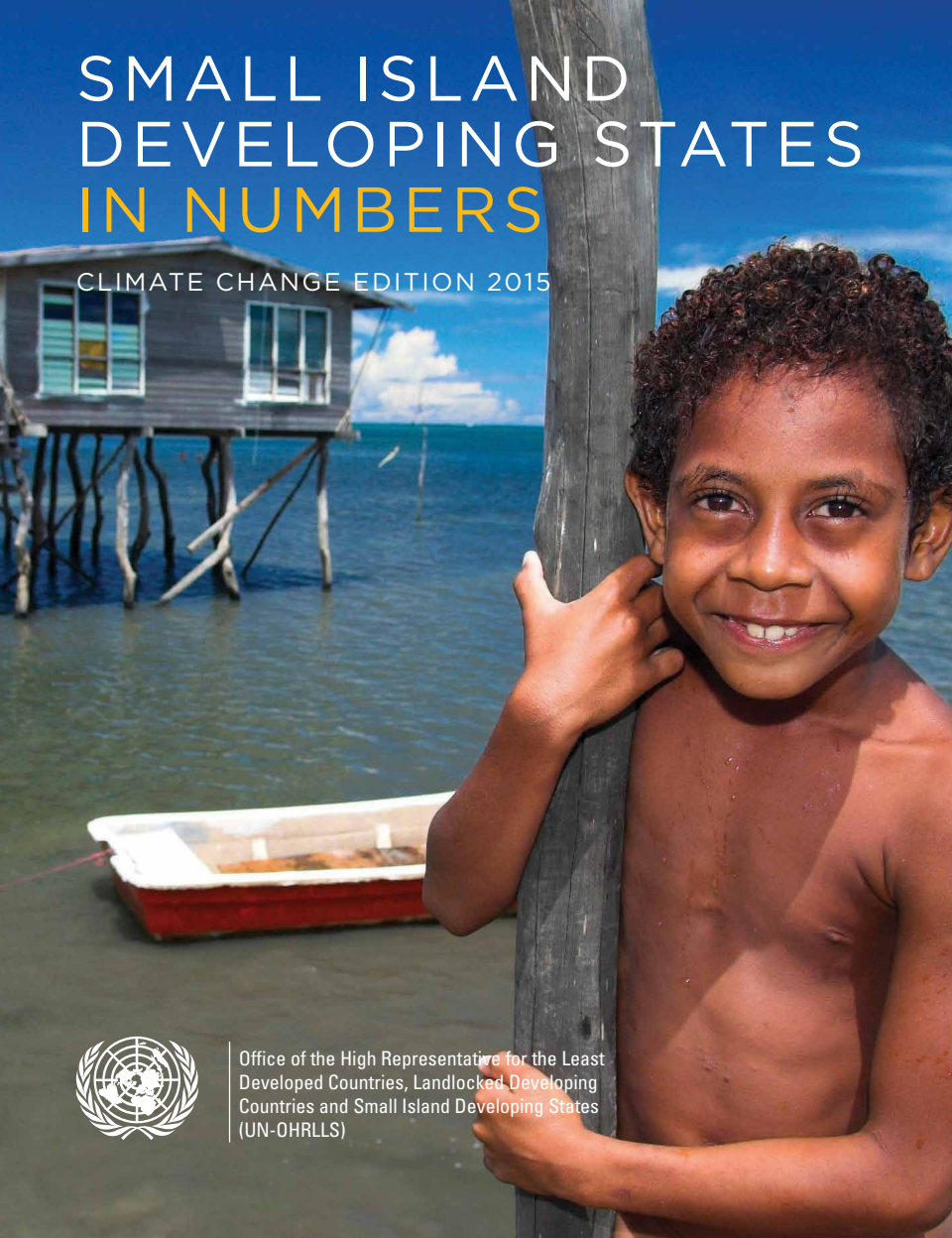
SMALL ISLAND DEVELOPING STATES IN NUMBERS

CLIMATE CHANGE EDITION 2015



Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States (UN-OHRLLS)

Front cover: Papua New Guinea, Steven Nowakowski, New Zealand MFAT. Belize Barrier Reef, Belize Caye Caulker Belize drone.

TABLE OF CONTENTS

ABBREVIATIONS

AAL	Average Annual Loss
AIMS	Atlantic, Indian Ocean, Mediterranean and South China Sea
AOSIS	Alliance of Small Island States
AR5	Fifth Assessment Report by IPCC
BPOA	Barbados Progamme of Action
COP	Conference of the Parties
DRR	Disaster Risk Reduction
ENSO	El Ñino Southern Oscillation
EVI	Environmental Vulnerability Index
GHG	Greenhouse gas(es)
IPC	Intergovernmental Panel on Climate Change
LDCs	Least Developed Countries
NASA	National Aeronautics and Space Administration
PIPA	Phoenix Island Protected Area
RCP	Representative Concentration Pathways
SAMOA Pathway	SIDS Accelerated Modalities of Action Pathway
SIDS	Small Island Developing States
SPREP	Secretariat of the Pacific Regional Environment Programme
UN	United Nations
UN-DESA	United Nations Department of Economic and Social Affairs
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNISDR	United Nations Office for Disaster Risk Reduction
UN-OHRLLS	United Nations Office of the High Representative for Least Developed Countries, Least Developed Countries and Small Island Developing States
UNU-EHS	United Nations University – Institute for Environment and Human Security
WMO	World Meteorological Organization

UN-OHRLLS MANDATE

The UN Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States (UN-OHRLLS) was established by the United Nations General Assembly in 2001 through its resolution 56/227 with functions recommended by the Secretary-General in paragraph 17 of his report A/56/645.

The UN-OHRLLS mandate from the General Assembly calls upon the Office to engage in advocacy and mobilization of international support and resources for the implementation of the Programme of Action for Small Island Developing States (SIDS), known also as the Barbados Programme of Action (BPOA). The latter outcome is known as the Mauritius Strategy for Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States (MSI).

With the successful conclusion of the Third International Conference on SIDS in 2014, the office's mandate was further amplified to ensure the mainstreaming of the Samoa Pathway and issues related to SIDS in the work of the United Nations system and to enhance the coherence of the issues of those States in United Nations processes, including at the national, regional and global levels.

http://unohrlls.org/

1. About 'SIDS In Numbers 2015 – Climate Change Edition 2015'

In December 2015 the future steps for successfully combating climate change will be determined at the 21st COP to the UNFCCC and the 11th Meeting of the Parties to the Kyoto Protocol in Paris, France. As Member States negotiate a global agreement for future concerted efforts, SIDS are already experiencing the often drastic impacts of climate change such as rises in temperature and sea level.

SIDS In Numbers – Climate Change Edition 2015 provides, at a glance, a snapshot of select key SIDS indicators under the three dimensions of sustainable development: Environment, Social and Economic, to highlight the impacts of climate change on SIDS.

The presentation of the data and statistics contained in this publication should not be taken as authoritative. They are being presented in a manner that attempts to illustrate and advocate for the special case of SIDS in the context of climate change. Data was obtained from a variety of sources, including the IPCC's AR5 on Climate Change published in 2013, The World Bank's Report "Turn Down The Heat", recent publications by various UN agencies including UNEP, UNISDR, UNDESA and from the broader scientific community.

The data used in this publication is exclusively obtained from publicly available sources. While extensive literature on climate change and related issues exist on a global scale, SIDS regions and individual countries in general remain under-researched. As a consequence, specific data on climate change impacts in SIDS is often sparsely available.

