

**Climate Change in the African Small  
Island Developing States:**  
From Vulnerability to Resilience -  
*The Paradox of the Small*



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United Nations  
Economic Commission for Africa

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## ACRONYMS

AIMS	Atlantic, Indian, Mediterranean and South China Sea
AOSIS	Alliance of Small Island States
BPoA	Barbados Program of Action
ENSO	El Niño Southern Oscillation
FAO	Food and Agricultural Organization
GDP	Gross Domestic Product
GNI	Gross National Income
LDCs	Least Developed Countries
LDCF	Least Developed Countries Fund
MSI	Mauritius Strategy for Further Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States
NAMA	Nationally Appropriate Mitigation Actions
NAPA	National Adaptation Programme of Action
SIDS	Small Island Developing States
SPREP	Secretariat of the Pacific Regional Programme in the Pacific
UNCED	United Nations Conference on Environment and Development
UNFCCC	United Nations Framework Convention on Climate Change

## SUMMARY

The African Small Island Developing States (SIDS) comprise Cabo Verde, the Comoros, Guinea-Bissau, Mauritius, Sao Tome and Principe, and Seychelles. In its Fifth Assessment Report, published in 2014, the Intergovernmental Panel on Climate Change underscored that small island States will continue to be threatened in the twenty-first century by rising sea levels, tropical and extratropical cyclones, rising air and sea surface temperatures and changing rainfall patterns. Because of the low elevation of many island coastlines and atolls, rising sea levels are considered the most significant threat to those States. Furthermore, in addition to irreversible and life-threatening climate-induced change, many SIDS also face challenges related to dwindling resources and limited income-generating opportunities for their citizens. While considerable attention has been given to the biophysical impact of climate change on SIDS, there has not been sufficient focus on how climate change could exacerbate social vulnerability. The impact of climate change in SIDS is felt, first and foremost, by local communities, and although those communities are already adapting to climate change, institutional support will prove crucial to ensure that adaptation strategies are appropriately structured and organized and result in successful outcomes.

SIDS face particular challenges related to their size and relative isolation. Those challenges complicate efforts to promote economic development while safeguarding

those countries' integrity. In particular, the remoteness and small size of African SIDS makes it difficult for them to achieve economies of scale and reap the benefits of global commodity chains. Understanding, anticipating and adapting to economic, social, environmental and climate-related challenges is therefore of critical importance if those States are to achieve economic stability and security.

Markets and regulatory mechanisms to scale up and enhance adaptation strategies are often subject to State oversight. Governments will therefore be largely responsible for the implementation of most adaptation strategies and decisions, which will require significant financial support. Mobilizing resources for major climate change initiatives will necessitate effective coordination at the national, regional and international levels in order to leverage support for individual SIDS. International awareness raising campaigns can also bolster domestic support for climate change initiatives, enabling African SIDS to establish collaborative partnerships to strengthen their institutions and ensure that they are ready to respond to climate risks and capitalize on emerging opportunities.

This paper highlights the key climate and development challenges faced by African SIDS. It underscores the uniqueness of these challenges and outlines how climate change also provides opportunities for spurring development in Africa.



## I. INTRODUCTION

Small Island Developing States are small island or low-lying coastal countries located in tropical and subtropical regions. They are either surrounded by oceans or have long coastlines and are therefore vulnerable to climate change impacts including rising sea levels, more intense and frequent extreme weather events, rising sea surface temperatures, and ocean acidification (Nurse and others, 2014; Boto and Biasca, 2012; Kelman and West, 2009). Globally, there are approximately 52 SIDS, 23 of which are in the Caribbean, 20 in the Pacific and 9 in the Atlantic and Indian Oceans or in the Mediterranean and South China Seas. There are six African SIDS: Cabo Verde, the Comoros, Guinea-Bissau, Mauritius, Sao Tome and Principe, and Seychelles. For a Small Island Developing State, its surrounding ocean or sea is both an asset and a liability. The long coastlines of SIDS make them vulnerable to a range of climate change impacts, and their economies are often heavily dependent on natural resources (Wong, 2012). In the long term, rising sea levels pose the greatest threat to many SIDS, especially atoll States. Moreover, ocean acidification is already having a significant impact on coral reefs, which, in turn is adversely affecting tourism and threatening livelihoods dependent on marine species (Nurse and others, 2014). As sea surface temperatures increase, it is also likely that storm surges will become more intense and frequent (IPCC, 2012). Many SIDS are situated in a tropical cyclone belt that extends between 5 and 20 degrees north and south of the equator (Meheux and others, 2007). Increased cyclone activity will degrade coral reefs, damage infrastructure and other physical assets, result in a loss of both lives and livelihoods, impact key industries such as tourism and, in some cases, may induce the permanent relocation of certain communities (Meheux and others, 2007). In SIDS that are struggling to address water scarcity, including certain SIDS in West Africa, climate change is projected to worsen the severity and frequency of droughts (Pelling and Uitto, 2001). Given the vulnerability of SIDS

to a wide range of climate change impacts, changing weather patterns and extreme climate change events will have significant economic repercussions: it is projected that SIDS will suffer enormous losses and damages in relation to the size of their economies and will be increasingly unable establish buffers to offset the impact of economic shocks. (Wong and others, 2014).

Many factors exacerbate the vulnerability of SIDS to adverse environmental factors, including their small size, isolation, narrow resource base, small populations, high population density and limited supplies of fresh water (Briguglio, 2003; Guillaumont, 2007; Wong, 2011; Boto and Biasca, 2012). In 2005, the parties to the United Nations Framework Convention on Climate Change acknowledged that, paradoxically, although SIDS produce less than one per cent of global greenhouse gases, they would be disproportionately affected by climate change. Because of their significant agriculture, fisheries and tourism sectors, the economies of many SIDS are highly dependent on natural resources. Climate change will therefore not only result in direct losses, but will also lead to a gradual erosion of those States' economic base (Pelling and Uitto, 2001). Environmental hazards can also undermine social and economic development if public resources, such as tax revenues, must be diverted to fund disaster preparedness and relief projects (White and others, 2004). SIDS that are also categorized as least developed countries are especially vulnerable because their economies are frequently heavily dependent on agriculture, tourism, fishing and other sectors that are particularly sensitive to climatic stressors (Bruckner, 2012). For instance, according to the United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States, the tourism and travel industry contributed 83.8 per cent of the gross domestic product of Aruba in 2012. Least developed countries are also less resilient to negative external events and, because of their low levels of

development, have lower adaptive capacities. (Bruckner, 2012).

