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SEYCHELLES

Disaster Management & Climate Change Handbook

August 2024

Disaster Management Reference Handbook Series

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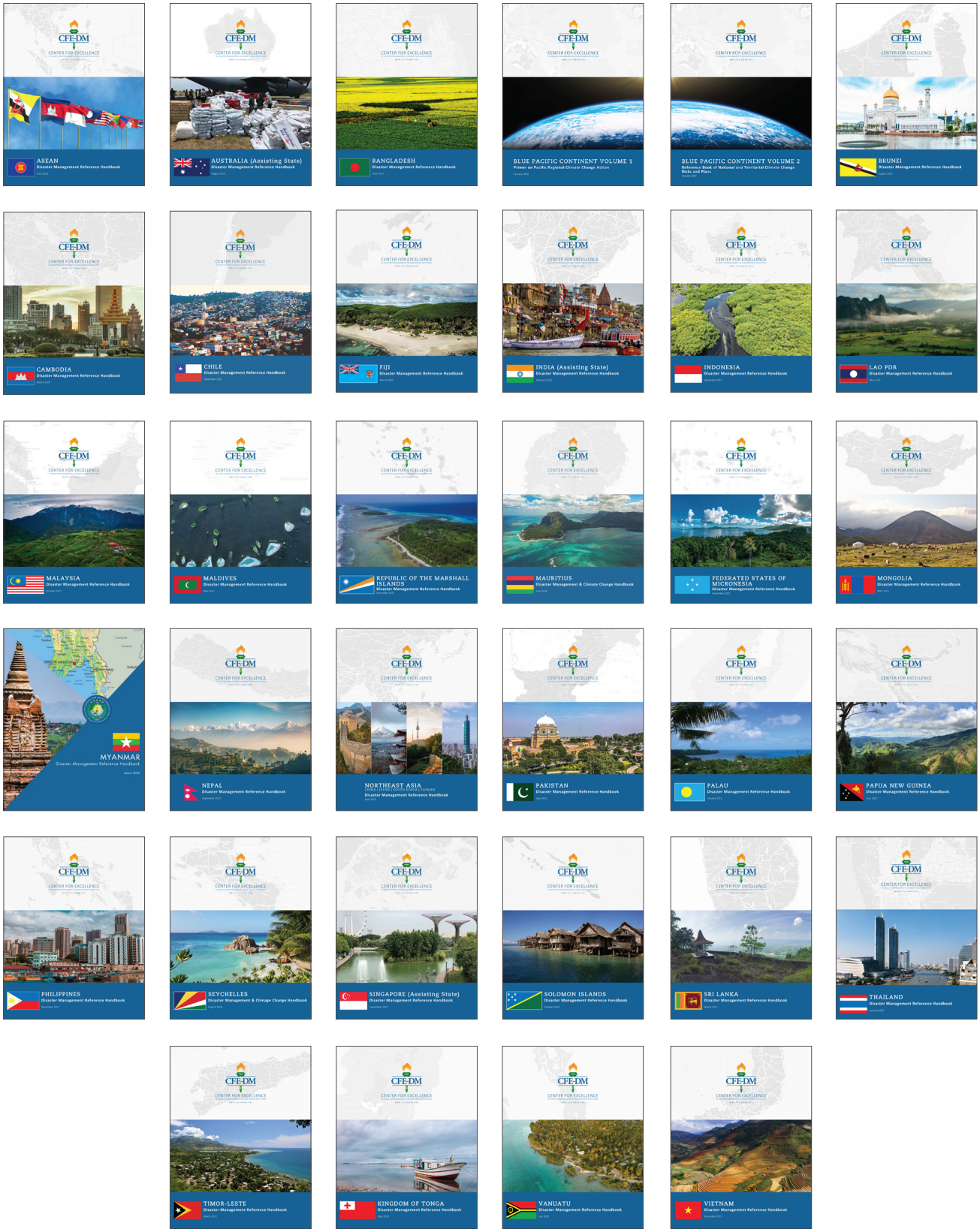

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Front Cover

La Digue, Seychelles by Christian Cacciamani on Unsplash.com. https://unsplash.com/photos/large-rocks-on-the-island-jPmurJKSL_0

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Letter from the Director

The Center for Excellence in Disaster Management and Humanitarian Assistance (CFE-DM), as a United States (U.S.) Department of Defense (DoD) entity, supports DoD and other U.S. government efforts to build a resilient, secure future at home and globally. This mission includes helping to accentuate allies' and partners' capacity to manage natural and anthropogenic hazards by reducing exposure and vulnerability and heightening coping capacity.

Seychelles is vulnerable to many of the same risks as other small island developing states (SIDS), including but not limited to the results of geographic remoteness, exposure to global economic shocks, and climate change impacts. Although Seychelles continues to invest in its ability to confront these hazards, the country's geographic isolation means that an increase in the frequency of incidents will strain the country's resources. Thus, as Seychelles continues to strengthen its domestic institutions, it engages robustly with regional and international partners to harness resources. Among these partnerships, Seychelles works closely with fellow Indian Ocean Island states and groupings, continental African organizations, and global alliances of SIDS. The U.S. continues to engage with Seychelles both bilaterally and through these fora.

The CFE-DM knows the potential for climate hazards to become disasters as has happened in our own region, the Pacific Ocean, and we understand that it is island communities themselves that are the leading forces in planning and implementing projects that will secure the futures of their people and their islands. Our work with partners is building knowledge and a community of practice that supports exposed states' own efforts to build resilience and shore up coping capacity.

As the second in a pair of books focusing on Southwest Indian Ocean states, this Seychelles Disaster Management and Climate Change Handbook is intended not only to deliver the best possible information to U.S. personnel working in Seychelles or with Seychellois practitioners but also to provide a basis for future bilateral or multilateral engagement on the interconnections between disaster risk and climate change. It offers an overview of the country's people, geography, and infrastructure, and it details past disaster responses in addition to the country's disaster risk reduction policies. Moreover, it examines the regional and national implications of climate change accompanied by a maps section illustrating the potential impacts on Seychelles' people.

Sincerely,

Joseph D. Martin, SES
Director

About the Center for Excellence in Disaster Management & Humanitarian Assistance

Overview

The Center for Excellence in Disaster Management and Humanitarian Assistance (CFE-DM) is a United States (U.S.) Department of Defense (DoD) organization comprised of nearly 30 subject matter experts that provide academic research, civil-military coordination training, and operational insights to support decision making before, during, and after crises. The Center is designed to bridge understanding between humanitarians, civilian, and military responders. CFE-DM partners with a diverse group of governmental and nongovernmental actors, as well as academic institutions to increase collaborations and capabilities in humanitarian assistance and disaster response. While maintaining a global mandate, the Indo-Pacific region is our priority of effort and collaboration is the cornerstone of our operational practice. The Center is a direct reporting unit to U.S. Indo-Pacific Command (USINDOPACOM) and is located on Ford Island, Joint Base Pearl Harbor-Hickam, Hawaii.

Vision

Resilient Joint Forces, Allies, and Partners that are fully prepared to respond across the spectrum of humanitarian crises.

Mission

CFE-DM builds crisis response capacity in US and Partner militaries, enhances coordination and collaboration with civilian and foreign partners, and strengthens those relationships to save lives and alleviate human suffering before, during, and after humanitarian crises in a changing climate environment.

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EXECUTIVE SUMMARY

The Republic of Seychelles is a collection of more than 115 islands in the western Indian Ocean, south of the Equator. The country's ocean territory is approximately 3,000 times larger than its land area owing to the distance between islands. The islands are of two types; approximately one-third are granitic, and the remainder are coralline. The three major granitic islands are the "Mahé Group" – Mahé, Praslin, and La Digue – at the northeastern end of the country's ocean territory. Mahé, by far the largest island, is also home to nearly 90% of the population, and most of the remainder of Seychelles' residents live on Praslin or La Digue. Most of the outer islands host only seasonal tourists, researchers, or Coast Guard and meteorological service personnel.

Tourism and fisheries make up a large portion of the country's Gross Domestic Product (GDP). As a high-income country, Seychelles delivers health and education services, public utilities, and social safety net programs to its people. However, it remains vulnerable to many of the same challenges as other small island developing states (SIDS), including but not limited to remoteness, a small market, limited revenues, exposure to global commodities price shocks, and climate change impacts.

The country's exposure to natural hazards is concentrated on storms and subsequent flooding, as well as landslides, mudslides, and rock falls. Major hazards are linked to sea level rise, which will increase exposure to storm surges and tsunamis generated elsewhere in the Indian Ocean, and to sea temperature changes, which will impact marine ecology. In addition, the country confronts challenges related to "anthropic" hazards – e.g., pollution, chemicals, solid waste, and ship or aircraft accidents. Although Seychelles continues to invest in its ability to confront these hazards and to cooperate internationally to address them, the country's geographic isolation means that any incident will have to be handled locally until external assistance can arrive from far away.

Since 2014, the Disaster Risk Management Division (DRMD) has been a separate government department tasked with comprehensive all-hazards management. Alongside the Division, there are three oversight and advisory committees - the National Disaster Risk Management Committee, the Vulnerability Assessment Committee, and the National Platform for Disaster Risk Reduction. National policy also demands that each local authority establishes and implements a disaster risk management (DRM) framework. Separately, the Ministry of Agriculture, Climate Change and Environment (MACCE) oversees ecological protection, safe water resources, and strengthening of capacities to address the impacts of climate change and climate-related disasters. Risk management and reduction are parts of the DRM and climate change sectors, and both integrate non-government and community groups.

Disaster response under the DRMD focuses on an incident command system, local leadership, and all-hazards functional capabilities. In case of emergency, the DRMD Director General is responsible for establishing and running the National Emergency Operations Centre and supplementary emergency operations centers, as required. Key partners involved in a response are the national police and fire-and-rescue services, as well as the Seychelles Defence Forces and the Red Cross Society of Seychelles. The country has built strong cooperation with United Nations (UN) system agencies and regional inter-governmental organizations, including the Indian Ocean Commission and Indian Ocean Rim Association. Beyond disaster management support, these groupings likely will prove to be important to Seychelles' climate change actions since the impacts of climate change can be expected to affect the economy and society, both of which require multilateral and multi-sectoral strategies.

COUNTRY OVERVIEW

The Republic of Seychelles consists of 115 tropical islands that sit just below the equator in the Western Indian Ocean. The capital, Victoria, is located on the main island of Mahé, where 88% of the population resides.[1] While Seychelles is the 15th smallest country in the world by land size, it has one of the largest Exclusive Economic Zones (EEZ) at 1.4 million square kilometers (km^2; 540,543 square miles). Seychellois culture and society are a mix of French, British, and African influences, with Chinese and Indian elements as well. The country was named for an 18th century French finance minister, Jean Moreau de Sechelles, later Anglicized to Seychelles.

The country gained independence from the United Kingdom (UK) in 1976. The first elected president, James Mancham, favored close ties or integration with Britain. The Socialist Seychelles People's United Party took power in a coup in 1977. The party's leader, France-Albert René, held the presidency from 1977 to 2004, and he identified as an "Indian Ocean Socialist" who promoted free education and healthcare.[2] René led one-party rule before the country returned to a multiparty system in 1991. René was succeeded by his vice-president, James Michel, who served as president from 2004 to 2016. Michel was followed by Danny Faure, who served as president from 2016 to 2020.[3] The current president since 2020 is Wavel Ramkalawan, who is also an ordained minister in the Anglican church. In 1990, Ramkalawan gave a nationally broadcast landmark sermon questioning one-party government and advocating greater respect for human rights and the rule of law, and this sermon is credited with inspiring the movement for democracy.[4]

Seychelles is a presidential republic, with the president being both chief of state and head of government. The president is elected for a 5-year term by absolute majority of the popular vote, in two rounds if necessary, and may be re-elected once. There is a unicameral National Assembly – l'Assemblée Nationale (French) or Lasanble Nasyonal (Creole) – where members serve 5-year terms. Among the Assembly's 35 seats, 26 are directly elected in single-seat constituencies by simple majority, and up to nine are elected by proportional representation. The legal system has elements of English common law, French civil law, and customary law.[5] The country is divided administratively into 26 districts – nine in the Greater Victoria area of Mahé, 14 throughout the rest of Mahé, two on Praslin, and one made up of La Digue and the outer islands.[6]

Population

Seychelles' islands were uninhabited before Europeans encountered the islands. The first recorded landing on the islands of Seychelles was made in 1609 by a British East India Company expedition. The French formally annexed the islands in 1756 and subsequently settled there, bringing enslaved Africans. France formally ceded Seychelles to Great Britain in 1814, but the French upper-class residents remained. Slavery was prohibited in 1835, but African workers continued to work on plantations without pay. Economic and political life was dominated by the Gran'bla ("big whites") of French origin with a British colonial administration that was sometimes supportive but often at odds with the Gran'bla. The majority of today's Seychellois people are of mixed European and East African descent. There are small minorities of ethnic Indian and Chinese people, and both of these groups predominantly work as small-scale merchants and shop owners.[7]

Seychelles gained independence from the UK in 1976; the exceptions were the islands retained as the British Indian Ocean Territory, including Diego Garcia. The people evicted from Diego Garcia when the U.S. military base was established there are the Illois (or Ilois), who were removed to Mauritius and Seychelles.[8] While they historically and culturally align with

the mobile plantation worker class in Seychelles, the Illois regard themselves as distinct from Seychellois.

The religious affiliation of approximately 61% of the population is Catholic, according to the 2022 census. The next largest congregations are Anglican (5%), Hindu (5.4%), Muslim (2.4%), and other Christian (8.6%), with the remainder belonging to other religions or none.[9]

The three official national languages recognized by the constitution are English, French, and Seychellois Creole, a French-based creole language also known as "kreol" or "Seselwa." Seychellois Creole is an adaptation of 17th-century French with additional vocabulary coming from African and Malagasy languages. Seychellois Creole is widely spoken and is the primary language spoken at home for the majority of the people. It has become a written language as well as a spoken one.[10] Lenstiti Kreol, the Creole Institute, was established in 1986; it works to monitor, regulate, and promote the development of the Seychellois Creole language and literature.[11] Additionally, the Creole Language and Culture Research Institute was launched in 2016 as an academic forum to promote discussion and reflection on a wider variety of issues, encompassing language, literature, history, anthropology, origin, and identity in Seychelles society.[12]

Demographics

As of 2022, Seychelles had a population of 102,612, an increase from 90,945 in 2010. Among the population, 56,266 are male and 46,386 are female. The ratio of males to females is higher than the national level in the regions of Outer Islands, Praslin and the Inner Islands, East and South, and West, in a reflection of the concentration of in-migrant male workers in these regions. Figure 1 depicts a population pyramid showing the age and sex demographics of Seychelles.[13]

The population density is 786 people per km^2 (2,036 people per square mile), according to the 2022 government census. The great majority of the Seychellois people live on the island of Mahé, with most of the rest living on Praslin and La Digue. The remaining smaller islands are either sparsely populated or uninhabited. Approximately 85% of the population and almost all economic activities are narrowly located along the coastal areas of Mahé Island.[14] Figure 2 is a population density map for the island of Mahé; it shows most of the population concentrated along the east coast.[15]

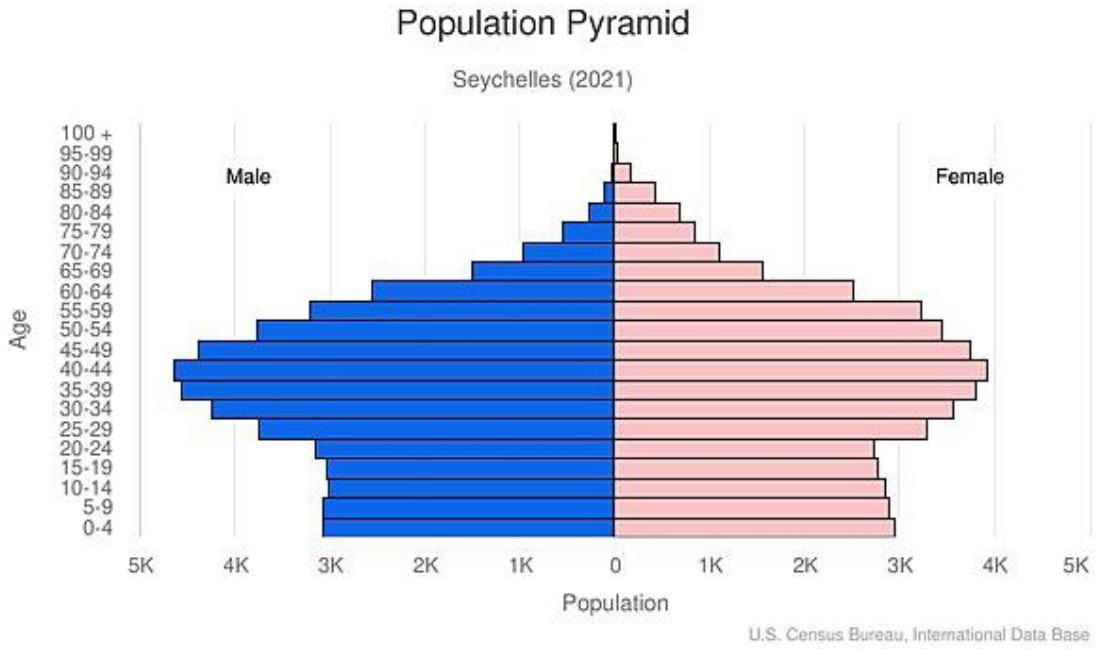
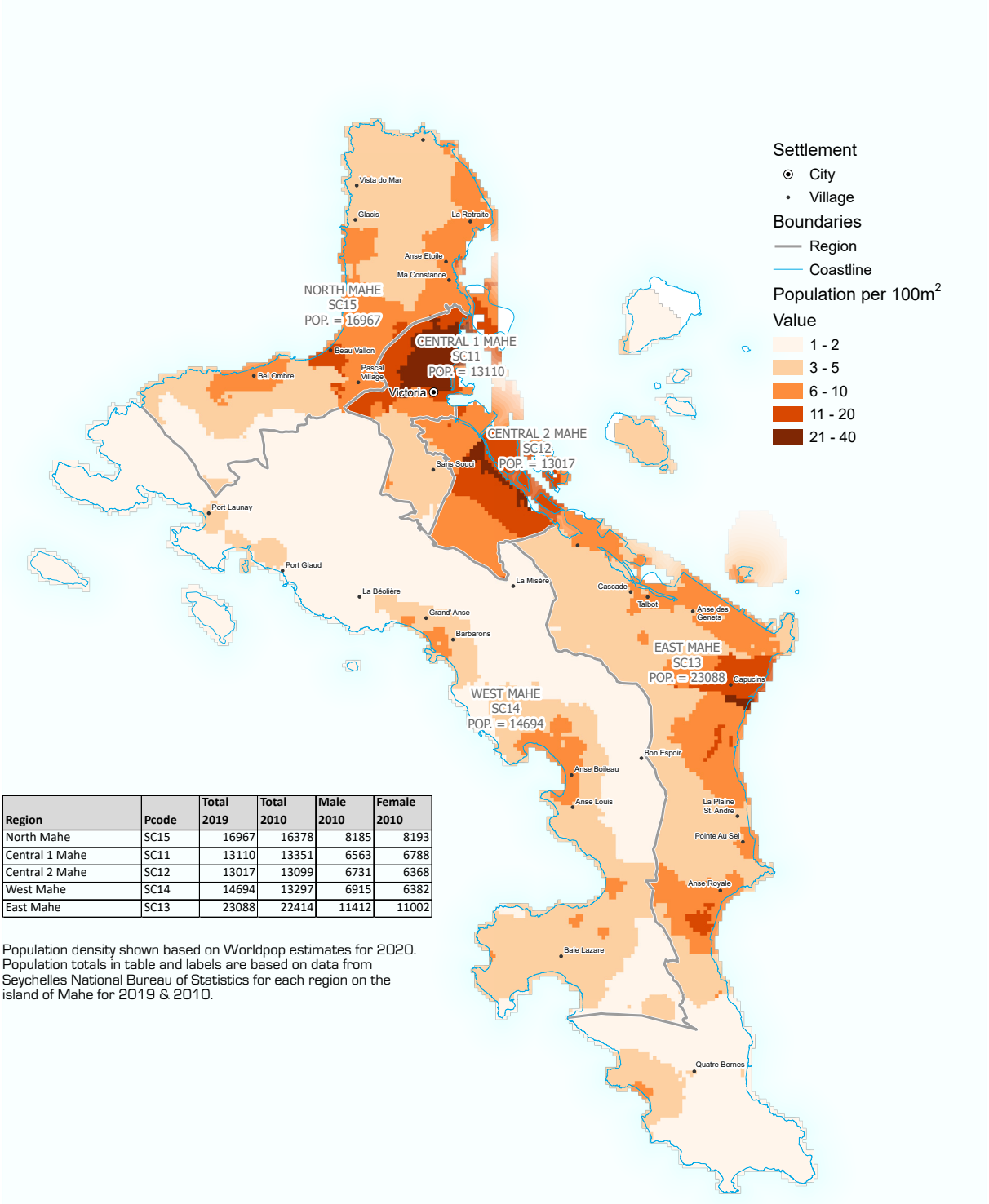


Figure 1: Population Pyramid, Seychelles (2021)

MAP ACTION

Mahe, Seychelles
Baseline population

MA010 v01



Region	Pcode	Total 2019	Total 2010	Male 2010	Female 2010
North Mahe	SC15	16967	16378	8185	8193
Central 1 Mahe	SC11	13110	13351	6563	6788
Central 2 Mahe	SC12	13017	13099	6731	6368
West Mahe	SC14	14694	13297	6915	6382
East Mahe	SC13	23088	22414	11412	11002

Population density shown based on Worldpop estimates for 2020. Population totals in table and labels are based on data from Seychelles National Bureau of Statistics for each region on the island of Mahe for 2019 & 2010.

Data Sources
Seychelles National Bureau of Statistics, Worldpop, OpenStreetMap

Map created by MapAction (22/04/2024)

Figure 2: Population Density Map of Mahé Island (MapAction)

Figure 3 is a depiction of the population densities of Praslin and La Digue, from the 2022 Seychelles census report.[16]

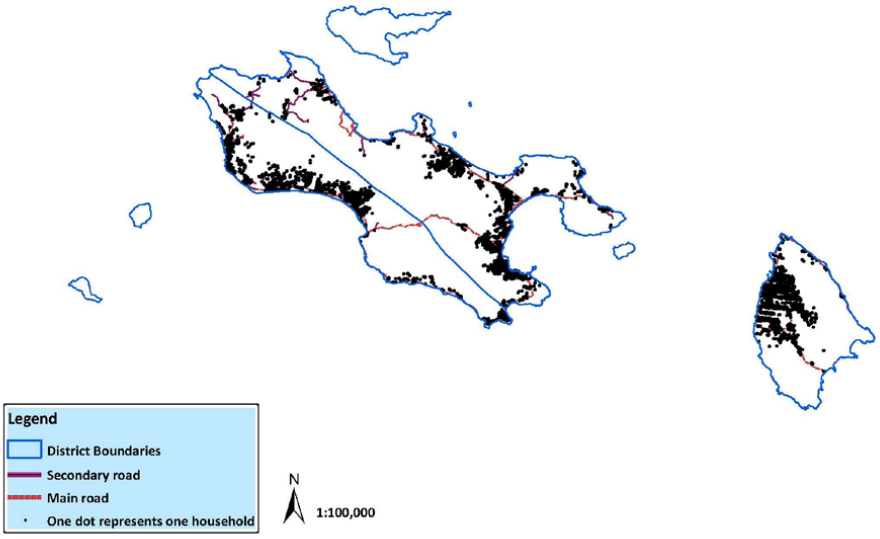


Figure 3: Population Density of Praslin and La Digue

Vulnerable Groups

Vulnerable groups are groups of people who are likely to be disproportionately disadvantaged by the effects of natural disasters, economic shocks, or other crises, due to their social position, circumstances, or resources. Vulnerabilities vary from one society to the next and can be compounded by multiple factors. Higher poverty rates and social or political marginalization often result in less ability to build resilience, recover after a shock, or adapt to change. The categories below are not comprehensive, but simply highlight some groups with increased social vulnerabilities. Vulnerable groups should not be considered in isolation, as factors that worsen vulnerabilities are often cross-cutting. The vulnerable groups discussed here are intended to provide additional context for considering crisis impacts. Combinations of economic status, sex, age, and health or disability status can particularly leave people disproportionately vulnerable to the effects of a crisis.

Women

Seychellois society is generally perceived to be matrifocal due to women's wide-ranging influence, from the family unit and church to political activities and public service institutions.[17] Furthermore, equal rights for men and women are covered under the law. However, men still hold the top positions in key spheres of power, such as the Cabinet and Parliament, where women comprise 22.9% of the National Assembly. Societal gender equality challenges also include domestic abuse and sexual harassment.

The Women, Peace, and Security (WPS) Index included Seychelles for the first time in their 2023/24 edition. The WPS Index is jointly produced by the Georgetown Institute for Women, Peace and Security and the Peace Research Institute Oslo in order to capture women's status across many countries. Seychelles has a score of 0.799 on a scale of 0 to 1 (with 1 being best), and this score can be interpreted as the percent of the gender gap closed – i.e., 79.9% of the gap in Seychelles has been closed. The country ranks 43rd of 177 countries globally and is the top-ranked country in sub-Saharan Africa. The WPS Index uses 13 indicators classified under three dimensions: 1) Inclusion – economic, social, and political; 2) Justice – formal and informal discrimination; and 3) Security – at the individual, community, and societal levels. Figure 4 provides Seychelles' scores across the 13 indicators used in the WPS Index.[18]

The law provides for the same legal status and rights for men and women across family, religious, personal status, and nationality laws, as well as laws related to labor, property, inheritance, employment, access to credit, and owning or managing businesses or property. The law provides fathers with 10 days of paid paternity leave upon the birth of a child; mothers are provided with 16 weeks of maternity leave after birth. The law provides equal rights to all children, including on matters of inheritance.

			INCLUSION					JUSTICE				SECURITY			
WPS Index rank	Country	WPS Index score	Education (years)	Financial inclusion (%)	Employment (%)	Cellphone use (%)	Parliamentary representation (%)	Absence of legal discrimination (score)	Access to justice (score)	Maternal mortality ratio (deaths per 100,000 live births)	Son bias (number of sons born per 100 girls)	Intimate partner violence (%)	Community safety (%)	Political violence targeting women (events per 100,000 women)	Proximity to conflict (%)
2023		2023	2016–2021[a]	2021	2018–2022[a]	2022	2023	2023	2022	2020	2022	2018	2020–2022[a]	2022	2021–2022
43	Seychelles	.799	10.2	70.2[f]	78.3	84.3[f]	22.9	76.3	3.877	3.3[b]	103.6	11.7[f]	63.0[f]	0.000	0.0

Figure 4: Seychelles' Scores on the 2023/24 WPS Index

Despite equality under the law, challenges remain for women. Rape, including spousal rape and domestic abuse of women and men, are criminal offenses for which conviction is punishable by up to 20 years' imprisonment, but sexual assault remains a problem. While there has been increased reporting of sexual assault cases, police are undertrained in handling sexual assault cases. Many survivors do not report rape or sexual assault due to social stigma and a reluctance to start lengthy court cases. Domestic violence against women remains a widespread problem, and authorities generally have not prioritized domestic abuse cases. The Social Affairs Division of the Ministry of Youth, Sports, and Family and non-governmental organizations (NGO) provide counseling services to survivors of domestic violence and have conducted gender-based violence training sessions. The law prohibits sexual harassment, but enforcement has been rare. The law provides no penalty for sexual harassment convictions, although a court may fine the perpetrator if the harassment continues. Regarding reproductive rights, there have been no reports of coerced abortion or involuntary sterilization on the part of government authorities. Health clinics and local NGOs operate freely in disseminating information on family planning under the guidance of the Ministry of Health, and there are no restrictions on access to contraceptives for adults. The law prohibits access to contraceptives for individuals younger than 18 years of age, even though the legal age of consent is 15 years. The country's high adolescent birth rate of 61 births per 1,000 women between the ages of 15 and 19 remains a concern.[19]

People Living in Poverty

According to a 2023 report from the United Nations Development Programme (UNDP), 0.9% of the Seychelles population is multidimensionally poor, assessed by looking at overlapping deprivations across health, education, and standard of living.[20] This rate is relatively low, particularly among nations outside of the Organisation for Economic Co-operation and Development (OECD). In contrast, the Seychelles government reports that 5,733 of 29,341 households, or 19.5% of households, self-categorized as poor in the 2022 census, which described a poor household as "lack[ing] money to pay basic things like food, utilities and housing cost."[21] This aligns closely with those living below the national poverty line of 4,376 Seychelles Rupees (SCR; US$2,671) per month per adult in 2018. The incidence of poverty using the international poverty line for upper-middle-income countries was at 5% in 2018, comparable to countries with similar levels of GDP. As poverty rates in Seychelles are not considered high by various assessments, what is illuminating is the demographic of poverty. Poverty rates are higher among female-headed households than male-headed ones and among larger households. Youth poverty rates are also higher than average. The Coronavirus Disease 2019 (COVID-19) pandemic temporarily increased poverty rates, driven by the contraction in the services sector, which accounts for the largest share of employment. The newly-poor, post-COVID households were more likely to be headed by younger and less educated people. Young people not only comprise a larger share of the poorest population, but they also face high unemployment rates. Their participation in the labor market, along with that of unmarried mothers, is constrained by drug use, crime, teen pregnancies, and skills mismatches.[22] Seychelles has a range of social protections that

help mitigate against poverty. The government provides universal access to health services. There are as many as 30 programs ranging from universal pensions and social welfare for the poor, to programs targeting orphans and people with disabilities. The social protection system is generous but fragmented, and there is a lack of fiscal sustainability given the rapidly aging population. At the government's request, the World Bank is assisting in improving efficiency among social welfare programs.[23]

People Living with Disabilities

The 2022 census recorded that 3.3% of the population aged five years and above lived with some type of disability. It was the second time the census had included persons with disabilities as a separate category and used the UN-recommended Washington Group Short Set of Disability Questions, after the 2010 census initially did. The most common type of disability reported was walking/climbing steps (2.0%), followed by self-care (1.0%), seeing (0.9%), remembering/concentrating (0.9%), communicating (0.5%), and hearing (0.4%). As Figure 5 shows, older women are disproportionately represented among people living with disabilities, a situation that the census report posits could be attributed to women's longer life expectancy and thus increased likelihood of being disabled at older ages.[24] Per 2021 data, life expectancy at birth for females was 76.5 years compared to 70.8 years for males.[25]

The constitution and law provide for special protections for persons with physical, sensory, intellectual, and mental disabilities, and these protections include reasonable provisions for improving quality of life. Government provision of universal access to health services benefits vulnerable groups, including people with disabilities. The government also has a department for elderly and disability matters under the Ministry of Youth, Sport, and Family.

Challenges remain for people living with disabilities. Not all persons with disabilities can access education, public buildings, and transportation equally with others. While laws prohibit discrimination, they do not address access to public buildings, transportation, or government services, and the government does not always provide such services. Efforts have been made to use universal design in construction of new public buildings for accessibility, as the Minister for Family Affairs reported to the UN Committee on the Rights of Persons with Disabilities in 2018.[26] Government information and communication on disability concerns have not been provided in accessible formats such as braille or sign language. The Electoral Commission Seychelles has installed

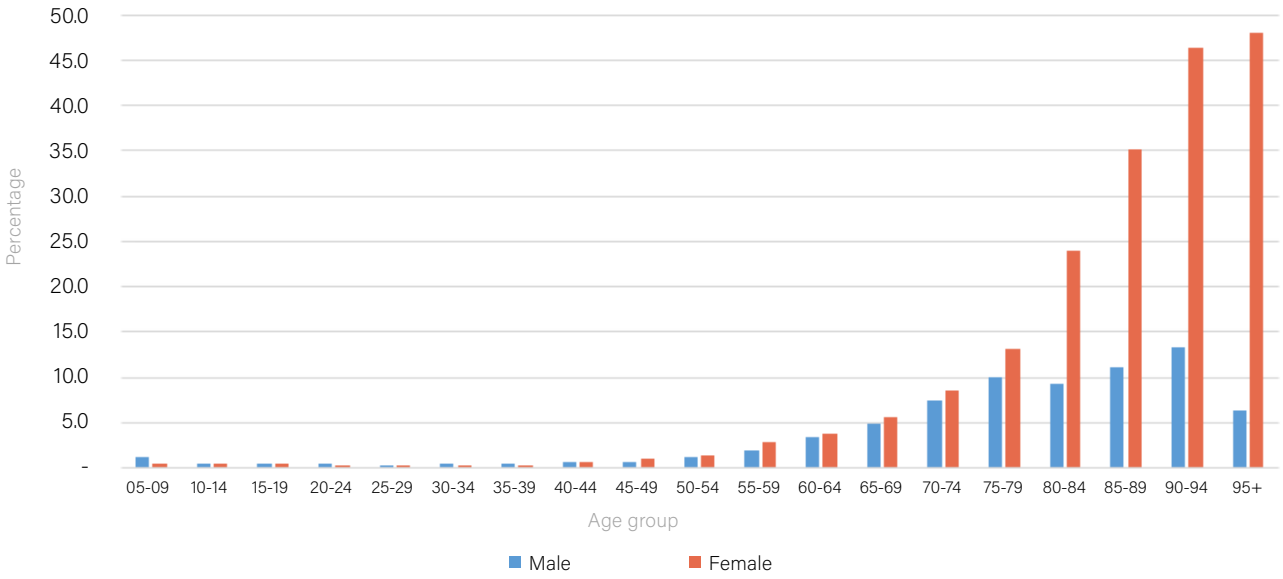


Figure 5: Percent of Population Living with Disability (by age and sex)

temporary ramps at polling stations to make provision for people with physical disabilities, and these people can request assistance in voting from the officer in charge of the polling station. There has been no provision for persons with visual disabilities to have braille ballot papers. While there were no reports in 2022 of violence or harassment of persons with disabilities by officials, NGOs advocated for more compassion, support, and resources for persons with disabilities.[27]

In November 2023, a team from the Commonwealth Secretariat's Human Rights Unit was in Seychelles to boost progress on the Convention on the Rights of Persons with Disabilities, and it facilitated a multi-stakeholder dialogue, a working session, and a workshop in partnership with the Ministry of Youth, Sports, and Family. Disability rights advocates raised awareness of accessibility barriers, lack of reasonable accommodations, and other societal challenges for people with disabilities.[28] The first Seychellois living with a disability to serve in the National Assembly was Naddy Zialor. He was born with cerebral palsy, which affects movement and muscle tone, and was sworn into the National Assembly in October 2020.[29]

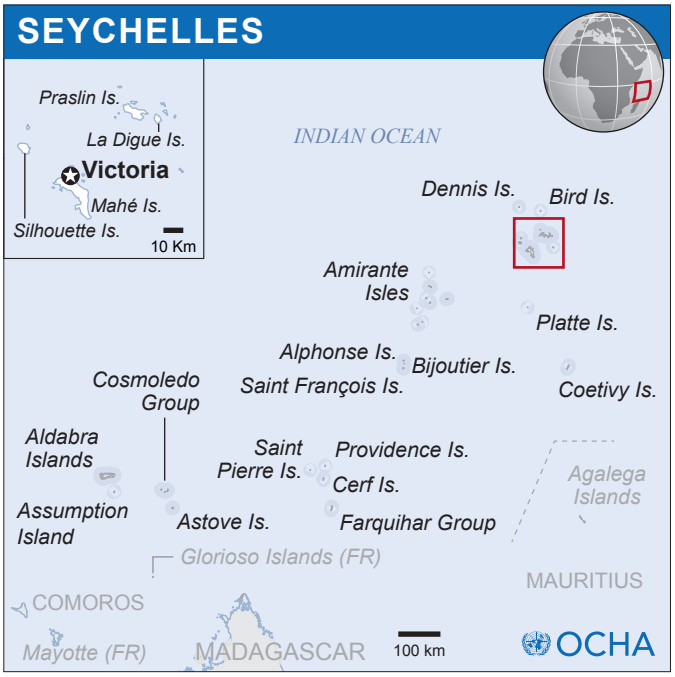
Environment

Seychelles is a country comprising 115 islands in the Western Indian Ocean. The tropical islands are located in the southern hemisphere between latitudes 4°S and 11°S and between longitudes 46°E and 56°E. The major islands are located approximately 1,600 km (1,000 miles) east of Kenya and 1,100 km (700 miles) northeast of Madagascar. The capital, Victoria, is situated on the island of Mahé.[30] Figure 6 shows a map of the Seychelles archipelago; it is sourced from the UN Office for the Coordination of Humanitarian Affairs (OCHA).[31]

Geography

Seychelles has a total land area of 453.2 km^2 (175.0 square miles) across its 115 islands. It is Africa's smallest country and the 15th smallest country in the world.[32] However, the islands are spread across a large EEZ of approximately 1.4 million km^2 (540,543 square miles).