2. What are SIDS?

SIDS are a distinct group of 38 UN Member States and 20 Non-UN Members/Associate Members of regional commissions facing unique social, economic and environmental vulnerabilities. The three geographical regions in which SIDS are located are the: Caribbean, Pacific, and the Atlantic, Indian Ocean and South China Sea (AIMS).

SIDS were recognized as a special case both for their environment and development at the 1992 United Nations Conference on Environment and Development held in Rio de Janeiro, Brazil. This recognition was made specifically in the context of Agenda 21 (Chapter 17 G). In 1994, the Barbados Programme of Action (BPOA) prescribed specific actions enabling SIDS to achieve sustainable development and in 2005, the Mauritius Strategy for further Implementation of the BPOA was adopted to address remaining gaps in implementation.

In 2014, the international community gathered in Samoa for the Third International Conference on Small Island Developing States to forge a new pathway for the sustainable development of this group of countries. The SAMOA Pathway, recognizes the adverse impacts of climate change and sea-level rise on SIDS' efforts to achieve sustainable development as well as to their survival and viability, and addresses economic development, food security, DRR and ocean management, among other issues. While many SIDS have made advances in achieving sustainable development, their inherent vulnerabilities including small size, remoteness, climate change impacts, biodiversity loss and narrow resource base mean that progress for many continues to be hampered, and their special case status remains.

3. Climate Change and SIDS

As recognized in the Barbados Programme of Action for the Sustainable Development of SIDS adopted in 1994, SIDS are particularly vulnerable to global climate change[1]. Their climate is influenced by large ocean-atmosphere interactions such as trade winds, El Niño, monsoons and tropical cyclones. With populations, agricultural lands and infrastructures tending to be concentrated in the coastal zone, any rise in sea-level will have significant and profound effects on settlements, living conditions and island economies[2]. These climate characteristics, combined with their particular socio-economic situations make SIDS, among which are 9 LDCs, some of the most vulnerable countries in the world to climate change. In addition, the fact that SIDS have a combined population of around 65 million people contributing to less than 1percent of global GHG emissions, means that they will suffer disproportionately from the damaging impacts of climate change[3] and that some may become uninhabitable.

[1] Barbados Plan of Action (BPOA), 1994.

[2] UNFCCC, 2007.

[3] UNFCCC, 2007.

Western Province, Solomon Islands, Wade Fairley

Timor-Leste, Dercusse, Louise Stoddard.

ECONOMIC

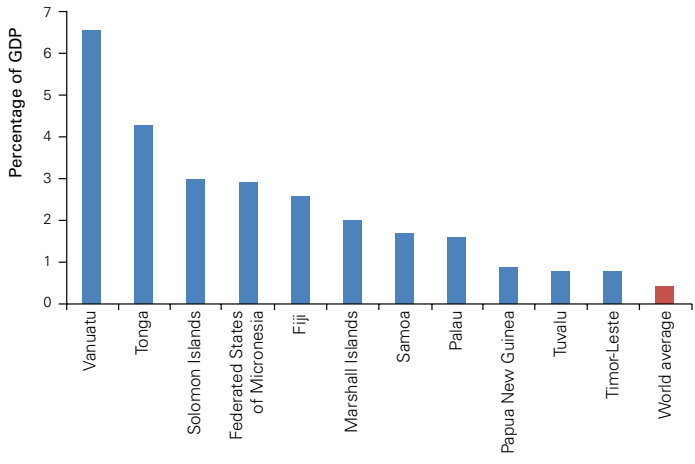
Given SIDS' unique economic vulnerabilities such as a narrow resource base, remoteness from markets, and limited ability to benefit from economies of scale, it comes as no surprise that climate change puts additional burden on their respective economies. In particular, damages incurred due to climate-related phenomena are often enormous in comparison to their economies' sizes and they experience great difficulties trying to raise funds for adaptation and mitigation measures[4]. In particular, high public debt levels constrain SIDS governments in their ability to invest in public infrastructure development and climate change adaptation measures. SIDS typically need to borrow further funds to address the loss of earnings resulting from disasters, and invest in disaster relief, reconstruction and infrastructure improvements to accommodate higher sea-levels.

Fijian Market, New Zealand MFAT.

1. Economic Losses & Cost of Inaction

Globally, estimated economic stresses due to climate change project losses of USD 63 billion per year starting in 2010. This impact will rise by more than 100 percent to USD 157 billion each year by 2030[5]. Average Annual Losses (AAL) as a percentage of GDP is much higher in SIDS compared with the global average as shown by Chart 1 below.

Chart 1. Worst affected by the consequences of climate change by share of GDP: Pacific Region



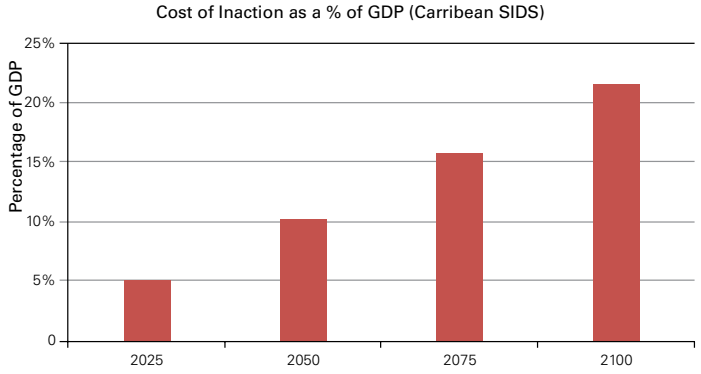
[4] IPCC, 2014.

[5] DARA and the Climate Vulnerability Forum, Fundacion DATA Internacional, 2010.

2. Cost of Inaction

SIDS may choose between several options to adapt to and combat climate change impacts. These options range from complete inaction to managed retreat to more proactive adaptation measures such as coastal engineering. In order to help decision-making, calculations are typically undertaken using a variety of different scenarios. With regard to inaction, i.e. if governments decide against any form of action to combat the impacts of climate change, the cost of inaction in the Caribbean alone is projected to amount to over US$22 billion annually by 2050 – equaling 10 percent of the current size of the Caribbean economy[6].

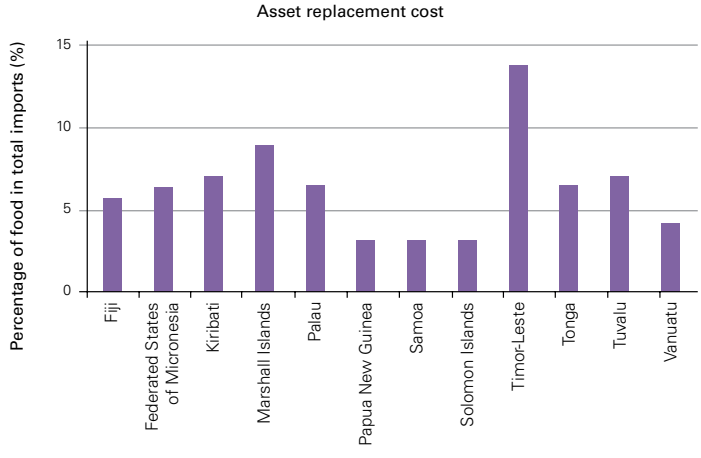
Chart 2. Inaction could prove extremely costly and will only grow more expensive in the future: Caribbean SIDS



[6] US Center; Global Development Institute, 2008.