While SIDS have many characteristics in common, they are politically, socially and culturally diverse and differ in their levels of economic development. As such, SIDS have varying levels of vulnerability to climate change and possess different capacities for adaptation (Wong and others, 2014). All African SIDS face development challenges, but the three that are also categorized as least developed States, namely the Comoros, Guinea-Bissau and Sao Tome and Principe, are particularly vulnerable to the impact of climate change. That

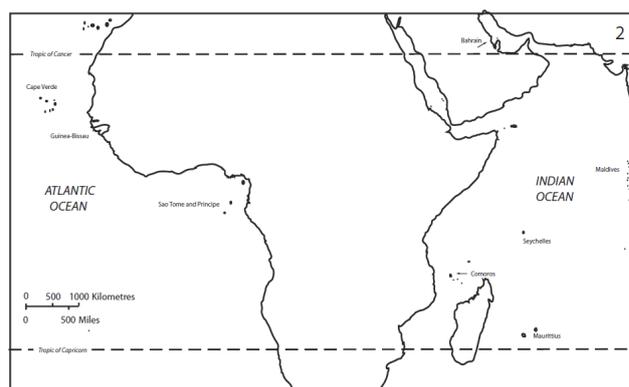
said, African SIDS are actively promoting sustainable development in numerous ways while also seeking to address climate change risks. This paper will highlight the particular vulnerability of African SIDS to climate change, a number of resilience building efforts currently underway in those countries to address its impact in key economic sectors, including tourism, agriculture, fisheries and renewable energy, and ways in which those efforts can be enhanced. Although considerable literature on SIDS is available, insufficient attention has been paid to the particular vulnerabilities of African SIDS and the opportunities offered by climate change.

## II. CHARACTERISTICS OF AFRICAN SMALL ISLAND DEVELOPING STATES

### A. LOCATION AND POPULATION

There are six African SIDS. Cabo Verde and Sao Tome and Principe are situated in the Atlantic Ocean, off the west coast of the African continent; Guinea-Bissau, a coastal State, is located on the continent; and the Comoros, Mauritius and Seychelles lie in the western Indian Ocean, off the east coast of Africa (see map 1). Guinea-Bissau is the most populous of the six States. In decreasing order of population, it is followed by Mauritius, the Comoros, Cabo Verde, Sao Tome and Principe, and Seychelles (see table 1). The land areas of those States, the percentage of their land areas devoted to agriculture, and other data are also provided in the same table.

**Map 1: Location of African Small Island Developing States**



**Table 1: Land size, population and other variables in African Small Island Developing States**

Variables	Cabo Verde	Comoros	Guinea-Bissau	Mauritius	Sao Tome and Principe	Seychelles
Population <sup>1</sup>	494 401	717 503	1 663 558	1 291 456	188 098	88 307
Land size (km <sup>2</sup> ) <sup>2</sup>	4 030	1 861	28 120	2 030	960	460
Arable land (% of land area) <sup>3</sup>	11.7	41.7	10.7	38.4	9.1	2.2
Percentage of population living 10 km from coastline <sup>4</sup>	96	100	41	72	97	100
Percentage of population living in cities in low elevation coastal zone <sup>5</sup>	38	40	82	75	100	100
Percentage of population living in urban areas	63.4	28	45	42	63	54

1. World Bank Data (2012) See: <http://data.worldbank.org/indicator/SP.POP.TOTL>.

2. World Bank Data (2012) See: <http://data.worldbank.org/indicator/AG.LND.TOTL.K2>.

3. World Bank Data (2012) See: <http://data.worldbank.org/indicator/AG.LND.ARBL.ZS>

4. See: <http://sedac.ciesin.columbia.edu/data/set/nagdc-population-landscape-climate-estimates-v3>

5. See: <http://sedac.ciesin.columbia.edu/data/set/lec3-urban-rural-population-estimates-v1>

## B. HUMAN DEVELOPMENT

According to the United Nations Development Programme's *2013 Human Development Report*, Seychelles is the African small island developing State with the highest levels of human development, with less than one per cent of its population living below the poverty line. Per capita gross national income in Seychelles increased from \$10,912 in 1980 to \$22,615 in 2012.<sup>1</sup> Mauritius has also achieved a high level of development and its gross national income increased by 275 per cent between 1980 and 2012.<sup>2</sup> Mauritius has a long-standing social welfare system that provides free health care and education to its citizens and, in 2013,

adopted an economic and social transformation plan to facilitate continued development. However, a five year review of policy achievements in Mauritius concluded that SIDS have made less economic progress than other groups of vulnerable countries, especially in relation to poverty alleviation and debt sustainability. While it has not reached the same level of development as Mauritius and Seychelles, Cabo Verde, whose per capita gross national income stands at \$3,630<sup>3</sup> according to data provided by that country's Government in 2013, has achieved significant development progress since its independence in 1975. Since 2012, the Government has been elaborating an economic transformation plan to spur further development.

**Table 2: Human development indicators in 2012**

	Cabo Verde	Comoros	Guinea-Bissau	Mauritius	Sao Tome and Principe	Seychelles	Sub-Saharan Africa	World
Life expectancy at birth (years)	74.3	61.5	48.6	73.5	64.9	73.8	54.9	70.1
Mean years of schooling (years) <sup>a</sup>	3.5 <sup>c</sup>	2.8 <sup>f</sup>	2.3 <sup>e</sup>	7.2	4.7 <sup>g</sup>	9.4 <sup>d</sup>	4.7	7.5
Expected years of schooling (years) <sup>b</sup>	12.7	10.2	9.5	13.6	10.8	14.3	9.3	11.6
Adult literacy rate	84.3 <sup>h</sup>	74.8 <sup>h</sup>	53.2 <sup>h</sup>	88.5 <sup>h</sup>	89.2 <sup>h</sup>	91.8	63.0	81.3
Gross national income (2005 PPP, in dollars)	3 557	986	1 042	13 300	1 864	22 615	2 010	10 184
HDI (value)	0.581	0.429	0.364	0.737	0.525	0.781	0.475	0.694

Source: (UNDP, 2013).