The country comprises two main island groups: the granitic group and the low-lying coral islands. The granitic group, or Mahé group, comprises 43 islands, all located within 50 km (31 miles) of Mahé Island. The granitic group contains the most populated islands, including Mahé, Praslin, and La Digue. Mahé, where the capital and seat of government are located, has a land area of approximately 148 km^2 (57 square miles), about one-third of the total land area. Nearly 90% of the population resides on Mahé, while most of the remainder reside on Praslin, 33.6 km (20.9 miles) northeast of Mahé, and on La Digue, 48.0 km (29.8 miles) northeast of Mahé. The granitic islands of the Mahé group are rocky and typically have a narrow coastal strip and a central range of hills. These islands feature tropical vegetation, white beaches, and clear lagoons. This mountainous island group contains the highest point in Seychelles, Morne Seychellois, which rises to 905 meters (2,969 feet). The mountain is located within Morne Seychellois National Park, which occupies almost 20% of the island of Mahé.[33]



Map Sources: UNCS, ESRI.
The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Map created in Aug 2013.

Figure 6: Map of Seychelles (OCHA)

In contrast, the other island group comprises 72 flat coralline islands rising only a few feet above sea level with coral reefs at different stages of formation.[34] Very few of the coral atolls, which have minimal amounts of fresh water, contain a resident population.[35] Among the coral islands, Aldabra is the largest and farthest at 1,150 km (715 miles) to the southwest of Mahé; it had a population of three people, per the 2022 census. The Aldabra Atoll is designated a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site and features one of the world's largest raised coral reefs and the largest giant tortoise population.[36]

Climate

Seychelles has a tropical, oceanic climate with little temperature variation throughout the year. Temperature and humidity remain generally high, with an average temperature of 26.9°C (80.4°F) and humidity of 80%. Daily temperatures rise to the low 30s °C (mid-80s °F) in the afternoon and fall to the low 20s °C (low 70s °F) at night. On Mahé, temperatures vary from 24 to 30°C (75 to 86°F). May through October is usually a cooler and drier time due to the Southeast trade winds. In July and August, the temperature varies between 25°C and 26°C, while in March and April, it is between 27°C and 28°C. Near sea level, the maximum temperature is about 4°C higher than at higher altitudes.

Precipitation varies among the islands and throughout the year. Rainfall ranges from 76.2 millimeters (mm; 3.0 inches) in July to 404.8 mm (15.9 inches) in January.[37] On Mahé, annual precipitation ranges from 2,300 mm (90 inches) at sea level to 3,560 mm (140 inches) in mountainous areas.[38] The period October to May is considered the Southwest Indian Ocean's cyclone season. The most populated islands of Mahé, Praslin, and La Digue are so close to the Equator that most tropical cyclones do not make direct hits. However, the islands can still experience associated wind, rain, and storm surge effects from tropical cyclones, which have historically generated flooding and landslides.[39]

Figure 7 depicts the monthly average minimum, mean, and maximum air temperatures and precipitation levels for Seychelles during the period 1991-2022.[40]

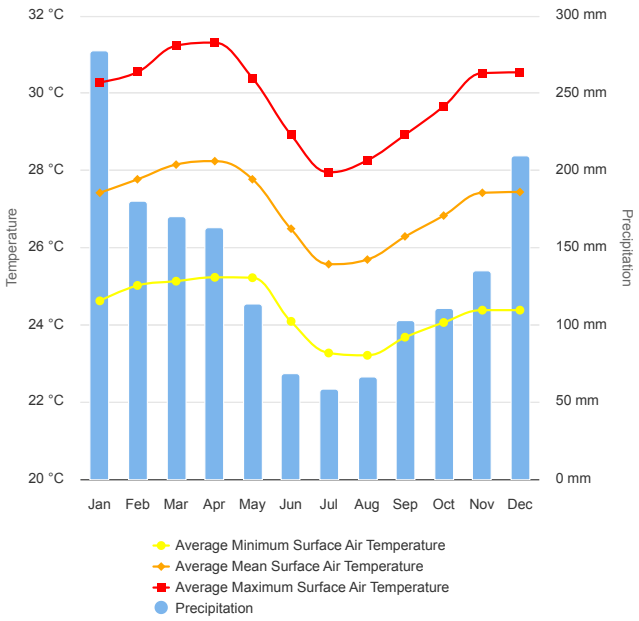


Figure 7: Monthly Average Temperatures and Precipitation, Seychelles (1991-2022)

Economy

Seychelles' GDP in 2022 was US$15.8 billion, Africa's highest on the basis of GDP. The economy is highly dependent on tourism and fisheries, and it is, therefore, vulnerable to external shocks and climate change. The economy has experienced steady growth. GDP growth reached 8.9% in 2022 and was estimated at 3.3% in 2023.

The service sector accounts for nearly four-fifths of the GDP and employs the largest proportion of the workforce, almost 75% of all laborers. The largest sub-sector is tourism, which grew rapidly after the opening of an international airport on Mahé in 1971 and now accounts for 31% of GDP and 41% of export earnings. Thousands of tourists visit Seychelles annually. The second largest contributor to GDP is fisheries, which has received growing investor interest as part of the "blue economy."[41] The growing manufacturing sector now accounts for almost one-sixth of the total GDP. It largely comprises food-processing plants and the production of alcoholic beverages and soft

drinks, animal feed, paint, and other goods. Agriculture accounts for only approximately 3% of GDP but is considered an important sector for the government to support in a quest for greater food security and agricultural self-sufficiency.[42] Seychelles imports most of the food it consumes, as arable land is limited. Agricultural exports include copra (from coconuts), cinnamon bark, vanilla, tea, limes, and essential oils.[43] Seychelles' main imports are petroleum products, machinery, and foodstuffs. Figure 8 shows Seychelles' predominant import sources in 2023.[44]

Seychelles' most important exports are canned tuna, copra, frozen fish, and cinnamon, together with the reexport of petroleum products. Figure 9 charts Seychelles' most important export destinations, excluding reexports, in 2023.[45]

Seychelles' economy was hit hard by the COVID-19 pandemic, which particularly affected the tourism sector. The return of visitors facilitated recovery, with a sharp rebound observed in 2022. Seychelles' economic recovery continued in 2023, albeit more moderately, as tourist arrival numbers approached pre-pandemic levels. In 2023, inflation decreased due to decreased global prices for food and fuel.

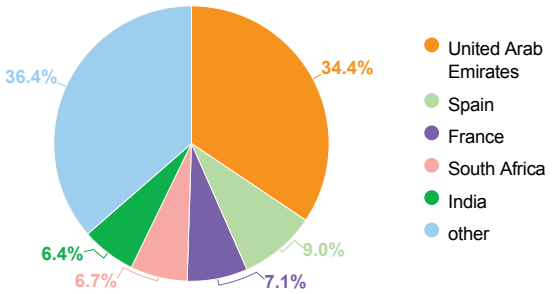


Figure 8: Seychelles' Major Import Sources (2023)

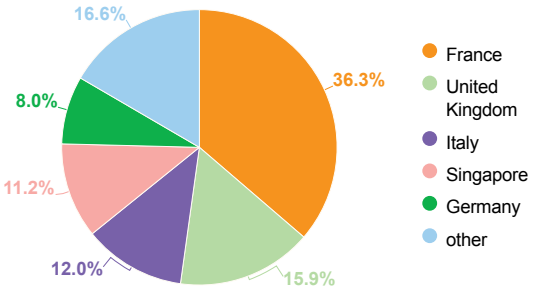


Figure 9: Seychelles' Major Export Destinations (2023)

Information and communications revenues also grew by 16% year-on-year in the second quarter of 2023 and were driven partly by demand for broadband data from tourists, while financial and insurance activities increased by 33%.[46]

Infrastructure

The government of Seychelles directly controls, manages, or partly owns key service providers in the transportation, education, communication, utilities, and health sectors. According to the Public Enterprises Monitoring Commission, in 2021, there were 32 state-owned enterprises (SOE).[47] These SOEs were either established using public financial resources or had significant shares held by the government. The SOEs are responsible for essential services such as electricity, water, roads, seaports, fuel supply, import and export, retail, transport, civil aviation, housing, and tourism. SOEs and parastatal bodies are required to maintain a board of directors and report regularly to their corresponding government ministry.[48]

Seychelles' vital infrastructure is predominantly situated in coastal areas and on reclaimed land and is, consequently, at risk of being impacted by the adverse effects of climate change, such as storm surges, erosion, heavy or decreased rainfall, sea level rise, and inundation.[49] The tourism and fishing industries rely on a well-functioning infrastructure, including ports, storage facilities, waste management, water conservation, and wastewater recycling. In addition, the main transportation network on the three main islands, the electricity generation and distribution networks, schools, and hospitals are all mostly located along exposed coastlines.[50] Furthermore, Seychelles' infrastructure - specifically in the energy and sanitation sectors - shows signs of aging. There are road and port congestion challenges, and only 15% of the population has access to centralized sewerage services or solid waste management.[51]

The Seychelles Planning Authority (SPA) is a government entity that has guided the development of Seychelles' infrastructure since

the 1960s. The SPA's mission is to regulate the development of land with the aim of ensuring orderly and sustainable use of the country's limited land-based resources, while safeguarding the built and natural environments for future generations. Since 14 April 2022, the SPA has been a semi-autonomous body, which functions independently of the Ministry of Lands and Housing and is guided by the 2021 Physical Planning Act.[52] The functions of the SPA are: 1) produce land use and development plans for Seychelles; 2) consider development applications submitted in the territories of Seychelles; and 3) monitor approved development and construction in the territories of Seychelles and enforce development laws.[53]

Transport

The Ministry of Transport (MoT) oversees the governance of transportation agencies and bodies, including departments and arm's length bodies (ALB), the latter of which tend to be formed for specific purposes. The two main departments comprising the MoT are the Department of Civil Aviation, Ports, and Marine (DfCAPM) and the Department of Land Transport (DoLT). The ALBs' responsibilities are to deliver, regulate, or advise on a range of transport services and infrastructure. ALBs include Air Seychelles, Seychelles Civil Aviation Authority (SCAA), Seychelles Maritime Safety Authority (SMSA), Seychelles Ports Authority (SPA), Seychelles Public Transport Corporation (SPTC), and Seychelles Land Transport Agency (SLTA).[54]

Airports

The SCAA, established under the 2005 Civil Aviation Authority Act, is the administrative and financial body responsible for services, facilities, and regulation of civil aviation activities in Seychelles. The SCAA has the following functions:

- Maintain and manage the Authority's aerodromes and provide the necessary services and facilities
- Provide air traffic services within the Seychelles Flight Information Region
- Provide search and rescue within the Seychelles Search and Rescue Region
- Provide firefighting and rescue services and facilities at the Authority's aerodromes
- Regulate and promote the development of air transport
- Advise the government on all matters relating to civil aviation
- Represent Seychelles internationally as the national body in all matters relating to civil aviation
- Perform any other function delegated by the Minister under the Civil Aviation Act[55]

Seychelles has a well-developed air service centered on the Seychelles International Airport near Victoria, with additional airports and airstrips on several islands. Praslin Island Airport is 200 km (125 miles) from Seychelles International. The country has intercontinental air connections between Mahé and Europe, the Middle East, and Southern Asia, but there are no direct flights between Mahé and the Americas, Oceania, or East, Southeast, or Central Asia.[56] Table 1 shows details of the country's two main airports.[57]

Established in 1977 and renamed in 1978, Air Seychelles is the national flag carrier of the Republic of Seychelles. Air Seychelles primarily provides scheduled domestic flights between Mahé and Praslin, and chartered flights to other destinations are available.[58] The airline provides passenger and cargo services. As of 14 June 2024, seven Air Seychelles aircraft were in service: five

Airport	IATA/ICAO Code	Island	Elevation	Runway Dimensions	Runway Surface
Seychelles International Airport	SEZ/FSIA	Mahé Island	3 m (10 feet)	2,987 x 46 m (9,800 x 151 feet)	concrete
Praslin Island Airport	PRI/FSPP	Praslin Island	3 m (10 feet)	1,316 x 32 m (4,318 x 104 feet)	asphalt

Table 1: Details of Seychelles' Main Airports

DHC-6 Twin Otter-400 Series and two Airbus A320-200neo.[59]

Roads

The DoLT is the government agency responsible for overseeing all land transport sectors.[60] The mandate of the DoLT is to develop policies and regulations aimed at enhancing mobility, ensuring the safety and security of transportation, and maintaining road networks. The aim of the Department is to deliver an effective land transport system that contributes to economic growth, quality of life for Seychellois people, and environmental sustainability of the country. In addition, the Vehicle Testing Station and the Highway Patrol Unit fall under the governance of the DoLT.

Established in December 1977, the SPTC is the sole public transportation service provider; its services operate on the islands of Mahé and Praslin.[61] The SPTC operates more than 106 bus routes, supported by four bus depots on Mahé and one in Praslin, and three bus terminals, all on Mahé. The SPTC fleet includes 250 buses and employs 240 bus drivers.[62]

The SLTA is fully funded by the government with an annual budget approved by the National Assembly and subjected to the Auditor General's audit processes.[63] Since August 2019, the SLTA has been working on bolstering the road infrastructure; one key project on Praslin is the Pasquere project, which aims to connect the Anse Boudin area on the northeast coast to Grand Anse, where the airport is located, via the La Plaine Holandaise Road.[64] The projected length of the road is 3 km (1.86 miles), and the estimated cost of the project is SCR 46 million (US$550,567). Phase I of the project completed 500 meters (m; 1,640 feet) of the road, as of June 2024.[65]

The road network predominantly comprises paved roads, with the majority situated on the islands of Mahé and Praslin. The total extent of the road network is 526 km (327 miles), including 514 km (319.5 miles) of paved roads and 12 km (7.5 miles) of unpaved roads.[66] Road transport on Praslin is dominated by two parallel roads that traverse the length of the island on either coast, while an additional road intersects the south-central mountains.[67] The island of Mahé benefits from an extensive paved road system that facilitates internal transportation. This network is complemented by the presence of Port Victoria and the international airport, both of which play a pivotal role in promoting international connectivity and fostering tourism on the island.

The road network is particularly vulnerable to climate hazards. Low-lying areas are at an increased risk of damage due to coastal erosion and flooding, and higher elevations are susceptible to landslides and rock falls during periods of intense rainfall.[68] The impairment of critical infrastructure could lead to substantial economic repercussions, including water supply shortages, disruptions in tourist and employee transit, compromised port operations, effects on the import and export of goods and services, reduced fishing fleet operations, restricted interisland transport between Mahé and Praslin, and an overall impact on the well-being of the people of Seychelles. For example, the 2004 Indian Ocean tsunami damaged portions of the transportation infrastructure, including the road linking Victoria with the international airport.[69] Figure 10 is a map of road infrastructure in Seychelles; the road network is represented by yellow lines.[70]

Seaports

Seychelles has one major seaport, Port Victoria, a key international gateway to Seychelles' economy. Port Victoria is located on the northeastern coast of Mahé. The state-operated ferry service facilitates transportation among Mahé, Praslin, and La Digue. Private schooners also deliver transport services for specific islands.[71] In addition to small pleasure ports serving inter-island ferries and passenger vessels, Port Victoria stands as the exclusive industrial fishing, cruise, and superyacht port destination in the southwestern Indian Ocean. Port Victoria maintains an active membership within the Association of Ports of the Indian

Figure 10: Map of Major Roads in Seychelles

Ocean Islands and the Port Management Association for Eastern and Southern Africa. The port comprises an open roadstead and an inner harbor enveloped by a series of islands and coral reef formations. The port features two berths for cargo handling.[72] In 2023, Seychelles maintained a fleet of 30 merchant marine vessels, comprising six general cargo ships, six oil tankers, and eighteen other vessels.[73]

The Seychelles Ports Authority Act (2004) established the SPA in October 2004.[74] The SPA acts as a landlord authority and is responsible for modernizing and upgrading all port infrastructure and ensuring the safety and security of all ports and terminals.[75] SPA oversees more than 1,883 square nautical miles of the Victoria Port Limit. Additional responsibilities include managing the berthing and movement of vessels into and out of the Port Victoria inner harbor, overseeing the main international commercial port (Mahé Quay), and managing the industrial fishing port (Ile du Port) as well as a network of domestic and inter-island jetties and terminals on Mahé, Praslin, and La Digue.[76] Port services provided by SPA include pilotage, tugs and pilot launches, anchorage, cruise ship services, port access, and fenders and gangways. Table 2 details of port facilities in Seychelles.[77]

In 2020, the Seychelles Maritime Safety Authority (SMSA) was founded[78] to operate as a regulatory and supervisory body within the MoT. The SMSA is primarily tasked with ensuring the safe and lawful navigation and utilization of the waters of Seychelles and other maritime areas.[79] Its functions and duties include:

- Discharge of Flag, Coastal, and Port State responsibilities with regard to international maritime conventions, treaties, agreements, and other instruments to which Seychelles is a party
- Implement international maritime conventions, treaties, agreements, and other instruments as may be required
- Regulate, control, and administer all matters relating to maritime safety, which includes the training and certification of seafarers and the auditing of maritime training institutions
- Collaborate with relevant agencies pertaining to the protection of the marine environment, prevention of pollution from ships, and response to marine environment incidents
- Provide assistance to other agencies in the

Port Victoria: 4° 36' 59.99" S, 55° 28' 59.99" E			
Quay	**Length (m / feet)**	**Maximum Draft (m / feet)**	**Type of Traffic**
Mahé Quay	370 / 1,214	North – 9.5 / 31.17 South – 11.5 / 37.73	Containers, dry and breakbulk cargo, fishing, military, tankers (cement, oil, and gas), supply, mega and superyachts, cruise ships
Tug Lay By	93.50 / 306.76	2.5 / 8.2	
Fishing Port			
B1	72 / 236.22	5.5 / 18.05	Provides services to fishing vessels and the tuna fishing industry
B2	132 / 433.07	7.5 / 24.61	
B3	90 / 295.28	7.5 / 24.61	
B4	60 / 196.85	7.5 / 24.61	
Bunker Pier	30 / 98.42	7.5 / 24.61	
Inter-Island Quay	105.60 / 346.46	5 / 16.4	Passengers and cargo for Praslin and other inner islands
Zone 14 (Ile du Port)	120 / 393.7	7.5 / 24.61	Repair facilities for vessels
Praslin and La Digue Ports			
Baie Sainte Anne Jetty - Praslin	60 / 196.85	5 / 16.4	Passengers and cargo
Eve Island Cargo Jetty - Praslin	160 / 524.93	5 / 16.4	Containers
Eve Island Annex Passenger Terminal	150 / 492.13	5 / 16.4	Passengers
La Digue Jetty – La Passe	30 / 98.43	5 / 16.4	Passengers and cargo

Table 2: Details of Port Facilities in Seychelles

coordination of matters relating to maritime security
- Represent Seychelles nationally and internationally on maritime affairs
- Ensure appropriate observance of international rules and regulations pertaining to the management of dangerous goods
- Coordinate activities for agencies and bodies involved in search and rescue operations and make relevant policy decisions thereupon
- Assist the implementation of the national oil spill contingency plan[80]

Schools

During the 1990s, the Ministry of Education (MoE) underwent a series of reforms to enhance the accessibility and quality of education through a unified and comprehensive framework.[81] In accordance with the provisions stipulated in the Education (Amendment) Act of 2017, the Minister's Secretariat holds the responsibility for overseeing the effective implementation of the government's defined mandate and strategic priorities within the education sector. These priorities encompass the development and execution of legal and policy frameworks, as well as institutional frameworks and action plans at the departmental level, achieved through proficient leadership, management, and operations. Figure 11 depicts the structure of the MoE Secretariat.[82]

As of 2018, the literacy rate in Seychelles was 95.9% for individuals aged 15 years and above (95.4% for males and 96.4% for females).[83] The education system in Seychelles is free and compulsory for students between the ages of 6 and 15 years. It consists of six years of primary education and five years of secondary education, with four years compulsory. Additionally, post-secondary education certificate and diploma programs are available.[84] Although not mandatory, pre-primary education is provided and funded by the government through institutions known as crèches. Crèches have a structured curriculum and are staffed by educators specialized in early childhood education and development. They are closely affiliated with primary schools and fall under the MoE's oversight.[85] In Seychelles, children are initially instructed in reading and writing in Creole from the ages of 6 to 10 years, with English gradually introduced as the language of instruction from grade three and French introduced as a foreign language in grade six.[86]

Established on 24 January 1983, the Seychelles Polytechnic (SEYPOLY) offers a range of post-secondary education programs encompassing one- to three-year certificate and diploma programs in teaching, business studies, humanities, science, hotels, and tourism.[87] Additionally, SEYPOLY offers a two-year upper secondary program culminating in the General Certificate of Education Advanced Level.

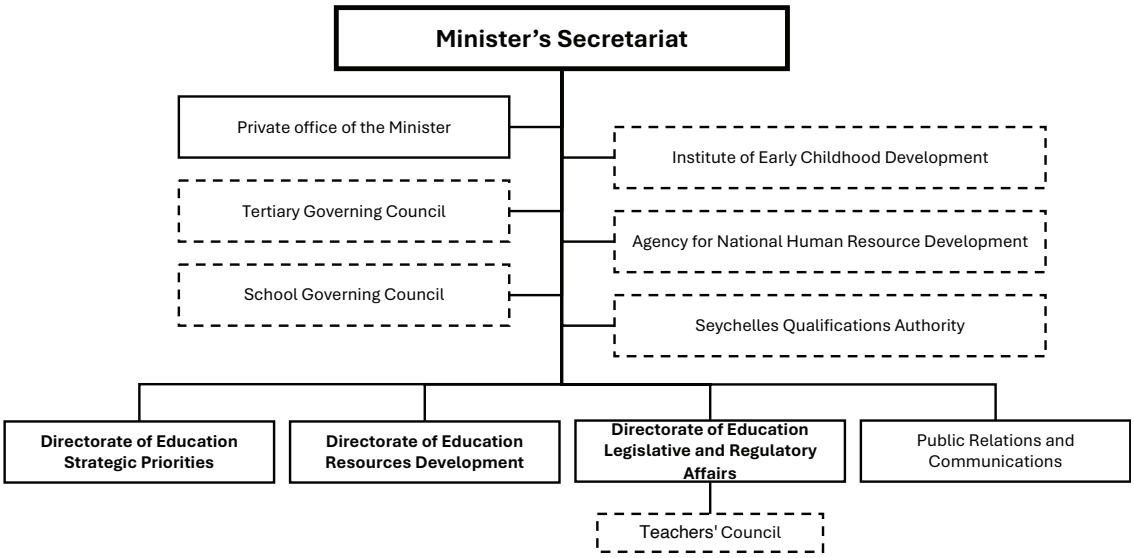


Figure 11: Structure of Seychelles' Ministry of Education Secretariat

The University of Seychelles (UniSey) was officially established in November 2010 and is registered and licensed by the government of Seychelles as a national university for higher education.[88] UniSey has two campuses located on the island of Mahé. The main campus is situated at Anse Royale, while the Mont Fleuri campus is home to the India-Seychelles Centre for Excellence in Information and Communication Technology. UniSey offers programs in various disciplinary fields including computing and information systems, education, languages, media, health and social care, business, finance, environment, law, tourism and cultural heritage, and island biodiversity and conservation, among others.[89] Furthermore, UniSey comprises four research institutes: the Blue Economy Research Institute, the Creole Language and Culture Research Institute, the Education and Socio-Economic Research Institute, and the Peace and Diplomacy Research Institute.

In response to the challenges posed by climate change, the government of Seychelles has taken significant steps to integrate climate change mitigation and adaptation content into the curricula of post-secondary education institutions, including UniSey, the Seychelles Tourism Academy, the Maritime Training Academy, the Seychelles Institute of Technology, and the Seychelles Institute of Agriculture and Horticulture.[90] Additionally, the government has prioritized the support of climate change initiatives by implementing blue economy and marine education curriculum development, programs, and internships within the formal education system, particularly those that reinforce Science, Technology, Engineering, and Mathematics (STEM) education. Furthermore, the government has extended its support to informal climate change programs targeted at the public, businesses, faith-based organizations, media, and other pertinent entities.

Communications

The country's telecommunications infrastructure is highly efficient, and there is a high rate of cellular telephone use, among the highest in sub-Saharan Africa.[91] In 2022, there were 19,027 fixed telephone line subscriptions, representing an estimated 18 subscriptions per 100 inhabitants. At the same time, there were 205,140 mobile cellular subscriptions, representing an estimated 192 subscriptions per 100 inhabitants.[92] As of 2019, landing points were established for the Pakistan and East Africa Connecting Europe (PEACE) and the Seychelles East Africa System (SEAS) submarine cables.[93] These developments facilitate connectivity to Europe, the Middle East, Africa, and Asia, as well as enabling direct radiotelephone communications with neighboring islands and coastal African countries.

The main mobile operators in the country are Cable and Wireless Seychelles (CWS) and Airtel Seychelles; both offer a range of mobile and internet services. SIM cards are available for purchase at different outlets and local stores on the islands of Mahé, Praslin, and La Digue.[94] A SIM card usually costs the equivalent of US$5-10, and prepaid plans can cost the equivalent of US$10-30. CWS offers services such as LTE 4G+ network, the only 5G network in the country, and an advanced fiber optic link,[95] and it delivers fixed line, mobile, TV, and broadband internet for residential customers and businesses. Airtel Seychelles offers services such as prepaid SIM card, data, mobile, and broadband.[96] In addition to CWS and Airtel Seychelles, Intelvision operates as an internet service provider, offering a range of services including TV and broadband.[97]

In January 2021, Seychelles had 58,000 internet users, representing an internet penetration rate of 58.8%.[98] In 2020, the total number of broadband fixed subscriptions was 34,966 (equivalent to 36 subscriptions per 100 inhabitants).[99] The average download speed is 71.27 megabits per second (Mb/s), while the upload speed is 17.16 Mb/s.[100] Wireless internet access is available at the majority of hotels for a fee, and certain restaurants may also offer this service. Kokonet and iSurf provide Wifi hotspots throughout the primary islands, and access to these networks can be obtained by

purchasing Pay-As-You-Go recharge vouchers.[101] Furthermore, internet cafes are available in various locations on Mahé, Praslin, and La Digue.[102] There are 75,000 social media users, accounting for 76% of the total population. The primary social media platform is Facebook.[103]

The publicly-funded Seychelles Broadcasting Corporation (SBC) is the national broadcaster. SBC functions as the sole terrestrial TV station, offering local programming and international broadcasts.[104] The national broadcaster oversees two radio channels: the Radyo Sesel on medium wave (AM) and Paradise FM.[105] Furthermore, a privately owned Internet Protocol Television channel delivers local programming via multi-channel cable and satellite TV through two providers. In addition, there are two privately operated radio stations, Pure907 and K-Radio, and listeners in Victoria can access transmissions from the BBC World Service and RFI Afrique.[106]

Following the introduction of multiparty politics in 1993, the prevalence of self-censorship in Seychelles media has gradually diminished. According to the 2024 Reporters Without Borders' World Press Freedom Index, Seychelles is ranked 37th of 180 countries surveyed, an improvement over the 2023 index, where Seychelles ranked 34th of 180 countries.[107] The Right to Freedom of Expression is provided in Article 22(1) under the Seychellois Charter of Fundamental Human Rights and Freedoms in the Constitution of Seychelles.[108] Notably, in October 2021, the National Assembly passed a law to decriminalize defamation.[109] The confidentiality of sources is protected, and each media outlet has its own ethical code. Since 2014, the Association of Seychelles Media Professionals has been responsible for defending journalists and press freedom. Since 2012, when the cost of a radio license dropped significantly, the government's monopoly of radio and TV ended and private-sector media outlets launched.[110] In July 2022, a new Communications Bill was published in the Official Gazette.[111] It aims to regulate and manage competition in the Information and Communication Technology industry and establish legal provisions to enable consumers to switch operators. The government also announced the establishment of a new Communications Regulations Authority in 2022 to promote fair competition in the telecommunications sector.

The Seychelles media landscape comprises four publications, including two daily newspapers, two weeklies (hebdos), and a variety of other periodic publications. The state owns one daily newspaper, Seychelles Nation, while a private publisher owns Today in Seychelles. The People, a weekly publication, is owned by the opposition party Parti Lepep (The People's Party), and The Independent, another weekly newspaper, is closely affiliated with the Seychelles Labour Union.[112] Established on 22 April 2014, the Seychelles News Agency is an online platform that provides national news content for a global audience. Furthermore, although Le Seychellois Hebdo has ceased hard-copy publication, it continues to operate through its Facebook page.[113]

The Seychelles Postal Services (SPS) is responsible for postal services in the country.[114] SPS became a member of the Universal Postal Union on 7 October 1977. Its primary role is to ensure the acceptance, handling, conveyance, and delivery of letter and parcel post items, encompassing priority and non-priority items. The services SPS provides include renting private letter boxes, letter and parcel post, direct mail marketing, express mail service, and local money orders. In addition to SPS, DHL, FedEx, UPS, and the Mahé Shipping Company Ltd offer courier services in Seychelles.

Utilities

Seychelles has been making substantial strides in modernizing its utility infrastructure through strategic investments focusing on enhancing reliability and sustainability. However, this progress has been accompanied by a continuous increase in the demand for electricity and potable water, driven by population growth, expanding tourism activities, and ongoing commercial developments within the country. The government's initiatives to stabilize and expand

the economy are evident in its investments and reforms in the utility sector.

The Ministry of Agriculture, Climate Change, and Environment (MACCE) oversees policies and regulatory frameworks pertaining to the Agriculture, Climate Change, and Environment Departments.[115] Established in 1986, the Public Utilities Corporation (PUC) is a parastatal company owned by the government of Seychelles and is the sole utility company providing electricity, water, and sewerage services in the islands of Mahé, Praslin, and La Digue.[116] In addition, the PUC conducts community engagement and awareness initiatives to promote responsible energy consumption and water conservation. The Corporation also supports skills development programs by providing work placement opportunities and conducting awareness sessions for secondary and post-secondary school students. The PUC was formed after the merger of two former parastatals, namely the Seychelles Water Authority and Seychelles Electricity Corporation Limited, and it is governed by the Public Utilities Corporation Act of 1 January 1986 under a Board of Directors,[117] which reports to the shareholders through the MACCE. The Chief Executive Officer and Deputy Chief Executive Officer of the PUC are appointed by the President of Seychelles.[118] PUC delivers electricity to over 44,000 customers, potable water to more than 37,000 customers, and sewerage services to over 6,000 customers.

The government provides tax incentives, such as value-added tax exemptions on imported goods, to promote environmentally friendly practices. These incentives are offered for activities that aim to conserve, generate, or produce renewable or eco-friendly energy sources; conserve fresh or potable water resources, or re-use and recycle wastewater; and recycle, reduce, or re-use solid waste. Additionally, businesses utilizing rooftop photovoltaic (PV) equipment for power generation are eligible for government rebates.[119]

Electricity

The Seychelles Energy Commission (SEC) is a statutory body governed by the Seychelles Energy Commission Act of 2009.[120] The SEC's primary function is to regulate electricity-related activities while protecting and conserving the environment. Additionally, the SEC oversees electricity generation, transmission, distribution, supply, and use, and promotes energy-efficient technologies and renewable resources.