Asset replacement costs arise out of inaction in preparing for climate change impacts. The total value of infrastructure, buildings, and cash crops considered at some level of risk in the Pacific is estimated at over US$111 billion. In the Pacific Region, the asset replacement cost is on average 4 times greater than the GDP (in 2013), for some countries such as Timor-Leste the ratio of asset replacement cost is 14 times their GDP.

Chart 3. The asset replacement costs due to climate change impacts is several folds greater than the GDPs of SIDS: Pacific SIDS



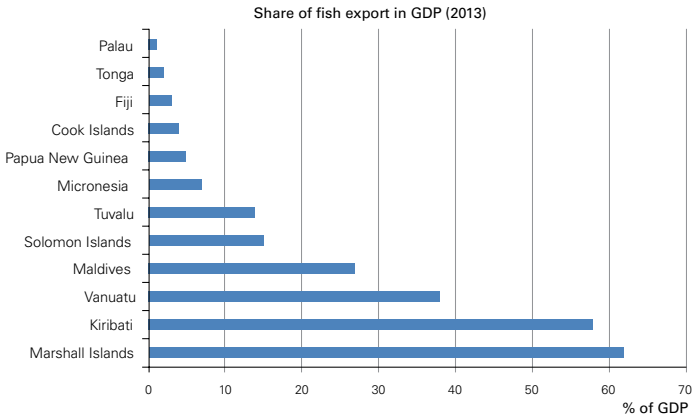
3. Impact of Climate Change on Economic Sectors

Due to their relative remoteness and size, many SIDS have a relatively narrow resource base to drive their industrial development. A few key industries including fisheries, tourism and agriculture help in contributing a significant share to national GDP. The adverse impact of climate change make SIDS' already open and exposed economies even more vulnerable.

Fisheries & Marine Resources

Many SIDS are in fact large ocean States. Their vast ocean spaces comprise a significant portion of the world's ocean – on average 28 times more than their actual land space. For example, the Republic of Kiribati has the 13th largest exclusive economic zone on Earth. Typically, oceans, more specifically the oceanic and coastal fishing industry, represent an important source of nutrition and revenue for SIDS populations.

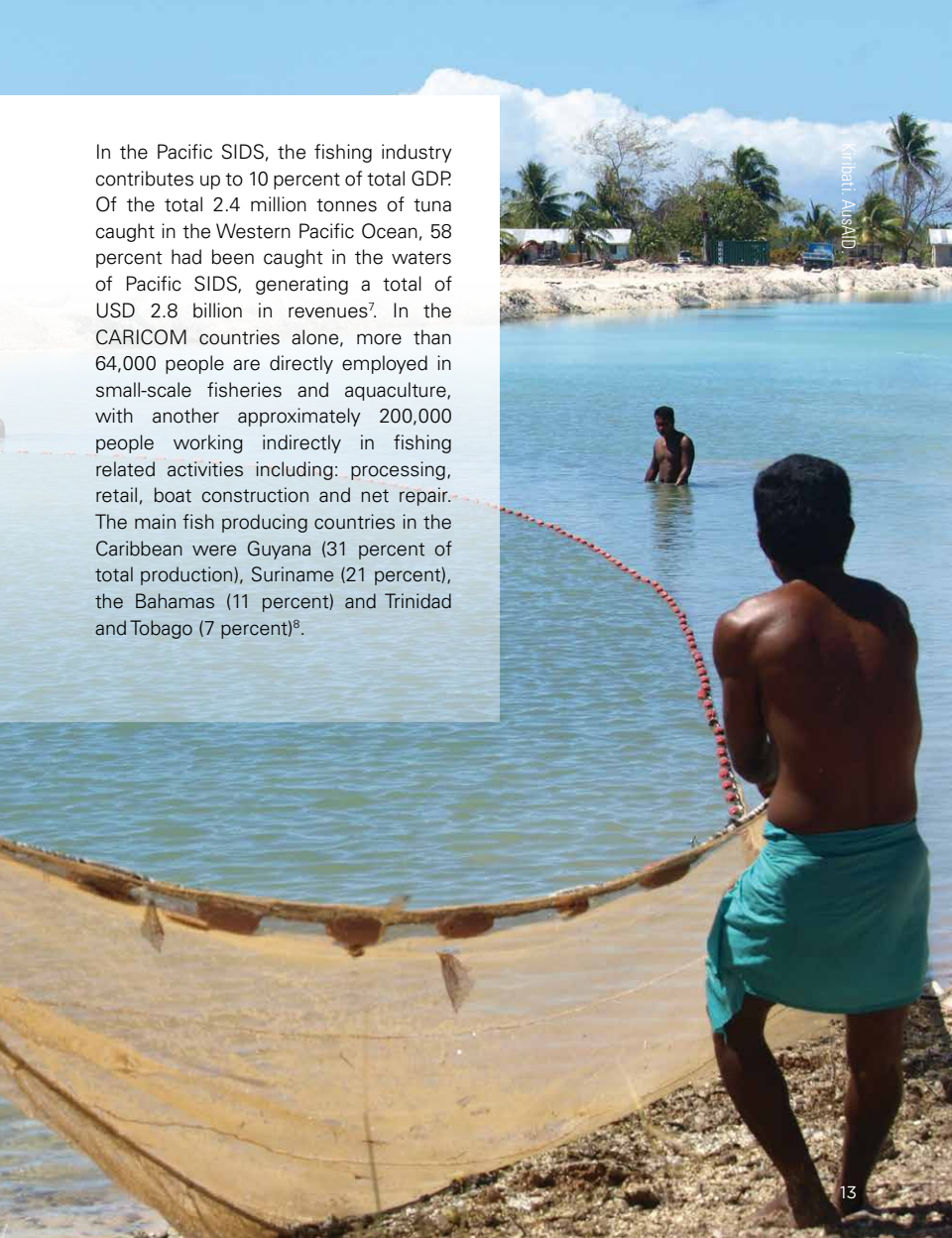
Chart 4. Export in fisheries: A significant source of income for many SIDS



[7] FAO, 2014.

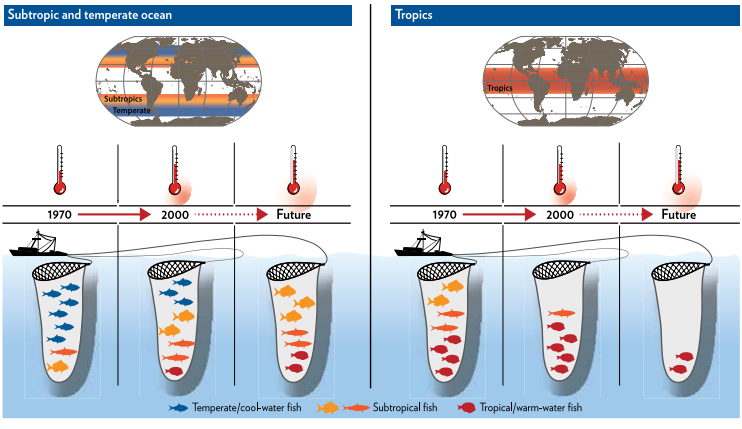
[8] FAO, 2014.