Note: a= data refer to 2010 or the most recent year available; b= data refer to 2010 or the most recent year available; c=based on cross country regression; d= based on the UNESCO Institute for Statistics (2012) estimate of educational attainment; e= based on data from UNICEF Multiple Indicator Cluster Surveys for 2002-2012; f= based on data on years of schooling of adults from household surveys in the World Bank's International Income Distribution Database; g= based on data from ICF Macro (2012).

1 See: <http://hdr.undp.org/sites/default/files/Country-Profiles/SYC.pdf>

2 See: <http://hdr.undp.org/sites/default/files/Country-Profiles/MUS.pdf>

3 <http://hdr.undp.org/sites/default/files/Country-Profiles/CPV.pdf>

**Table 3: Poverty and inequality indicators**

	Cabo Verde	Comoros	Guinea-Bissau	Mauritius	Sao Tome and Principe	Seychelles	Sub-Saharan Africa	World
Percentage of population living below \$1.25 per day (PPP)	21.0	46.1	48.9	-	-	0.3		
Income Gini coefficient	50.5	64.3	35.5	-	50.8	65.8	-	-
Percentage of seats in national parliament held by women	20.8	3.0	10.0	18.8	18.2	43.8	20.9	20.3
Labour force participation rate (ratio of female to male shares) 2011	0.610	0.437	0.870	0.584	0.570	-	0.85	0.66
Percentage of population living in urban settings	63.4	28.1	44.6	41.8	63.4	54.0		

Source: UNDP, 2013.

### III. VULNERABILITY OF AFRICAN SMALL ISLAND DEVELOPING STATES TO CLIMATE CHANGE

It is an irony that even though the size and remoteness of African SIDS may adversely affect them in areas such as trade, these same attributes play a major role in attracting tourists to them and enhancing their profile as exotic tourism destinations (Stevens and Mommsen, 2008). Owing to their small size, SIDS may be able to coordinate their tourism industry more efficiently and adapt to changing market demands by capitalizing on new opportunities. While African SIDS vary in size, geography and location, they share similar ecological fragility and dependence on natural resources (see table 4).

Agriculture, fisheries and tourism are some of the key economic sectors in African SIDS (see table 5).

These sectors are all likely to be impacted by climate change and ecosystems. The sustainability of these sectors relies on the integrity of the ecosystems. The following section outlines some of the ways in which climate change is already affecting these sectors and the expected future impacts.

#### A. ECOSYSTEMS

The biodiversity of African SIDS is among the most threatened in the world. Some of the ecosystems are confined to tight spaces and lack adaptive mechanisms such as ecological corridors and escape routes for species. Coral reefs are extremely important for biodiversity as they are home to over 25 per cent of all marine life and are vital for various ecosystem services. They provide nurseries for many species of commercially important fish and protect coastal areas from storms and waves. They are also a huge attraction for the tourism industry. Increasing greenhouse gas emissions lead to rising ocean temperatures, which

**Table 4: Natural resource and environmental threats**

Country	Natural resources			Effects of environmental threats		
	Natural resource depletion	Forest area		Freshwater withdrawal	Impacts of natural disasters	
	% of GNI (2010/2012)	% of total land area (2011)	% change (1990/2011)	% of total renewable water resources (2007-2011)	Number of deaths (2005 – 2012)	Population affected (2005-2012)
Comoros	1.1	1.4	-78.3	0.8	5	106 714
Cabo Verde	0.1	21.0	46.7	6.8	2	41 479
Guinea-Bissau	0.5	71.6	-9.2	0.6	41	20 739
Mauritius	0.0	17.3	-9.7	26.4	1	689
Seychelles	0.0	88.5	0.0	-	0	38 151
Sao Tome and Principe	0.7	28.1	0.0	0.3	-	-
SIDS	4.9	63.0	-3.6	-	479	33 638
World	5.3	31.0	-3.5	7.6	12	24 203

Source: UNDP 2014 – Human Development Report.

can induce coral bleaching – one of the most visually dramatic impacts of climate change. When the ocean warms up, the oxygen content reduces and corals expel the symbiotic algae living in their tissues, causing the corals to turn completely white.

## B. AGRICULTURE

Climate change presents a challenge to efforts to increase the amount of food grown domestically in African SIDS. For example, projected decreases in rainfall and increases in temperature in Mauritius are expected to reduce vegetable and other crop yields (Republic of Mauritius, 2010). This phenomenon is already occurring in the Comoros, reducing the yields of staples such as maize and bananas and threatening food security (Union of the Comoros, 2006). Changing rainfall patterns and increasing temperatures are also expected to impact agricultural production in Cabo Verde, where over 90 per cent of agriculture is rain-fed (Republic of Cabo Verde, 2007). Meanwhile, flooding is already hurting agricultural productivity in Seychelles (Republic of Seychelles, 2013). Perhaps the greatest impact of climate change on agriculture will be felt in Guinea-Bissau, where 80 per cent of the population relies on agriculture, and where changing rainfall patterns could significantly impact yields and exacerbate poverty (Republic of Guinea-Bissau, 2006).

## C. TOURISM

Tourism is a major source of revenue and has huge potential for growth and development in African SIDS. In Seychelles, for instance, the industry accounts for 64 per cent of gross domestic product (Republic of Seychelles, 2013). The expected 0.45-0.82 m rise in sea levels will threaten coastal infrastructure, exacerbate coastal erosion and inundate beaches, thereby impacting tourism. Ocean acidification will degrade coral reefs and impact marine life, while rising temperatures will impact biodiversity and reduce the availability of water (Nicholls, 2014). As the deterioration of coral reefs and lagoon ecosystems continue, tourism and recreation activities such as diving, snorkeling and sport fishing will be affected.

