate change is a threat to human wellbeing and the health of the planet.

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

The Small Islands chapter along with the entire IPCC 6th Assessment Report offer solutions to the Caribbean Region.

Thank you

Additional resources:

- IPCC Report and Chapter 15 online;
- Small Islands Factsheet online;
- Frequently asked questions in chapter 15