In the Pacific SIDS, the fishing industry contributes up to 10 percent of total GDP. Of the total 2.4 million tonnes of tuna caught in the Western Pacific Ocean, 58 percent had been caught in the waters of Pacific SIDS, generating a total of USD 2.8 billion in revenues[7]. In the CARICOM countries alone, more than 64,000 people are directly employed in small-scale fisheries and aquaculture, with another approximately 200,000 people working indirectly in fishing related activities including: processing, retail, boat construction and net repair. The main fish producing countries in the Caribbean were Guyana (31 percent of total production), Suriname (21 percent), the Bahamas (11 percent) and Trinidad and Tobago (7 percent)[8].



Kiribati. AusAID

Figure 1. Warming oceans are reshaping fisheries



Source: Cheung, Watson, & Pauly, 2013.

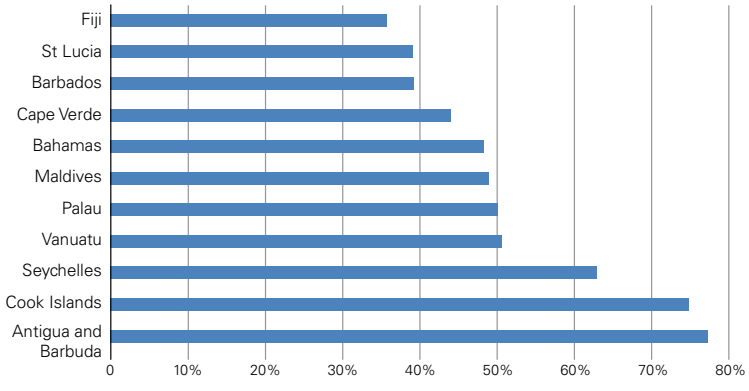
The impact of climate change could fundamentally alter the fishing industry in SIDS. Marine species are gradually moving away from the equator into cooler waters, and, as a result, species from warmer waters are replacing those traditionally caught in many fisheries worldwide. These shifts could have negative effects including loss of traditional fisheries, decreased in profits and jobs, conflicts over new fisheries that emerge because of distribution shifts, food security concerns and a large decrease in catch in the tropics[9].

[9] Cheung, Watson, & Pauly, 2013.

Tourism

Revenues generated by the tourism sector and tourism related activities represent an important source of income for many SIDS[10]. The Caribbean SIDS in particular base most of their livelihoods on revenues from tourism. Annually, about 12 percent of the total labour force, i.e. approximately 2 million people, are estimated to work in the Caribbean tourist sector, generating around 47 billion USD of revenue in 2012, i.e. 14 percent of GDP and 25 billion USD of exports, 15 percent of total exports[11].

Chart 5. Tourism-dependent Islands – share of tourism in GDP



Source: World Travel and Tourism Council
GDP = gross domestic product

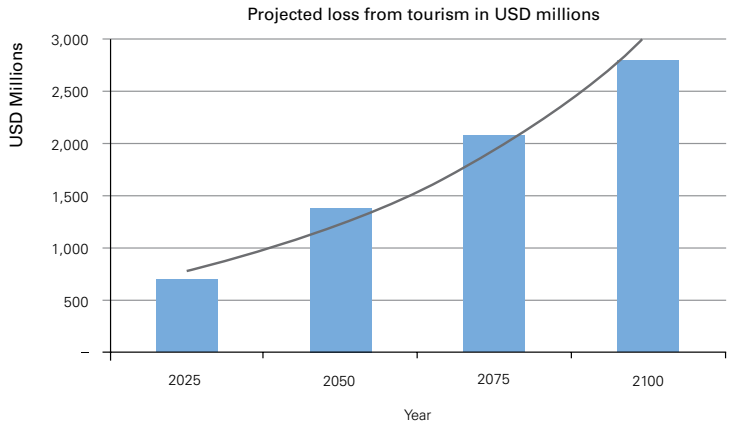
Source: IRENA, 2012.

[10] IPCC, 2014.

[11] EP/GRID-Geneva and ZMT Leibniz Center for Tropical Marine Biology, 2014.

Research on sea-level rise has shown that as much as 29 percent of major resort properties in the CARICOM countries would be partially or fully inundated by a one-meter sea-level rise. Furthermore, about 49 percent are estimated to be damaged or destroyed by combined sea-level rise and storm surge and sea-level rise-enhanced erosion given their lack extensive coastal protection in order to preserve aesthetics of natural beach areas and views to the sea[12]. Across the Caribbean, Moore et al. (2010) estimate that by 2050 visitor expenditures could decline from US$ 25 to US$ 15 billion as a direct result from the consequences of climate change on the area[13].

Chart 6. The economic impact of climate change on the tourism sector will be significant: Caribbean region (in USD millions)



[12] Journal of Sustainable Tourism, 2012.

[13] Current Issues in Tourism, 2010.

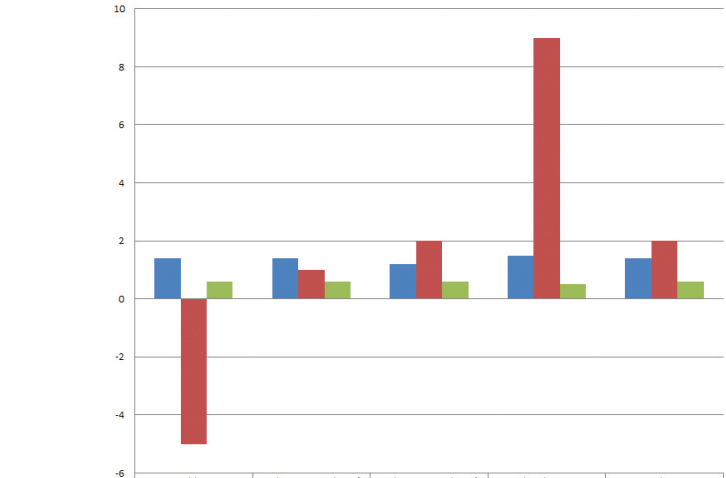
Maldives, New Zealand MFAT.

1. SIDS on the Frontline of a Changing Climate

According to the IPCC, CO2 concentrations in the atmosphere are at an 'unprecedented' level not seen for the last 800,000 years. As greenhouse gas emissions continue to rise, an average global temperature increase of 2.6 – 4.8°C by 2100 is expected – as per the highest emissions scenario. SIDS as a group of countries contributes less than 1 per cent to total greenhouse gas emissions but have been and will continue to be among the earliest and most impacted countries. SIDS may experience both rapid-onset and temporary events, such as storms and flooding, and slow-onset processes including land erosion and changes in the global water cycle[14]. More specifically this includes: marine inundation of low-lying areas, coral bleaching, saline intrusion into terrestrial systems, degrading ecosystems, species shifts in terrestrial systems, habitat loss, climate induced diseases as well as casualties and damage from extreme events[15]. For the regions where SIDS are located, significant changes are expected in average temperature, rainfall and sea level rise as illustrated in Figure 2 on page 19.

Haiti. Marco Dormino, UN Photo/Flickr.

Figure 2. Climate Change Projections for the IPCC Intermediate Low-Emissions scenario (RCP4.5)



	Caribbean	Northern Tropical Pacific	Southern Tropical Pacific	North Indian Ocean	West Indian Ocean
Average temperature (°C)	1.4	1.4	1.2	1.5	1.4
Average rainfall (%)	-5	1	2	9	2
Sea level rise (m)	0.6	0.6	0.6	0.5	0.6

Source: Based on data from IPCC AR5 - RCP4.5 low emissions scenario.

[14] UNEP, 2014.

[15] CDKN, 2014.