## D. FISHING

The fishing industry in African SIDS is also highly vulnerable. Under a warming scenario of 2°C by 2050, climate change is projected to lead to a loss of \$17 million to \$41 million to the global fishery industry (Holmyard, 2014). Anecdotal evidence in Guinea-Bissau has indicated that the reduction in precipitation and increase in temperatures have contributed to dwindling lake species (Republic of Guinea-Bissau, 2011). Off the coast of the Comoros, acidification has led to coral

**Table 5: Contribution to gross domestic product, by sector (percentage)**

Country	Cabo Verde		Comoros		Guinea-Bissau		Mauritius		Sao Tome and Principe		Seychelles	
	2006	2011	2006	2011	2006	2011	2006	2011	2006	2011	2006	2011
Agriculture, forestry, fishing and hunting	9.4	8.2	41	43.9	43.6	40.3	5.2	3.5	17.7	19.3	3.4	2.7
Tourism	8.8	6.8	40.40	43.40	No data	No data	31.10	28.10	9.80	9.30	57.90	63.70

*Source:* African Development Bank, Organization for Economic Cooperation and Development, United Nations Development Programme, Economic Commission for Africa and African Centre for Statistics.

bleaching and a reduction in stocks of some fish species. This has reduced the income of fishermen and led to shortages in local markets (Union of the Comoros, 2006). These impacts will in turn influence the spawning cycles of reef fish and other marine life, which depend on coral reefs. In addition, the increasing intensity and frequency of extreme weather events may affect safety at sea for fishermen (Daw and others, 2009). This has been a particular issue for Sao Tome and Principe.

## E. LOSS AND DAMAGE

While different levels of development and varying geography and topography make African SIDS differentially vulnerable to climate change impacts, rising sea levels are of concern to all of them. Although the quantity and quality of hydrological data varies, a sea level rise of 3.8 mm/year has been recorded for Mauritius. Ocean acidification is affecting some SIDS more than others, with Seychelles bearing the brunt of coral bleaching (Nurse and others, 2014); as elucidated above, this has significant implications for the tourism and fishing industries. Many African SIDS are experiencing an increased incidence of flooding. For example, heavy rainfall has led to flooding in

Seychelles, causing damage to homes, roads and coastal infrastructure (Republic of Seychelles, 2013). Torrential rains have also become more common in Cabo Verde and Sao Tome and Principe, damaging infrastructure and reduced the fertility of arable land owing to soil erosion (Republic of Cabo Verde, 2007; Sao Tome and Principe, 2006). In 2013, a flash flood in Mauritius claimed the lives of 10 people.<sup>4</sup>

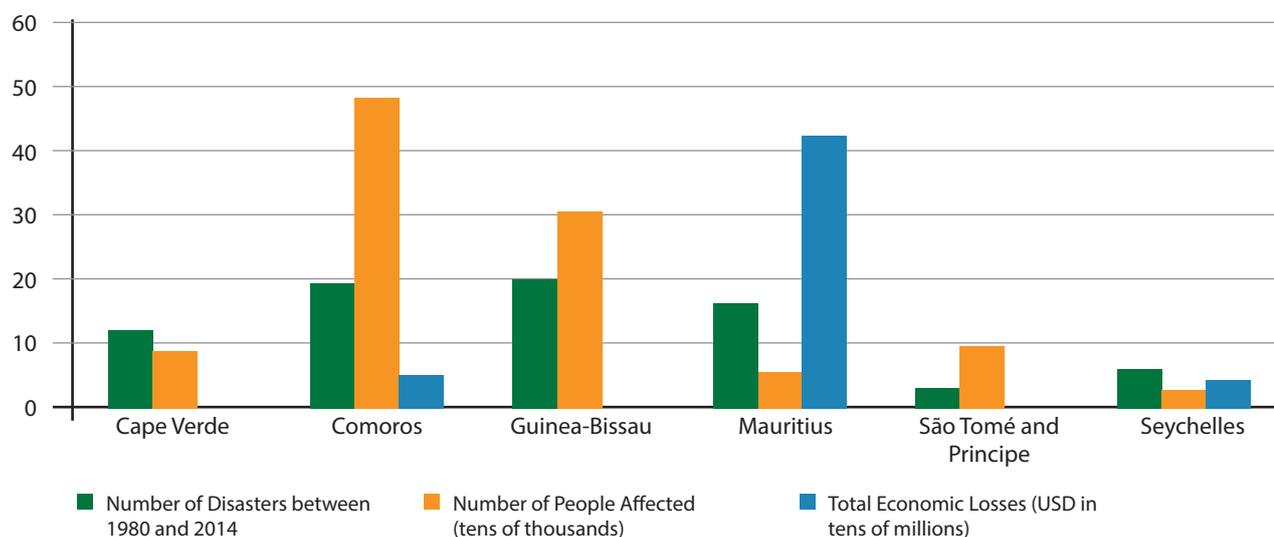
Many African SIDS are also experiencing increasing temperatures and decreasing rainfall, resulting in a high risk of drought. In Cabo Verde, rising temperatures are very likely to lead to increased aridity, which will exacerbate water scarcity (Republic of Cabo Verde, 2007). Rising temperatures have also been accompanied by a decline in rainfall in the Comoros. These have caused many rivers to dry up, delayed the fruit harvest and reduced the productivity of key crops such as maize and bananas, thereby threatening food security (Union of the Comoros, 2006). Many African SIDS have also experienced more frequent cyclones and storms. In Sao Tome and Principe, these weather events have led to property losses and damage to coastal infrastructure and productive assets (boats, fishing equipment), not to

**Table 6: Disasters and losses from 1980 to 2014**

	Country	Coastal length (km)	Number of disasters between 1980 and 2014	Number of people affected	Total economic losses (\$)
1	Cabo Verde	724	12	86 669	3 000 000
2	Comoros	340	19	481 539	47 804 000
3	Guinea-Bissau	1 227	20	302 847	No data
4	Mauritius	839	16	51 951	421 373 000
5	Sao Tome and Principe	170	3	94 063	No data
6	Seychelles	151	6	25 763	41 000 000
	Total	3 451	76	1 042 832	513 177 000

Source: <http://www.emdat.be>

<sup>4</sup> See: <http://www.reuters.com/article/2013/03/31/us-mauritius-floods-idUSBRE92U06Q20130331>.

**Figure 1: Number of disasters, people affected and economic losses**

mention the loss of lives and livelihoods (Republic of Sao Tome and Principe, 2006) (see table 6 and figure 1).

As shown in table 1, for Guinea Bissau, Mauritius, Sao Tome and Principe, and Seychelles, the percentage of the population living in coastal cities is extremely high. The increased risk of sea level rises, flooding and extreme weather events will, therefore, affect large segments of that population.