Seychelles relies heavily on imported fossil fuels for its energy supply, and they constitute about 25% of the country's net imports.[121] Only 5% of the country's total energy comes from renewable resources. As of 2021, 100% of the Seychellois population had access to electricity.[122] In its 2021 Nationally Determined Contribution (NDC) under the UN Framework Convention on Climate Change (UNFCCC), Seychelles aims to achieve 15.5% energy efficiency and a 15% renewable energy share in national electricity production by 2030.[123] The NDC also targets a reduction in economy-wide greenhouse gas (GHG) emissions by 2030.

Seychelles' 100% Renewable Energy Strategy seeks to achieve full decarbonization of the energy sector by 2050.[124] The adoption of solar PV systems is experiencing a marked upsurge in Seychelles.[125] In 2014, Seychelles initiated the Seychelles Energy Efficiency and Renewable Energy Program, which offers subsidized loans for renewable energy investments to small and medium enterprises and households to integrate grid-tied PV systems into their infrastructure.[126]

The 5 megawatts (MW) Solar Farm Project on Romainville Island (Ile de Romainville) was commissioned in April 2021 in line with the Government's Energy Policy drafted in 2010. The policy aims to meet 5% and 15% of the country's total electrical energy demand through renewable energy by 2020 and 2030, respectively.[127] The Solar Farm consists of almost 15,000 PV panels installed over an area of about 50,000 m^2 (53,8196 square feet). Additionally, the island houses five wind turbines with a

total maximum output capacity of 6.5 gigawatt hours (GWh) annually. The Solar Farm has the capacity to produce 7 GWh of electricity yearly, meeting the electricity needs of approximately 2,000 homes. The project cost for the Solar Farm is US$10.2 million and was financed with a concessional loan of US$8.5 million from the International Renewable Energy Agency and the Abu Dhabi Fund for Development. The remaining US$1.7 million is financed by the PUC. Furthermore, in 2013, the government of the United Arab Emirates donated the Port Victoria Wind Farm, which consists of eight 750-kilowatt (kW) capacity wind turbines, three of which are based on Port Island (Ile du Port) and five on Romainville Island (Ile de Romainville). Figure 12 depicts an outline of the Solar Farm project on Romainville Island (Ile de Romainville).[128]

In October 2023, the PUC and International Montage Maintenance, a Belgium-based contracting company specializing in thermal power generation plants, signed an agreement initiating the Roche Caiman power station project with a cost of €21.8 million (US$23.3 million).[129] The financing of this project is through a loan from Nouvobanq. The Roche Caiman power station aims to boost Seychelles' generation capacity by an additional 18 MW by installing two new 8-MW generator sets. By introducing these generator sets, the PUC aims to reduce its reliance on older generator sets at the New Port Power Station. The project's kick-off meeting was held on 13 November 2023 at PUC headquarters in Roche Caiman. The project is expected to be completed by July 2025.

On 30 September 2023, the 33-kilovolt (kV) Transmission Network project was inaugurated to enhance the reliability of electricity supply and reduce loss on the PUC's network in the South, Southeast, and West of Mahé.[130] It involved implementing a 33-kV underground cable transmission line extending to the North of Mahé to address increasing electricity demand. The project cost approximately US$30.9 million, with funding from the Saudi Fund for Development, the Arab Bank of Economic Development in Africa, the government of Seychelles, and the PUC. The project involved the construction of eight modern substations, the installation of approximately 300 km (186 miles) of 33-kV cable, 40 km (25 miles) of 11-kV cable, and a 12.5 km (7.7 miles) line with two feed stations. The 33-kV underground transmission network extends from the Roche Caiman Power Station through Providence, along the East Coast of Mahé to Turtle Bay, with branches extending to Anse Boileau via Mont Posée and Anse Royale, and to Quatre Bornes as shown in Figure 13.[131] The new network is interconnected via

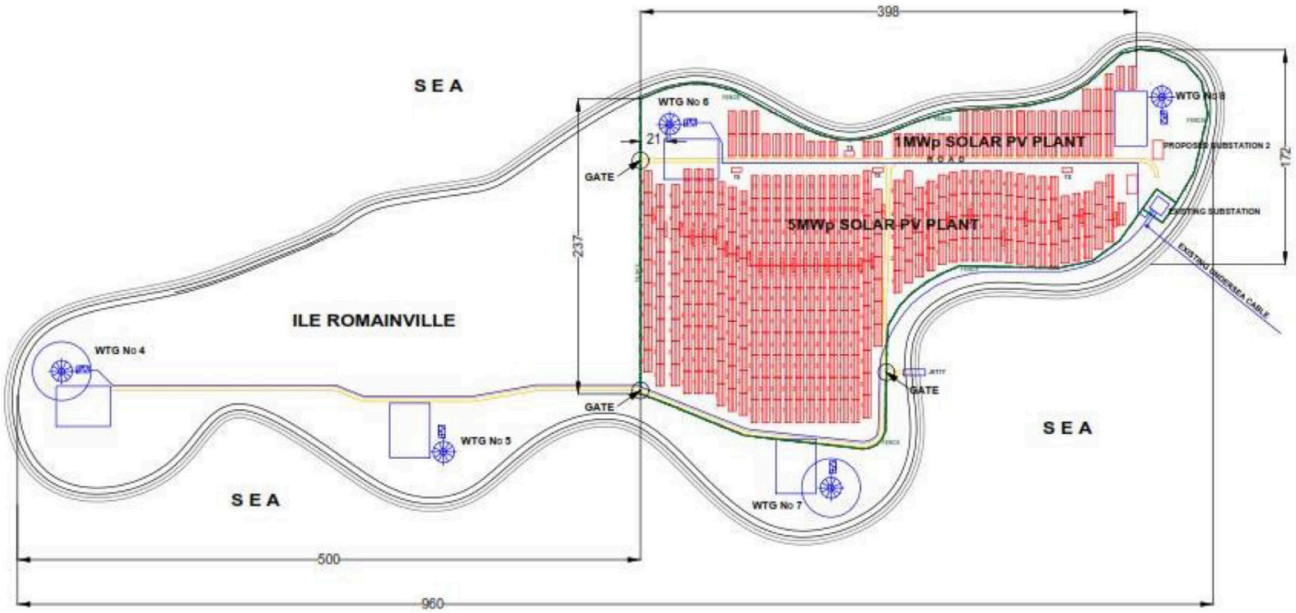


Figure 12: Solar Farm Project on Ile de Romainville

a Supervisory Control and Data Acquisition system, enabling remote monitoring, control, and operation of specific network features. The project aims to enable the PUC to meet the electricity demand for the next 20 years.

Water and Sanitation

Ensuring that all citizens have access to clean drinking water and proper sanitation is a priority of the government. Currently, over 97% of homes in Seychelles have access to drinking water, but the government aims to raise this to over 99%.[132] The demand for water in Seychelles has significantly increased – rising approximately 5% annually over the last decade - amidst growing needs of the industrial, domestic, and tourism sectors. Currently, 43,000 cubic meters (m^3; 11.4 million gallons) of water is provided daily for domestic and commercial use on Mahé, Praslin, and La Digue.[133] The primary water sources in Seychelles are reservoirs, rivers (surface water), and boreholes. Additionally, six desalination plants are located on the three main islands, and they add to the drinking water supply and reduce the likelihood of water restrictions.[134] In addition, the PUC operated 25 freshwater treatment plants, 115 pumping stations, and 152 reservoirs. Tables 3 and 4 detail PUC's key water infrastructure.[135]

There are two dams in Seychelles – the Rochon Dam and the La Gogue Dam, both located on Mahé. The Rochon Dam has a storage capacity of 50,000 m^3 (13.2 million gallons).[136] In line with the government's vision to ensure the country has the proper water infrastructure to address its development requirements, the La Gogue Dam, the country's largest, was recently raised by 6 m (19.7 feet). The La Gogue Dam raising project also increased its storage capacity by 60%, to 1.6 million m^3 (422 million gallons). President Ramkalawan officiated the reopening of the La Gogue Dam on 28 June 2023.[137]

The waste infrastructure consists of four operational sewage treatment plants that urgently need repair to meet present and future demands. Seychelles' existing sewage treatment and disposal system comprises septic tanks with soak pits for most households and buildings. Challenges of sewage treatment plants include broken manholes, downpipes diverting rainwater, surface run-off water directed into manholes,

Figure 13: Map of the 33-kV Network South Mahé Project

Nos.	Desalination Plant	Island	Treatment Capacity (m^3 / gallons per day)
1	Providence	Mahé	16,000 / 4.2 million
2	Perseverance	Mahé	2,000 / 528,000
3	Bel Ombre	Mahé	2,500 / 660,000
4	Anse Boileau	Mahé	3,750 / 990,000
5	Baie Ste Anne	Praslin	2,900 / 766,000
6	La Passe	La Digue	1,400 / 370,000

Table 3: Details of the Public Utilities Corporation's Desalination Plants

Island	Nos.	Freshwater treatment plants
Mahé	1	Cascade
	2	Rochon
	3	Le Niol
	4	Hermitage
	5	Mt. Plaisir
	6	Quatre Bornes
	7	Anse Louis Lower
	8	Baie Lazare
	9	Anse Aux Poules Bleues (Dame Le Roi)
	10	Bougainville
	11	Anse Boileau
	12	Capucin
	13	Mt. Simpson
	14	Port Glaud Upper
	15	Port Launay
	16	La Misere
	17	Grand Anse
	18	Morne Blanc
	19	Caiman
	20	Dan Bernard
Praslin	21	Fond B'Offay
	22	Nouvelle Decouverte
	23	Salazie
	24	Mt Plaisir
La Digue	25	La Passe

Table 4: Public Utilities Corporation's Freshwater Treatment Plants

and illegal connections.[138] In an effort to expand the sewerage network and reduce environmental pollution, the PUC has initiated a project to connect 171 households to the Beau Vallon sewerage network at a total cost of SCR 11.6 million (US$812,094).[139]

Current water sources on the island of La Digue include surface water, groundwater, and desalinated water for drinking. The disposal of sewage from point sources could threaten the island's groundwater. Without a proper wastewater disposal solution, the island's development could also be hindered. As a result, the PUC is constructing a wastewater system in La Digue.[140] The project will include a piped sewerage system with manholes, pumping stations, and lifting stations. Additionally, three strategic sewerage infrastructures on Mahé, the Providence Sewerage Treatment Plant, the Le Rocher Pump Station, and the Roche Caiman Pump Station, have been refurbished.[141]

Established in 2009, the Landscape and Waste Management Agency (LWMA) is responsible for the management of waste and implementing

policies for waste and sewage management.[142] LWMA is governed by the Environment Protection (Landscape and Waste Management Agency) Regulations of 2009 and is managed by a Board of Directors appointed by the Minister of MACCE. The Waste Management Section within LWMA is responsible for designating, monitoring, and regulating all waste disposal sites and overseeing the country's waste management. Additionally, the Section manages contractual work and participates in community outreach programs to promote good waste practices such as recycling in household, private, and commercial businesses. The Section consists of the Cleaning, Commercial and Data, Landfill, and Recycling Units.[143]

The Integrated Comprehensive Sanitation Master Plan (ICSMP) aims to assist the government and the PUC in creating a sustainable strategy for the sanitation sector over the next 20-30 years.[144] The concept of the ICSMP is based on the idea that "waste is a resource." The ICSMP study, in collaboration with the African Water Facility and the Global Water Partnership, concluded with a Donor's Conference in 2018. The conference sought potential donations from financial institutions to meet the project's capital investment of SCR 1.6 billion (US$1.1 billion).

Health

Seychelles is progressing towards achieving Universal Health Coverage (UHC) by 2030.[145] In 2024, the life expectancy at birth for Seychellois is 76.6 years, with males having a life expectancy of 72.2 years and females 81.1 years.[146] The Constitution guarantees the population free primary health care, which also includes universal access to anti-retroviral therapy, safe drinking water, good sanitation, and housing provision.[147] Health services in public health institutions are provided free at the point of delivery, with the government as the principal financier. In 2020, the government spent approximately 6.4% of GDP on health expenditures.[148] According to the Sustainable Development Report, there has been improvement in maternal and neonatal mortality rates and in reducing traffic deaths. Despite the health progress made, significant challenges remain in addressing the incidence of tuberculosis, the increase in non-communicable diseases (NCD), and ensuring childhood immunizations.[149]

Health Care System Structure

The government of Seychelles is committed to ensuring the provision of high-quality health care services to its population by making the country's health system comprehensive and widely accessible geographically. The health system is decentralized and consists of a three-tier system comprising the national, cottage, and district levels.[150] The country's public health sector comprises one tertiary hospital, one rehabilitative hospital, and one psychiatric hospital, all located on Mahé; three cottage hospitals (one each on Mahé, Praslin, and La Digue); and 17 health centers (13 on Mahé, two on Praslin, one on La Digue, and one on Silhouette Island).[151] The district health centers provide primary health care services such as family planning, pre- and post-natal care, vaccination services, school health services, physiotherapy, and dental treatment.[152] Furthermore, the decentralized system provides access to emergency services across the main islands, with a substantial diagnostic capacity and access to expanded medicine and therapeutic services. The private health sector is growing rapidly and plays a critical role in improving the health of Seychellois. The private sector consists of 16 private clinics, eight dental care clinics, and 22 private pharmacies.[153] The Seychelles Licensing Authority is responsible for issuing licenses to practitioners in the private health care sector. However, the existing legal framework is inadequate and outdated in addressing the growth of the private health sector.[154] Additionally, communication between the Ministry of Health (MoH) and the private sector is poor, and regulatory frameworks for reporting are inadequate.[155] Figure 14 depicts a map of the health facilities in Seychelles.[156]

The country's health system was restructured based on a review conducted by a special task

force in 2013, and the main reform was to separate various functions. The MoH is divided into a Parent Ministry composed of the Health Care Agency (HCA), the Public Health Authority (PHA), and a National AIDS Council.[157] The Parent Ministry is responsible for oversight functions such as policy formulation, monitoring and evaluation of macro-health indicators, human resources development, and matters related to international cooperation. The HCA is responsible for service delivery functions, such as the provision of preventive, curative, and rehabilitative care in primary, secondary, and tertiary health care institutions. Additionally, HCA is responsible for the overseas treatment program, which extends health services delivery to homes and communities overseas.[158] The PHA is responsible for regulatory functions, such as disease prevention and control through the Public Health Act, and as for policies and strategies for the prevention of non-communicable and communicable diseases. The National AIDS Council is responsible for coordination of the national response to the HIV/AIDS epidemic. The National Institute of Health and Social Studies (NIHSS) is a vocational training center and functions very much as a division of the MoH.[159] Figure 15 depicts the organizational structure of Seychelle's MoH.[160]

Health Strategies

The national vision for health is the "attainment, by all people living in Seychelles, of the highest level of physical, social, mental, and spiritual health and living in harmony with nature."[161] To achieve this vision, the government of Seychelles implemented the National Health Strategic Plan (NHSP) 2022-2026, the second strategic plan of the National Health Policy 2015.[162] Significant progress was made during the first strategic plan – the NHSP 2016-2020 – such as the availability of a wider range of specialist services, integration of primary health care with medical, oral health, and rehabilitative

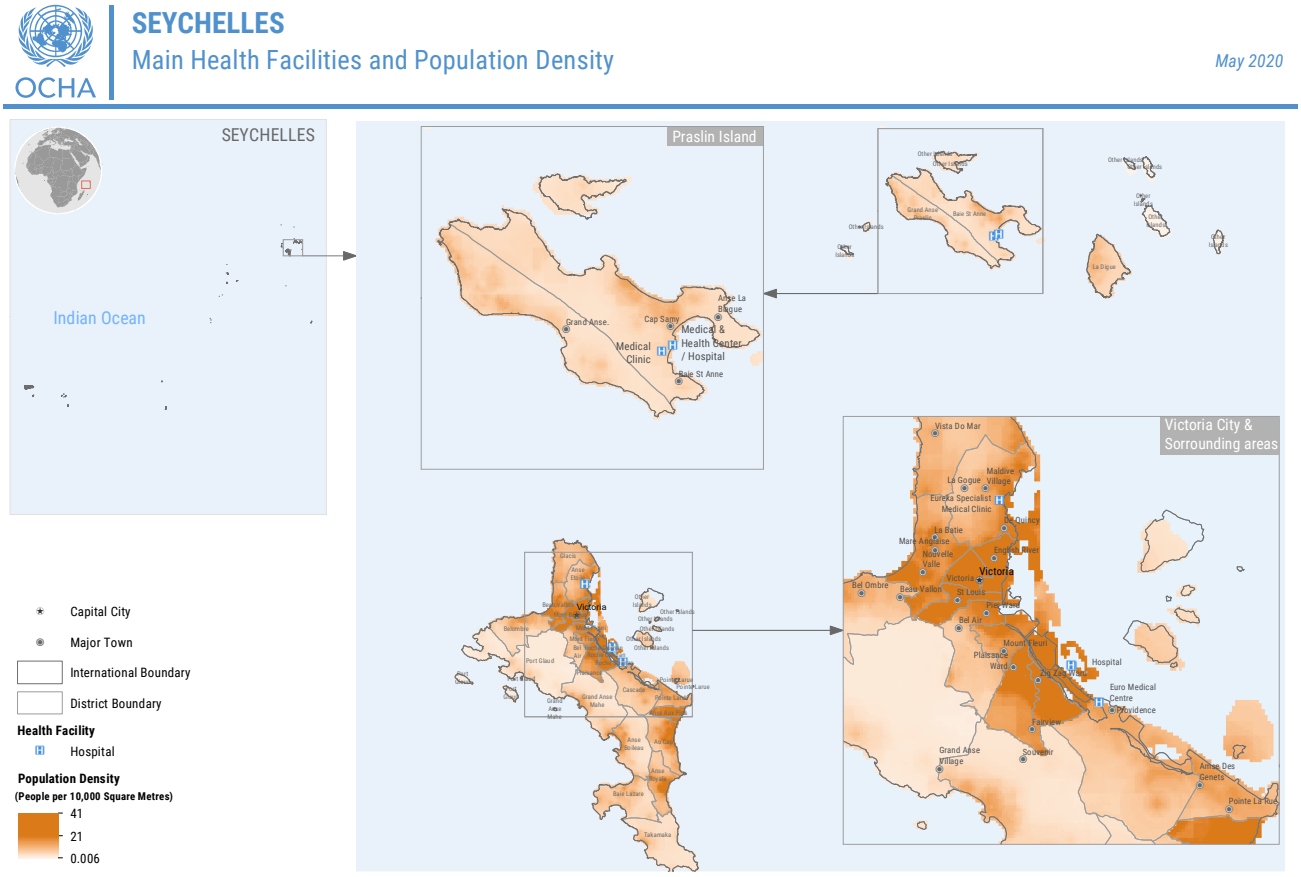


Figure 14: Map of Seychelles' Main Health Facilities (OCHA)

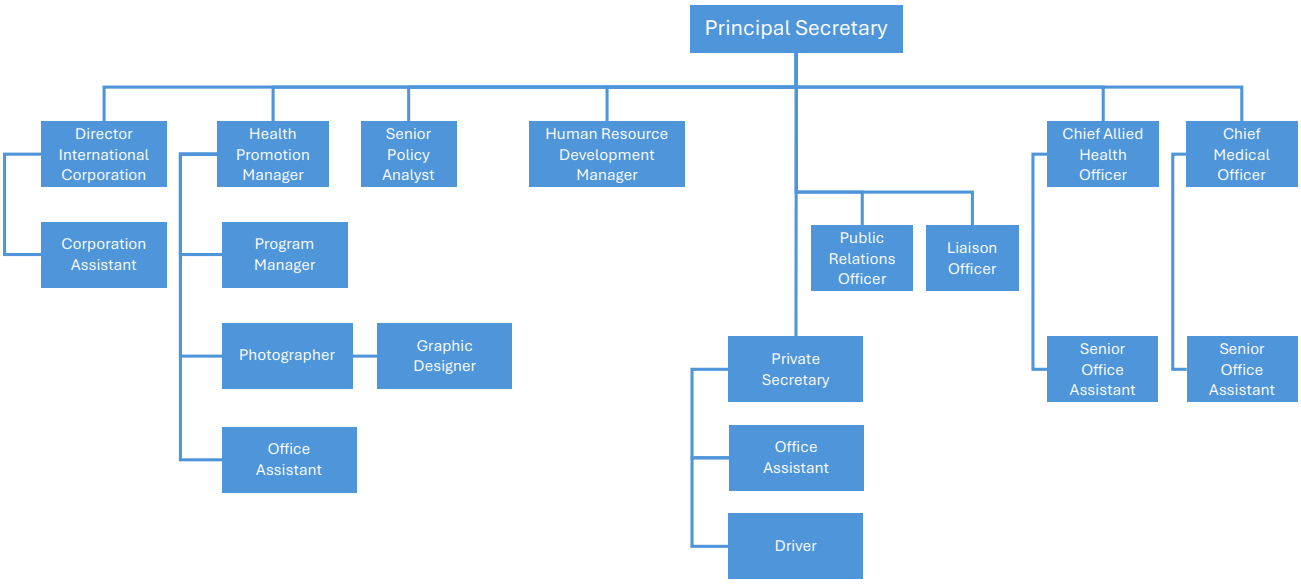


Figure 15: Organizational Structure of Seychelles' Ministry of Health

services offered together under regional centers, inauguration of the Family Hospital in 2017, an increased number of Seychellois doctors, and development and implementation of key health policies and Acts.[163] The goals of the NHSP 2022-2026 are: to increase life expectancy and healthy life expectancy; to achieve and sustain all dimensions of UHC; to prevent, prepare for, detect early, and respond adequately to all health emergencies; and to promote healthy populations.[164] The NHSP comprises six strategic directions represented by its six pillars: strengthen leadership, governance, and administration; protect and improve UHC; improve health security; promote healthy populations; invest for results; and improve data for impact. The NHSP sets the priorities for each pillar and identifies the different entities responsible for delivering the specific objectives for the next five years. The MoH is responsible for most of the service delivery infrastructure. Significant challenges remain regarding maintenance systems, the weakness of which delay repairs and replacements, alongside outdated requirements to meet modern standards of care delivery and chronically unaddressed safety concerns related to health and natural hazards.[165] Figure 16 depicts the NHSP 2022-2026 framework.[166]

To strengthen the country's health system, the World Health Organization (WHO) Regional Office for Africa implemented the Seychelles Country Cooperation Strategy (CCS) 2016-2021. The CCS is a strategic plan to guide WHO's work in and with Seychelles in support of the country's health agenda defined in the National Health Policy and the NHSP. The CCS comprises five strategic priorities identified for WHO cooperation with the government of Seychelles:

- **Strategic Priority 1:** Halt and reverse the rising burden of NCDs through a multi-sectoral approach to address the diseases and risk factors most responsible for current and future NCDs in Seychelles
- **Strategic Priority 2:** Introduce new and ensure sustained delivery of existing interventions targeting emerging or re-emerging conditions to eradicate, control, and eliminate targeted communicable diseases
- **Strategic Priority 3:** Put in place innovations in quality, effectiveness, and responsiveness in provision of essential services focusing on person centeredness, client management, and service organization
- **Strategic Priority 4:** Attain a fit-for-purpose and motivated health workforce through improvements in regulation, production, and management of the health workforce
- **Strategic Priority 5:** Achieve health for all at all ages through the promotion of health through the life course[167]

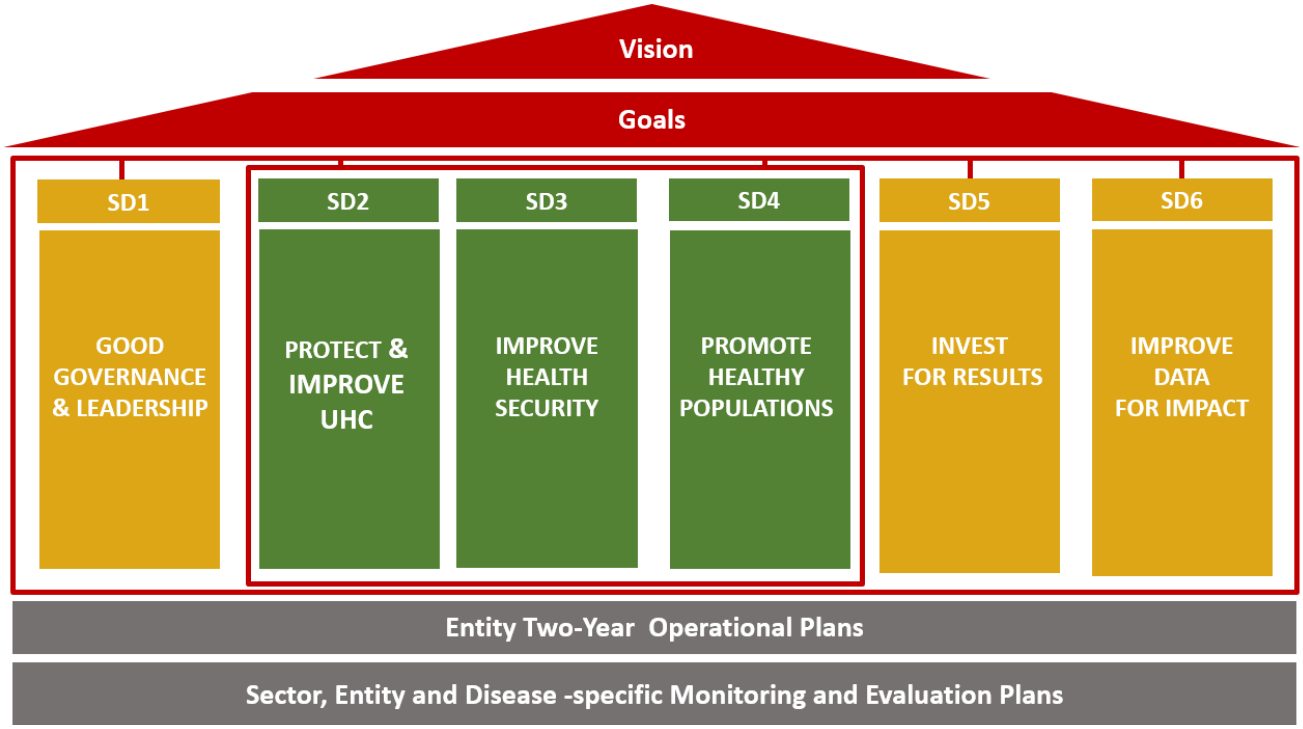


Figure 16: Republic of Seychelles' National Health Strategic Plan 2022-2026 Framework

Seychelles is vulnerable to the effects of climate change, particularly in relation to the health of the Seychellois population. In 2023, at the 28th Conference of the Parties (COP28) under the UNFCCC in Dubai, United Arab Emirates, Seychelles' Minister for Health, Peggy Vidot, launched the first world discussions on the impacts of climate change on health for SIDS.[168] The Minister held the talk under the theme "Climate change and human health in Seychelles: a SIDS perspective and Seychelles."[169] Data collected by the MoH in collaboration with the Seychelles Meteorological Authority indicates a rise in water-borne diseases, particularly leptospirosis, attributed to heavy rainfall and consequent flooding.[170] Since 2015, there has been a notable increase in dengue cases, attributable to the proliferation of the mosquitoes that carry the disease. Dengue is typically prevalent during the rainy season and tends to subside thereafter.[171] Additional health challenges linked to climate change are NCDs such as heart disease, blood pressure, and kidney disease. Notably, the incidence of kidney disease has increased by 80% in the last 10 years.[172] Seychelles, in conjunction with 80 other nations, has pledged its commitment to the Alliance for Transformative Action on Climate and Health (ATACH), led by the WHO. ATACH membership provides access to bilateral donors and the World Bank.[173]

Communicable Diseases

The COVID-19 pandemic had a detrimental impact on the health and well-being of the Seychellois population and all fundamental components of the health system. In March 2020, Seychelles detected its first case of COVID-19 and promptly implemented public health measures and responses to mitigate the spread of the disease.[174] The country experienced a surge in COVID-19 cases between December 2021 to February 2022.[175] In addition to COVID-19, Seychelles faces significant public health challenges related to HIV/AIDS, viral hepatitis C, dengue, and leptospirosis. As of December 2022, the country had over 900 people living with HIV.[176] The provision of free HIV/AIDS services by the government was disrupted during the COVID-19 pandemic, a disruption that led to a decrease in service uptake and HIV-positive persons missing follow-up treatment.[177]

In 2024, the WHO reported that Seychelles, along with other countries in the African region, had seen active transmission of the dengue virus.[178] The region reported 32,925 dengue cases and 57 deaths between 1 January and 28 April 2024. Three of the four serotypes of the dengue virus – DENV-1, DENV-2, and DENV-3 – have been identified circulating the region. An observational study conducted by Santé Publique France reported that the high incidence of leptospirosis, a neglected tropical disease, was confirmed in Seychelles with a case fatality rate of 11.8%.[179] Leptospirosis was positively associated with various socio-professional and clinical variables in univariate analysis. These variables included gardening/farming, oliguria, jaundice, conjunctivitis, a history of hepatitis C virus infection, anemia, thrombocytopenia, and/or biological renal failure.[180] Furthermore, the study recommended continuous efforts in health education and further studies to clarify the epidemiology of leptospirosis.

To mitigate potential threats to health security, the country conducts monitoring and surveillance for emerging or re-emerging diseases through the Disease Surveillance and Response Unit (DSRU).[181] The DSRU is under the PHA, and its main functions are to monitor and report communicable and non-communicable disease trends, investigate and verify unusual public health events and disease outbreaks, and promptly notify the Public Health Commissioner and the Minister of Health to inform decision-making. Furthermore, the country's genomic surveillance is bolstered by one sequencing machine donated by the Africa Centres for Disease Control and Prevention (Africa CDC).[182] On 11 March 2022, the WHO and Africa CDC collaborated on a joint mission to support Seychelles' efforts to build sequencing capacity to detect variants and pathogens of public health significance. The sequencing machine also has the potential to investigate outbreaks and better understand transmissions.

Non-Communicable Diseases

Seychelles is burdened by NCDs such as cardiovascular disease, cancer, diabetes, and obstructive pulmonary disease. These NCDs account for more than 65% of all deaths in the country.[183] Figure 17 compares the top ten causes of mortality and rate of change from 2011 to 2021.[184] Of the ten causes of mortality, eight are relevant to NCDs.

In response to the growing concern about NCDs, their associated risk factors, and the consequential threats to public health, the MoH implemented the National NCD Strategy 2016-2025.[185] The aim of the NCD Strategy is to better integrate and coordinate a whole-of-society response to sustain the efforts of NCD programs, health promotion, community awareness, and other interventions. The six objectives of the NCD Strategy are:

- To raise the priority accorded to the prevention and control of NCDs
- To strengthen national capacity, leadership, governance, partnerships, and multisectoral action, and to accelerate the country's

What causes the most deaths?

Communicable, maternal, neonatal, and nutritional diseases
Non-communicable diseases

Cause	2011 rank	2021 rank	Change in deaths per 100k, 2011-2021
COVID-19	-	1	↑ +127.1
Ischemic heart disease	1	2	↓ −0.6
Stroke	2	3	↓ −3.9
Lower respiratory infect	3	4	↓ −12.2
Hypertensive heart disease	4	5	↓ −1.4
Chronic kidney disease	5	6	↑ +6.7
Cirrhosis liver	6	7	↓ −1.5
Diabetes	8	8	↑ +4.1
COPD	7	9	↑ +0.0
Colorectal cancer	9	10	↑ +1.5

Figure 17: Top 10 Causes of Deaths per 100,000 (2011 and 2021) and Rate of Change

response to the prevention and control of NCDs
- To reduce modifiable risk factors for NCDs in the population through the creation of health-promoting environments
- To strengthen health systems to address the prevention and control of NCDs through people-centered primary health care and UHC
- To promote and support national capacity for high-quality research and development for the prevention and control of NCDs
- To monitor the trends and determinants of NCDs and evaluate progress in their prevention and control[186]

The main underlying risk factors of NCDs are tobacco use, poor nutrition, physical inactivity, and harmful use of alcohol. As of 2019, Seychellois consumed 9.48 liters (2 gallons) of pure alcohol per capita, and in 2020, 20.2% of the population (34% of males and 6.4% of females) used tobacco.[187] In November 2019, the country adopted a WHO Package of Essential NCDs (PEN) interventions to better understand and improve management of NCDs.[188] The Seychelles PEN Project was implemented in two health facilities – the Anse Aux Pins Health Center and Beau Vallon Health Center, both on Mahé – with guidance from WHO. The project's primary objectives are to scale up cost-effective interventions for the early detection, diagnosis, and comprehensive management of diabetes and hypertension. As a result, the two health facilities have implemented standardized and integrated management protocols for these prevalent chronic conditions. Furthermore, the MoH launched a national population-based survey on cardiovascular diseases and other NCDs to assess the distribution of health behaviors, diet, and main risk factors of the Seychellois population.[189] The NCD survey was conducted from August to December 2023.

For 25 years, Seychelles has dealt with high rates of substance abuse. In 2019, the Division for Substance Abuse Prevention, Treatment and Rehabilitation (DSAPTR), formerly the Agency for the Prevention of Drug Abuse and Rehabilitation (APDAR), reported that approximately 10% of the population between the ages of 18 and 35 years was dependent on heroin.[190] Based on this statistic, Seychelles has the highest per capita rate of heroin usage globally. The social consequences of this level of heroin dependence include broken families and citizens lost to their schools, churches, and community networks, as well as broader health challenges, such as the spread of blood-borne pathogens through use of shared needles. Moreover, the country's economy has suffered as employers have resorted to greater recruitment of foreign workers to plug gaps in the workforce as drug-dependent locals fail to engage in productive work.[191]

To address the domestic aspects of the substance abuse challenge, since May 2019, as part of a harm reduction approach, DSAPTR/APDAR has operated a Methadone Maintenance Programme, which involves the distribution of methadone through mobile clinics, staffed by drug counselors and qualified nurses, who administer methadone to individuals in recovery.[192] More recently, the government of Seychelles allocated SCR 75 million (US$896,673) toward prevention and rehabilitation for drug users in 2022.[193] However, these domestic health strategies do not operate in a vacuum as the country's police and maritime security forces also work – often in cooperation with international partners – to address drug trafficking, which has been especially prevalent in southwestern Indian Ocean island states, positioned as they are on key trafficking routes between opium poppy growing regions of south-central Asia and markets in East Africa and Europe.[194] It is also noteworthy that in addition to heroin, cannabis is widely used, and there is a concerning increase in the consumption of other substances, such as crack cocaine and methamphetamines.[195]

Training for Health Professionals

Despite the country's investment in its health workforce, the human capacity for

health economics, disease surveillance, health regulation, data governance, and monitoring and evaluation are inadequate.[196] As of 2019, there were 2.25 physicians per 1,000 population and 3.6 hospital beds per 1,000 population.[197] The health sector often competes with other sectors in attracting the country's best minds. Consequently, the country's health system relies heavily on foreign health workers. Approximately 57% of all health professionals are expatriates, and 64% are trained abroad.[198] In an initiative to cultivate greater interest in careers in the health and social fields among secondary school students, the NIHSS has developed the Access Program,[199] which is designed to aid students in fulfilling admission criteria and to enhance enrollment. Since 2014, the NIHSS has operated as a professional training center under the MoH and is governed by the Tertiary Education Act and the NIHSS Charter of 2015.[200] NIHSS provides training and continuing professional development in the health and social sectors, and it offers certificates and advanced diplomas aligned with the National Qualification Framework of the Seychelles Qualifications Authority. Health diploma programs include biomedical laboratory sciences, dental hygiene, emergency medical care, environmental health sciences, nursing, nutrition, occupational therapy, pharmaceutical sciences, physiotherapy, and social work.