2. Sea-Level Rise: Implications for SIDS

Sea level rise coupled with extreme weather events induced by climate change poses one of the most immediate threats to SIDS. In particular, the majority of communities, infrastructure and economic activities are located in low-lying coastal areas. For low-lying atoll nations with a majority of land area within 5m above sea level (refer to Table 1) and those with a majority of population living within 5m above sea level (refer to Table 2), the dangers and challenges of rising seas are significant. According to UNEP (2008), approximately 70 percent of the Caribbean population lives in coastal areas. In the tropical Western Pacific where a large number of SIDS communities exist, rates of sea level rise of up to four times the global average (approximately 12 mm per year) have been reported between 1993 and 2009[16]. In addition, as populations grow, and coupled with climate change impacts, relocation to higher ground or beyond national borders will be a major challenge. Owing to higher projections of sea level rise in AR5, it is clear that many – particularly low lying atoll nations – face an existential threat.

A case in point is Tuvalu where removing all the factors which affect short-term sea level fluctuation (including relative sea level rise of 10 percent due to subsidence and effects of ENSO), the long-term sea level around Tuvalu rose at the rate of 5.1 (±0.7) mm per year from 1950-2009[17]. This is almost 3 times greater than the global average sea level over that time of 1.8 mm per year.

[16] IPCC, 2014.

[17] Becker et al., 2011.

Table 1. Highest and lowest share of land area within 5m above sea level	
COUNTRY	% OF LAND AREA WITHIN 5M ABOVE SEA LEVEL
Maldives, Tuvalu	100%
Marshall Islands	99%
Kiribati	96%
Cook Islands	88%
Average	**26%**
Haiti	4%
Suriname, Timor-Leste, Guyana	3%
Papua New Guinea	2%

Source: UN-OHRLLS, Small Island Developing States in Numbers, 2013.

Table 2. Highest and lowest share of population living within 5 m above sea level	
COUNTRY	% OF POPULATION LIVING WITHIN 5M ABOVE SEA LEVEL
Maldives, Tuvalu	100%
Marshall Islands	99%
Kiribati	95%
Suriname	68%
Average	**29%**
Mauritius	6%
Haiti	5%
Timor-Leste	4%
Dominican Republic	3%
Papua New Guinea	2%

Source: UN-OHRLLS, Small Island Developing States in Numbers, 2013.


NASA/Flickr.

3. Extreme Weather Events

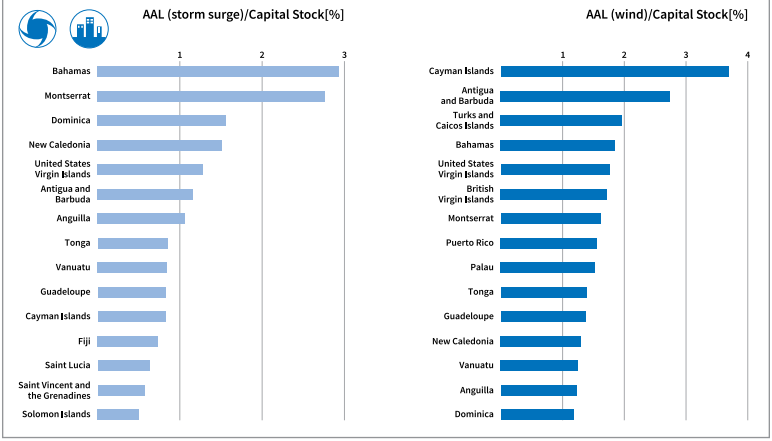
About 90 percent of SIDS are located in the tropics – areas naturally prone to suffer more frequently from severe weather events ranging from rapid-onset and temporary events, such as storms and flooding, slow-onset processes including land erosion and changes in the global water cycle[18]. What is more, as SIDS populations grow and move into more at-risk areas in search of livelihoods, the number of people exposed to risk stemming from severe weather events also increases[19].

[18] UNEP, 2014.

[19] Internal Displacement Monitoring Center, Norwegian refugee Council, 2015.

According to UNISDR in the case of a one-in-250 year cyclone, six of the ten countries most at risk are SIDS[20]. Due to high coastal exposure, storm surge further exacerbates tropical cyclone AAL in SIDS. As illustrated in Figure 3, Cayman Islands and Antigua and Barbuda have the highest relative AAL in relation to cyclone wind while the highest relative risk with respect to storm surge is found in the Bahamas, Montserrat and Dominica.

Figure 3. Top 15 SIDS: Tropical cyclone AAL (storm surge and cyclone wind) in relation to capital stock

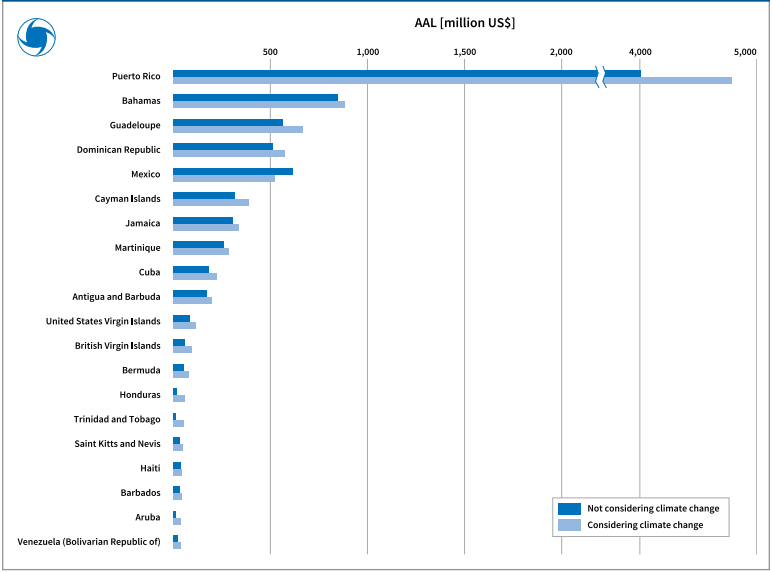


Source: UNISDR, 2015.

[20] UNISDR, 2015.

It is clear that climate change will exacerbate the impacts of tropical cyclone winds on SIDS. For the Caribbean basin as a whole, climate change contributes an additional US$1.4 billion to expected average annual losses associated with wind damage alone as illustrated in Figure 4.

Figure 4. AAL from tropical cyclone wind for Caribbean and Central American countries, with and without climate change



Source: UNISDR, 2015.