Some African SIDS are also experiencing the cascading effects of climate change impacts on the continent. For example, dust storms are much more prevalent in Cabo Verde during periods of drought in the Sahel (Wong and others, 2014). Climate change also has health impacts. For instance, the risk of dengue fever, which is prevalent in Cabo Verde, the Comoros and Mauritius, is expected to increase with climate change (Niang and others, 2014).

## IV. PARADOX OF AFRICAN SMALL ISLAND DEVELOPING STATES

As mentioned earlier, although African SIDS vary in size, geography and location, they share the same ecological frailty and are all dependent on natural resources. Agriculture, fishing and tourism are some of the key economic sectors in African SIDS likely to be affected by the impacts of climate change. The following section outlines some of the ways in which climate change is already affecting these sectors and what type of impacts could be expected in the future. Paradoxically, African SIDS can exploit key natural resource endowments and turn them into assets to transform their economies and the lives and livelihoods of their people, many of whom are resource dependent. However, these very productive sectors are greatly exposed to climate change impacts, compelling African SIDS to try to reverse the trends rather than enjoy the full benefits of a thriving tourism sector; a small but potentially strong and competitive agriculture sector and a fishing industry that aspires to feed its people and maximize on its rich capital. African SIDS tend to rely heavily on their oceans as a purveyor of jobs and the mainstay of their small and fragile economies. SIDS, with their beautiful beaches and coral reefs that are the lifeblood of their economies, are often perceived as a haven for tourists from all over the world.

Even with such assets, however, African SIDS remain insular and remote in their fight against the biophysical processes that are claiming their resources, affecting their ability to build a sustainable future for their citizens and greatly reducing any room for manoeuvre in terms of exploiting their agricultural, fishing and tourism sectors. The ability of SIDS to bounce back from climate shocks and extremes is being constantly undermined by a set of complex biophysical processes, which conspire to further reduce the adaptive capacity of farmers and fishermen and expose them to new

threats and risks, which are often beyond their coping thresholds. The threats that climate change imposes on African SIDS are also likely to disable and derail the processes already undertaken by many of them in their bid to achieve the Millennium Development Goals.

Although African SIDS have many assets that could be used to lift their people out of poverty, they face challenges such as economies that are relatively fragile, an agricultural sector that has not managed to make a full recovery and is mainly gridlocked on smallholder and subsistence farming, and a tourism industry in which Governments have not managed to “displace” climate change with a robust infrastructure and technological base as key levers to managing weather variation and patterns.

Economic and social transformation has eluded some African SIDS because of weaknesses that are peculiar to small States. These include the small number of skilled workers, a poor infrastructural base, limited technological investment and a struggling agricultural sector. Countries such as Mauritius, Seychelles and Cabo Verde have, however, to varying degrees succeeded in rising above these constraints to reinvigorate their economies and keep economic growth at a reasonable level. Nevertheless, the real constraints have not gone away. Many African SIDS have not been able to lay the foundation for an industrial policy and the commensurate infrastructure to turn their oceanic wealth into large dividends, and introduce measures to forestall the harmful impacts of climate change. The paradox of being small resides in the fact that the safety nets often associated with natural capital are not wide enough to insulate African SIDS from major risks and threats. The dilemma is that the key elements of their productive economy, which are valuable lifelines, are also their main Achilles heel. Indeed, although agriculture, fishing and forestry are at the core of the economies of SIDS, they remain the most vulnerable to climate change impacts. The trajectory to a viable blue and green economy in

African SIDS is heavily predicated on how natural resources are managed and the institutional backing and infrastructure to harness these new areas of growth. The potential to develop the fisheries sector and exploit it across the entire value chain is largely underutilized. Climate change will either multiply these

threats or provide new opportunities for Government to rethink innovative adaptation strategies, which will enhance the resilience of current agricultural and fishing systems and lead to the creation of jobs in these climate-sensitive sectors.

## V. VOICING THE NEEDS OF SMALL ISLAND DEVELOPING STATES ON THE INTERNATIONAL STAGE

Recognizing their unique vulnerability to climate change and the challenges posed to sustainable development as a result of their shared characteristics, the SIDS formed the Alliance of Small Island States in 1990 to ensure that their voices were heard on the international stage, including during the negotiations under the United Nations Framework Convention on Climate Change. Two years later, at the United Nations Conference on Environment and Development, the international community recognized the unique vulnerability of SIDS to environmental hazards. In 1994, the Barbados Programme of Action was launched, which highlighted the vulnerabilities of SIDS, outlined priority areas for sustainable development, and emphasized the need for regional cooperation and the role of the international community in supporting the sustainable development of SIDS. The Programme set out a number of actions

that could be taken at the national and regional levels to address the impacts of climate change (see box 1). In 2005, the Programme was reviewed and the Mauritius Strategy for the Further Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States was unveiled.

In the Mauritius Strategy, the General Assembly reaffirmed the threat posed by climate change to sustainable development goals and, in some cases, to the very existence of SIDS, and asserted that adaptation remains a priority for these countries. The Strategy further strengthened the social and economic dimensions of the Barbados Programme of Action by placing greater emphasis on issues such as culture, health and knowledge management, education for sustainable development, consumption and production. The Strategy encouraged the international community to take steps to address climate change, including the development, transfer and dissemination of technologies, and the provision of financial support to help SIDS address climate change.

**Box I. Actions to address climate change at the national, regional and international levels from the Programme of Action for Sustainable Development of Small Island Developing States (United Nations General Assembly, 1994)**