In 2011, the Indian Ocean Field Epidemiology Training Program (FETP) was established. It is hosted by the IOC and offers field epidemiology training to professionals from Comoros, Madagascar, Mauritius, and Seychelles.[201] The FETP focuses on areas of infectious diseases, neglected tropical diseases, foodborne diseases, zoonotic diseases, disease surveillance, disease and emergency response, research and evaluation, and veterinary medicine. The Indian Ocean FETP is a two-year program based on IOC's SEGA One Health Network and consists of five workshops and mentored fieldwork.[202] The FETP aims to create a regional task force of field epidemiologists and supervisors to enhance regional health security.

In 2023, the MoH relaunched its basic and advanced life support training program for nurses and midwives in collaboration with the American Heart Association.[203] This program ensures that all nurses and midwives working in the public sector are trained in cardiopulmonary resuscitation (CPR) and are competent to facilitate the return of spontaneous circulation and avoid death and any physical or neurological damage in patients after cardiac arrest. The Red Cross Society of Seychelles builds health capacity in the country through community engagement by providing first aid training, recruiting volunteers for non-remunerated blood donors, a water safety program, and contributing towards preventing road traffic injuries through sensitization and awareness programs targeting the youth population.[204]

From 2 to 14 May 2023, the MoH hosted the 3rd African Regional Training of Trainer's Workshop on Public Health Emergency Operations Center (PHEOC).[205] This workshop was conducted in collaboration with several prominent organizations, including the WHO, Africa CDC, the United States Centers for Disease Control and Prevention (CDC), the West African Health Organization, the United Kingdom Health and Security Agency, and the Robert Koch Institute. The event saw the participation of 42 health professionals from 27 countries and regional bodies across Africa. The main objective of the workshop was to equip the participating trainers with the necessary resources and tools to enhance the capabilities of their respective country's PHEOCs. Moreover, these trained trainers are expected to further disseminate their knowledge at sub-national levels and contribute to the pool of health emergency management experts in the African Region. Their responsibilities may include leading countries conducting simulation exercises and undertaking after-action reviews.

DISASTER MANAGEMENT AND CLIMATE CHANGE AGENCIES AND ACTIONS

Seychelles has established a national disaster management system with policy and strategy set at the national level but with an emphasis on the importance of local community action. Thus, it integrates civil society and the private sector. Moreover, strategies incorporate not only DRM principles but also disaster risk reduction (DRR) to ensure greater coping capacity and reduced vulnerabilities. Although resilience, including to impacts of climate change, is integrated into disaster management strategies, institutionally, climate change and environmental protection are handled separately from disaster management. Among the national leadership's missions is to ensure that the country's natural resources are managed and that hazards do not develop into disasters.

Government

Since 2014, the Disaster Risk Management Division has been a separate government department tasked with developing and conducting a comprehensive all-hazards management policy, framework, and program. As part of the post-2014 government national DRM system, alongside the Division, there are also three committees tasked with high-level oversight and advisory roles; they are the National Disaster Risk Management Committee, the Vulnerability Assessment Committee, and the National Platform for Disaster Risk Reduction. At the sub-national level, national policy demands that each local authority establish and implement a DRM framework to ensure integration and uniformity; the bodies include district and community DRM committees.

Separately, the Ministry of Agriculture, Climate Change and Environment oversees ecological protection, safe water resources, and the strengthening of capacity to address the impacts of climate change and climate-related disasters. The Ministry is divided into the Departments of Agriculture, Climate Change, and Environment, all of which pursue their missions with a focus on promoting environmental protection, contributing to sustainable development, promoting community participation, and investing in resilience. Under the Department of Climate Change sits the Climate Change Division, headed by a Director General. The Meteorological Authority supports climate science and research.

Lead Government Agencies

The mission of the Disaster Risk Management Division (DRMD) was formalized in the 2014 Disaster Risk Management Act. The Division's mission is two-fold: 1) to promote DRM practices nationally, and 2) to strive for a disaster-resilient country.[206] DRMD is led by a Director-General and divided into two sections – administration and operations. Under the Operations Section, there are four units – Disaster Risk Assessment and Mitigation; Preparedness and Planning; Humanitarian Affairs, Recovery, and Enforcement; and Education, Research, and Information.[207] Figure 18 shows the DRMD organization structure as of 2021.[208]

Disaster Risk Management Division

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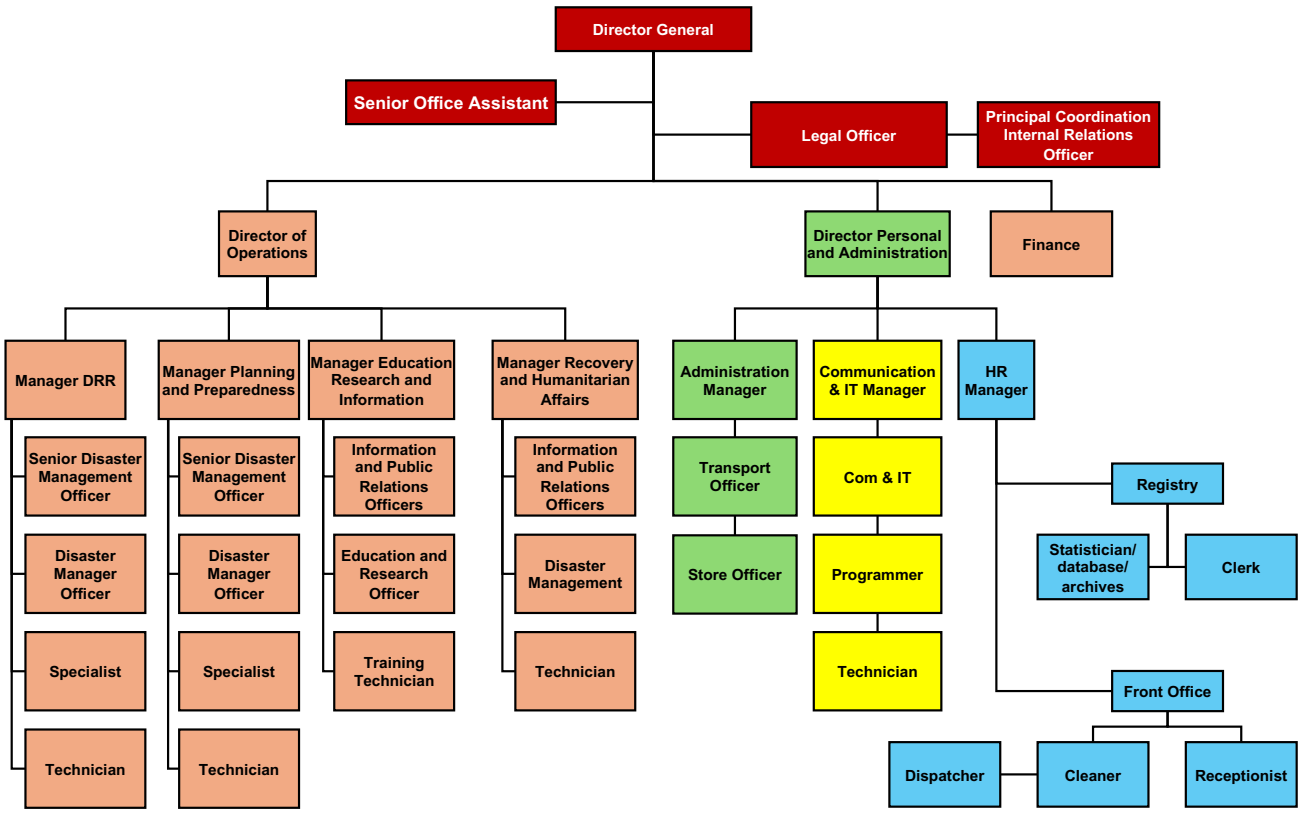

Figure 18: Disaster Risk Management Division Organization Structure

By law, DRMD's functions are to:

- Act as the national body for DRM on a national level and in supporting regional and local level DRM initiatives and response;
- Implement and monitor a comprehensive, integrated DRM system at all levels by facilitating and coordinating the development and implementation of integrated DRM systems through the national DRM policy and international DRM guidelines;
- Design methods and establish norms and criteria for auditing guidelines to undertake hazard surveillance, identification, analysis, and risk assessment to implement DRR activities through government bodies, NGOs, the private sector, and communities;
- Coordinate, monitor, and promote a uniform approach to DRM among government institutions, NGOs, the private sector, and communities, including the adoption of common standards and best practices;
- Prepare a National DRM Plan and Strategy with regard to the national disaster policy and DRM plans and strategies prepared by government institutions, NGOs, the private sector, and communities;
- Implement such other plans, strategies, procedures, and guidelines as the Director General considers necessary or as recommended by the National DRM Committee or the Minister designated to oversee DRM;
- Develop guidelines on and provide technical assistance for the preparation of DRM plans and strategies by government institutions, NGOs, the private sector, and communities;
- Approve, review, and monitor DRM plans of each government institution, NGOs, private sector entity, and community;
- Monitor, coordinate, and give direction regarding mitigation and preparedness measures to be taken by the government, NGOs, the private sector, and communities;
- Collaborate with relevant government institutions, NGOs, private sector entities, communities, and such other bodies or persons as the Division deems necessary and to:

  - Identify, analyze, and map hazards, conduct related research, and develop control measures, preparedness, and response strategies;
  - Conduct vulnerability and risk assessments and investigations as and when required to determine vulnerable areas for each hazard;
  - Encourage and support the development of community-based sustainable development programs and interventions aimed at reducing the risk and impact of hazards and disasters and harnessing community resources for disaster preparedness, response, and recovery;
  - Encourage and support the establishment of resilient critical infrastructure;
- Plan and coordinate specialized training programs for persons involved in DRM, including volunteers;
- Provide business continuity planning advice and assistance to the private sector as resources permit;
- Coordinate the conduct of assessments following a disaster;
- Promote education and awareness in relation to DRM and use such mechanisms as necessary to stimulate public interest in DRM and in securing public cooperation and participation in achieving planned objectives, which include:
  - Act as a repository and conduit for hazard and other disaster information and collaborate with relevant agencies as necessary in the collection, processing, and analysis of such information;
  - Develop and maintain a database on disaster information, including climate change and other new and emerging threats, and ensure access to the database by stakeholders, including about special vulnerable areas declared;
- Reduce vulnerability to disasters in identified areas of concern and put in place appropriate measures that minimize the impact or negative effects of a disaster;
- Promote the development of new technologies in risk and vulnerability reduction programs, including early warning systems, and carry out risk awareness campaigns;
- Coordinate and monitor other stakeholders' long-term risk and vulnerability reduction, rehabilitation, and recovery programs and facilitate resources for disaster risk and vulnerability reduction programs; and
- Perform such other functions as may be prescribed.[209]

The National DRM Committee is chaired by a Minister, appointed by the President to oversee all national disaster management activity. The Committee's role is to advise the President and Cabinet on DRM matters, ensure DRR is integrated into government activities, policies, and programs at national, regional, and local levels, and mobilize resources for human resources development, scientific research, and early warning. It comprises, among others, the DRMD Director General, principal secretaries from the Ministries responsible for environment, land use and housing, health, community development and sports, and transport and labor, and one representative each from SBC, the Seychelles Meteorological Authority (SMA), the Seychelles Police, the Red Cross Society of Seychelles (RCSS), and the Seychelles Fire and Rescue Services Agency (SFRSA).

The Vulnerability Assessment Committee (sometimes called "SEZVAC") uses an all-hazards approach to assess vulnerability and inform agencies responsible for development strategies and planning, early warning, and poverty reduction; it also assesses impacts of disasters on livelihoods and society and conducts periodic reviews of vulnerability for reporting to the President and Cabinet. This Committee consists of the DRMD Director General; director-level representatives from the Ministries of health, environment, labor, tourism, and community development and sport; and directors from the Gender Secretariat and Child Welfare Services, Seychelles Agriculture Agency, Seychelles Defence Forces (SDF), SFRSA, and Seychelles National Parks Authority.

The National Platform for DRR is intended

to act as a national mechanism to identify and address interrelated social, economic, and environmental problems related to DRR and to coordinate government, private sector, and community DRR programming to ensure a consultative and participatory process. The platform leaders and members are appointed by the Minister in charge of DRM in consultation with the National DRM Committee.[210]

Figure 19 shows the overall national structure for disaster risk management.[211]

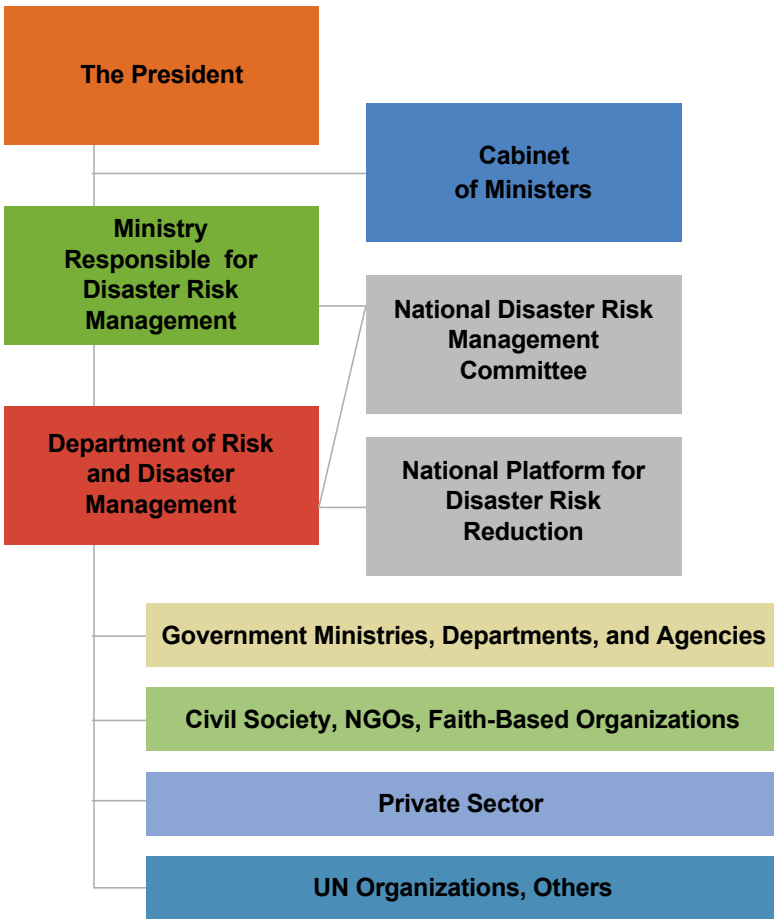

Figure 19: Seychelles' Disaster Risk Management Structure

Regional Resilience Platforms (RRP) – In 2019, the National Integrated Emergency Management Plan (NIEMP) proposed seven multiagency and multi-sectoral RRPs for interagency coordination on emergency preparedness and response. The RRPs would be geographically constructed to include 3-5 districts each; six of the RRPs would operate on Mahé, and one RRP would cover Praslin and La Digue. The RRPs would fall under the DRMD-led National Resilience Platform, via which they would share best practices and lessons learned. The rationale behind developing RRPs instead of using only the national level is to ensure the best use of specialist personnel and resources for planning and training at the sector and district levels. All RRPs would include Category 1 and 2 responders, detailed in the "Disaster Response" section.[212]

Climate Change Agencies

The Ministry of Agriculture, Climate Change and Environment (MACCE) Climate Change Department is headed by a Principal Secretary who oversees the development and implementation of policies and frameworks oriented toward addressing climate change adaptation (CCA).[213] The MACCE is the national focal point for coordinating and managing climate action under the UNFCCC.[214] The Department's Climate Change Division, overseen by a Director General, coordinates climate change issues, and implements the National Climate Change Strategy, the Sustainable Development Strategy, and the country's engagement in international climate change cooperation and negotiations. The Division has five sections – Climate Adaptation Management, Climate Mitigation Management, Climate Science and Data Management, National Meteorological Services, and International Climate Negotiation.[215] Parastatal agencies that fall under the MACCE are the PUC, Seychelles Parks and Gardens Authority (SPGA), LWMA, SEC, and SMA.[216]

Ministry of Agriculture, Climate Change and Environment

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Key focus areas of the MACCE, in general, and the Climate Change Department, specifically, are promoting and further developing technologies to build climate resilience and developing the use and connection of solar PV systems. Various MACCE partnerships with global climate and environment agencies and funds exist to implement CCA programs. These include:

- Ecosystem-based adaptation with the Adaptation Fund
- The European Union-led Global Climate Change Alliance (GCCA+)
- Ecosystem-based adaptation through South-South cooperation with the Global Environment Facility (GEF)
- Ecosystem-based coastal adaptation with the United Nations Environment Programme (UNEP)
- Restoring Marine Ecosystem Services by Rehabilitating Coral Reefs to Meet a Changing Climate Future[217]

The MACCE has a dedicated Climate Science and Data Management Section that handles the Ministry's geographic information system (GIS), remote sensing, and data management with the goals of providing GIS support to the Ministry and its partners, developing remote sensing use in the country, and managing MACCE's databases, clearing houses, and repositories. The Section is led by the Climate Change Department's Principal Secretary, and the Section headquarters serves as a hub for MACCE data to be accessible to the public, as appropriate, with special emphasis on making data and information available to researchers and university students.[218]

There is a National Climate Change Committee (NCCC), chaired by MACCE's Principal Secretary in the Department of Climate Change. It is the main body tasked with coordinating and monitoring the implementation of CCA and mitigation projects and with identifying emerging gaps and opportunities for further action.[219] It works to develop a plan of action that identifies high-priority multi-disciplinary tasks, to act as an interface between the government and national non-government climate change actors – NGOs, academics, and the private sector – and to maintain national and relevant international climate change information within the National Climate Change Information Centre, hosted by the SMA.[220] The NCCC, initially established in 1992, prepared the First and Second National Communications to the UNFCCC and built a national network of experts.[221] It is integral to the development and execution of the National Action Plan under the UNFCCC and Paris Agreement. As of the publication of the Third National Communication to the UNFCCC, the NCCC was mostly inactive due to a lack of funding and external partners.[222]

The 2020 National Climate Change Policy created the National Climate Change Council, chaired by the Vice-President, and tasked with coordinating climate change actions. The Council is required to report on the implementation status of all national and international climate change obligations to the Cabinet and the National Assembly.[223] In its 2021 updated NDC, Seychelles pointed to the operationalization of the Council as a key component of cross-sectoral coordination of adaptation and mitigation actions. The Council is expected to fully integrate representatives of the private sector, women, and youth.[224] However, as of the 2023 Third National Communication to the UNFCCC, the Council had yet to become fully operational.[225]

Disaster Response

DRMD prepares the national strategy for emergency management and response as well as various plans to detail roles and responsibilities, including the NIEMP, which spells out government roles, actions, structures of command and control, and the government business continuity plan. In case of emergency, the DRMD Director General is responsible for establishing and running the National Emergency Operations Centre (NEOC) and supplementary emergency operations centers (EOC). The NEOC is the headquarters for

response activities;[226] it is located at DRMD's headquarters in Mont Fleuri, south of central Victoria. In December 2022, DRMD operationalized EOCs on Praslin and La Digue; these EOCs will allow the Division to effectively coordinate multi-agency response. The EOC on Praslin is at the SFRSA Station on Eve Island, in Baie Ste Anne on Praslin's eastern coast; the Praslin EOC will also serve as the Regional Emergency Operation Centre (REOC) for both Praslin and La Digue. In the event of a serious disruption on either island, the REOC will link with the NEOC at Mont Fleuri. On La Digue, the EOC is located within the former courthouse and is staffed by the Police Force. Additional stakeholders who help operate the Praslin and La Digue EOCs represent the LWMA, SPGA, the Terrestrial Restoration Action Society of Seychelles (TRASS, on Praslin), and the Business Association (on La Digue).[227]

The country has identified Category 1 and 2 responders. Category 1 responders are responsible not only for cooperation and coordination during a disaster response but also for risk assessments, contingency planning, public information in case of emergency, and supporting business continuity planning. Category 1 includes the DRMD, Finance Department, Environment Department, Local Government Department, RCSS, PHA, HCA, SFRSA, Seychelles Police, SDF, and the PUC. Category 2 responders are sectoral bodies expected to take action in their respective sectors and to share information among responders during training and disaster response. Category 2 includes the Ministry of Habitat, Infrastructure, and Land Transport; Family Affairs Department; MACCE's Departments of Environment, Climate Change, and Agriculture; LWMA; Department of Information and Communication Technology; Ministry of Education and Human Resource Development;. National Biosecurity Agency; NGOs; Seychelles Agricultural Agency; SCAA; Seychelles Interfaith Council; SLTA; SMA; SMSA; Seychelles National Parks Authority; SPA; Seychelles Trading Company; Family Affairs Department; Agency for Social Protection; Seychelles Petroleum Company; Industrial Estate Agency; and the Department of Tourism, Land Transport, and Civil Aviation.[228]

The 2014 DRM law mandated the adoption of a comprehensive Integrated Emergency Management System, to be developed and put in place by DRMD. A key part of the System is the Incident Command System (ICS), which sets out structures and procedures for response and recovery across all scales and types of emergencies. The four layers of command within the ICS are color-coded:

- Platinum: Policy direction provided by the national government
- Gold: Direction through a unified command at the NEOC facility
- Silver: Direction of tactics and field operations through a unified command at an Incident Command Post (CP)
- Bronze: First-line management and supervision of personnel in the field

Figure 20 illustrates the layers of incident command.[229]

As most emergencies in the country are local, Bronze is the most commonly-activated level. These events are handled by individual responding agencies or district administrators as part of their routine duties and within their given mandates. Typically, these events involve minimal injury or damages with no significant impact on the environment or the economy, and the impacts are localized. For example, a traffic collision or a single structure fire may require an element of operational collaboration in the field between respective "Bronze" managers from the SFRSA, the Police, and the ambulance service, but they do not require a higher level of formal multi-agency coordination.

Emergencies that require more agencies than the typical first responders are elevated to Silver as they require more coordination within a district and among managers of agencies, NGOs, or the private sector, as appropriate. These incidents may include floods or landslides that affect structures, roads, or utilities; events that impact a large area; minor maritime

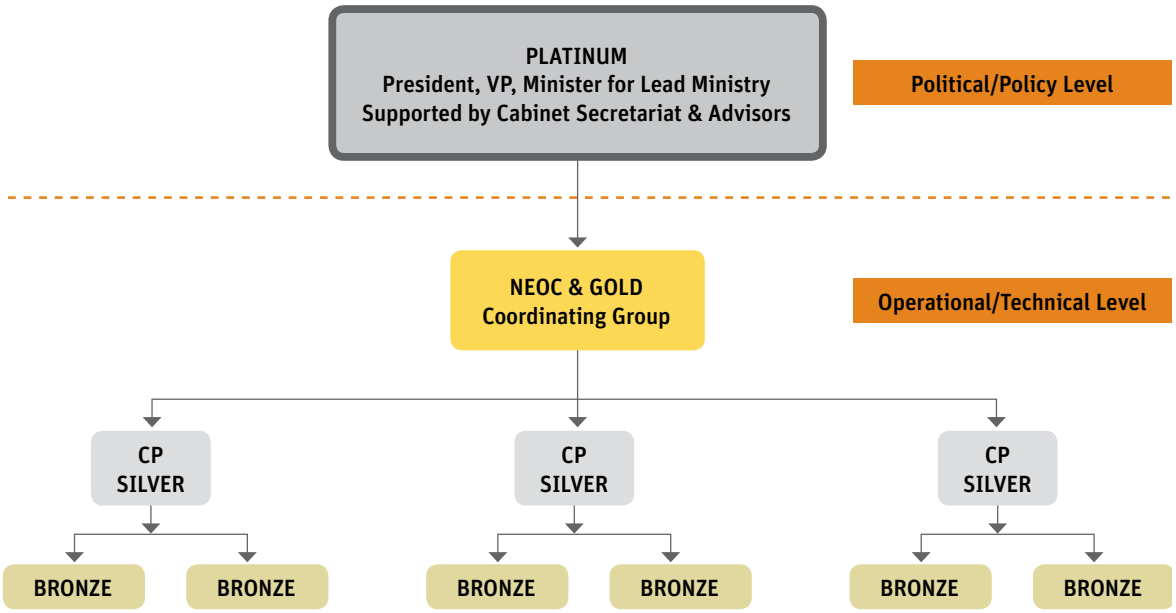

Figure 20: National Incident Command Structure

accidents; or structure fires in public schools. In such a case, all Silver leadership of involved agencies, including NGOs and private sector entities, will meet at a CP that is at or near the scene or that has been pre-identified in plans for the affected site; most often, these sites are district offices or a port or airport building. In general, the Police Force's Silver commander or the district administrator will nominate the CP location and notify the NEOC duty officer upon establishment. The NEOC duty officer will consider whether to activate the NEOC and at what level of activation to support Silver operations.

Incidents that require national coordination and resources due to scale, impact, or potential consequences but that do not require a declaration of a state of emergency or an appeal for international assistance are managed by Gold commanders. Events that can be declared in advance – e.g., cyclones or tsunamis – but where the direct impact is unknown ahead of time are included in this level because they require coordination structures and resources to be pre-positioned. Other events at this level may include building collapses, flooding and landslides that require national response resources, or extreme rainfall. When Gold is activated, the DRMD Director General or deputy determines the level of NEOC activation, and the members of the Gold command group attend the NEOC. Whenever the NEOC is established, the DRMD Director General or deputy liaises with the Platinum level to keep them apprised of the situation and to allow them to consider the need to escalate the incident. Appropriate Silver CPs are also activated to manage operational responses. Any widespread incident requiring more than two Silver commands is automatically escalated to Gold with the NEOC activated. The key role of Gold command is to ensure effective multi-agency and multi-sectoral coordination and to manage and direct national resources.

Any event for which a declaration of a state of emergency is made is Platinum, as these events are considered to have significant economic, environmental, or diplomatic implications and are of a magnitude, geographic spread, or impact that inhibits the country's ability to go about normal business. Declaration of a formal state of emergency can be for a district, a region, or the whole country. Any event that disrupts the function of three or more districts and has a national impact on society and the economy requires the Platinum level of command. The President, Vice-President, minister of the lead government department involved, or other ministers as nominated by the President, form the Platinum group to ensure that the Gold group has appropriate policy direction and

authorization. The need (or potential need) to enact emergency powers or to appeal for international assistance automatically invokes a Platinum activation. In these events, the NEOC is fully activated, and appropriate Silver CPs are established. Platinum leaders maintain an overview of the incident and response actions coordinated by Gold, and they receive regular briefings from the NEOC chair and NEOC command support group. A Platinum event may be a tsunami, airplane crash, large scale maritime accident, epidemic or pandemic, or an event that involves a large number of people and international implications or affects tourism or island food security.[230]

The DRMD Director General and Minister appointed to oversee DRM make an initial estimate as to whether domestic capacities are sufficient to meet the needs of affected communities and determine whether and what type of international assistance is required. With the consent of the President, they may then immediately request international assistance through the Ministry of Foreign Affairs (MFA).[231] The MFA coordinates cooperation from the initial appeal for international aid, through aid offers that are registered within the NEOC Humanitarian Assistance Module, and to the final delivery of the assistance. If the specific assistance is related to urban search and rescue (USAR), DRMD may make a request directly through the UN's International Search and Rescue Advisory Group (INSARAG) and will support the arrival of USAR teams via logistics.[232] The Division may, in consultation with the MFA, request assistance from foreign components of the International Red Cross and the Red Crescent Movement. Any international humanitarian organizations already present in Seychelles may provide offers of assistance directly to the DRMD.[233]

Laws, Policies, and Plans

Disaster Risk Management Act, 2014 – The DRM Act is the legal foundation for DRMD officers and staff to undertake action. It gives the DRMD the power to oversee the formulation of national DRM plans and to support regional and local DRM initiatives; it also tasks the DRMD with the management of the National Platform for DRR and of hazards, risks, and emergency events. Finally, the Act created the National DRM Fund, administered by DRMD.[234]

National DRM Policy (2014) – The National Policy sought to shift the country away from emergency response and toward improvements in early warning and hazard tracking capacity, development of monitoring and surveillance processes, and dissemination of information on hazards. To entrench DRR within the country's DRM framework, the policy considers existing coping mechanisms of vulnerable communities, households, and individuals and advocates the enhancement of coping capacities. The five objectives of the Policy are:

- Objective 1: Make DRR a priority at all levels in Seychelles by establishing sound, integrated, and functional legal and institutional capacity within the established national DRM system to effectively apply the concept of total DRM.
- Objective 2: Develop and implement methods and mechanisms for risk identification, assessments, and monitoring in Seychelles.
- Objective 3: Reduce the underlying risk and vulnerability factors by improving DRM application at all levels.
- Objective 4: Strengthen disaster preparedness for effective response and recovery practices at all levels.
- Objective 5: Enhance information and knowledge management for DRM.