4. Natural Resources

Coral Reefs

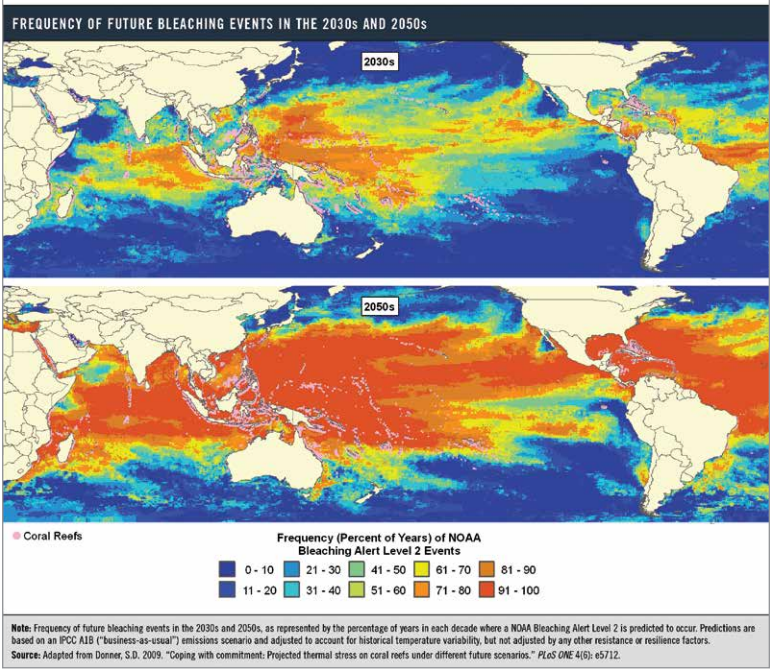
Coral reefs play an important role in the wellbeing of many island communities. Healthy reefs are highly efficient in breaking waves, storing carbon and supporting biodiversity. Furthermore, they function as important sources of sand, slow down (beach) erosion and support a variety of tourism activities. Rising sea surface temperatures and more acidic oceans in combination with other unsustainable practices, however, can severely impact the growth and resilience of corals[21] exposing them, amongst others, to thermal stress. Figure 5 illustrates the extent of coral bleaching projected in the 2030s and 2050s with a significant amount of bleaching expected to occur in SIDS regions.

Across the SIDS regions, the abundance of coral species is rapidly declining, particularly across the Pacific as well as the Caribbean where it has decreased by over 80 percent. The IPCC estimates that one third of global coral reefs will experience degradation over the coming decades – even under a low-emissions scenario[22]. In the World Resources Institute's *Reefs at Risk Revisited* report, Haiti, Grenada, Comoros, Vanuatu, Kiribati and Fiji were identified as the SIDS most vulnerable to the effects of coral reef degradation[23]. AR5 reported that the annual damage of coral reef loss caused by ocean acidification has been calculated at between US$528 and US$870 billion (depending on scenario) and can represent large portions of GDP for SIDS that are impacted[24].

[21] SREP, 2013.
[22] IPCC, 2014.
[23] World Resource Institute, 2011.
[24] IPCC, 2014.

Jamaica. Evo Flashy/ Flickr.

Figure 5. Projected: coral reef bleaching events in the 2030s and 2050s



Note: Frequency of future bleaching events in the 2030s and 2050s, as represented by the percentage of years in each decade where a NOAA Bleaching Alert Level 2 is predicted to occur. Predictions are based on an IPCC A1B ("business-as-usual") emissions scenario and adjusted to account for historical temperature variability, but not adjusted by any other resistance or resilience factors.
Source: Adapted from Donner, S.D. 2009. "Coping with commitment: Projected thermal stress on coral reefs under different future scenarios." *PLoS ONE* 4(6): e5712.

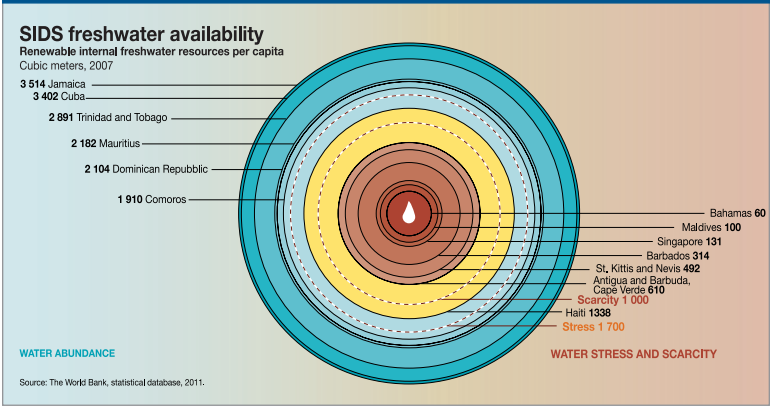
Source: World Resource Institute, 2011.

Fresh Water

Having access to a reliable, safe, sustainable and affordable supply of drinking water remains a critical issue for the majority of SIDS[25]. Typical sources of potable water for SIDS communities include groundwater, surface water and desalinated water which are commonly recharged during the wetter season of the year. Many countries rely entirely on a single source of water supply[26].

Contamination leading to water quality degradation, over-extraction and shortcomings in national water management, however, threaten the efficient operation and maintenance of freshwater sources. With many SIDS facing water stress and scarcity (refer to Figure 6), the impacts of climate change, such as extreme tides, sea-level rise and saline intrusion into coastal aquifers adds further pressure on SIDS. In addition, communities that depend primarily on rainwater harvesting will be particularly vulnerable to changes in precipitation patterns and prolonged drought conditions.

Figure 6. SIDS freshwater availability



Source: SIDS-Focused Green Economy: An Analysis of Challenges and Opportunities. UNEP, UNDESA & FAO, 2012.

[25] UNEP, 2012.

[26] UNFCCC, 2005.

Haiti. FMSC Distribution Partner.

Varying degrees of water insecurity resulting from these challenges are already being experienced by many SIDS. For example, Mauritius is projected to become a "water-stressed" country, and Comoros a "water-scarce" country by the year 2025[27]. Further, as many SIDS economies are heavily dependent on agriculture or tourism activities, both major consumers of freshwater, economic losses are likely to result when operations have to be discontinued. What makes the matter of water security particularly challenging in a SIDS context, is the immediacy of water-related problems, and many SIDS' limited capacity to respond[28]. In the World Resources Institute's Aqueduct Country and River Basin Ranking, ranking the Baseline Water Stress (i.e. the ratio of total annual water withdrawals to total available annual renewable supply) by country and for agricultural, municipal, and industrial sectors, 9 out of the 16 countries tied for highest possible score – meaning extremely high water stress – are SIDS. In the Caribbean, Antigua and Barbuda, Barbados, Dominica, Jamaica, St. Lucia, St. Vincent and the Grenadines and Trinidad and Tobago. In the AIMS SIDS, these are Bahrain, Comoros and Singapore.

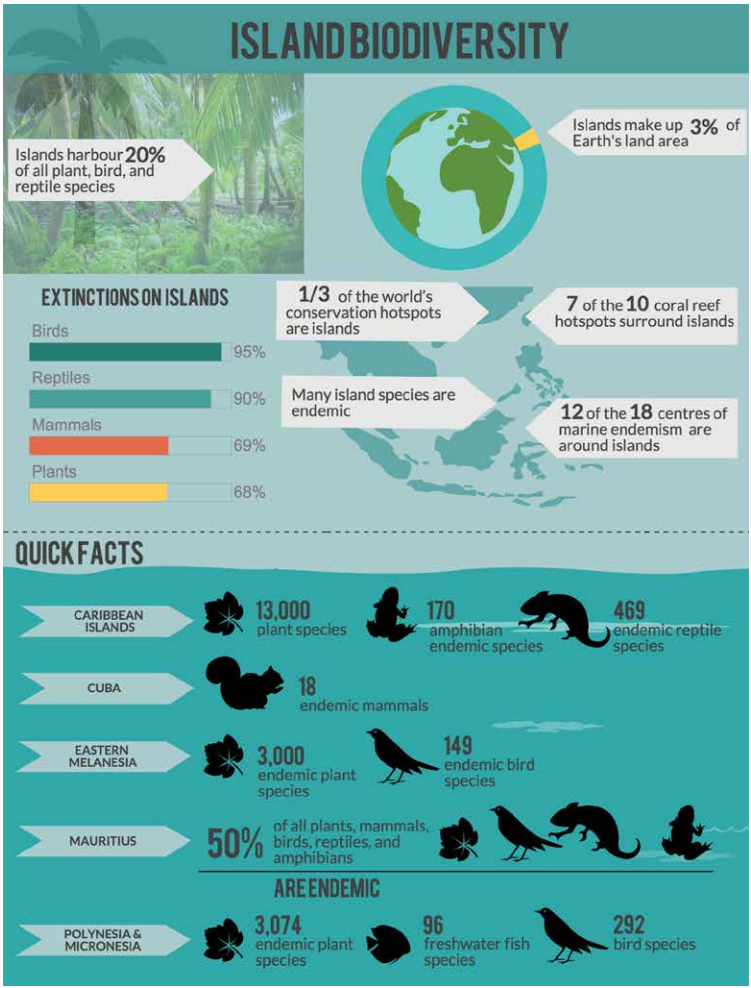
[27] UNEP, 2012.