<p><b>National action, policies and measures</b></p> <ol style="list-style-type: none"> <li>1. Ensure early ratification of, or accession to, the United Nations Framework Convention on Climate Change. Collect and monitor data on climate change and sea-level rises.</li> <li>2. Formulate comprehensive adjustment and mitigation policies for sea-level rises in the context of integrated coastal area management.</li> <li>3. Assess the effects and socioeconomic implications of climate change, climate variability and sea-level rises.</li> <li>4. Undertake vulnerability mapping to inform adaptation strategies.</li> <li>5. Enhance understanding of the potential impacts of climate change.</li> <li>6. Compile information on the range of issues pertinent to adaptation planning.</li> <li>7. Promote energy efficiency in the context of sustainable development and minimize the effects of climate change on sustainable development.</li> <li>8. Participate in bilateral, regional and global programmes to map and assess the impacts of climate change.</li> </ol>	
<p><b>Regional action</b></p> <ol style="list-style-type: none"> <li>1. Create and strengthen programmes to improve the capacity to assess the impacts of climate change.</li> <li>2. Develop and strengthen mechanisms to facilitate the exchange of information and experiences and promote technology transfer.</li> <li>3. Help States Parties to ratify and shoulder their responsibilities under the United Nations Framework Convention on Climate Change.</li> <li>4. Support national efforts aimed at developing strategies and measures on adaptation to climate change, as well as the development of technical guidelines and methodologies to facilitate adequate adaptation to climate change.</li> </ol>	<p><b>International action</b></p> <ol style="list-style-type: none"> <li>1. Immediate implementation of the United Nations Framework Convention on Climate Change.</li> <li>2. Support SIDS in the development of integrated coastal zone management plans.</li> <li>3. Improve access to resources to support the monitoring and assessment of the impacts of climate change and the development and implementation of adaptation strategies</li> <li>4. Improve access to information and facilitate information-sharing.</li> <li>5. Provide access to environmentally sound and energy-efficient technology to assist SIDS in energy conservation.</li> <li>6. Support the activities of intergovernmental, regional and subregional organizations in their work to support SIDS in assessing and addressing the impacts of climate change.</li> <li>7. Provide improved access to financial and technical resources to assist SIDS in meeting the costs associated with the development of national and regional strategies, measures and methodologies to facilitate adequate adaptation to climate change.</li> </ol>

## VI. UNLOCKING THE DEVELOPMENT POTENTIAL OF AFRICAN SMALL ISLAND DEVELOPING STATES

All of the African SIDS have made significant efforts to mitigate the impacts of climate change and comply with their responsibilities as signatories to the United Nations Framework Convention on Climate Change. Cabo Verde, Mauritius and Seychelles have already introduced national climate change strategies, while the Comoros, Guinea-Bissau and Sao Tome and Principe are at varying stages of developing such strategies. The States are also in the process of implementing their national adaptation programmes of action and developing national adaptation plans. The African SIDS still need to put in place strategic reforms to align their economies to low-carbon, climate resilient pathways and build strategic alliances and partnerships. The key focal areas are set out below.

### A. GREEN ECONOMY

In order to harness their intrinsic potential, in spite of the paradox of the small and their remoteness, African SIDS will need to move towards a green economy. This is critical for safeguarding their natural resources, providing local communities with improved employment opportunities and boosting their energy security by shifting to renewable sources. Measures to achieve this need to be embedded into both sectoral and national policies and operational responses. Some of the ongoing national reforms, as well as suggestions for improvement, are discussed below.

#### 1. AGRICULTURE

A significant amount of the food consumed in African SIDS is imported. The biggest importers are Cabo Verde (80 per cent), Mauritius (75 per cent) and Seychelles (70 per cent), which makes them particularly vulnerable

to external factors such as price fluctuations, global food shortages and varying quality standards.

The amount of arable land and water in African SIDS is limited (see table 1); nevertheless, there is the potential to increase productivity by improving agricultural techniques. For instance, Cabo Verde has introduced drip irrigation technology, which has increased the proportion of arable land by 20 per cent, while Mauritius is promoting the consumption of locally produced food and increasing domestic food production.

#### 2. FISHING

The fishing industry is hugely important in the African SIDS: not only is it a major source of dietary protein, it also a source of livelihood for many people. Mauritius has established six fishing reserves and two marine parks on the main island, and four marine reserves, one marine park and three fishing reserves on the island of Rodrigues (Republic of Mauritius, 2013). In the process of developing a plan for transforming the marine economy, Cabo Verde has identified a number of challenges including a weak and fragmented institutional environment, which the Government plans to address by developing institutional capacity, investing in modern infrastructure and equipment, and developing human capital (Republic of Cabo Verde, 2009). Cabo Verde hopes that by mainstreaming climate change into development processes, the resilience of coastal and marine biodiversity will be enhanced, which will in turn reduce the vulnerability of the people whose livelihoods depend on the fishing industry. Coastal and fisheries management policies would be greatly enhanced if they were implemented in conjunction with local fishermen (Hauzer and others, 2012). Small-scale fishermen and others in the fishing industry should be given access to finance, insurance and market information, and greater investments need to be made in infrastructure and improving producer and trade organizations. Research for development is also essential in order to generate

high economic returns and increase employment opportunities.

### 3. TOURISM

Tourism makes a significant contribution to the national economies of many African SIDS (see Table 5). In 2010, Cabo Verde implemented the Strategic Plan for Tourism, which designated specific areas for preservation owing to their importance as natural resources and tourist destinations (Republic of Cabo Verde, 2013). The 2012-2020 Sustainable Tourism Master Plan of the Seychelles aims to strengthen its position on the international market and increase the ownership and participation of local communities in the industry (UNDESA, 2012). In Mauritius, the Tourism Sector Strategy Plan 2009-2015 outlines a strategy for the sustained development of the tourism industry, with a view to increasing revenue (Republic of Mauritius, 2012b). Mauritius has also introduced the Long-term Energy Strategy 2009-2025, which outlines actions for improving energy efficiency in the tourism sector by investing in solar-powered water systems and energy-efficient technologies, and giving tourists the opportunity to offset their flights by donating to sustainable energy schemes in the country (Republic of Mauritius, 2009).

Given the economic importance of the tourism industry in some African SIDS, there are tremendous opportunities for expanding such growth to other African SIDS. The infrastructure and transaction processes characterizing the sector could be further improved to enhance their efficiency and effectiveness through green transformation measures, which would increase current profit margins.

To increase the benefits of tourism for the local economy, foreign investment and technology transfer are needed to expand and modernize tourism infrastructure (General Assembly, 2005). In addition, broader social participation in planning and development is critical to ensure that benefits are distributed widely. Linkages with other sectors of the

economy will help to ensure that a greater proportion of revenue from tourism stays within local and national economies. In Seychelles, there has traditionally been tension between the tourism and agricultural industries but this could be eased if both industries were benefiting each other; for instance, hotels could be encouraged to buy food from local farmers and suppliers. This would in turn improve local economies. In addition, there is a real need for planning processes that better tackle issues such as carrying capacity, tourism supply and demand, resource utilization, and economic, sociocultural and environmental impact, and that incorporate the views and needs of a wider range of stakeholders in order to ensure that poverty alleviation and development goals are maximized.