The National DRM Policy demands that government and private sector stakeholders cooperate to develop national DRM plans, early warning systems, and effective response mechanisms.[235]

National DRR Strategic Plan 2021-2030 – DRMD developed the National DRR Strategic Plan to provide all national DRR stakeholders with a 10-year roadmap linked to the Sendai

Framework. The plan has four priority areas, three of which are explicitly addressed in the Strategic Plan, and the fourth is covered by the NIEMP. Each priority area has underlying objectives and expected outcomes. Table 5 details the priorities and objectives of the DRR plan.[236]

National Integrated Emergency Management Plan (NIEMP) (2019) – The NIEMP outlines the country's approach to emergency preparedness and response as well as delivery of the Integrated Emergency Management System from the national to local levels. It details the roles and responsibilities of emergency preparedness and response stakeholders and explains relationships among different agencies and organizations during emergencies. The NIEMP covers natural hazards and human-induced events with the stated goals of saving lives, meeting humanitarian need, reducing health impacts, safeguarding property, the economy, and the environment, and promoting recovery. The Plan covers the ICS, the hazards to which the country is exposed, the functional areas of response, and the specific infrastructure or contingencies for which

Priority Area	Strategic Objective	Expected Outcome
Understanding Risk	A robust information management system used by all DRR/DRM stakeholders	Develop and strengthen institutional knowledge
		Sendai Framework monitoring
	Informed stakeholders about DRR	Vulnerability profiling
		Information and data gathering and dissemination
Strengthening Disaster Risk Governance to Manage Risk	DRR mainstreamed at all levels	DRR incorporated into action planning for all government agencies
		DRR incorporated into action planning for all government agencies
		DRMD participation on national committees and international platforms related to DRR/DRM
		All government agencies understand DRR roles and responsibilities
		Initiation of DRR-related research projects
		Engagement between public and private sector on DRR
		Integration of DRR in school curricula
	Effective governance and organizational capacity of DRMD	Establish National DRM Committee
		National DRM Committee sensitized on DRR
		Establishment of the Vulnerability Assessment Committee (SEZVAC)
		Vulnerability Committee trained on DRR at basic and intermediate levels
		Establishment of the National Platform for DRR
		Rebranding of DRMD
		Strengthen DRMD capacity for program management
		Strategic human resources management
		Program monitoring and evaluation
	Strong DRMD-led committees and secondments	Volunteer management
		DRMD-led teams with capacity to train DRR on all levels and across all sectors
		Train DRMD-led committees and secondments in basic DRR
	Effective DRR capacity at national level	Ministries, departments, and agencies trained on DRR
	Effective DRM policy, law, and governance structures	National DRM Policy periodically updated
		National DRM Act periodically updated
		Periodic stakeholder sensitization on DRM Act
	DRR strategic planning at all levels	Implementation of the National DRR Strategic Action Plan 2021-2030
		Guidance for sectoral DRR strategies
		Local and sectoral DRR

Table 5: Priorities, Objectives, and Outcomes of the National Disaster Risk Reduction Strategic Plan

Priority Area	Strategic Objective	Expected Outcome
Investing in DRR for Resilience	National Strategy for Disaster Risk Financing	Financial protection mechanisms
		Contingent financing
		Resource allocation towards the Implementation of DRR across all government agencies
		Contingent fund to support response and recovery efforts
	Effective public-private partnerships within DRR	Private sector involvement with DRR/DRM
		Partnership with embassies and consulates
		Business Continuity Planning
		International cooperation for DRR
	Nation-wide and cross-sectoral use of adaptive technologies for DRR	Disaster-resilient infrastructure
		Structural standards for workplaces
		Nature-based solutions
Enhancing Disaster Preparedness for Effective Response and to Build Back Better in Recovery, Rehabilitation, and Reconstruction	NIEMP	

Table 5: Priorities, Objectives, and Outcomes of the National Disaster Risk Reduction Strategic Plan (cont.)

additional contingency plans are required.[237]

Seychelles' National Climate Change Policy (NCCP) (2020) – The NCCP defines the country's climate principles, including climate justice, and highlights needed legislative actions to integrate climate change adaptation and mitigation. The overall NCCP vision is to achieve a sustainable, climate-resilient, and low-carbon Seychelles.[238] The overall objective is to facilitate a coordinated, coherent, proactive, and effective response to the local, regional, and global climate change challenges, and the five specific objectives are:

1. To advance understanding of climate change and its impacts on Seychelles
2. To strengthen capacity and social empowerment at all levels to adequately respond to climate change
3. To mainstream and integrate climate change considerations into all relevant sectors and all levels of government
4. To achieve a transition to a low-carbon economy
5. To put in place measures to adapt, build resilience, and minimize vulnerability to the impacts of climate change

The NCCP is intended to enable government and non-government stakeholders to develop programs and projects that reduce GHG emissions while enhancing adaptive capacity across sectors, including agriculture, energy, transport, and finance.[239]

Nationally Determined Contributions (NDC) – Seychelles' updated NDC under the UNFCCC includes specific commitments focused on targets to safeguard the "Blue Economy" and "Blue Carbon" ecosystems, both of which have been identified as key to diversifying the economy. The 2019–2023 National Development Strategy included reforms to regulate coastal planning and infrastructure at the national and local levels to prioritize the consideration of "blue" nature-based solutions (NbS), protect "Blue Carbon" ecosystems to increase the carbon sink from seagrass and mangrove systems by at least 50% by 2025 and 100% by 2030, and implement the Marine Spatial Plan, based on participatory, integrated, multi-sector approaches to support the health and sustainable long-term use of Seychelles' ocean waters. The updated NDC also presents opportunities to align the climate and development agendas to promote sustainable growth. Seychelles' NDC aims to reduce GHG emissions by 293.8 kilotons of carbon dioxide equivalent ($ktCO_2eq$) by 2030, 26.4% compared to the business-as-usual scenario, and it targets net zero emissions by

2050. In recent years, emissions have steadily increased to over 610 $ktCO_2eq$ (2019) in total. The country has committed to using renewable energy for water supply mobilization by 2030 and to secure a sustainable and resilient water management system. The country has also committed to ensuring sewage systems and wastewater treatment facilities include nutrients and energy recovery. The key implementation targets focus on modernizing the entire electricity sector, increasing electricity generation from renewable sources, improving energy efficiency across sectors, shifting from fossil-fuel engineered transport to electrified transport and individual active mobility, and enhancing resource rehabilitation and land mitigation measures.[240]

Blue Economy Strategic Policy Framework and Roadmap (2018-2030) – The "Blue Economy Roadmap" provides a national approach to ocean-based sustainable development, integrated across economic, environmental, and societal needs and capacities. It is in line with the SDGs, the Convention on Biological Diversity, and the Paris Agreement. The goal is to ensure that Seychelles is viewed as having a comparative advantage due to its sustainable practices based on legal and policy frameworks, planning and financial initiatives, and investment priorities. Work is conceived as falling along four pillars: economic diversification (increase in GDP related to marine sectors); shared prosperity (high value jobs and local investment opportunities); food security; and integrity of habitats and ecosystem services (climate resilience). The desire is to ensure that traditional ocean-linked sectors – fisheries, tourism, and ports – are supplemented by emerging sectors – aquaculture, renewable energy, and marine biotechnology. Success in this diversification will depend heavily on another requirement – application of protective measures and enforcement.[241]

Coastal Management Plan (CMP) (2019-2024) – In 2019, the government developed the first national CMP to address coastal flooding, erosion, and ecosystem degradation. The plan delineates strategic investments and institutional capacity building on coastal adaptation, although implementation remains limited and only a few adaptation interventions have been operationalized.[242] Within its portfolio, MACCE's Climate Change Department has responsibility for overseeing coastal protection, management, and erosion, all with cooperation from the MACCE's Environment Department.[243]

The Environment Protection Act (EPA) 1994 – The EPA is the basic legal foundation for protection, preservation, and improvement of the environment and for control of hazards to humans, other living creatures, plants, and property; among the key hazards addressed is pollution. The Act also provides for the coordination, implementation, and enforcement of policies on environmental protection. The MACCE's Department of Environment administers the act's provisions, which include the authority to coordinate the activities of other agencies concerned with protecting the environment.[244]

Nature Reserves and Conservancy Act (2022) – The Nature Reserves and Conservancy Act replaced the National Parks and Nature Conservancy (NPNC) Act (1969). The new Act provides for conservation of biological diversity and the sustainable use of land and marine ecosystems. A key effect of the Act is to make way for the designation of protected areas and to authorize officers to enforce provisions related to access and restrictions. Under the Act, types of protected areas are strict nature reserves, ecological reserves, national parks, protected landscapes or seascapes, sustainable use areas, and transboundary protected areas.[245] Several of these categories relate to the International Union for Conservation of Nature and Natural Resources (IUCN) category list with recommendations on how to establish protection and enforcement.[246] The SPGA's land and sea enforcement officers are tasked with enforcement of the Act's provisions.[247] As of 2021, there were no "strict nature reserves," which are areas with the highest level of protection; there were three Special Reserves, seven Marine National Parks[248]

(IUCN Category II – protect the ecosystem, exclude exploitation, and provide non-destructive visitor experiences[249]), and one Area of Outstanding Natural Beauty. There is some expectation that more areas will be designated as sustainable use or community-managed protected areas, and the new Act makes possible Temporary Protected Area status for areas that host migratory species of whaleshark and nesting Hawksbill turtles.[250]

Seychelles Marine Spatial Plan (SMSP) – The SMSP emerged from an initiative launched in 2014. It was government-led but integrated various stakeholders in a participatory process. As of 2024, the MACCE is the SMSP government lead with facilitation and project management by The Nature Conservancy (TNC). The SMSP objectives are to expand marine protection to 30% of the EEZ, address CCA, and support the Blue Economy. As part of the SMSP contribution toward Seychelles NDC, the project has developed climate change risk mapping for coral reefs.[251] As part of the process, SMSP committees drafted and workshopped an SMSP Policy that was approved by the Cabinet in 2020. The Policy addresses comprehensive marine environmental management of the EEZ and territorial seas, considers Seychelles' international commitments and developments in protected area management, facilitates integrated inter-ministerial management, addresses the need to review and synergize management priorities in the country, and integrates national biodiversity goals and the Blue Economy.[252] Other key outputs are data catalogs that drive mapping and zoning considerations for protection and allowed use plans.[253]

Public Utilities Corporation (PUC) Act 1985 – The PUC Act established the PUC as a parastatal with a mandate to manage the supply of electricity and water and the treatment and disposal of sewage. The PUC has the authority to address pollution and its sources. Moreover, under the PUC regulations, communities are required to either utilize PUC-provided sewerage or install and maintain private sewage disposal systems, as directed by the PUC.[254]

Armed Forces' Role

The Seychelles Defence Forces (SDF) include the infantry, Air Force, special forces unit, and the Seychelles Coast Guard (SCG), the last of which is tasked with search and rescue, deterring maritime crime, and protecting the EEZ.[255] All SDF report directly to the President who maintains the portfolio of the Ministry of Defence.[256] Given the importance of the marine environment to the country's people and economy, a significant focus of all branches of SDF is on addressing illegal fishing and other natural resource protections, making SDF support to fisheries authorities a key activity. Beyond SCG, the Air Force maintains maritime surveillance capability, and maritime special operations, boarding, counter-piracy, and combat diving tasks are the remit of the special forces unit, known as "Tazar."[257]

Under the NIEMP, the SDF are considered a Category 1 responder, with specific preparedness and response duties. Particularly under NIEMP's Functional Area I – Rescue and Security, the SCG is tasked with leading maritime search and rescue, while all of the SDF are tasked with supporting SFRSA in land-based search and rescue. In addition, during states of emergency, SDF may be tasked with supporting the police in maintaining law and order, supporting SFRSA in firefighting, supporting local governments for evacuations, and supporting SFRSA for hazardous materials management. Under Functional Area II – Health, SDF may be asked to support health agencies and the public health authorities in delivering First Aid, hospital care, and epidemiological surveillance. Under Functional Area III – Humanitarian Services, SDF may support local governments' efforts to install and manage shelters. Under Functional Area V – Emergency Management, DRMD may seek SDF support for subnational coordination.[258]

Based on the Defence (Amendment) Bill, 2020, the SCG has policing powers for maritime areas in addition to any requirements for sea-based territorial defense as the country has no navy. Thus, the SCG has a key role in addressing

hazards and incidents in the country's waters; such incidents may include threats to marine resources and the environment, pollution, and accidents requiring search and rescue. Moreover, the SCG can be called upon by the SDF commander to support any government Ministry or Department in case of an emergency with a maritime element.[259]

The IOC leads the EU-funded Maritime Security in Eastern and Southern Africa and Indian Ocean (MASE) program, within which there are two regional maritime security centers, the Regional Coordination of Operations Centre (RCOC) in Seychelles and the Regional Maritime Information Fusion Centre (RMIFC) in Madagascar. The latter promotes maritime domain awareness and sharing of information thereupon, and the former is dedicated to coordination operations at sea among[260] 21 countries.[261] With an SDF officer as its Director, the RCOC reached full operational capacity in 2019 and is active 24 hours per day, every day of the week and year.[262] Among the key DRM/DRR elements that RCOC monitors are threats to the marine environment and cooperation in response to natural or environmental disasters. Although Seychelles hosts the RCOC, the Centre is staffed by liaison officers from each state party of the MASE agreements; they include the key western Indian Ocean states of Comoros, France (Réunion), Madagascar, and Mauritius.[263]

Regional Coordination of Operations Centre

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Co-located with RCOC in Bois de Rose but operating as the primary national point of contact for maritime security,[264] the Seychelles' National Information Sharing and Coordination Centre (NISCC), established with Cabinet approval in 2017, acts as an information sharing hub and coordinates a broad spectrum of national aviation and maritime safety and security activities.[265] Led by a Director who is from the SDF, the NISCC has the key tasks of operating the Joint Rescue Coordination Centre (JRCC), coordinating oil spill responses and responses to coastal maritime crime, and operating the Coastal Radio Station. The NISCC is staffed by personnel seconded from the SDF, police, aviation and port authorities, and other national stakeholders involved in emergency response.[266]

National Information Sharing and Coordination Centre

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As defined in their founding mandates, both the RCOC and NISCC have roles to play in regional emergency response, and under the Djibouti Code of Conduct / Jeddah Amendment (DCoC/JA), they are part of an international information sharing network. The Djibouti Code of Conduct was initially mobilized to address piracy and armed robbery of ships in the western Indian Ocean, but in 2017, the Jeddah Amendment expanded the Code's scope as signatories agreed to build national and regional capacity to address other maritime security challenges – including illegal and unregulated fishing, transnational crime, and terrorism. In its execution, given the importance this cooperation has for the overall "Blue Economy," the Amendment also encourages effective protection of the marine environment and sustainable management of marine living resources.[267] Under the DCoC/JA 2023 Standard Operating Procedure for national maritime information sharing centers, RCOC and NISCC are regional and Seychellois national focal points for using various tools to notify partners of incidents, accidents, and threats in the western Indian Ocean maritime domain. These tools include widely used mobile platforms – e.g., WhatsApp or email – as well as dedicated maritime security platforms[268] which include SeaVision, originally developed in 2012

by the U.S. Department of Transportation for U.S. Naval Forces Africa to enhance maritime domain awareness and now used globally as a multinational information sharing tool,[269] and IORIS, the Indo-Pacific Information Sharing platform, which was launched in 2018 to enable coordination, cooperation, and communications among maritime agencies via a secure encrypted online environment.[270]

Early Warning

The Seychelles Meteorological Authority (SMA, previously the Seychelles National Meteorological Service) is the national weather service, tasked with delivering all weather and climate services to the country's government and public. It provides and publicizes weather forecasts and warnings, implements and advises on climate projects, and participates in DRR education, awareness, assessment, and planning. Headquartered at the Seychelles International Airport, SMA, maintains weather stations and offices throughout the islands.[271] SMA is a parastatal under the MACCE. Its Board consists of representatives of the MACCE, the Ministry of Finance, SCAA, SPA, and the Town and Country Planning Authority, as well as a meteorological expert, one Presidential appointee, and the Chief Executive Officer (CEO) of SMA.[272] Figure 21 shows the SMA organization structure.[273]

SMA produces various early warning messages for hazard-related events. Among these products are storm and cyclone bulletins and updates, to include information on projected paths and landfalls, projected intensity, and safety precautions.[274] In the SMA's Strategic Plan for 2024-2028, Goal #1 is to enhance multi-hazard, impact-based forecasts and early warning services. Underpinning progress toward this goal, Seychelles is a Member of the World Meteorological Organization (WMO) Regional Association I, with the SMA CEO named Permanent Representative for WMO on Meteorological matters and in close liaison with the designated Hydrological adviser. The Regional Association aims to foster regional cooperation and capacities; thus, SMA works closely with the Regional Specialized Meteorological Centre (RSMC) La Réunion (Météo-France), as the Tropical Cyclone Centre for the Southwest Indian Ocean and the Tropical Cyclone Committee (RAI TCC); RSMC Pretoria (SAWS) for the Severe Weather Forecasting Programme (SWFP); Regional WMO Integrated Global Observing System (WIGOS) Centre Pretoria; and the Regional Training Centre Pretoria.[275]

The Authority participates in various efforts to bolster early warning capacity alongside partners, especially the WMO. Through the Climate Risk and Early Warning Systems (CREWS) project, SMA not only updated its Strategic Plan but also worked to review the Meteorological Act 2015 and address legislative shortcomings to allow SMA to develop new programming that will

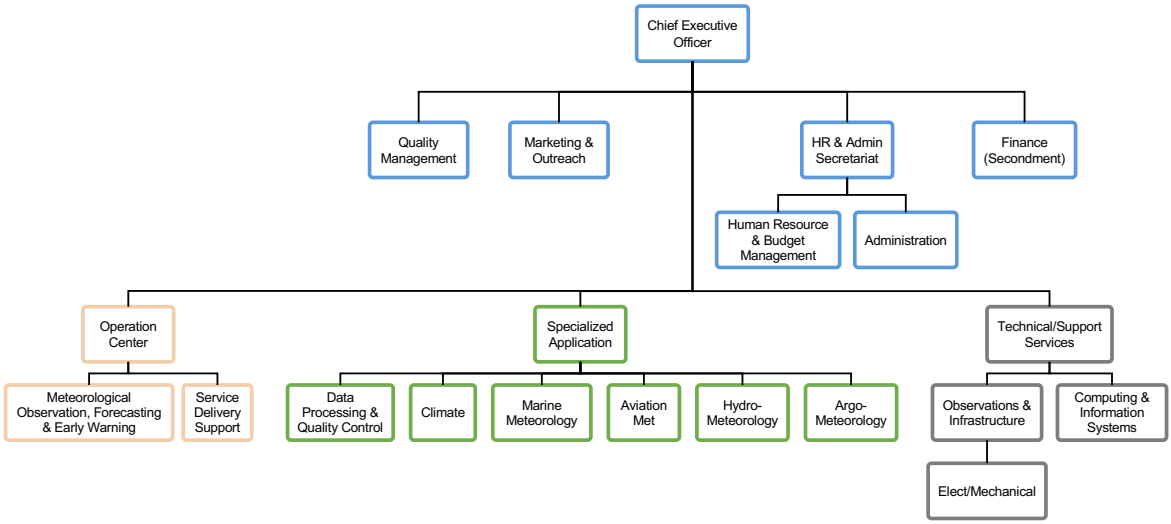

Figure 21: Meteorological Authority Organization Structure

allow it to generate revenue and manage climate risk data and projects.[276] In addition, in late 2023, SMA launched its Early Warnings for All initiative to enhance community understanding of climate and weather. The first activities were to visit elder homes across the main islands to help prepare vulnerable people for hazard events by familiarizing them with color-coded alerts and appropriate actions to take after receiving an alert.[277]

There are weather stations in the outer islands at Aldabra Atoll, Farquhar Atoll, and Desroches, one each on La Digue and Praslin, and 17 across Mahé.[278]

Seychelles Meteorological Authority

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After the 2004 Indian Ocean "Boxing Day" Tsunami, Indian Ocean countries joined UNESCO to establish a regional tsunami warning system, and since 2009, UNESCO's Inter-governmental Oceanographic Commission has run IOWave, a regional exercise of the warning system. The 2016 iteration of the exercise included various national stakeholders, to include Seychelles Petroleum Company (SEYPEC), the SPA, SMSA, PUC, Zil Air helicopter company, SCAA, the SLTC, two dozen hotels, one hospital, an elder-care home, and the Land Marine company. SLTC emphasizes that, even if buses are available to transport tens of thousands of people away from coastal areas that could be impacted by an approaching tsunami, the condition of roads could be questionable. There is only one main road going around Mahé, and there are three main inland roads.[279]

The media is an important primary source of disaster risk information. It significantly influences how the population and the government view, perceive, and respond to hazards and disasters. For example, the right information helps government and humanitarian organizations understand the needs of affected communities and ways to meet those needs. The role of the media during disasters involves not only focusing on the underlying causes of disasters but also promoting a culture of risk avoidance behavior among Seychellois. To a great extent, this process involves the media informing the public on the importance of understanding early warnings and reinforcing the need to take heed of them. Moreover, the media is expected to maintain a presence during all phases of disasters – pre-, during, and post-.[280]

Partners

DRMD maintains strong ties with various international and national organizations, including UN agencies, regional groups, national bodies – Petro Seychelles, Seychelles Red Cross Society, and University of Seychelles – and international financial organizations, such as the World Bank.[281] UN agencies and other development partners have a role in supporting government efforts, especially mobilizing resources. Per agreements between Seychelles and UN system agencies, agencies programming in Seychelles must integrate DRR into poverty reduction, sustainable development, women's empowerment, natural resource management, and good governance projects. The National DRM Policy notes the vital role that national NGOs and faith- and community-based organizations play in effective DRM because of their ability to be flexible and respond rapidly, effectively, and appropriately. The Policy provides mechanisms for coordination and integration of the contributions of these national and local groups with those of other stakeholders through the National DRM Committee. The Policy also recognizes the need to coordinate the influx of international aid in the country in times of significant disasters to ensure fair distribution of capacities and resources.[282]

Islands Development Company (IDC) is a parastatal entrusted with management and development of 17 islands and atolls, all but one

of which – Silhouette – are outer islands spread out over half of the entire EEZ.[283] The islands leased to IDC management are: African Banks, Alphonse, Astove, Assomption, Boudeuse, Coëtivy, Cosmoledo, Desroches, Desnoeufs, Etoile, Farquhar, Marie-Louise, Ile Plate, Poivre, Providence, Rémire, and Silhouette. African Banks, Boudeuse, and Etoile are set aside purely for conservation.[284] The IDC reports directly to the Vice-President and is managed by a 9-member board, which determines company policies. Its mission is to ensure that the outer islands contribute to the socioeconomic development of Seychelles, while adhering to the highest environmental standards. The company activities include:

- Operating air and sea links to the islands
- Managing utilities – electricity generation and distribution, potable water treatment facilities and distribution, and sewerage and solid waste treatment facilities
- Maintaining efficient telecom links to the islands
- Constructing and maintaining infrastructure
- Supplying and stocking essential food supplies on the islands and operating retail facilities
- Providing medical and medivac facilities
- Maintaining law and order and managing emergency plans
- Providing facilities for visiting government officials on islands
- Providing and maintaining social infrastructure
- Engaging in agricultural activities
- Supporting conservation programs operated by conservation partners.[285]

Per the NIEMP, the IDC has a role in Functional Area I – Rescue and Security, where it will support the SCG in sea-based search and rescue, support SFRSA in firefighting and managing hazardous materials, and support local governments in evacuations. Under Functional Area III – Humanitarian Services, the IDC will support local government in needs assessment, family reunification, shelter installation and management, procurement and delivery of non-food assistance, and protection of vulnerable groups.[286]

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Tel: +248 4 384 640
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NGOs

Citizens Engagement Platform Seychelles (CEPS) - The CEPS has since 2014, served as a national umbrella organization for civil society and non-governmental organizations. It replaced the Liaison Unit for NGOs of the Seychelles (LUNGOS), which operated 1989-2014 with the stated goal of promoting and coordinating activities, resource mobilization, and innovation among the country's NGOs.[287] CEPS has upwards of 40 members among Seychelles civil society groups who utilize the CEPS as a link to national and regional governments and to other NGOs.[288] Among the thematic groupings under CEPS are environmental NGOs.[289]

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Seychelles Islands Foundation (SIF) – SIF was founded as a non-profit, charitable, public trust organization in 1979. It is overseen by a 15-member board, appointed by the President.[290] It manages the Vallée de Mai and Aldabra protected areas. Both have been designated UNESCO World Heritage Sites. SIF's 35 staff comprise rangers and security officers,[291] and it funds its operations through revenue from entrance fees and sales at Vallée de Mai alongside additional grants and donations.[292] SIF has conducted various conservation and resilience projects in the protected areas with the support – financial and technical – of the Seychelles Conservation and Climate

Adaptation Trust (SeyCCAT), the Organisation of African, Caribbean and Pacific States, the European Union (EU), IUCN, Oxford University, UNESCO, and the GEF, among others.[293]

Seychelles Islands Foundation
La Ciotat building, Mont Fleuri, Victoria, PO Box 853, Seychelles
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Nature Seychelles – Nature Seychelles is the country's oldest environmental NGO and has a focus on conservation and management. It is the national partner of Birdlife International and is a member of the IUCN and the Western Indian Ocean Marine Science Association. It manages Cousin Island, designated a Special Reserve, and 15 staff biologists, economists, and educators conduct its biodiversity-related activities,[294] such as bird and turtle monitoring and staff training.[295] In cooperation with the GEF, government, and private island owners, Nature Seychelles has also carried out island ecosystem management and rehabilitation on Frégate, Cousine, North, and Denis islands.[296] The organization has worked on projects financed by the United States Agency for International Development (USAID), the GEF, and UNDP to research and restore coral reefs, and it supports global scientists working on research on corals.[297]

Nature Seychelles
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Island Conservation Society (ICS) – ICS is an environmental NGO undertaking conservation work on several islands; it maintains conservation centers in Alphonse, Aride, Desroches, Farquhar, and Silhouette.[298] It is responsible for the management of Aride Island, declared a Strict Nature Reserve, and it undertakes conservation works on a number of other islands. ICS staff comprises wardens, rangers, and volunteers. ICS has also signed a memorandum of understanding with the IDC to undertake biodiversity management and environmental monitoring activities on outer islands.[299] Among completed projects is the Fonds Français pour l'Environnement Mondial-funded eradication of rats from North, Conception, Ile aux Rats, and several islands of Cosmoledo Atoll, and the eradication of cats and barn owls on North.[300]

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Website: *http://www.islandconservationseychelles.com/contact-us.html*

Sustainability 4 Seychelles (S4S) – Among S4S' projects are programs to build sustainable practices at the country's largest businesses, including major hotels throughout the islands, to restore mangroves on private land, and to integrate local communities into major business sustainability activities. It partners with Air Seychelles, the Seychelles Tourism Board, the largest brewery in the islands – Seybrew – the PUC, and NCCC and has worked on projects funded by UNDP.[301]

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United Nations Country Team

On the basis of the UN Country Team (UNCT), in case of a major emergency that requires multi-national assistance, the UNCT would likely form the basis of the Humanitarian Country Team (HCT), led by the UN Resident Coordinator and with the addition of support from UN OCHA. Of the 19 UN system agencies that make up the UNCT in Seychelles, four - the WHO, UNDP, Food and Agriculture Organization (FAO), and the UN Office of Drugs and Crime (UNODC) – are resident in the country; the remainder work from regional/global offices.

As an example of UN mobilization to assist Seychelles, during the response to COVID-19, at the declaration of the pandemic, the WHO supported Seychelles' government to develop, implement, and adapt medical and public health campaigns to prepare for and respond to the virus' spread while establishing a strategy and protocols to allow the country to re-open safety to economic activity. Meanwhile, the Resident Coordinator offered additional UNCT support, and the government requested assistance to design a collaboration plan to minimize social and economic impacts. The Resident Coordinator's Office then managed UNCT member organizations' actions to contribute to meeting the request.

With WHO as the UNCT lead for supporting government response implementation, additional support came from:

- The International Atomic Energy Agency (IAEA) – purchased COVID-19 diagnostic kits, diagnostic and biosafety and biosecurity equipment, and personal protective equipment
- The International Organization for Migration (IOM) – developed Guidance for Employers and Businesses on the Protection of Migrant Workers During the COVID-19 Crisis, shared multilingual COVID-19 information posters, and supported the state for both assistance to stranded migrants and border management with enhanced health security; support to implementation of labor migration policy
- UNDP – mobilized funds to strengthen the national health system and prepare frontline services to provide critical care, purchased vital non-medical supplies, and created public health messages and related communication; contributed funding to National Disaster Response Fund; supported frontline prevention initiatives on Praslin and La Digue
- The United Nations Population Fund (UNFPA) – provided funds for setting up the Public Health Emergency Operation Centre (PHEOC) and equipment for quarantine facilities in collaboration with WHO; supported sustaining continuity of care for sexual and reproductive health services and for HIV and hepatitis care
- UNODC – raised resources to procure PCR test kits and extractor equipment through a partnership with the private sector; delivered interpreter services in court cases; shared guidelines for COVID-19 precautions and protocols for prisons, drug use, gender-based violence, access to justice, human rights, and COVID-19 aboard ships
- FAO – supported implementation of rapid assessment of food security needs and development of a recovery plan
- UNESCO – embedded with the Ministry of Education to develop distance education, online learning materials, and teacher resources; improved access to climate change, DRR, and water management tools; conducted surveys among cultural practitioners regarding COVID-19 impacts; provided education on the media's role in a pandemic; and sustained Intergovernmental Oceanographic Commission Capacity Building in Marine and Technology program
- UN-Habitat – contributed financial resources to sustainable urbanization recovery planning
- The UN World Tourism Organization (UNWTO) – maintained tourism statistics project to support preparation of protocols for safe tourism and tourism sector recovery[302]

United Nations Agencies

The United Nations Sustainable Development Cooperation Framework (SDCF 2024-2028) set out the overall program strategy for UN system agencies supporting Seychelles' progress toward the 2030 Agenda and Sustainable Development Goals (SDG) with a focus on building a resilient society, economy, and environment. Outcome 3 of the Framework is, "By 2028, people and institutions are better prepared for disaster risks, and natural ecosystems are more resilient to climate change, biodiversity losses, and

pollution." The UN contribution is expected to focus on greater support for strong, evidence-based national policies and strategies for natural resource protection and access to climate financing. Work by UN system agencies focuses on two outputs: 1) institutions and communities are prepared and collaborate to adapt to climate change and manage risk; and 2) institutions and communities have stronger capacity for the management of natural resources, ecosystems, and waste. UN system agencies involved in work on outputs for Outcome 3 are: FAO, IFAD, ILO, IOM, ITU, UNDP, UNDRR, UNEP, UNESCO, UNFPA, UN-Habitat, UNIDO, UNODC, WHO. UNDP is the UN lead on output one and UNEP is the lead on output two.[303]

Beyond the SDCF, the UN Department for Economic and Social Affairs (UNDESA), UNEP, UNESCO, and the UNFCCC supported the 2022 launch of the SIDS Coalition for Nature, a platform created for SIDS members to advocate as one for agreed common SIDS priorities and needs, including the needs for greater means to implement biodiversity objectives in SIDS. It is co-led by the governments of Cabo Verde, Samoa, and Seychelles. Specific goals include accelerating biodiversity mainstreaming and strengthening SIDS-SIDS inter-regional and intra-regional cooperation, peer learning, and policy dialogue to expand SIDS best practices and nature-based solutions.[304]

Since March 2022, the UN Office for Disaster Risk Reduction (UNDRR) has run the Resilience Building and Disaster Response Management in the Indian Ocean (RDRM-IO) project, co-funded by the EU and IOC; targeted stakeholders are the DRR/DRM authorities of Comoros, Madagascar, Mauritius, and Seychelles. The project is scheduled to run through 2025 and coordinate with other RDRM-IO stakeholders – IOC and the French Red Cross' PIROI. It is focused on participating states' government capacities for DRR and CCA with two goals: 1) improving national institutional and operational preparedness; and 2) assessing, improving, and developing national policies and regulatory frameworks for DRR.[305] In 2024, UNDRR delivered the communication and sensitization strategy under the RDRM-IO; this component made available to stakeholders tools and assets to roll out the strategy. In work with Seychelles stakeholders, UNDRR found a desire to ensure young people – especially secondary school and university students – were engaged and an additional demand for strategies to integrate people living with disabilities into both planning and audience considerations. As the strategy is implemented, stakeholders will be surveyed again by UNDRR's implementing partners.[306]

United Nations Environment Programme (UNEP) - Among other programs in SIDS, UNEP supports the development and implementation of legal and collaborative frameworks and strategic planning to address plastic pollution in Seychelles, where it has helped the country develop national plastic source inventories to identify intervention areas and establish strategies based on collected data.[307] UNEP is also the Secretariat for key multilateral conventions related to conservation, pollution, and hazardous wastes; among these conventions are the Nairobi Convention for the Protection, Management, and Development of the Marine and Coastal Environment of the Eastern African Region[308] and the Basel, Rotterdam, and Stockholm (BSR) Conventions - Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal; "Rotterdam" Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade; and "Stockholm" Convention on Persistent Organic Pollutants (POP). The MACCE's Environment Department and its Pollution Control and Environmental Impacts Division are the official contact offices for the BSR Conventions Secretariat.[309]

International Red Cross and Red Crescent Movement

Red Cross Society of Seychelles (RCSS) – The Seychelles Red Cross Act of 1991 enshrined in law the RCSS' mandate: to prevent and alleviate suffering with complete impartiality, making

no discrimination as to nationality, race, sex, religious beliefs, language, class, or political opinions. By law, RCSS is a member of the National DRM Committee. The RCSS' objectives are to contribute to the improvement of health and wellbeing, alleviate suffering, organize emergency relief, assist victims of conflict, and disseminate and implement the ideals of the International Red Cross and Red Crescent Movement – led by the International Federation of Red Cross and Red Crescent Societies (IFRC) and the International Committee of the Red Cross (ICRC). The daily activities of the RCSS include First Aid training and blood donation mobilization, which are activities that keep staff and volunteers active in the community so that when an emergency strikes, they are known and well-received. There is one branch, headquartered in the main office on Mahé, where there is also a warehouse and ambulance. There is no permanent office on Praslin or La Digue, although there are volunteers on both islands.[310]

RCSS has been part of a national effort to address the impacts of climate change alongside the Ministries of Health and Education. Key among these efforts has been ensuring that young people have access to information on climate change and are encouraged to participate in adaptation and mitigation activities. Alongside the MACCE, RCSS also works on key adaptation projects, including mangrove protection, tree planting, and beach safety.[311] Among the financial backers of RCSS' climate change action is the Blue Grants Fund (BGF) of SeyCCAT. In March 2024, RCSS was among the 21 local and national organizations to receive fresh BGF grants, and the RCSS was set to put its SCR 2 million (US$72,000) grant toward anticipatory climate change action and last-mile community early warning systems. The 18-month (April 2024-late 2025) project is slated to ensure that an early action protocol is in place so that, for a planned five-year period (2025-2030), IFRC funding will allow the protocol to be staffed to promote ecosystem-based adaptation and pre-positioning of supplies.[312]

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La Digue Island
L'Union, La Digue, Seychelles
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RCSS benefits from membership in the PIROI (Plateforme d'intervention régionale océan Indien; Indian Ocean Regional Intervention Platform), a French Red Cross program for DRM that integrates the Red Cross and Red Crescent National Societies from Comoros, Madagascar, Mauritius, Mozambique, Seychelles, Tanzania, and France's Indian Ocean islands – Mayotte and Réunion – along with IFRC and ICRC representatives. Among PIROI's key contributions to regional DRR are trainings for emergency response teams and pre-positioned equipment in 11 regional warehouses.[313] One of the warehouses is in Seychelles; the facility contains equipment for water, sanitation, and hygiene (WASH), temporary shelter, health risk management, and other non-food items. From its founding in 2000 through 2021, PIROI conducted 76 DRM projects regionally and supported 58 emergency responses, three of them in Seychelles. Since 2017, the Platform has been building a regional center to host experts, trainings, and innovation areas – the PIROI Center.[314] Construction of the PIROI Center is slated for completion in mid-2024, and it will house a training facility alongside a humanitarian warehouse with relief items sufficient for 25,000 people and a crisis management officer that can host 25-30 staffers.[315]

PIROI

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International Federation of Red Cross and Red Crescent Societies – The IFRC maintains 50 delegations worldwide to provide tailored support to National Societies. While the IFRC's regional office for Africa is in Nairobi, Kenya, the Seychelles is also covered by the Country Cluster Delegation for the Indian Ocean Islands, based in Antananarivo, Madagascar, and covering Comoros, Madagascar, Mauritius, and Seychelles. For its 2024 Global Plan, IFRC expects to focus partnership with RCSS on data collection for climate change forecasting, developing the national early warning system, and supporting public-private partnerships that are driving the post-pandemic recovery.[316]

Regional Organizations

African Union (AU) – The AU Commission's Department of Agriculture, Rural Development, Blue Economy, and Sustainable Environment (ARBE) has the task of promoting DRM initiatives and initiating and supporting climate change research.[317] The AU adopted the Africa Regional Strategy for DRR in 2004 and worked to support national and sub-regional implementation of the Hyogo Framework for Action 2005-2015, which was followed by adoption of the Sendai Framework for DRR 2015-2030, for which the AU developed a dedicated Africa Programme of Action. In 2017, the AU established its DRR Unit, which was subsequently integrated in 2019 into the AU Commission and operates under the Directorate of Sustainable Environment and Blue Economy (SEBE) under ARBE. In 2020, the AU also launched the Africa Biennial Report on DRR to track progress in reducing disaster risk and losses, including via a multilateral program to develop a continental multi-hazard early warning system, which took a step forward in 2021 with the launch of the Africa Multi-hazard Early Warning and Action System (AMHEWAS) Situation Room for DRR. Since 2022, the Situation Room has been linked to a regional Disaster Operations Centre hosted at the Kenya-hosted Intergovernmental Authority on Development's Climate Prediction and Applications Centre as well as at the Continental Multi-hazard Advisory Centre hosted by the African Centre of Meteorological Application for Development in Niger.[318]

The Programme of Action for the Implementation of the Sendai Framework for DRR in Africa collates and integrates the priorities and actions to be undertaken by all Africa's DRR stakeholders and, thus, is intended to guide all AU bodies, the Regional Economic Communities, including the South African Development Community (SADC) and Common Market for Eastern and Southern Africa (COMESA), to which Seychelles belongs, and national disaster management agencies alongside their local administrations and NGOs.[319]

The African Union Climate Change and Resilient Development Strategy and Action Plan (2022-2032) identifies key priority areas, interventions, and actions to reduce the vulnerability of affected communities and manage risks related to climate change and climate-induced extreme events. Given that each AU member-state is responsible for its individual climate response, the AU strategy seeks to build on the shared challenges and opportunities for the continent and to encourage African-led and African-owned innovation and to leverage nature-based solutions. The overall goal is to strengthen adaptive capacity, pursue equitable and transformative low-emission, climate-resilient development pathways, enhance Africa's capacity to mobilize resources, and enhance inclusion, alignment, cooperation, and ownership of climate strategies, policies, programs, and plans across all stakeholders.[320]

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Southern African Development Community (SADC) – The SADC emerged in 1992 from the Southern African Development Co-ordination Conference. SADC members are Angola, Botswana, Congo (Democratic Republic of), Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe. The SADC Treaty sets out the regional grouping's main objectives – i.e., achieve development and economic growth, alleviate poverty, enhance the standard and quality of life of the peoples of Southern Africa, and support the socially disadvantaged through regional integration.[321] Since 2007, SADC has met annually to prepare for future disasters. It established a DRR Unit responsible for coordinating regional preparedness and response programs for trans-boundary hazards and disasters. In 2011, it inaugurated the SADC Regional Platform for DRR. In addition, the SADC's Regional Indicative Strategic Development Plan emphasizes cooperation in implementing projects aimed at early detection, early warning, and mitigation via the SADC Climate Services Centre, the Agricultural Information Management System, Regional Remote Sensing Unit, and Regional Vulnerability Analysis and Assessment Program Management Unit, as well as water and natural resources management programs.