[28] UNEP, 2012.

Biodiversity

While many SIDS are home to large numbers of endemic flora and fauna, it is also amongst SIDS that alarming rates of biodiversity loss are taking place. According to SPREP, there is a high degree of confidence that projected changes in climate will result in the degradation, redistribution, and/or fragmentation of ecosystems and the loss of biodiversity, species, and ecosystem services in the Pacific over the coming decades.

Comoros Islands. Daryl Wallace/Flickr.



Source: Based on data from the Secretariat of the Convention on Biological Diversity and Conservation International.

For SIDS, the impacts of climate change pose distinctive challenges to their social sector including on their public health, food security, migration, cultural and natural heritage and their ongoing efforts to attain their sustainable development aspirations. These challenges stem from SIDS' inherent characteristics of high dependency on natural resources and ecosystem services, small markets, isolated geographic locations and large coastal populations, most of which are located in low-lying communities.

1. Public Health

Climate change will have the greatest effect on health in societies with scarce resources, little technology and frail infrastructure[29] in low- and middle-income countries and populations including sub-Saharan Africa, South Asia and SIDS[30]. Higher temperatures, changes in precipitation and an increase in the frequency and intensity of extreme weather events will increase the risk of food – and water borne diseases; vector-borne diseases; undernutrition resulting from diminished food production; lost work capacity and reduced labour productivity[31].

The IPCC's projections and qualitative assessments of the future burden (for the period 2030–2040) of ill-health due to current climate change, in which the world will inevitably experience approximately 1.5°C of warming due to past and present greenhouse gas emissions, already paints an alarming picture. The IPCC's projections for the period 2080–2100, for which the global mean temperature is expected to increase by approximately 4°C above preindustrial levels, however, depicts a scenario of increased health risk concerns including those on air quality and prevalence of food and water borne diseases[32]. SIDS will undoubtedly be affected with the rest of the world.

[29] GWHO, 2009.
[30] WHO, 2014.
[31] OWHO, 2015.
[32] WHO, 2015.

Figure 7. Summary of the main expected health impacts of climate variability and climate change globally by the middle of the current century

	Climate change effects	Health risks	Health impacts	Confidence rating
Direct effects	Increased number of warm days and nights; increased frequency and intensity of heat waves; increased fire risk in low rainfall conditions	Excess heat-related mortality; increased incidence of heat exhaustion and heat stroke, particularly for outdoor labourers, athletes, the elderly; exacerbated circulatory, cardiovascular, respiratory and kidney diseases; increased premature mortality related to ozone and air pollution produced by fires, particularly during heat waves	**Increased risk of injury, disease and death due to more intense heat waves and fires**	**Very high**
	Decreased number of cold days and nights	Lower cold-related mortality and reduced cardiovascular and respiratory diseases particularly for the elderly in cold and temperate climates	**Modest improvements in cold-related mortality and morbidity**	**Low**
Effects mediated through natural systems	Higher temperatures and humidity; changing and increasingly variable precipitation; higher sea surface and freshwater temperatures	Accelerated microbial growth, survival, persistence, transmission, virulence of pathogens; shifting geographic and seasonal distribution of diseases (e.g. cholera, schistosomiasis) and ecological changes (e.g. harmful algal blooms); lack of water leading to poor hygiene; flood damage to water and sanitation infrastructures; contamination of water sources through overflow	**Increased risks of food- and water-borne diseases**	**Very high**
	Higher temperatures and humidity; changing and increasingly variable precipitation	Accelerated parasite replication and increased biting rates; prolonged transmission seasons; re-emergence of formerly prevalent diseases; changing distribution and abundance of disease vectors; reduced effectiveness of vector control interventions	**Increased risks of vector-borne diseases**	**Medium**
Effects heavily mediated by human systems	Higher temperatures and changes in precipitation	Lower food production in the tropics; lower access to food due to reduced supply and higher prices; combined effects of undernutrition and infectious diseases; chronic effects of stunting and wasting in children	**Increased risk of undernutrition resulting from diminished food production in poor regions**	**High**
	Higher temperatures and humidity	Outdoor and unprotected workers obliged to work either in physiologically unsafe conditions or to lose income and livelihood opportunities	**Consequences on workers' health include lost work capacity and reduced labour productivity in vulnerable populations**	**High**
Combined effect	**Overall climate change**	**Combination of above risks**	**Negative health effects would outweigh positive effects worldwide**	**High**

Note: The final column refers to the level of confidence in the evidence for expected health impacts, as presented in the Fifth assessment report of the IPCC (*1*). Other health impacts are possible (see text), but were not assigned evidence grading by the IPCC.

Source: Operational framework for building climate resilient health systems, WHO, 2015.

2. Migration and Displacement

It is clear that there is the potential for human movement as a response to climate change[33]. With high percentage of SIDS populations living near the coast, many of which in low-lying areas, coastal floods, storm surges and inland flooding can cause serious social migration and/or displacement challenges. High sea levels and swells have already resulted in the displacement of people in a number of SIDS including Kiribati, Solomon Islands, the Marshall Islands, and the Federated States of Micronesia[34]. The displacement of people is likely to increase over the 21st century as a direct result of climate change[35]. These induced or forced migration and resettlement could have a significant impact on the social fabric, traditional culture and way of life of many SIDS.

Figure 8. Links between loss of land, livelihood and habitat security, and migration

FORCED MIGRATION				INDUCED (VOLUNTARY MIGRATION		
Lost land security	Lost livelihood security	Habitat security severely reduced	Land security partly lost	Livelihood security severely disrupted	Livelihood security significantly but not severely disrupted	Land and livelihood security disrupted periodically
Community relocation	**Community relocation**	**Community relocation or individual migration**	**Community relocation or individual migration**	**Individual migration**	**Individual migration**	**Short-term migration**
Atoll submerged and or eroded Coastal sites submerged and/ or eroded Delta sites eroded and/ or inundated (coastal and/or river bank)	Salinization • Water polluted • Crop failure Persistent Drought • Water reduced • Crop failure	Changes in disease vectors such as malaria, dengue, ciguatera Changes in water borne incidence Temperature related illnesses	Severely but not completely reduced land available for settlement or livelihoods	Severe reductions in • water supply • food production	Moderate reductions in: • water supply • food production Moderately but completely reduced land available for settlement or livelihood	Increased frequency and or magnitude of climatic extremes Atolls/coastal land temporarily inundated

Source: UN-ESCAP 2014[36].

[33] IPCC, 2014.

[34] OCHA, 2008.

[35] IPCC, 2014.