There is a great deal of potential for further developing frameworks for integrated coastal management, which can play a role in adaptation planning and facilitate the establishment of sustainable development strategies that take into account the availability of environmental, sociocultural and institutional resources (Cambers, 2001). These processes should incorporate the needs of a range of relevant stakeholders. Tourism development and environmental management should be mutually supportive: niche markets, particularly nature and cultural tourism, need to be identified and facilities developed; local populations should also be involved in identifying and managing protected areas set aside for eco-tourism (UN-OHRLS, 2011). Lastly, the poor in particular must participate in planning, development and implementation processes, and receive training that allows them to benefit from tourism (Neto, 2003).

However, heavy reliance on the tourism sector could have the downside of increasing the vulnerability of African SIDS to exogenous shocks (Neto, 2003). Natural resources are often the prime reason for tourists to visit remote SIDS; plans for diversifying and managing the carrying capacities of the islands must, therefore, be established to safeguard such resources for future generations.

#### 4. RENEWABLE ENERGY

Renewable energy resources, such as hydropower, wind, solar, geothermal, biomass and wave power, have the potential to reduce reliance on costly foreign oil imports as well as create employment and business opportunities for African SIDS. A recent report by the International Renewable Energy Agency showed that through a mix of four key reforms (political prioritization to attract investment; market framework for investment; technical planning for investment; and capacity-building to implement investment), SIDS can attract investment for cost-effective renewable energy resources. Cabo Verde has developed a strategy to derive 50 per cent of its energy from renewable sources by 2050 (Republic of Cabo Verde, 2013) while Mauritius has developed both the Energy Strategy Action Plan 2011-2015 and the Long-Term Energy Strategy 2009-2025, with the aim of increasing the share of renewable energy to 35 per cent by 2025, using financial incentives and tax rebates (Republic of Mauritius, 2013). Seychelles has approved the Energy Act which allows independent power producers to sell renewable energy to the national grid, and has committed itself to diversifying its energy supply, with the goal of deriving 15 per cent of the total energy supply from renewable sources by 2030 (AOSIS, 2012). The Comoros, Guinea-Bissau and Sao Tome and Principe are yet to develop renewable energy policies. However, the Government of Guinea-Bissau recognizes the significant potential for wind, solar and even tidal energy and that these have largely been unexplored (Republic of Guinea-Bissau, 2011). International financing and technological support will be crucial for the realization of such potential. For the private sector, there are significant opportunities for investment in renewable energy in the African SIDS by capitalizing on existing potential and national policy reforms, which have created enabling business environments.

Piloting new technologies for renewable energy in African SIDS presents an opportunity to find more efficient energy mixes in countries where conventional

technologies are expensive (Chen and others, 2007). For example, good wind conditions in Cabo Verde prompted the installation of several wind farms (Pelc and Fujita, 2002).

The development of renewable energy is capital intensive, requiring significantly more frontload investment than conventional energy technology (Sovacool, 2013). External resources will need to be mobilized and incentives and regulatory frameworks developed to facilitate the transformation process. To help African SIDS transform their energy sectors in a way that facilitates pro-poor development, long-term commitments will be required by development partners to provide and facilitate investment, attract private capital and transfer knowledge (Malydev, 2009).

#### B. REGIONAL COOPERATION

Though geographically disparate and distributed in remote locations, African SIDS could benefit immensely from collaborative partnership building in order to uphold their common interests in regional and international forums, and pool their resources for joint advocacy and implementation of common actions. The establishment of a regional institution similar to the Secretariat of the Pacific Regional Environment Programme, which provides a platform for sharing expertise, could be a model for African SIDS.

African SIDS have been engaged in global efforts to reduce the risk from extreme climatic events under the Hyogo Framework for Action of the United Nations International Strategy for Disaster Reduction. While disaster risk reduction continues to be a priority policy area across SIDS, capacity constraints and limited financial resources have hindered the implementation, evaluation and reporting of programmes and policies under the Framework (UNDESA, 2010).

SIDS generally rely heavily on trade to drive economic growth. Trade flows are far higher in SIDS than in other

developing countries and least developed countries. Their trade openness, coupled with the long distances exports have to travel, result in high unit costs of commodities and services and non-competitive locally produced tradable goods (Boto and Biasca, 2012). Economies of scale through increased volumetric transactions could be significantly boosted by a regional framework and greater cooperation.

Although the remoteness and small size of African SIDS works against them in some ways, these same features play an important role in attracting tourists as they are seen as exotic destinations (Stevens and Mommsen, 2008). In addition, their small size may make it easier for SIDS to coordinate the tourism industry, adapt and innovate to changing market demands, and capitalize on new opportunities (Stevens and Mommsen, 2008). It is essential to enhance regional cooperation and establish a regional tourism strategy for sharing information and expanding the tourism carrying capacity.

Regional cooperation could also play a role in driving the development of renewable energy. These efforts should be supported by research to enhance understanding of how the unique economic, social, geographical and climate challenges in SIDS can be overcome to facilitate the expansion of renewable energy (Stevens and Mommsen, 2008). Public-private partnerships can facilitate the sharing of both the risks and the benefits of renewable energy technology (Sovacool, 2013).

### C. INSTITUTIONS, GOVERNANCE AND CAPACITY

Building resilience to climate change in SIDS requires strengthening adaptive capacity, reducing the risk of climatic hazards and addressing inequality (World Bank, cited by Perch, 2011). Governments can, and have already, effectively addressed both climate change and development through national policies that promote coherence along with subnational policies

that simplify and combine programmes (Perch, 2010a). Integrating policies can promote coordination among line ministries that may have conflicting priorities and mandates (Kok, 2006).

No single sector can address climate change on its own: cross-sectoral collaboration and the sharing of lessons and best practices are necessary (Perch, 2010a). Perch and Roy (2011) analysed 32 national adaptation programmes of action and found that only two mentioned activities to be undertaken by various ministries. That said, the adaptation programmes of Guinea-Bissau and Sao Tome and Principe incorporated multidimensional frameworks that looked at the nexus between climate change, poverty, gender and other environmental concerns (Perch, 2010b).