The goal of the SADC Climate Services Centre, co-located with Botswana Meteorological Services, is to reduce the negative impacts of adverse weather and climate conditions. It generates and disseminates meteorological, environmental, and hydro-meteorological products. Annually, it organizes the Southern Africa Regional Climate Outlook Forum to present a consensus outlook for the October-March rainfall season.[322]

As part of SADC member-states' commitments to integrated and sustainable development, the SADC actively participates in negotiations and ratification of international environmental agreements, such as the UNFCCC, and it works to put in place mechanisms for their implementation.

In 1991, Lesotho's Soil and Water Conservation and Land Utilisation Sector Coordination Unit within the Ministry of Agriculture, Co-operatives and Marketing was mandated to cover overall responsibility for environmental coordination in the SADC region and was renamed the SADC Environment and Land Management Sector (ELMS).[323]

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Climate Services Centre
SADC Directorate of Infrastructure
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Indian Ocean Commission (IOC) – The IOC is an intergovernmental organization comprising five member-states: Comoros, France (Réunion), Madagascar, Mauritius, and Seychelles. Since 1984, it has operated within the scope of the "Victoria Agreement." With support from international partners, it voices and advocates member-states' interests on the continental and international stages and oversees cooperation on sustainable development projects across preservation of ecosystems, natural resources management, maritime security, entrepreneurship, public health, renewable energies, culture, and other sectors.[324]

The IOC's Strategic Development Plan for 2023-2033 has four pillars to build collaboration on sustainable development among member-states and international partners. They are:

- An "Indianoceania" of resilience, peace, and security
- An "Indianoceania" of sustainable economic

growth
- An "Indianoceania" of human development
- A strengthened institutional and partnership architecture

With these targets, the IOC seeks to support member-states' individual and collective action on natural resources management; building capacity for DRM, governance, and dialogue; promoting regional supply and value chains; strengthening regional trade; integrating regional ecological and energy transitions; investing in health, education, training, research, culture, and mobility; promoting gender and generational equality; building a regional expert network; and expanding the slate of IOC partnerships.[325] Although there are many activities under the IOC, three key portfolio projects are:

"Building resilience and managing disaster response," funded by the EU and conducted in cooperation with PIROI and UNDRR, aims to improve the DRR understanding and governance capacities and to strengthen disaster risk response, especially through building institutional and operational capacity on preparedness and disaster management and through creation of a regional early warning mechanism.[326]

HYDROMET, backed by the Agence Française de Développement (AFD) and the EU, incorporates efforts to build climate, meteorological, and hydrological monitoring networks and forecasting systems and to strengthen national and regional capacities for climate modeling, forecasting, and early warning. Improved hydrometeorological equipment, knowledge, and decision-making; better adaptation planning infrastructure; and enhanced community resilience are expected to result in reduced socio-economic losses.[327]

RECOS – Resilience of Indian Ocean Coastal Zones - aims to strengthen the resilience of coastal populations and ecosystems to the effects of climate change by restoring ecosystem services by strengthening regional and national governance and implementing innovative restoration and sustainable use projects, supported by scientific working groups.[328]

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Indian Ocean Rim Association (IORA) – IORA launched in 1997 as an intergovernmental organization of 23 states. Its priority areas are maritime safety and security, trade and investment facilitation, fisheries management, DRM, tourism and cultural exchange, and academic, science, and technology. Under the maritime safety and security portfolio, it considers issues across the maritime spectrum, including degraded ocean health and climate change impacts.[329] Under the IORA Action Plan on disaster management, regional development of DRM is undertaken by the Working Group on DRM, the objectives of which are:
- Build the foundation for a Collaborative IORA DRM Framework based on the respective needs and priorities of member-states
- Establish an integrated policy approach on DRM in order to promote institutional capability enhancement, capacity building, and DRM mainstreaming
- Establish a Coordinated Regional Vision for DRM to address existing and emerging issues.

The Working Group provides a mechanism for engaging disaster and emergency response officials and experts across the region to promote cooperation among stakeholders.[330]

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Climate Change Action Funding

The Adaptation Fund has delivered financial support administered by MACCE in partnership with UNDP. Adaptation Fund support provides funding to various initiatives under the project "Ecosystem-based Adaptation to Climate Change in Seychelles," such as integrating ecosystem-based adaptation in the school curriculum and a best practices manual for wetland rehabilitation and management.[331]

The Global Environment Facility (GEF) is a multilateral grouping of funds dedicated to confronting biodiversity loss, climate change, and pollution, and to supporting land and ocean health. The target recipients are government agencies, civil society organizations, private sector companies, research institutions, and other partners in developing countries.[332] The Seychelles national focal points for GEF funds sit within the MFA and the MACCE.[333] The MACCE and UNDP have overseen GEF Small Grants funding of up to US$50,000 for local NGOs for climate change education.[334] Of potentially the greatest long-term impact for Seychelles, the GEF played a major role in the world's first debt swap in exchange for ocean conservation. The GEF committed US$15 million to support the transformation, which began with the government's decision to bring 30% of its marine territory under protection by 2020. After the first wave of expansion of the Seychelles' marine protected area network, GEF joined with other partners to support the sustainable financing of the entire area and then supported the country's Debt-for-Nature Swap with The Nature Conservancy; that deal raised funding to buy US$21.6 million of Seychelles' sovereign debt, which was then refinanced with a portion of repayments directed to SeyCCAT. The success of this process saw the creation of the Indian Ocean's second-largest marine protected area. Concurrently, in 2018, Seychelles launched the world's first sovereign "blue bond" – a financial instrument designed to support sustainable marine and fisheries projects. The World Bank and GEF helped secure the instrument, which raised US$15 million from international investors. Proceeds from the issuance were used to support the further expansion of marine protected areas, improvement to the governance of priority fisheries, and the development of Seychelles' blue economy, as well as regional efforts to support more sustainable management fisheries across the Indian Ocean.[335]

The Green Climate Fund (GCF) is the global climate fund, mandated by the UNFCCC to support developing countries' development and achievement of their NDCs. The MACCE is Seychelles' nationally designated authority for the GCF, a designation that, along with other criteria, makes the country eligible to take advantage of Fund programs.[336] Seychelles is a participant in four multi-country GCF programs – Sustainable Renewables Risk Mitigation Initiative, Global Fund for Coral Reefs Investment Window, Ecosystem-Based Adaptation in the Indian Ocean, and Building Regional Resilience through Strengthened Meteorological, Hydrological, and Climate Services; all of these programs are under implementation. The last of these programs targets the national meteorological, hydrological, and climate services in the IOC member countries to implement multi-hazard early warning systems, which include developing procedures and tools for preparation for and adaptation to climate change.[337] Meanwhile, the Ecosystem-Based Adaptation program targets Indian Ocean SIDS' most vulnerable populations, especially coastal communities who rely on tourism. The program is intended to ensure that civil society organizations have the support they need to implement ecosystem-based adaptation projects.[338]

DISASTER OVERVIEW

Seychelles is relatively less exposed than similar small island states to many natural hazards – e.g., earthquakes or cyclones – but its people and economy are vulnerable to impacts because of the concentration of the population and industries in the coastal plains of Mahé. Climate change and large-scale seismic, hydrometeorological, or anthropogenic events have the potential to disrupt the country's people, economy, ecology, and culture to an extent that could be existential. Over the past decade, major disaster events have been few, although the average annual loss from floods is estimated at US$2.5 million (approximately 0.24% of GDP).[339] Natural hazards and their potential to bring disastrous impacts are being exacerbated by the effects of climate change – i.e., sea level rise and sea temperature warming – and these impacts pose risks to the country's people and economy.

Risk Profile

Risk calculation takes into account exposure to hazards, vulnerability, and coping capacity. Addressing all of these elements is important in reducing and mitigating disaster risk. Various indices emphasize structural or institutional risk, while others emphasize hazards or losses (human and economic). Regardless of emphasis, disaster risk calculations use some form of the equation:

Disaster Risk = (Hazard × Vulnerability) / Capacity[340]

Taken from the UNDRR glossary, definitions will help clarify this formula:

- Capacity - The combination of strengths, attributes, and resources available within an organization, community, or society to manage and reduce disaster risks and strengthen resilience.
- Disaster risk - The potential loss of life, injury, or destroyed or damaged assets, which could occur to a system, society, or a community in a specific period of time, determined probabilistically as a function of hazard, exposure, vulnerability, and capacity.
- Hazard - A process, phenomenon, or human activity that may cause loss of life, injury, or other health impacts, property damage, social and economic disruption, or environmental degradation.
- Vulnerability - The conditions determined by physical, social, economic, and environmental factors or processes, which increase the susceptibility of an individual, a community, assets, or systems to the impacts of hazards.[341]

In general, the goal of indexing risk is to inform disaster management, DRR, and CCA decision makers and practitioners of the level of risk to and underlying capacity of the target community. The various risk calculation models support proactive crisis management frameworks and are helpful for prioritizing allocation of resources and for coordinating actions focused on anticipating, mitigating, and preparing for humanitarian emergencies.

INFORM Risk Index

INFORM is a collaboration of the Inter-Agency Standing Committee (IASC) Reference Group on Risk, Early Warning, and Preparedness with the European Commission. It is a multi-stakeholder forum for developing shared, quantitative analysis relevant to humanitarian crises and disasters. The Joint Research Center of the European Commission is the scientific lead. There are three operational dashboards – i.e., INFORM Risk, INFORM Severity, and INFORM Climate Change.[342] The INFORM Risk Index measures the risk of humanitarian crises and disasters in 191 countries. The INFORM model is based on the standard dimensions of risk: Hazards and Exposure, Vulnerability, and Lack of Coping Capacity. The first dimension measures the natural and human hazards that pose the risk. The second and third dimensions cover population factors that can mitigate

against or exacerbate the risk. The Vulnerability dimension considers the strength of individuals and households relative to a crisis, while the Lack of Coping Capacity dimension considers factors of institutional strength.[343]

The INFORM model provides a quick overview of the underlying factors leading to humanitarian risk. INFORM gives each country a risk score of 1-10 (1 being the lowest risk and 10 the highest risk) for each of the dimensions, categories, and components of risk, as well as an overall risk score.[344] In the 2024 INFORM Risk Index, Seychelles had an overall risk score of 2.1/10, which INFORM categorizes as the "very low" risk class and earns Seychelles the rank of 182nd most at-risk country in the Index. The Hazards and Exposure dimension score takes into account a combination of both natural and human hazards, and Seychelles rated 1.2/10 or 171st of 191 countries. The Vulnerability dimension score was 1.0/10 or 186th of 191, and the Lack of Coping Capacity dimension score was 2.6/10 or 150th of 191. Physical exposure to Tsunami at 7.8/10, was the greatest threat in the Hazards and Exposure dimension, with Development and Deprivation measuring 2.0/10 for the Vulnerability dimension and DRR rated 4.3/10 in the Lack of Coping Capacity dimension. Figure 22 shows the INFORM dashboard for Seychelles for 2024.[345]

World Risk Report

The World Risk Report by Bündnis Entwicklung Hilft strives to raise awareness of disaster risk among the global public and political decision-makers and to provide practitioners with data to promote faster orientation to complex situations – i.e., societies experiencing disasters. This effort stems from the perception that disaster risks are not solely determined by the occurrence, intensity, or duration of extreme events. Social factors, political conditions, and economic structures play an important role in turning these events into crises. Thus, this index is based on the assumption that every society can take precautions – e.g., effective disaster preparedness and management – to reduce the impact of extreme events and lower the risk of disasters.

The World Risk Report calculates the level of risk a country faces based on a formula of exposure to hazards and vulnerability. It provides an assessment of the risk that countries will confront disasters but does not indicate probabilities for the emergence of disasters, nor does it forecast the timing of future disasters. This index uses 100 indicators that include risk, hazard exposure, vulnerability, and coping capacity (as defined above), and adds two others:

- Susceptibility - The disposition to suffer damage in the event of extreme natural events. Susceptibility relates to structural characteristics and frameworks of societies.
- Adaptation - A long-term process that also includes structural changes and comprises measures and strategies that address and

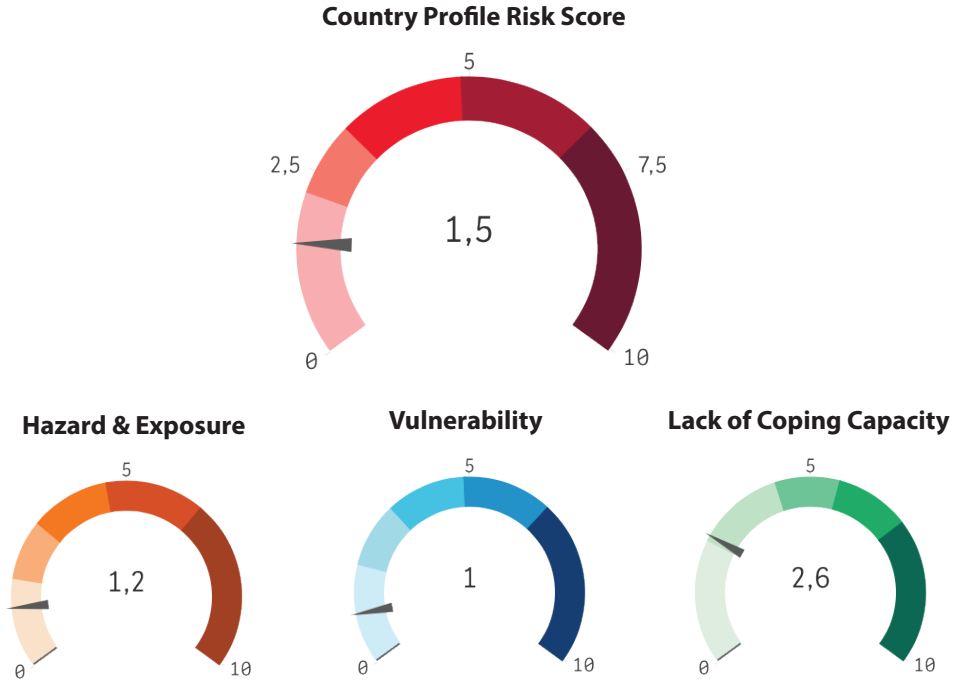

Figure 22: INFORM Risk Index Dashboard - Seychelles (2024)

try to deal with future negative impacts of natural hazards and climate change. Analogous to "lack of coping capacity," the lack of adaptive capacities is included in the Index.

In the 2023 World Risk Report, Seychelles ranked 128th of 192 countries wherein the lower the rank (1), the greater risk the country faces and the higher the rank (192), the less at-risk a country is. Seychelles' total Index score was 2.76 (on a scale of 0-100 wherein 0 connotes less risk and 100 more risk), putting the country in the "low" risk class. The component scores were:

- Exposure: 1.03 (medium)
- Vulnerability: 7.40 (very low)
- Susceptibility: 4.34 (very low)
- Lack of Coping Capacity: 2.50 (very low)
- Lack of Adaptive Capacity: 37.38 (low)

For comparison, Seychelles' 2.76 total score is below the regional (Africa) median of 4.39 but above the sub-regional (Southern Africa) median of 1.97. Exposure influences this result as Seychelles scores lower than the sub-regional average in all other categories. The country's exposure to tsunami – especially in a context of sea level rise – accounts for most of the country's exposure score. In terms of Exposure, Seychelles is above the median for Africa (0.7) and Southern Africa (0.14). In the Vulnerability dimension, the country is below the medians for Africa (30.53) and Southern Africa (26.7) in a reflection of the country's overall effort to build socio-economic resilience. Under Susceptibility, Seychelles is below the medians for Africa (30.4) and Southern Africa (23.92) due, in part, to higher socio-economic development and national income status, as well as to a lack of violence and conflict. In the Lack of Coping Capacity dimension, Seychelles is also below the medians for Africa (14.68) and Southern Africa (12.83), as it has suffered relatively little damage from recent shocks and continues to build strong state disaster management and international climate change partnerships. Finally, on the Lack of Adaptive Capacity score, Seychelles sits below the medians for Africa (59.83) and Southern Africa (51.41) in a reflection of investment in capacity, including in the education system and early warning systems.[346]

Figure 23 shows the World Risk Report's matrix of scores and their classifications.

Hazards

Based on UNDRR's DesInventar database for monitoring progress toward achieving the Sendai Framework for DRR and the SDGs, Seychelles experienced 664 hazard events between 1980 and 2014, the period leading up to adoption of the Sendai Framework. Storms, floods, heavy rains, and landslides are, by far, the most common events; taken together, they total 83% of events. Figure 24 illustrates the makeup of the country's hazard events over the decades leading up to the elaboration of the "2030 Agenda" – the Sendai Framework, Addis Ababa Action Agenda, and Paris Agreement.[347] Since 2014, only two events have been of sufficient magnitude to register in EM-DAT, the international disaster database managed by the University of Louvain's Centre for Research on the Epidemiology of Disasters; these two events were a dengue outbreak in 2016 and the 7 December 2023 explosion at an industrial warehouse.[348] In order to be entered in the database, an event must overwhelm local capacity and require a national or international response; the event must have caused at least 10 fatalities, or affected 100 people, or resulted in a

Classification	World Risk Index	Exposure	Vulnerability	Susceptibility	Lack of Coping Capacities	Lack of Adaptive Capacities
very low	0.00 - 1.84	0.00 - 0.17	0.00 - 9.90	0.00 - 7.17	0.00 - 3.47	0.00 - 25.28
low	1.85 - 3.20	0.18 - 0.56	9.91 - 15.87	7.18 - 11.85	3.48 - 10.01	25.29 - 37.47
medium	3.21 - 5.87	0.57 - 1.76	15.88 - 24.43	11.86 - 19.31	10.02 - 12.64	37.48 - 48.04
high	5.88 - 12.88	1.77 - 7.78	24.44 - 33.01	19.32 - 34.16	12.65 - 39.05	48.05 - 59.00
very high	12.89 - 100.00	7.79 - 100.00	33.02 - 100.00	34.17 - 100.00	39.06 - 100.00	59.01 - 100.00

Figure 23: World Risk Report Classification Matrix

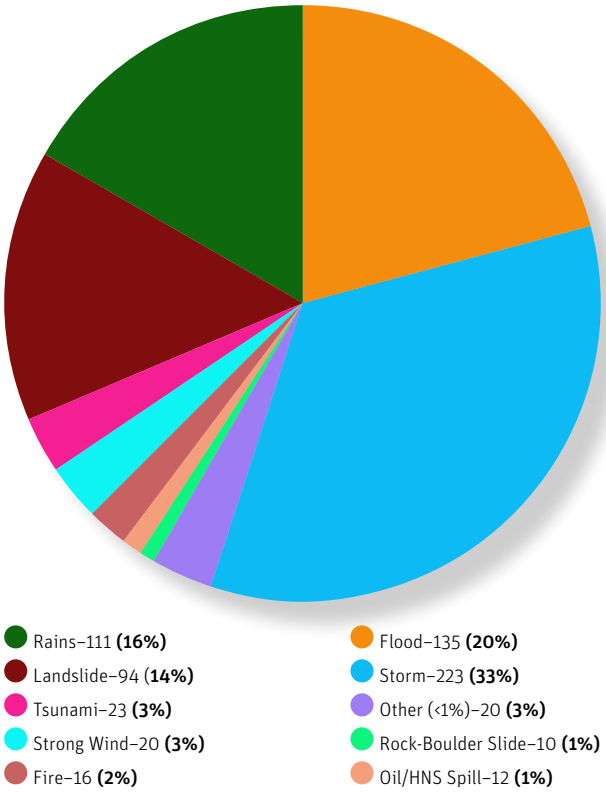

Figure 24: Summary of Disaster Events, Seychelles (1980-2014)

declaration of an emergency, or have triggered a call for international assistance. If it meets one of these criteria, it will appear in the EM-DAT.[349]

Coastal Erosion

Almost 85% of the population lives in a coastal area, and there is increasing pressure on the coasts for economic and recreational activity at the same time as policymakers and communities are seeking to adapt coasts for greater resilience to natural hazards. The country has noted an increase in beach erosion across all islands. In some areas, beaches have receded 40 m (131 feet), and private properties are being affected.[350] Among the drivers of coastal and beach erosion are the impacts of wave and storm energy that are increasingly powerful as the country's coral reefs sustain damage from bleaching events, runoff of sediments, and human activities,[351] which include coastal road construction, coastline hardening, and degradation of coastal vegetation. The MACCE's Climate Adaptation and Management Section is tasked with implementing soft and hard engineering projects to slow erosion and secure coastlines from further degradation. Among the actions taken are recreation of dunes, installation of timber pilings, and re-vegetation.[352]

Earthquake / Tsunami

Fault zones that can cause seismic activity that affects Seychelles are the Makran Trench, off Pakistan and Iran, the Mid-Indian Ridge (Indian Ocean), and the East African Rift system (East Africa). Given the generally low-magnitude earthquakes that these zones generate, they pose little threat to the islands of Seychelles directly. Indeed, there is no history of loss or casualty in Seychelles from earthquakes in these zones. The greater threat to Seychelles is from tsunamis generated by high-magnitude earthquakes in other parts of the Indian Ocean.[353] A tsunami generated by a Makran Trench quake would reach Seychelles in five hours. One generated near Indonesia takes approximately seven hours to reach the country. A tsunami could also be triggered by volcanic eruptions on Réunion or in Comoros, with waves estimated to arrive in less than three hours.[354]

The 2004 Indian Ocean "Boxing Day" tsunami brought waves to Praslin and Mahé; waves reached 200 m (656 feet) into downtown Victoria and topped 4.4 m (14.4 feet) above sea level at Anse Forbans on Mahé's southeastern coast.[355] By mid-day on 26 December, an extremely low tide occurred throughout the main islands. At 1300 local time, tidal waves ranging 2.5-4 m (8.2-13.1 feet) in height came ashore on the east coast of Praslin and Mahé. Refracted waves then hit the west coasts of Praslin and Mahé 30 minutes to one hour later, and a second tidal surge occurred at 1700 local time, followed by two smaller ones at 2200 that night and 0500 on 27 December. The second surge was somewhat smaller because it occurred at high tide, and the last waves caused known damage only on the west coast of Praslin.[356] Two people were killed in the country, and damage to coastal infrastructure, hotels, fishing boats, and other businesses was estimated at US$30 million. Docks at Port Victoria were damaged, and two bridges between downtown

Victoria and the international airport were washed out. Even coastal buildings that did not suffer direct hits saw damage as their foundations were undermined when the tsunami wave waters drained back out to sea.[357] The tsunami also wrought havoc on coral reefs surrounding the country's smaller coralline islands, and some smaller islands saw 100% coral reef mortality after the tsunami waves passed.[358]

Epidemics / Pandemics

There is a history of epidemics in Seychelles. Outbreaks of cholera led to the founding of a quarantine island in the main harbor of Mahé in the early 19th century, and a leprosarium operated on Curieuse Island, off the north coast of Praslin, up through 1965. The best-known epidemic disease to have impacted the country – before the COVID-19 pandemic – was smallpox, which arrived in the country in the late 19th century and caused significant mortality alongside social and economic dislocation after the then colony closed its border to trade.[359] The modern Seychelles does not have a high burden of communicable diseases and maintains high rates of immunization for vaccine-preventable diseases. In 2020, the country did experience a measles outbreak just as it was noted that the overall measles immunization rate had fallen to 94%. It should be noted, however, that the number of zero-dose (no record of any immunization) people for most outbreak-prone diseases is in the low two-digits (fewer than 100 people).[360] More commonly, there are outbreaks of vector-borne illness – dengue or chikungunya. Then, on 12 March 2020, one day after the WHO declared the spread of the SARS-CoV-2 virus a pandemic, Seychelles reported its first case of the disease.[361] The interest that the COVID-19 pandemic generated in epidemic preparedness has seen assessments of Seychelles' readiness, and it has been assessed to have strong capacity for immunization as well as biosecurity. However, it has not developed sufficient capacity to thwart zoonotic disease development and spread. Moreover, its nearest neighbors – Mauritius, Madagascar, and Comoros – are assessed as also needing to do significantly more work to disrupt transmission of diseases with epidemic potential.[362]

Fire

Forest and structure fires can be devastating to Seychelles' economy as they impact tourism and agriculture. In 1990, Praslin was the scene of a massive forest fire that destroyed part of the island's forest of coco-de-mer (Lodoicea maldivica) trees, which are ecologically, economically, and culturally important.[363] Between 1990 and 2008, 12 additional fires, all recorded as linked to human actions, left 30 hectares of Praslin's central watershed degraded – i.e., without tree cover to protect soils and fix water. Fires are considered the main threat to forest ecosystems on Praslin,[364] which has a greater expanse of highly flammable palms than do the other central islands,[365] and climate change is exacerbating the already long drought periods felt on Praslin.[366] In the past 15 years, the islands have seen comparatively less loss of tree cover to fire, although small fires break out in the forests frequently.[367] Structural and industrial fires are also common, with major events recorded at the main Mahé landfill, adjacent to the Providence industrial area, in 2020, 2022, and 2023. The toxic smoke and fumes from these fires caused closures of schools and businesses in areas along the coast.[368]

Flooding

Flooding is the most common hazard event, and it usually results from periods of intense rainfall, especially during the northwest monsoon. The most common flood events affect coastal lowlands, where rainfall-swollen river waters slow down and accumulate after running swiftly down from the central ridges of the three main islands.[369] Coastal flooding may also be induced by extreme tides, storm surges, and tsunami. The country's topography means that rivers are short, and heavy rainfall events swiftly overwhelm riverbanks and drainage systems. A World Bank assessment in 2016 found that the country can expect to suffer US$2.5 million

each year in flood damage as climate change shifts precipitation patterns globally. Such losses would account for 90% of all direct losses from all hazards.[370] Sea level rise and future changes in storm intensity and direction may increase the levels and frequency of flooding, especially on the outer islands that, though mostly unpopulated, are low-lying.

Landslide

Most of the central islands' land is made up of densely vegetated slopes with an incline of more than 10%, the upper level of what is considered a "gentle" slope, and is, therefore, unsuited to much development.[371] There is a strong historical record as well as evidence on the ground of many landslides on Mahé, with less evidence of major landslides on Praslin and La Digue, where evidence of rock falls is more common. Landslides are common as heavy rains saturate soils in the upper portions of river basins, and the accumulated sediment and vegetation press down onto obstacles that eventually give way and allow the water, soil, trees, and rocks to precipitate down ravines, valleys, and slopes. Additional falls occur as central granite spires weather and split, and large rocks fall off of them. These rocks, in turn, can create areas of collection of mud, sediment, and water that eventually spill further downhill as a landslide.[372] Mapping of the landslide risk index finds that the area most at risk from landslides is concentrated in northwestern areas of Mahé, with lesser risk in eastern and southern areas of this island, western and southeastern Praslin, and northeastern La Digue.[373] Although the impacts on the public at large from landslides and rock falls are generally minimal because of the localized impact, landslides do cause significant damage to property and roads and can disrupt economic activity.[374]

Technical Hazards - Environmental Pollution, Hazardous Materials, or Industrial or Marine Accidents

Seychelles – like its neighbors Comoros, Madagascar, and Mauritius – is home to a large, bio-diverse, and ecologically vulnerable maritime environment. However, the concentration of the population and industries in small, coastal areas means that an industrial incident has the potential to disrupt livelihoods and businesses for the entire country. There is also some potential for a natural hazard – storm, flood, or tsunami – to trigger release of chemicals or other hazardous or polluting substances or cause an industrial, air, or marine accident. Such a "natech" (natural hazards triggering technological disasters) event can exacerbate the impacts of the natural hazard event by complicating the response due to the added health and safety concerns.[375]

The risk of pollution caused by oil or other hazardous and noxious substances (HNS) in the region is also high, often with impacts that defy national jurisdiction. Seychelles is a signatory of the Nairobi Convention, a UNEP-backed platform for government, civil society, and the private sector to cooperate on sustainable marine and coastal management.[376] In a 2020 workshop, Seychelles representatives to the Nairobi Convention indicated mixed progress on preparing for incidents, specifically oil spills; the country cited a lack of technical capacity, financing, and regulations as obstacles even as regular training and exercise of First Responders ensured that personnel know their roles and responsibilities.[377]

In 2017, Seychelles revamped its occupational safety and health (OSH) policy, which adheres to International Labour Organization (ILO) conventions on sustainable development, livelihoods, and the environment.[378] As the economy has developed, it has integrated significantly more uses of petroleum and refined petroleum products, pesticides, cleaning agents, heavy industry-related chemicals, and food processing-related chemicals, all of which require proper handling to avoid contaminating the environment and threatening human, animal, and plant life. Among the key challenges is overuse of pesticides in agriculture as residuals accumulate in the environment and cause long-term soil degradation and high toxicity in human and animal populations. The MACCE

oversees use of proper safety equipment among all industries using potentially hazardous chemicals, development of response plans, spill response management, and regulation of disposal of hazardous materials. The country does ship some hazardous materials to Réunion for disposal as Seychelles itself does not have the capacity to handle all types of chemicals.[379] Most recently, in March 2023, MACCE was part of a kick-off of a GEF-funded and UNDP-backed Indian Ocean regional project to ensure that the four participating states – Comoros, Maldives, Mauritius, and Seychelles – have the capacity to safely manage and dispose of chemicals with a focus on institutional mechanisms for managing hazardous chemicals and waste. A particular focus for Seychelles is improving waste disposal processes to try to halt the production of toxic fumes and smoke that rise from fires at the main landfill.[380]

Finally, given its remote location but proximity to major international shipping lanes, Seychelles must be prepared to respond to aircraft and ship accidents either by deploying search and rescue personnel or by coordinating a response within its EEZ. Indeed, given the potential for an accident – especially a hazardous material spill at sea – to impact Seychelles and its neighboring island states, the country may be asked to cooperate in a response. Although DRDM, SCG, and SMA attempt to notify all aircraft and vessels within their areas of responsibility of hydrometeorological hazards, not all vessels, especially small fishing craft, may be reached in time, and any subsequent need for rescue will see Seychelles assets called upon.

Tropical Storms/Cyclones

The region's cyclone season runs roughly October-May.[381] Southwest Indian Ocean cyclone tracks generally do not cross the main islands – Mahé, Praslin, and La Digue – because they lie too close to the Equator. The outer islands that lie further south are more exposed to direct cyclone damage. Nonetheless, all of the islands may be affected by wind, rain, and storm surges associated with a storm that passes well away from land.[382] Assessments of historic cyclones indicate that buildings and roads built below 2.5 m (8.2 feet) above average sea level, across all islands, are highly likely to experience damage from a major storm.[383]

History of Major Disasters

The following is a list of major disasters in Seychelles in the past 10 years.