Federated States of Micronesia. David Weekly

3. Natural World Heritage Listed Sites

Climate change will have an impact on the world's cultural and natural heritage. If current projections hold, these impacts will become even more threatening in the near future. This will have impacts on the conservation of World Heritage natural sites, many of which may be jeopardized. Increased ocean temperature and acidification poses a threat to marine biodiversity. Many marine World Heritage sites are tropical coral reefs whose exposure to bleaching events is increasing, possibly leading to massive extinction of coral reefs[37]. To be included in the World Heritage List, sites must be of outstanding universal value and meet at least one out of ten selection criteria. 22 SIDS, have World Heritage Listed sites. Of the 33 listed sites in these SIDS, nine are sites that involve outstanding natural heritage found along the their coasts and oceans. Some of these natural world heritage listed sites cover vast tracts of ocean space.

Kiribati's Phoenix Island Protected Area (PIPA) is a 408,250 sq.km expanse of marine and terrestrial habitats in the Southern Pacific Ocean. The property encompasses the Phoenix Island Group, one of three island groups in Kiribati, and is the largest designated Marine Protected Area in the world. PIPA conserves one of the world's largest intact oceanic coral archipelago ecosystems, together with 14 known underwater sea mounts (presumed to be extinct volcanoes) and other deep-sea habitats.

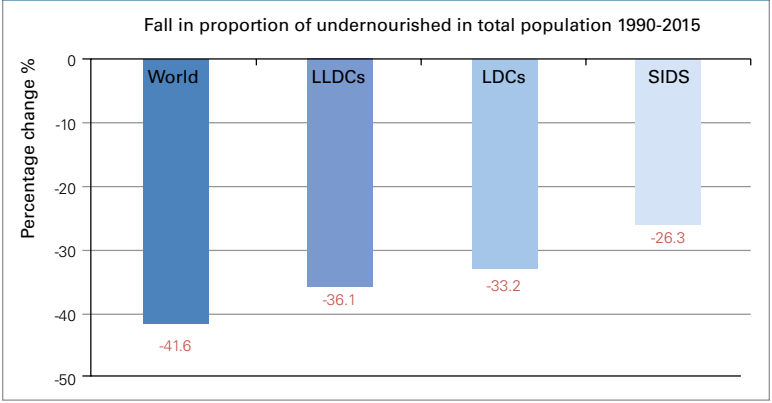
[37] 'Issues Related to the State of the conservation of properties inscribed on the World heritage List', WHC-06/30/COM/7.1, p.18.

4. Food Security

All aspects of food security are potentially affected by climate change, including food access, utilization, and price stability[38]. SIDS being among the most vulnerable to the adverse impacts of climate change and are already experiencing an increase in such impacts, including persistent drought and extreme weather events, sea-level rise, coastal erosion and ocean acidification, further threatening food security[39].

Climate change would exacerbate food security and nutrition in SIDS. Over the 15 years life period of the MDGS, proportion of malnourished people in SIDS fell by 26 percent. This compares with a fall in 33 percent in LDCs and 36 percent in LLDCs. Globally, the figure went down by 41 percent. While the aggregate figure for SIDS masks notable progress achieved in individual countries, as a group, SIDS are facing constraints across the four dimensions of food security – *food availability, food accessibility, food utilization, stability across time.*

Chart 7. Progress towards the MDG target on reducing proportion of undernourished in total population

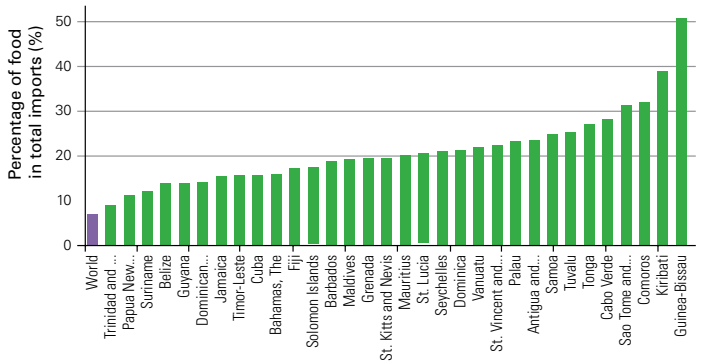


[38] IPCC, 2014.

[39] SAMOA Pathway, Paragraph 31.

SIDS are primarily net food-importing countries and are exceptionally vulnerable to the fluctuating availability and excessive price volatility of food imports. It is therefore important to support the right of everyone to have access to safe, sufficient and nutritious food, the eradication of hunger and the provision of livelihoods while conserving, protecting and ensuring the sustainable use of land, soil, forests, water, plants and animals, biodiversity and ecosystems[40]. Some SIDS expend up to 50 percent of total import on food, compared with the world average of 7 percent.

Chart 8. Share of food imports in total imports



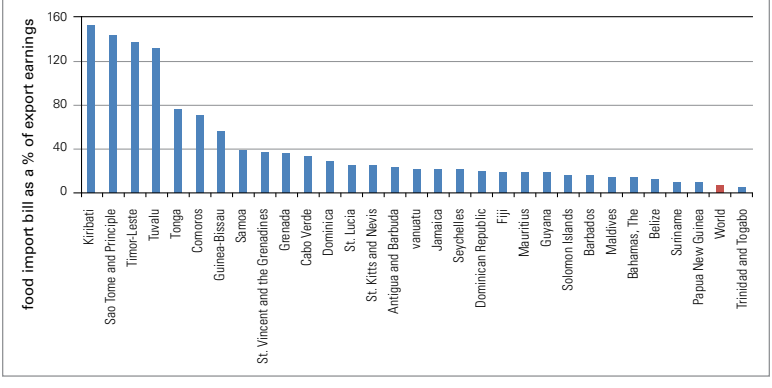
Source: Secretariat of the Convention of Biological Diversity and Conservation International.

[40] SAMOA Pathway, Paragraph 59.

Climate-related hazards affect the vulnerable and poor people's lives directly through impacts on livelihoods, reductions in crop yields, or destruction of homes and indirectly through, for example, increased food prices. Over the period 2005 to 2013, food import bills in SIDS accounted for over a third (or 33 percent) of all exports of goods and services. A high degree of volatility is also observed across time, with the figure reaching 40-42 percent during the spikes in global food prices around 2008. To put this into context, globally ratio of food imports relative to exports has remained relatively steady at 7 percent over the same time period. Furthermore, for a handful of SIDS (Kiribati, Tuvalu and Sao Tome and Principe) food imports to exports was consistently over 100 percent in 2005 to 2013, indicating some SIDS are already suffering from unsustainably high food bills.

SIDS in general face high food import bills with some experiencing food import bills that are more than their export earnings.

Chart 9. SIDS ratio of food imports to foreign exchange



KEY POINTS

1. The climate is already changing and SIDS area already feeling the impacts
2. Further climate change is inevitable in the coming decades
3. Climate change is affecting SIDS' growth and development
4. Climate change poses an existential threat to some SIDS
5. Adaptation can reduce the impacts of climate change, but there are limits and risks involved
6. The economic cost of adaptation to climate change is high in SIDS relative to the size of their economies
7. SIDS stand to benefit from further integration of climate adaptation, mitigation and development approaches
8. Transformation to a low-carbon economy implies new patterns of investment
9. International cooperation is vital to avert dangerous climate change and SIDS governments can promote ambitious global action

Source: Adapted from: Climate and Development Knowledge Network, 2014.

For a detailed list of references please visit our website at
http://unohrlls.org/small-island-developing-states-in-numbers-2015/

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