In the African SIDS, there is significant potential for capturing “blue carbon” by protecting and rehabilitating marshes and mangroves (Republic of Seychelles, 2013), which would also have adaptation and development benefits. Such projects could align with the clean development mechanism and be financed through a proposed blue carbon fund to support the protection and rehabilitation of coastal and marine ecosystems.

### D. TECHNOLOGY TRANSFER

There is significant potential to develop and implement renewable energy technology in African SIDS. A range of tools is available to increase market access, including public-private partnerships. This demands appropriate policies to be put in place to encourage investment, as renewable energy is capital intensive and requires significant investment.

Although substantial investment will be required for the technologies and skills needed to support low-carbon development in African SIDS, expanding markets and enhancing access to renewable energy have great potential as a strategy for achieving development goals and addressing climate change.

## VII. WAY FORWARD

The present report has shown that African SIDS are highly vulnerable to climate change. What are the options for those countries to become less vulnerable to climate change, in their efforts to ensure their sustainability?

### A. MAXIMIZING CO-BENEFITS

African SIDS are grappling with a range of development challenges. Climate change adds another layer of complexity to the policy landscape. A robust framework of pro-poor development policies will enhance resilience to climate change and reduce losses and damages from its impacts. While the contribution of those countries to global emissions is minimal, a number of benefits can be attained by combining development, adaptation and mitigation strategies. Activities such as providing clean energy for household use can improve health and well-being, especially that of women. Strategies to capture “blue carbon”, such as protecting and rehabilitating coastal mangroves, can provide protection from storm surges, but are still in the development stages.

In order to maximize the benefits of climate-dependent sectors, such as fishing and tourism, for the national economy, the profits of industries related to those sectors must remain within the country. With regard to tourism, this will require reducing leakage by increasing the number of nationally owned tourism operations. Linkages to local industries will also ensure that tourism enhances development at the local level. In the case of fisheries, African SIDS are capitalizing on marine resources by entering into trade agreements that help open up markets for fish exports. However, policies aimed at helping small-scale fishermen must also be implemented. To ensure the sustainability of fisheries, African SIDS must develop protection and conservation policies, similar to those that have been introduced in Mauritius.

### B. FOSTERING INNOVATION

There is significant potential for developing renewable energy technology in African SIDS. A range of tools is available to increase market access, including public-private partnerships. As renewable energy is capital intensive and requires significant investment, policies that encourage investment must be developed. Subsidies for renewable energy need to be offered, while those pertaining to conventional energy should be gradually reduced. In addition, policies aimed at further incentivizing energy efficiency should be introduced. Some African SIDS are already making significant strides in this area.

### C. INVESTING IN SOCIAL CAPITAL

In the recovery and coping strategies of vulnerable communities, investing in social capital improves the chances of being able to rebound after a disaster.

### D. TARGETING INTERVENTIONS TO POOR COMMUNITIES

While tourism, agriculture, fishing and renewable energy can yield significant benefits for national economies, those benefits do not always trickle down to those who need it most. It is therefore important that policies be pro-poor and that risk management strategies, such as insurance and social safety nets, be applied when losses and damages from climate change impacts cannot be avoided.

### E. IMPROVING FOOD SECURITY

Much of the food consumed in African SIDS is imported, which makes them vulnerable to price fluctuations. Orienting consumption towards local food and increasing domestic food production are two strategies that are being implemented by Mauritius to improve food security. Improving agricultural production requires improved agricultural methods,

especially in countries with a limited supply of water. Cabo Verde is increasing its agricultural production by using drip irrigation technology.

## F. STRONG INSTITUTIONS

Enhancing resilience to climate change requires strong institutions that incorporate the needs of stakeholders and lay a foundation for formulating policies and regulatory frameworks to advance green and blue economy initiatives in SIDS.

## G. REGIONAL COOPERATION

African SIDS need to increase knowledge on climate change impacts and potential strategies to deal with them, including the combination of appropriate risk

management approaches. Given that all decisions have trade-offs and opportunity costs, it is also important to provide decision-makers with information about the costs of implementing policy options, as well as the potential losses and damages. Though geographically disparate, African SIDS could benefit from the establishment of a regional institution similar to the Secretariat of the Pacific Regional Environment Programme.

To this end, ClimDev-Africa, through its secretariat, the African Climate Policy Centre, undertook country-based assessments in the African SIDS to identify each country's key climate and development priority needs. Based on the findings, key intervention portfolios will be prepared and policies will be implemented to turn risks into opportunities in the African SIDS.

## VIII. CONCLUSION

African SIDS are often perceived as being extremely vulnerable and impoverished. Climate change will undoubtedly increase their baseline stress and adversely affect their natural resource endowments. African SIDS tend to rely on external processes and support for making their voices heard. In the scheme of things, climate change represents a major game changer for African SIDS. It presents them with the opportunity to create robust institutions, pursue pathways for achieving a blue and green economy, and build a strong technological and scientific knowledge base that would help drive efforts to build resilience and develop their economies.

However, the poignancy of the words of James Michel, the President of Seychelles, spoken at a conference in July 2013, clearly reveal the dilemma faced by African SIDS: “a fair deal for SIDS means a truly sustainable governance structure for oceans. When harvesting the oceans for fish or other resources, they seem to belong to everyone. But when it comes to dealing with sustainability of resources, marine conservation, pollution and piracy, the oceans seem to belong to no one”. These words underline the fact that although many small islands are coveted for their natural

endowments, which are the basis of their economies, they often stand alone in the face of rising temperatures and other biophysical impacts of climate change. Therein lies the crux of the SIDS dilemma.

To create an environment for coping with climate challenges, African SIDS need access to enormous financial resources and new technologies. In addition, and most importantly, effective national, regional and global policy and governance frameworks must be established. African SIDS are building and enhancing the resilience of their agricultural and food systems, exploiting their natural resource endowments through tourism, fishing, agriculture and forestry, and investing in infrastructure. SIDS should also make use of science and technology in their drive to pursue a low-carbon climate-resilient development pathway. African SIDS have an opportunity to reorient their development strategies in a way that takes into account the impacts of climate change. In order to tackle growth and development challenges and secure a future that is not compromised by climate change, African SIDS must reframe their growth models, focus on climate-sensitive sectors and ensure that investments foster economic growth and social transformation.

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