Gas Incidents – April-May 2024

For over one month between 8 April and 24 May 2024, more than 350 people reported to their local health centers after experiencing shortness of breath, headaches, skin irritation, and stomach pains that were chalked up to unknown gas substances detected at several primary and secondary schools, the judiciary, and the parliament. By late April, authorities had begun offering monetary rewards for credible information on the incidents, and the Ministry of Internal Affairs was treating the incidents as criminal.[384] Despite the combined efforts of DRDM, the Ministries of Internal Affairs and of Health, and the police, several more incidents were reported in May with additional reports of people smelling the odor of gas and having trouble breathing at the judiciary and several schools.[385]

Explosion and Flooding – December 2023

On 7 December, an early morning explosion rocked the Providence industrial zone on the eastern coast of the main island, between Victoria and the international airport. At the same time, massive rainfall triggered significant flooding and caused the government to declare a state of emergency that ran into the early evening of 7 December.[386] The explosion occurred at a construction company storehouse where explosives were being held. The explosion left a crater – initially reported as 13 m (42.5 feet) deep – and blew out windows and doors and collapsed roofs in nearby buildings. The airport – 4 km (2.5 miles) away – also sustained some damage but remained operational. More than 170 people were injured, five seriously,[387] and more than 200 people who lived or worked in

the area had to be evacuated.[388] Police and SDF personnel took control of the scene and helped in the evacuations.[389] Concurrent overnight (6-7 December) rainfall across Mahé brought floods and landslides that destroyed several homes and killed three people in the island's northern districts.[390] Wastewater treatment facilities were overwhelmed, and raw sewage flowed into coastal waters.[391] Waters off of Beau Vallon, on the northeastern coast of Mahé, were especially contaminated by sewage. Northern areas of the island were worst affected by power outages and damaged roads.[392] By late December, upwards of 1,500 people had received some type of assistance with most receiving financial assistance to find new housing, repair homes and commercial spaces, and supplement lost income. The Ministry of Local Government and Community Affairs oversaw collection and distribution of emergency funds.[393]

Tropical Cyclone (TC) Fantala – April 2016

TC Fantala formed on 11 April, and it made first landfall on Seychelles' Farquhar Atoll on 17 April, at which time it packed maximum sustained winds of 241 km per hour (150 miles per hour).[394] Photo 1 shows a satellite image from the U.S. National Aeronautics and Space Administration (NASA) of TC Fantala on 18 April 2016 when the storm reached its peak speeds.[395] On 19 April, it made a second landfall on Farquhar, although at this time, the storm was somewhat weakened with sustained maximum winds of 157 km per hour (98 miles per hour). The storm's fastest gust registered at 350 km per hour (217 miles per hour). On Farquhar, infrastructure and coconut palm groves were badly damaged. Initial damages were estimated to total SCR 101 million (US$7.5 million).[396] Nonetheless, agricultural production losses continued accruing as coconut palm groves were replaced; these trees mature over the course of seven years and, thus, would not be immediately productive. The main tourist guesthouse on Farquhar suffered severe damage that would preclude hosting tourists until 2017; this damage was compounded by damage to the bunkers housing the island's three generators and by

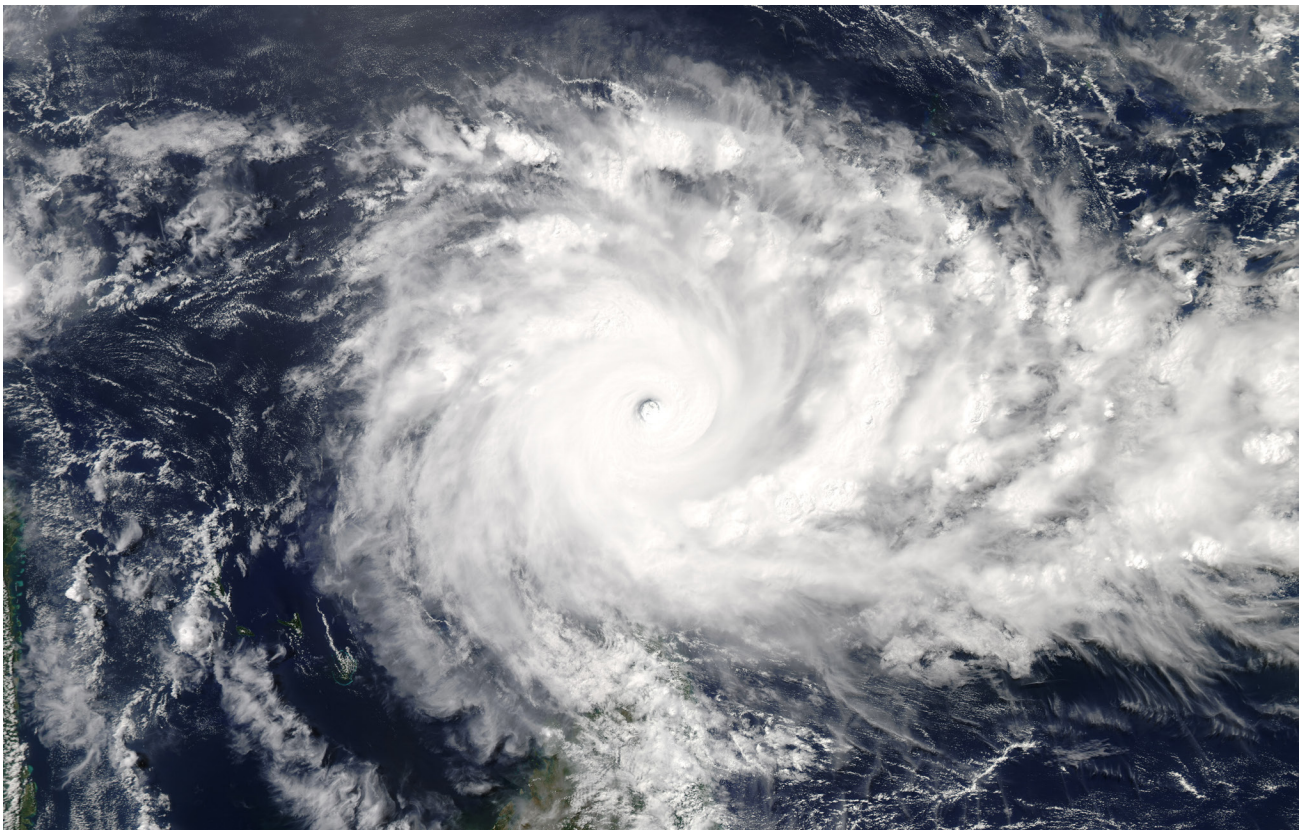

Photo 1: NASA Satellite Image of Cyclone Fantala on 18 April 2016

water contamination in the fuel storage depot. Finally, all communications for the airstrip were destroyed and needed to be entirely replaced. Farquhar's ecosystems in general – beaches, dunes, mangroves, and coral reefs – sustained serious damage.[397]

No casualties were reported.[398] Ahead of the storm's arrival, Seychelles National Meteorological Services (SNMS) – with information from the Regional Tropical Cyclone Warning Centre, Météo-France La Réunion (RSMC La Réunion) – issued and updated advisories and warning bulletins. As a precaution, the IDC and SCG evacuated most of their staff and personnel from Farquhar; essential staff were left behind in expectation that they would be needed for clean-up and to ensure that the runway was safe and accessible.[399] On 20 April, the government declared the Farquhar group area, including Providence Atoll and St. Pierre, a disaster area. DRDM, IDC, and SBC conducted a first assessment on 22 April, and SCG reported an estimate that returning its Farquhar post to full operation would take up to 15 months.[400]

Dengue Outbreak – 2016

In the first half of 2016, the country experienced an explosion of dengue cases. All regions of the country were affected, and 1,062 people tested positive for the virus between January and mid-July. The most affected districts were all on Mahé – La Riviere Anglaise, Anse Royal, Anse Etoile, Beau Vallon, and Point La Rue; northern areas of Mahé recorded the most infections, and western Mahé recorded the fewest. Medical agencies suspect that the actual infection rate was significantly higher since those people who suffered mild or no symptoms did not seek medical treatment and, therefore, were not tested for reporting. Public health campaigns focused on reducing the risk of spread by public information campaigns and distribution of insect repellent and mosquito nets to target populations. The Ministry of Health led the national response via weekly meetings, and it coordinated action to destroy mosquito breeding habitat, conduct epidemiological surveillance, and deliver treatment across national health centers. DRDM served a facilitating role by ensuring all First Responders were in sync. In cooperation with the MoH and DRDM, RCSS supported the response by using pre-positioned PIROI stocks. With IFRC support, RCSS staff were trained on the use of the open-source mobile data collection tool, KOBO Toolbox, which RCSS then used to conduct surveys of residents of affected districts. By August, the number of new cases was declining, but responders continued action to eradicate mosquito breeding habitats and maintain public awareness of risks and responses.[401]

Flooding – January 2014

From 24 January 2014, several days of heavy rains and strong winds impacted all three central islands. An estimated 4,500 people were affected. On La Digue, areas of standing water stagnated, and terraced fields and riverbanks collapsed into landslides; 250 houses were flooded. On Praslin, 187 houses were flooded, and in Mahé's Bel Ombre district, 87 houses flooded, and landslides were reported. DRDM led and coordinated the response. SFRSA and local authorities launched operations to pump water and provide sandbags. Although the MoH did not report any major outbreaks of water-borne illness, public messages continued throughout the response to inform affected populations of preventative measures. RCSS mobilized more than 50 of its volunteers to provide humanitarian assistance, and the National Society worked closely with national responders and utilized the PIROI platform for coordination with IFRC. RCSS also used its pre-positioned stocks to distribute mosquito nets and repellent, and it ran public service messages on television. In the wake of the disaster, health authorities and RCSS continued public health messaging regarding mosquito vector control, environmental sanitation, and information on reporting potential water- and vector-borne ailments related to standing water and contamination.[402]

CLIMATE CHANGE

Changes to the physical climate are impacting and will continue to impact national development. A key example, cited by the WMO in its State of the Global Climate 2023 report, is that changes in the acidity or temperature of the ocean affect marine life in ways that will impact coastal communities that depend on the local catch for their livelihood or food security.[403] For small island states, regardless of their social, economic, and political characteristics, the impacts that changes within the ocean will have on coastal communities are key concerns, especially when paired with atmospheric changes that are shifting temperature and precipitation regimes that also underpin social and economic activities. Indeed, the country's exposure is exacerbated by the concentration of people, livelihoods, and infrastructure near or in low-lying coastal areas.

Over the past 50 years, atmospheric temperatures across the Southwest Indian Ocean have warmed by 0.6-1.1°C (by 1.08-1.98°F). During the same period, Indian Ocean sea levels rose by 0.4-1.2 mm (0.02-0.05 inches) per year, although there are marked year-to-year fluctuations. Drinking water is becoming contaminated by saltwater intrusion. A 2019 assessment by the French Institute for International and Strategic Affairs (IRIS) found that, by 2090, the region is likely to experience an increase in atmospheric temperature of 2.8-3.9°C (increase of 5.04-7.02°F). Temperatures are set to climb sharply during the hot season, leading to more frequent heatwaves. Precipitation patterns are also expected to fluctuate more, with greater seasonal contrasts (less rain during the dry season, more rain during the wet season). The potential changes in cyclonic activity in the Southwest Indian Ocean are not yet entirely understood. The Indian Ocean records an average of nine storms annually. Although an uptick in the number of tropical storms has not been observed, the proportion of storms reaching cyclone status – i.e., with winds stronger than 165 km per hour (more than 100 miles per hour) – has grown since 1975.[404] Seychelles' foreign policy for 2021-2025 includes statements that commit it to, among other things, taking a global leadership role in promoting the SIDS agenda, protecting and promoting the environment against the threat of climate change, and pursuing the "Blue Economy" worldwide.[405]

Overview

The increase in human emissions of carbon dioxide and other greenhouse gases causes a positive radiative imbalance – i.e., less energy is being released than is entering – at the top of Earth's atmosphere; this energy trapped within the climate system leads to an accumulation in the form of heat, which is driving global warming. The ocean absorbs heat and, thus, can slow the rate of warming in the atmosphere even as the heat absorbed by the ocean leads to ocean warming which, together with the melting of sea ice and glaciers, raises sea levels. The ocean also absorbs carbon dioxide, which acidifies ocean waters. Warming waters, sea level rise, and ocean acidification all have significant effects on the plants and animals that live in the ocean and on the people who rely upon the ocean for their livelihoods.

Most data sets indicate that the Western Indian Ocean is not among the areas of ocean that have shown the greatest warming to date, but it is still warming, as illustrated in Figure 25.[406]

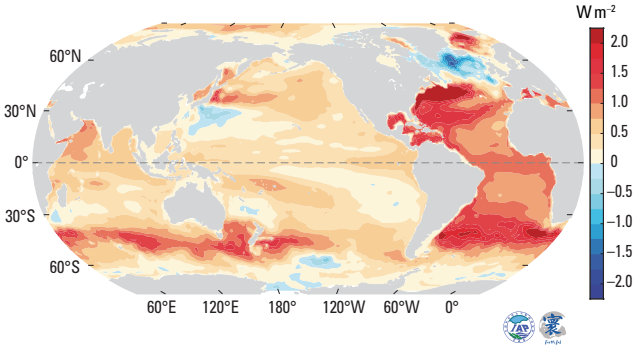

Figure 25: Observed Ocean Heat Content Increases between 1958 and 2023 (WMO, 2024)

There are shorter-term natural phenomena that affect weather and climate on the daily, monthly, and yearly scale. These phenomena are not explicitly linked to climate change but will interact with climate change in ways that contribute to more extreme weather and ocean events.

Among the key influences over sea level in the Western Indian Ocean is the Indian Ocean Dipole (IOD), which is a wind-driven dynamic of coastal upwelling and downwelling that alters the depth of the thermocline[407] – the transition layer between warmer mixed water at the ocean's surface and cooler deep water below[408] – and, therefore, drives differences in sea level and ocean temperatures.[409] The IOD has a positive phase and a negative phase. In the positive phase, the Western Indian Ocean is warmer, and colder waters from the deep rise to the surface of the Eastern Indian Ocean. In the negative phase, the opposite is true. Figure 26 illustrates the dipole's positive phase and its associated impacts on Indian Ocean rim land masses.[410] Figure 27 shows satellite measurements of IOD phases (red=positive and blue=negative) from NASA.[411] The U.S. National Oceanic and Atmospheric Administration (NOAA) points out that the IOD has only been studied since approximately 1999, but records of sea surface temperatures in the region have allowed identification of earlier events. The strongest IOD positive phase on record occurred in 2019.[412] Of note, there is some dispute about the IOD's links to the better-studied El Niño Southern Oscillation (ENSO), of which, the cooler La Niña phase tends to bring slight deceases in global mean sea level rise whereas the warmer El Niño phase brings rapid rises in sea level.[413] There appears to be an IOD-ENSO link as El Niño's surface winds near Indonesia blow from southeast to northwest and help bring cold water to the surface near Java and Sumatra and initiate a positive IOD event. Similarly, La Niña tends to trigger

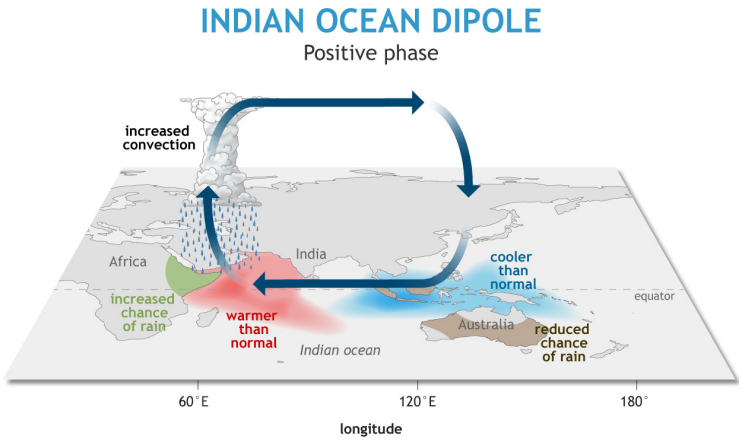

Figure 26: Indian Ocean Dipole, Positive Phase

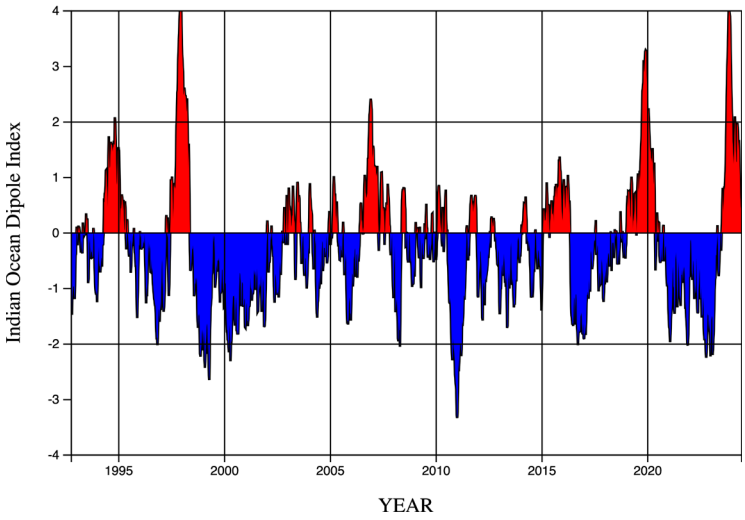

Figure 27: Indian Ocean Dipole Index, 1993-Present (NASA)

negative IOD events.[414] At present, the potential impacts of climate change on the IOD are poorly understood.

The sea temperatures and levels associated with the IOD influence weather. In the second half of 2023, the WMO noted a shift to the positive phase of the IOD that resulted in higher-than-average sea levels in the Western Indian Ocean, illustrated in Figure 28.[415] The positive IOD's warmer, higher waters in conjunction with an El Niño in the Pacific ensured more active convection and a stronger-than-normal northeast monsoon (October-December) that brought more precipitation to much of the region.

As the 21st century progresses, the variability of Seychelles' climate will be related to both shorter- and longer-term shifts in winds, sea surface temperatures, and other oceanic factors as climate change impacts the annual and decadal cycles discussed above. Given the importance

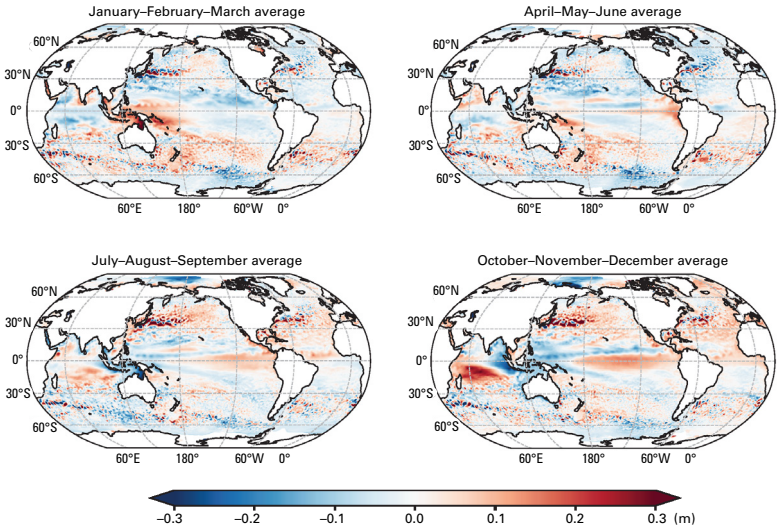

Figure 28: Sea Level Anomalies by 3-Month Average, 2023 (relative to 1993-2012 average) (WMO)

of the ocean to Seychelles' environment, people, and economy, this variability has the potential to exacerbate the climatic, biological, geological, and technological hazards that already cause human casualties and physical and economic damage on an annual basis.

Seychelles is highly vulnerable to climate change-influenced hazards, especially storms, sea level rise, and ocean impacts. Climate shocks have a disproportionately high economic, social, and environmental impact because of the small size of the country in geographic, demographic, and economic terms. Landslides and coastal erosion – both influenced by climate shifts – make infrastructure more vulnerable. Increased salinity of aquifers and soil will impact food security and water supply. Increased sea temperatures, acidification, deoxygenation, and related phenomena – all impacts of climate change – are already felt in the fisheries, tourism, and energy sectors throughout the EEZ. The concentration of an estimated 90% of Seychelles' people and development in narrow coastal areas of just one island – Mahé – already puts increased pressure on the environment and ecosystem. Coastal zones of all islands also hold most of the country's natural capital – e.g., beaches, fishing grounds, coral reefs, mangroves, etc. – and this concentration further increases vulnerability for fisheries and tourism, and therefore, the entire economy.[416]

Seychelles has suffered several climate-related disasters in the past 40 years. Examples include coastal erosion on Praslin in 1986, massive coral bleaching in 1998, heavy rainfall and coastal flooding on Mahé in 2004, a tropical cyclone in 2006, and tidal flooding on Mahé in 2007 and 2012. Coral reefs were altered significantly in the 1998 event, which was related to a warming event in the Indian Ocean; coral bleaching caused mortality in the upper 15–20 m (50-65 feet) of reef across 70% of the inner islands' coastal water. Reef growth also slowed considerably. On land, since approximately 2012, observers have noted an extended drought period, with signs of water scarcity. Moreover, indications of sea level rise have become pervasive; they include degraded coastal dune vegetation, waves overtopping sea walls, saltwater intrusion into farmland, and flash flooding in low-lying districts.[417]

The effects of climate change in Seychelles are projected to include increased temperatures, increased ocean acidity, changes to rainfall patterns, and continued sea level rise. Table 6 details some of the trends and projections for various phenomena that can be influenced by climate change; (un)certainty is noted as available in models accessed, and differing projections due to emissions pathway are noted.[418, 419, 420, 421, 422]

Small Islands Developing States

SIDS worldwide confront major threats from climate change-linked hazards.

Since the 1992 UN Conference on Environment and Development, SIDS have been recognized as particularly vulnerable to climate change impacts. A key set of documents from the mid-1990s – i.e., Barbados Programme of Action (BPoA), Mauritius Strategy of Implementation (MSI), and MSI+5 Outcome – recognized that SIDS are afflicted by economic difficulties and confronted by development imperatives both unique and similar to those of developing countries generally. SIDS' particular

Table Header	Trend	Projection	Potential Impacts
Coastal erosion	Costal destabilization due to extreme tidal events; coral reef degradation allows greater wave energy to erode coasts	0.5 m (19.7 inches) of sea level rise leads to 25-50 m (82-164 feet) of beach recession	Greater wave energy will reach more inland zones
Rainfall	High inter-annual variability related to IOD and ENSO events; annual trends for Mahé for 1972-2006 showed an increase of 13.7 mm (0.54 inches) per year with the increase attributable to a few heavy rainfall events	Heavier rains interspersed with longer dry periods; overall minimal long-term change; high inter-annual variability	Changing rainy season patterns; extreme rainfall events trigger coastal flooding; fluctuations will reduce agricultural productivity and have adverse health impacts
Sea Level Rise	Rate of increase of 5.6–6.6 mm (0.22-0.25 inches) per year between 1993 and 2020 with slightly higher increases for 2010-2020	At observed historic rate, rise expected to be 0.3 m (11.8 inches) by 2050 and 0.6 m (23.6 inches) by 2100 over 2010 levels; some models expect a regional rise of 0.4-0.6 m (15.75-23.6 inches) during the latter part of the century	Coastal flooding events increase in frequency and severity; greater wave energy will reach the coastal zones; a 1-m (-foot) rise would submerge 70% of national landmass
Temperature	Annual air temperatures have increased at an average rate of 0.11˚C (0.198°F) per decade over the period 1960–2006; mean annual sea surface temperature shows increase of 0.5˚C (0.9°F) per decade for 1990–2019; El Niño and positive IOD events appear to raise sea temperatures	Annual air temperature increase of 1.2-3.4˚C (2.16-6.12°F) by 2080; average temperature rise by 2100 varies across emissions scenarios - +1.5°C (2.7°F) for more optimistic scenarios and at least +3°C (5.4°F) under the worst-case scenario; by 2100, sea surface temperature likely to rise by +1.6°C (2.88°F)	Massive coral bleaching events reduce live coral coverage around main islands; coastal ecosystems stop providing protection and habitat
Tropical Cyclones	Wind speeds already increasing for September-November	Poorly understood; cyclones may continue to become more intense but less frequent; cyclone impact zone may shift northwards to affect Seychelles' inner islands	Changes in storm patterns will contribute to determining the extent of extreme coastal flooding

Table 6: Projected Impacts of Climate Change-Influenced Phenomena

vulnerabilities were then highlighted at the UN Conference on Sustainable Development (Rio+20) in June 2012; this conference defined SIDS' vulnerabilities as small geographic and population sizes, remoteness, narrow resource and export bases, and exposure to global environmental and economic shocks.[423] These vulnerabilities increase the risk these states confront since these attributes connote an inability to build coping capacity and the slow arrival of help for acute crises.

The OECD has generalized the hazards and challenges confronting SIDS, as laid out by the Intergovernmental Panel on Climate Change (IPCC), which considers SIDS' vulnerability a result of eight interconnected risks:

1. Marine and coastal biodiversity/ecosystem loss – Coral bleaching negatively impacts reefs, which frequently play an important role in SIDS' economies (e.g., fisheries, tourism) and, more importantly, play a role in climate change mitigation and resilience (e.g., carbon storage, wave attenuation). Sea level rise and extreme storms' influence over tides and surges erode beaches, which are vital ecosystems.
2. Terrestrial biodiversity/ecosystem loss – Avian and mammalian species are at risk of extinction due to climatic and human drivers. Sea level rise and extreme weather events cause coastal erosion, which undermines options for adaptation. Migration away from coasts, tourism, natural resource exploitation, and urbanization further degrade terrestrial ecosystems and increase wildlife-human interactions.
3. Sea level rise – A sustained rise will lead to significant flooding and storm surges that affect low-lying communities, industrial areas, and agricultural lands. Degraded coral reefs no longer provide natural protection.
4. Water security – Freshwater shortages affect populations' health and livelihoods.
5. Loss and damage – Settlements and infrastructure are increasingly exposed to extreme events in SIDS, where there are

major impacts on climate-sensitive sectors such as agriculture, fisheries, transport, energy, and tourism – sectors that are key contributors to SIDS' GDP. These losses strain public finances by increasing expenses and the cost of borrowing after weather events strike. The WMO estimates that SIDS have lost US$153 billion since 1970 due to weather, climate, and water-related hazards.

6. Health and well-being – Temperature increases are expected to lead to higher mortality and reduce well-being among outdoor workers even as they make new areas of the world more hospitable to disease vectors and increase exposure to and prevalence of diseases (e.g., malaria or dengue fever). Climate change will also impact local food systems and, thereby, challenge food security, increase malnutrition, and lead to higher rates of food-borne and non-communicable diseases.
7. Economic decline – Economic growth in SIDS is, on average, low compared to other developing countries and is generally highly concentrated in a few sectors. As a result, SIDS are very exposed to external shocks.
8. Loss of heritage and cultural resources – SIDS have rich cultures that result from their complex histories, and they maintain a variety of languages and traditions. Under the MSI and the SIDS Accelerated Modalities of Action Pathway (SAMOA Pathway), cultural and natural heritage is key to advancing sustainable development, but climate change strains the capacity to safeguard cultural resources, the loss of which increases vulnerability to climate change because culture, historical knowledge of the natural environment, and social capital foster SIDS' adaptive capacity and resilience.

An illustration of how extreme events can intersect to exacerbate climate-related risks is the COVID-19 pandemic. In addition to its human toll, the pandemic triggered a global economic crisis, with significant costs for SIDS, which experienced 2.1% more GDP loss than the global average. While GDPs were recovering from the pandemic, Russia's invasion of Ukraine disrupted supply chains and shipping routes, increased the price of raw materials, food, and fuel, and increased debt servicing, all of which reduced SIDS' ability to sustain recovery from the pandemic.

While SIDS' vulnerability can be reduced, these countries may not be able to fully contain the root causes of their vulnerabilities. On the whole, SIDS are not able to keep pace with growing climate-related risks and challenges without policies and reforms that foster economic recovery and curb the adverse impact of exogenous crises on public finances in a way that promotes resilience and limits the impact of future climate-related shocks. Thus, comprehensive global approaches that develop capacities are appropriate, and the international community plays an important role in complementing domestic efforts.

Article 6 of the UNFCCC recognizes the importance of improving programs to strengthen capacity through education and public awareness and through better access to climate-related information and training. Under Article 11 of the Paris Agreement, capacity building is recognized as an avenue to address climate change and engage in sustainable development. Calls for greater donor support are made repeatedly in the annual UNFCCC COP, but many bottlenecks clearly remain in support for climate-related capacity development, including for SIDS. Many of these bottlenecks interact, leading to vicious cycles that require comprehensive action to address multiple constraints simultaneously. Otherwise, climate-related capacity development aimed at a single stakeholder, policy, or institution is unlikely to succeed. SIDS' main barriers in this area include:

1. Limited finance and access to finance – Observers note that finance is SIDS' largest constraint. SIDS lack the financial resources for robust assessments of climate-related needs and priorities or for designing and implementing climate plans. SIDS often rely on external sources that may be unconnected to development plans.
2. Lack of climate-related data and information

– Key historical, observational, slow-onset, and damage data, among other data sets, are not reliably collected in or available for many SIDS, and this lack can undermine modeling of observed impacts, understanding exposure, and assessing losses and damages, among other challenges. Further, available data might not be sufficiently downscaled to capture local and specific characteristics, a particular problem for SIDS with microclimates or that are scattered across large ocean territories where country-level data might not correspond to local realities. Limited data also complicates monitoring, evaluation, and learning processes and undermines SIDS' efforts to formulate a case to access climate finance, such as for anticipatory action or insurance products.

3. Limited human capacity – SIDS often have small job markets with little ability to attract and retain skilled staff, and they consequently have a shortage of expertise in jobs that address climate change (e.g., meteorologists, hydrologists, geographers, biologists) or that facilitate access to opportunities to fund climate-related activities (e.g., preparing bankable projects, communicating in English).
4. Governance challenges – SIDS face important governance gaps around climate change, with small, stretched institutions, inadequate policy frameworks, and limited coordination.

These barriers impact what SIDS can autonomously do, and most SIDS, therefore, engage in short-term, sectoral, and small-scale climate-related actions. Nonetheless, SIDS are not a monolithic group; they have different levels of capacity and constraints on capacity development and, therefore, require tailored and context-specific approaches. Many of the constraints listed above are documented in NDCs, and this listing can direct climate finance allocations to where needs are greatest. In 91% of SIDS' NDCs – versus 74% of other developing countries' NDCs – there is a call for capacity development as a condition for implementation. As of March 2023, only 10 SIDS had submitted National Adaptation Plans (NAP), but all include capacity development as a component to adapt to climate change risks.[424]

Figure 29 shows key climate change risks, trends, and adaptations of import to SIDS.[425]

The first International Conference on SIDS in Barbados in 1994 resulted in the BPoA, which prescribed specific actions that would

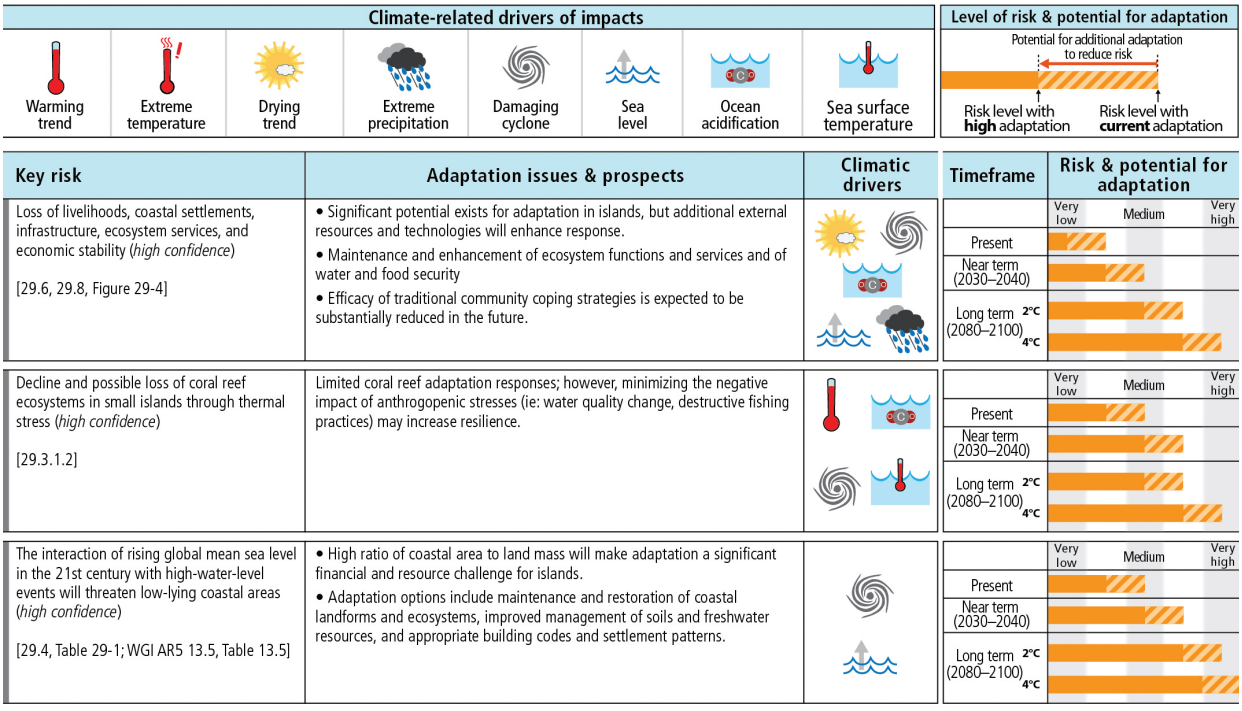

Figure 29: Climate Change Risks, Trends, and Adaptations of SIDS

enable SIDS to achieve sustainable development. The second conference, in Mauritius in 2005, resulted in the MSI to address remaining gaps in implementation of the BPoA. In 2014, Samoa hosted the third conference to seek a new pathway for SIDS' sustainable development. The result was the SAMOA Pathway, which recognizes the adverse impacts of climate change and sea level rise on SIDS' efforts to achieve economic development, food security, DRR, and ocean management. The SAMOA Pathway is crafted to help SIDS address the unique challenges they face and guide international stakeholders in supporting SIDS' development across five action areas:

- Promote sustained, sustainable, inclusive, and equitable economic growth with decent work for all, sustainable consumption and production, and sustainable transportation
- Act to mitigate climate change and adapt to its impacts by implementing sustainable energy and DRR programs
- Protect the biodiversity of SIDS and environmental health by mitigating the impact of invasive plant and animal species and by properly managing chemicals and water, including hazardous waste, as well as protecting oceans and seas
- Improve human health and social development through food security and nutrition, improved water and sanitation, reducing the incidence of non-communicable diseases, and promoting gender equity and women's empowerment
- Foster partnerships among SIDS, UN agencies, development partners, and others to achieve these goals[426]

In May 2024, Antigua and Barbuda hosted the fourth SIDS conference, which involved a review of SIDS' sustainable development progress and unanimous support for "The Antigua and Barbuda Agenda for SIDS (ABAS) – a Declaration for Renewed Prosperity," a new 10-year plan of action to deliver meaningful change for this group of vulnerable countries.[427] In preparation for this conference, the Regional Preparatory Meeting for the Atlantic, Indian Ocean, and South China Seas (AIS) region was held in Mauritius in July 2023. Ahead of the AIS meeting, an online consultation of stakeholders – dominated by NGOs – found that groups working in the AIS region identified the top three challenges to sustainable development as 1) adverse effects of climate change, 2) loss of biodiversity, and 3) accessing financing. The same survey respondents put forward key policy recommendations to address their top challenges; these recommendations clustered around comprehensive climate risk assessments, integration of climate change considerations into all sectors of development planning, involving local communities in decision-making processes, investing in the blue economy, and improving the status of "climate refugees" and migrants. Meanwhile, concrete actions promoted by these same respondents were to protect and restore biodiversity and vulnerable ecosystems, reduce marine pollution, invest in and expand risk prevention systems and advanced monitoring, forecasting, and early warning systems, establish communication channels, and conduct public awareness campaigns.[428]

The outcome of the AIS meeting in Mauritius in 2023 was an agreement on priorities and recommendations to serve as the basis of the AIS positions on a new SIDS development agenda that builds on the BPoA, MSI, and SAMOA Pathway. A key highlight was the confirmation that AIS states encounter significant limitations in terms of financial resources and access to finance and, therefore, confront challenges to effectively implementing development priorities. In terms of progress, the AIS states applauded the mainstreaming of the SAMOA Pathway in national policies. However, they also noted that the COVID-19 pandemic disrupted work and compounded the adverse impacts of climate change, especially related to sea level rise and extreme weather events. All facets of energy, water, transport, demographics, and the digital economy are expected to play into the future SIDS program development as SIDS seek to ensure they gain better access to a reformed

international financial architecture for climate finance and sustainable private finance.[429]

Influences on Hazards

Modelling for SIDS requires integration of global tools and data sets with elevation models accurate to small areas, wave and tropical cyclone effects, impacts of reefs and mangroves, and other flood inundation assessments. Taken as a whole, the SIDS in the Indian Ocean – Comoros, Maldives, Mauritius, and Seychelles – show the highest rise in exposure to flooding among world regions, with 13-17 times more people exposed by 2100 compared to present day, depending on emissions scenario. Meanwhile, damages are projected to be 113-152 times higher. At the same time, these conclusions occlude the fact that, a more granular level, flood exposure and loss varies substantially among regions and countries and depends highly on local factors – e.g., character of the coastline, waves and currents, human interventions, and coral habitats' health.[430]

In the IPCC's Sixth Assessment Report (AR6), projections for rainfall and tropical cyclones in the Indian Ocean in general were inconclusive, but there was substantial agreement that relative sea levels would be higher than average in the Southwest Indian Ocean.[431] This report reflects the difficulty in modelling and assessing impacts on SIDS because they are impacted by more than just climate.

In its own assessments and modeling for the Third National Communication under the UNFCCC, Seychelles used climate simulations generated by the ALADIN-Climate regional model, which includes model physics developed at the National Research Centre in Meteorology (CNRM), Météo France, in Toulouse, France. It is a limited-area atmospheric model with a high resolution of 12 km (7.5 miles). This model specializes in analyzing large-scale climate trends in small, high-mountain areas like the Seychelles. The IOC, Météo France, and AFD supported Seychelles' use of the model through the Building Resilience in Indian Ocean (BRIO) Project. Additional simulations from the Coupled Model Intercomparison Project 6 (CIMP6) were used for the outer islands because of a scarcity of data for islands other than Mahé. Data inputs to the models were primarily from SMA's own archives.[432]

The below are taken directly from Seychelles' Third National Communication unless otherwise noted.[433]

Precipitation

In the inner islands, the projected overall annual precipitation is not expected to change much, compared to the long-term average, although most models show a slight increase in precipitation during the rainy season of January, February, and March, and a slight decrease in the dry season of July, August, and September. Models do suggest significant year-to-year variations in precipitation between now and 2100 under all emissions scenarios. In many instances, opposite extreme conditions are likely to change abruptly from one event to the next, e.g., an extremely wet year followed by an extremely dry one.

Amirantes group and Ile Platte: Model projections indicate that more precipitation will be received in the Amirantes group and Ile Platte throughout most months, except for the July to September (dry) season. The increase in precipitation is likely to vary between 5% and 25%, with a maximum in April, May, and June by +20% under medium emissions scenarios and by +25% under high emissions scenarios by 2080. At the same time, the decrease in July-September will reach a deficit of -20% and -30% by 2080 under medium and high emissions scenarios, respectively. The annual total is also likely to increase between +5% and +10% between 2030 and 2050 for all reduced emissions scenarios, and almost +15% by 2080 under the business-as-usual scenario.

Alphonse and Coëtivy: Model projections show a more pronounced dry season during July, August, and September, as well as reduced precipitation during the rainy months of October to December under emissions scenarios from 2030 until 2080. A slight 5% increase in

precipitation is projected in the rainy season of January, February, and March and during the dry period of April, May, and June. The projected precipitation for April-June is likely to increase from 5% to 10% under all emissions scenarios by 2080, with the overall annual trend likely to remain unchanged compared to the 1981-2010 baseline period.

Farquhar: The island group is expected to receive less rain in the dry months of July, August, and September, and in wet periods of October, November, and December. The precipitation deficits for July-September will vary between -5% and -10% from 2030 to 2080 under all but the worst-case emissions scenarios, from -10% and -15% from 2050 to 2080 medium to high emissions scenarios and -20% by 2080 under worst-case scenarios. For the period October-December, the deficit will vary between -10% and -15% from 2050 to 2080 for medium and high emissions scenarios and from -20% and -35% for the period 2050 to 2080 under high emissions scenarios. For the other seasons, the change is expected to be negligible, ranging from-5% to +5% for any scenario, except by 2080, when it is likely that the seasonal precipitation during April, May, and June, and the annual total precipitation will start to decrease by -10% under all but the lowest emissions scenarios.

Aldabra and Cosmoledo: Similar to Farquhar, the precipitation projections show that Cosmoledo and the Aldabra Atolls are likely to be seriously affected by a reduction in precipitation throughout the projected periods of 2030, 2050, and 2080 for all emissions scenarios except for an increase during the wet months of January, February, and March. The magnitude of the seasonal decrease in precipitation is likely to be more pronounced during the dry months of July, August, and September and the wet months of October, November, and December. The July-September deficit is likely to range from -10% to -25% during the period 2030-2080 and from -20% to -40% for the period 2030-2080, under all scenarios. The annual total precipitation is also likely to be reduced.[434]

Figure 30 illustrates the Pacific Disaster Center (PDC) analysis of worse-case emissions scenarios influence on extreme precipitation events in Seychelles and the Southwest Indian Ocean region in 2050. Various available model visualizations display maps that illustrate the potential future impacts related to sea level, temperature regimes, and precipitation patterns. The Pacific Disaster Center (PDC) maintains layers of data on worldwide boundaries, bio-surveillance, conflict, demographics, economics, hazards, humanitarian action, hydrology, infrastructure, and natural resources, and its map-based DisasterAWARE platform delivers impact assessments related to climate change, risk, and vulnerability via both quick, hazard event briefs and longer-range forecasts, based on demographic, economic, and climate trends. The system is based on the world's largest, scientifically-vetted big data catalog for disaster management decision making; this catalog is derived in part from PDC's unique National Disaster Preparedness Baseline Assessment as well as its Global Risk and Vulnerability data.[435]

Air Temperature

For the inner islands, the average temperature from present to 2100 is projected to exceed 0.5°C above the climatology average of 1981-2010 for lower emissions scenarios, is likely to exceed 1.5°C above 1981-2010 for medium-high emissions scenarios, and is more likely than not to exceed 3°C under the worst-case scenario. It is likely that by the end of the century, the mean annual temperature will reach 29-30°C for lower-range scenarios and almost 32°C in the business-as-usual scenario, compared to the normal average of 27.5°C (1981-2010). Figure 31 illustrates the range of modeled scenarios, with all emissions pathways showing similar rises through 2030 and diverging substantially from 2050 onward.[436]

The annual mean temperature for Amirantes, Ile Platte, Alphonse, Coëtivy, Farquhar, Cosmoledo, and Aldabra is projected to rise in the range of 1-3°C by 2030, 2050, and 2100. Across all emission scenarios, air temperature will continue to increase in the outer islands

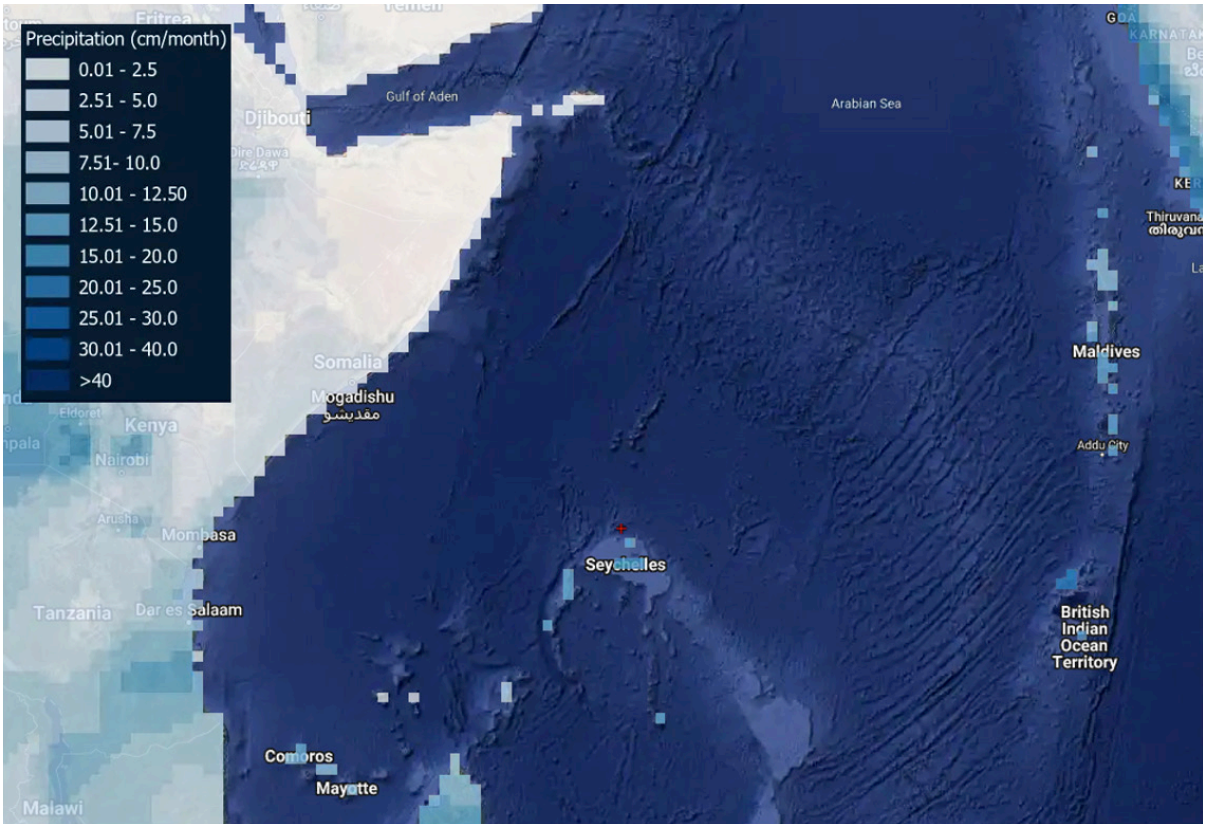

Figure 30: Extreme Precipitation in Southwest Indian Ocean under RCP 8.5 (2050 projection) (PDC)

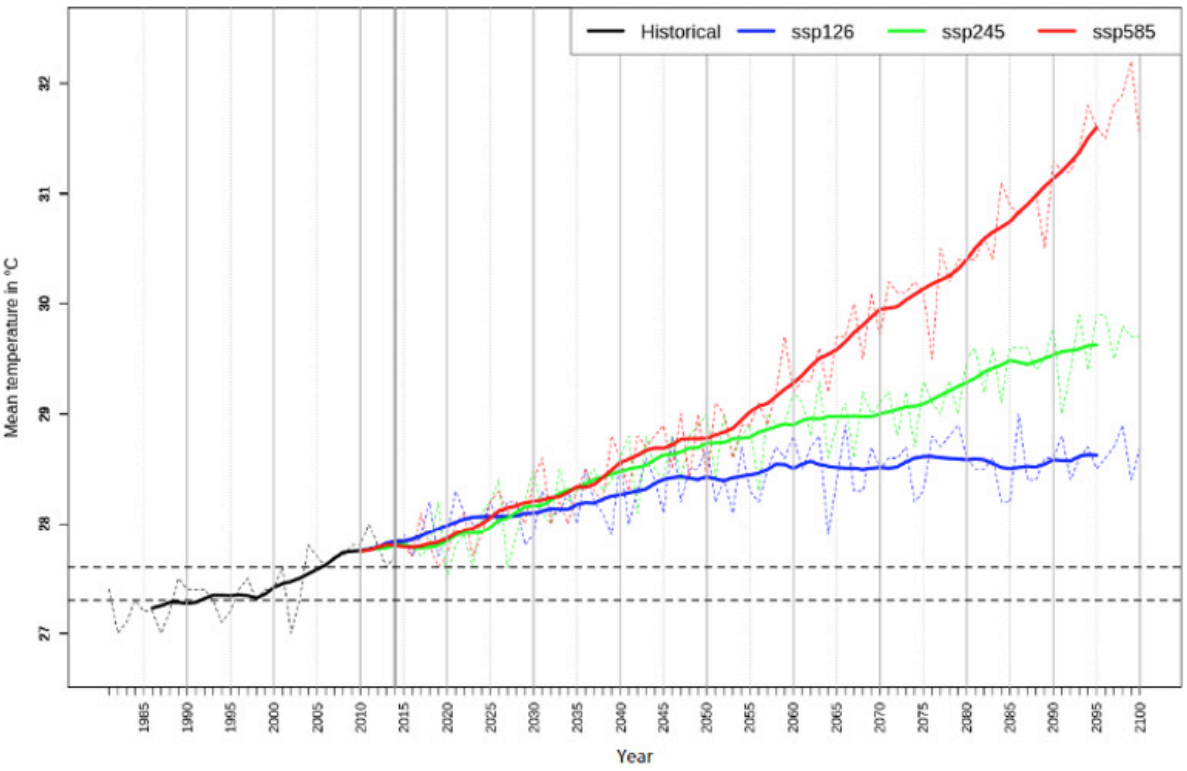

Figure 31: Projected Mean Temperature Rise for All Islands

throughout the different seasons until the end of the century. The temperature anomaly is very likely to reach +1°C by 2030 for low-medium emissions scenarios, +1.5°C by 2050 for medium scenarios, and +3°C by 2080 for worst-case scenarios.[437]

Figure 32 illustrates the PDC assessment of extreme heat incidents for Seychelles for the year 2050 under the worst-case emissions scenarios.

Sea Level

Rising sea levels are projected to continue and exacerbate prolonged coastal erosion, particularly around the main islands. Based on observed rates of rise, the sea level countrywide is likely to rise by 6.1 centimeters (cm; 2.4 inches) by 2030, by 18.3 cm (7.2 inches) by 2050, by 36.6 cm (14.4 inches) by 2080, and by 48.8 cm (19.2 inches) by 2100, compared to the 2020 baseline. However, under a worst-case emissions scenario, some models show the inner islands impacted by a significantly greater rise – 43 cm (16.9 inches) by 2040 and by as much as 154 cm (60.6 inches) by 2100. The impacts on Seychelles' coastal zone could be catastrophic in combination with tidal waves, storm surges, and swells.[438]

Sea Surface Temperatures

Assessments have noted peak positive anomalies in sea surface temperatures in 1998, 2006, and 2016, all of which were El Niño and/or positive IOD event years. However, from 1990 to 2019, the sea surface temperature increased by approximately +0.5°C, suggesting that the warming was also related to the increase of GHG forcing. An increase in GHG emissions is considered one reason for global ocean warming. Further analysis of data sets for Seychelles indicates that the spatial annual mean (1990-2019) was 28.58°C, with a warming trend of +0.02°C annually. If this rate of increase is maintained, the sea surface temperature in Seychelles is likely to rise by +0.2°C in 2030; +0.6°C in 2050; +1.2°C in 2080; and +1.6°C in the 21st century, relative to 2019/2020. As a result, the annual mean sea surface temperature will increase from 28.58°C in 2019 to 28.78°C by 2030; 29.18°C by 2050; 29.78°C by 2080; and

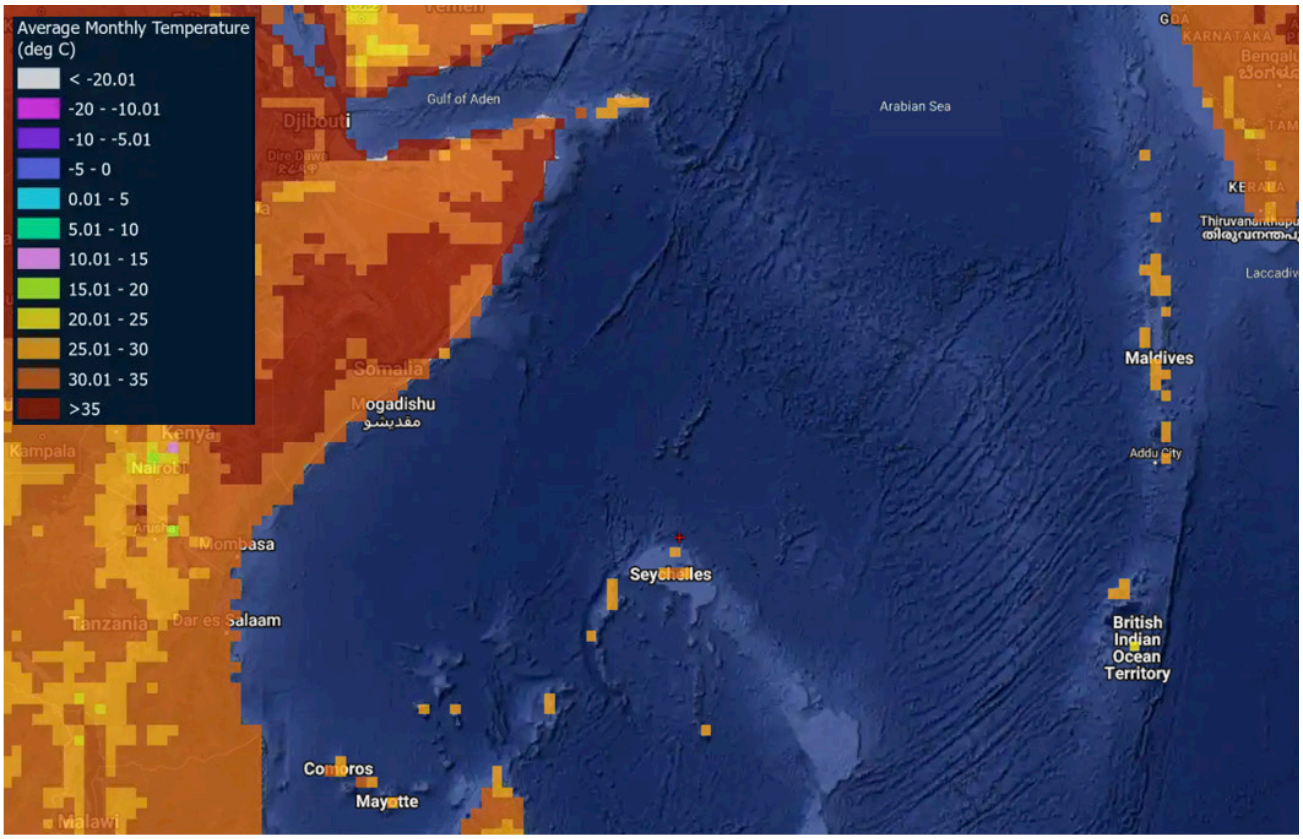

Figure 32: Extreme Heat in Seychelles under RCP 8.5 (2050 projection) (PDC)

30.18°C by 2100.[439]

Tropical Cyclones

Models suggest that the number of tropical storms and cyclones might decrease while the number of intense cyclones might increase. Of importance for Seychelles, is the opinion that the latitude where TCs reach their maximum intensity will shift southwards. While this projection does not suggest greater risk of TC landfall for the inner islands, the outer islands may suffer direct impacts from more intense TCs. Moreover, more intense cyclones imply the presence of more intense "feeder bands" - spiraling lines of convection that extend outward from a TC's center and that bring heavy precipitation, storm surge, and high winds – and, therefore, the inner islands' insulation from TC impacts could wane.[440]

As an illustration of the current TC environment in and around Seychelles, the PDC has tracked the last 10 years of TCs in this region; Figure 33 shows these tracks.

Impacts on Populations and Built Environments

Rising sea levels will exacerbate coastal erosion, and, in combination with tidal waves, storm surges, and swells, put Seychelles' coastal settlements, industries, and infrastructure at risk. Given the concentration of economic activity within coastal zones, sea level rise is a looming hazard for transport, utilities, agriculture, and health, among others, as wave overtopping and saltwater intrusion become more common.

For the inner islands, extreme rainfall events are expected to increase in frequency and intensity. The year-to-year deficit in precipitation is also expected to increase and become more severe. This combination suggests an increase in frequency of instances when the weather will suddenly change from too wet to too dry, or vice versa, and the result of such transitions is projected to be an increase in floods and drought. Some projections indicate that the average number of extremely wet days will increase from one per year to 2-4 per year, a rise

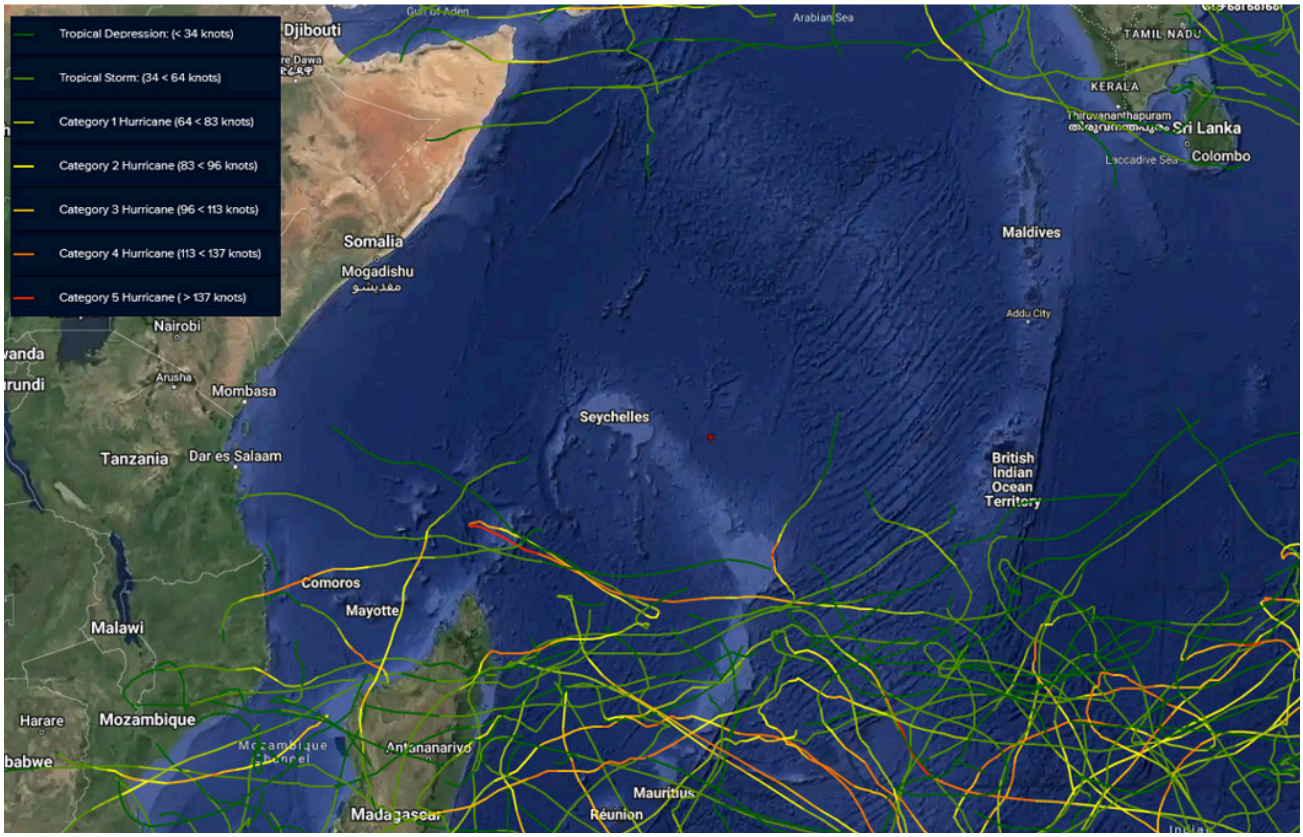

Figure 33: Last 10 Years of Tropical Cyclones in Southwestern Indian Ocean (PDC)

that will increase the frequency of key hazards – i.e., flooding and landslides – that threaten life and the built environment. Increased flooding also promotes water contamination – e.g., by human or animal waste – and standing water; the consequences of these effects include human exposure to waste as well as mosquito breeding and, thus, outbreaks of water- and vector-borne illnesses, including leptospirosis and dengue fever. Concurrently, sustained warming trends can be expected to exacerbate already observed increases in the rate of evaporation, which decreases soil moisture and water availability and, therefore, makes drought conditions more common, thereby decreasing water supplies, reducing agriculture production, and promoting wildfire ignition.

Future precipitation patterns over the outer islands are expected to vary from island to island and season to season. There appears to be a higher probability of more precipitation in the Amirantes group and Ile Platte during most months, especially in the wet season from January to March, through 2080 across all emissions scenarios. Dry conditions are expected over Cosmoledo, Aldabra Atoll, Farquhar, Alphonse, and Coëtivy during most months with more severe water shortages during the dry season of July, August, and September and the rainy season of October, November, and December through 2080 across all emissions scenarios. Given the relative lack of human settlement on these outer islands, periods of too much or too little rain pose an economic risk due to the reduction of productive capacity of agricultural or tourism activities.[441]

Although difficult, some modeling groups are working at small scales. The Climate Central Coastal Risk Screening Tool presents interactive maps of areas threatened by sea level rise and coastal flooding by integrating visualizations of coastal elevation (produced by global models) and projections of future flood levels. Their proprietary CoastalDEM is a high-accuracy digital elevation model (DEM) for coastal areas, and their resulting maps are based on the latest sea level projections, including from the Sixth Assessment Report (AR6) from the IPCC and the 2022 Sea Level Rise Technical Report from an interagency U.S. government task force.[442] Figures 34, 35, and 36 show Climate Central's comparisons of areas of Mahé, Praslin, and La Digue that are projected to be below the tide line after +1.5°C (2.7°F) and +3.0°C (5.4°F) change in average world temperatures.[443]

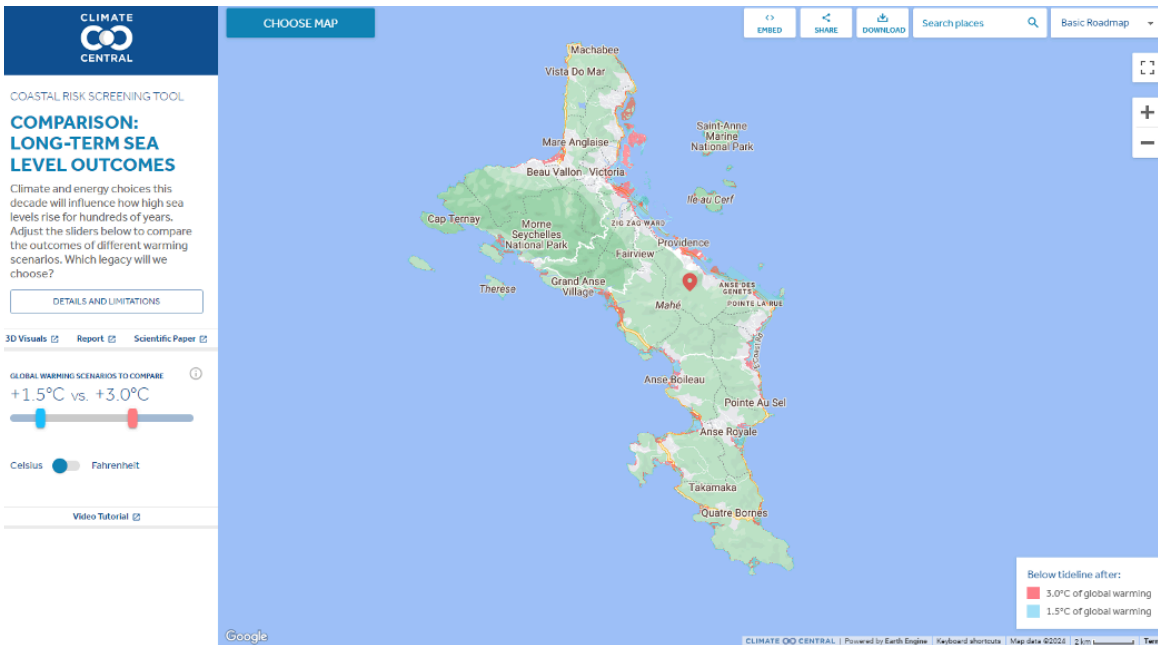

Figure 34: Mahé, Areas Projected to Be below Tideline after 1.5°C and 3.0°C Global Temperature Rise (Climate Central, by permission)

Figure 35: Central Mahé, Areas Projected to Be below Tideline after 1.5°C and 3.0°C Global Temperature Rise (Climate Central, by permission)

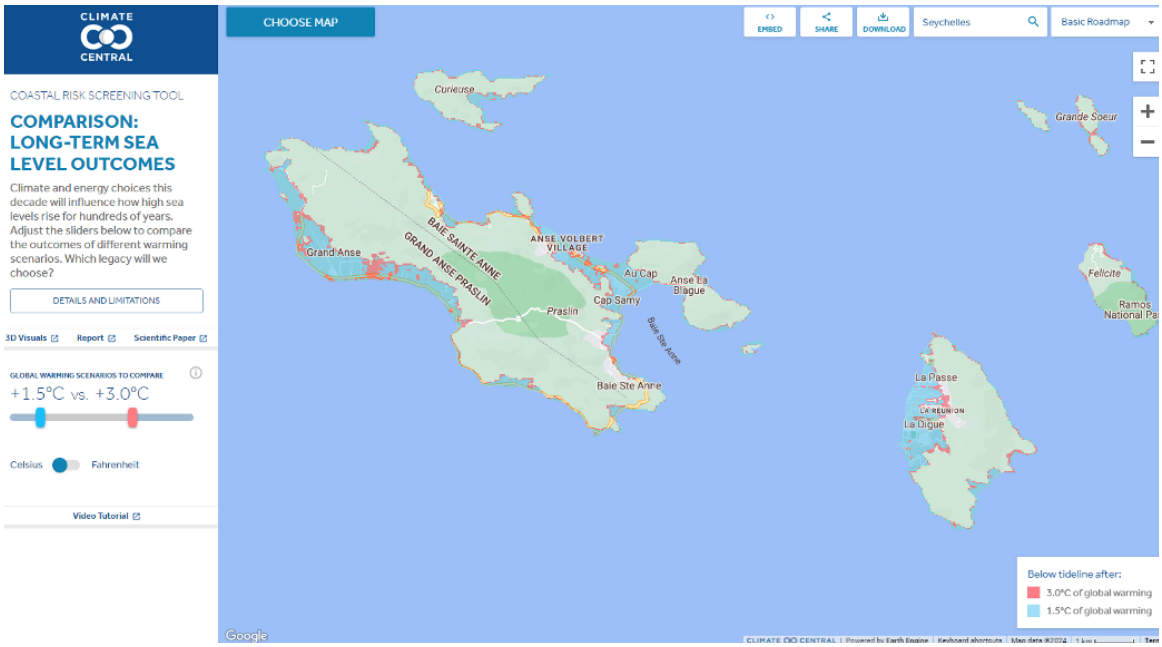

Figure 36: Praslin and La Digue, Areas Projected to Be below Tideline after 1.5°C and 3.0°C Global Temperature Rise (Climate Central, by permission)

CONCLUSION

The natural hazards to which Seychelles is most exposed are storms, flooding, landslides, mudslides, and rock falls. While Mahé, Praslin, and La Digue are unlikely to be directly struck by tropical cyclones due to their proximity to the equator, they nonetheless experience associated wind, rain, and storm surge effects from cyclones in the area, which have generated flooding and landslides.[444]

Seychelles' people and economy are vulnerable to the impacts of natural disasters, particularly hydrometeorological ones, because of the concentration of communities and industries along the narrow coastal plains of Mahé. The vast majority of the Seychelles population reside on three of the 115 islands – Mahé, Praslin, and La Digue. Most reside on Mahé, which contains the capital, Victoria, the seat of government, and the center of economic activities. Approximately 90% of the population resides along the coast, exposing them to the more potentially extreme effects of natural disasters as well as climate change. While Seychelles is one of the smallest countries in the world by land size, it has one of the world's largest EEZs, and the ocean environment is intimately intertwined with the life of the islands.

Climate change is exacerbating natural hazards and increasing the potential for disastrous impacts in Seychelles. Effects of climate change that pose significant risks to the country include sea level rise and sea temperature warming. The rising sea level is increasing exposure to storm surges and tsunamis generated elsewhere in the Indian Ocean, and rising sea temperatures are affecting the marine ecology – corals, sea grasses, mangroves, and fish stocks. In turn, the decline of coastal wetlands, such as seagrasses, mangroves, marshes, and swamps, increases Seychelles' vulnerability due to the loss of barriers against extreme weather and rising waters.

Seychelles is actively working to mitigate and adapt to climate change, which poses enormous risks to its people and economy. Seychelles has been increasing its strategic efforts on mitigating against and adapting to climate change. As of 2023, Seychelles' disaster management and climate change impacts programs are handled separately. The national body for disaster risk management is the DRMD, which develops and implements plans and strategies. DRMD coordinates at the national level and supports local-level initiatives to improve DRM practices nationally. Alongside the DRMD are three committees with high-level oversight and advisory roles: the National Disaster Risk Management Committee, the Vulnerability Assessment Committee, and the National Platform for Disaster Risk Reduction. The lead on climate change is in a separate ministry; the MACCE oversees ecological protection, safe water resources, and capacity strengthening to address the impacts of climate change and climate-related disasters. Within the ministry, focused work is done by the Climate Change Department and Climate Change Division. In addition to coordinating climate change issues interagency and nationally and engaging internationally, focus areas include promoting technologies to build climate resilience.

Disaster risk management and climate change are cross-cutting and multi-faceted challenges. In finding solutions, Seychelles collaborates with UN agencies and regional inter-governmental organizations, including the African Union, South Africa Development Community, Indian Ocean Commission, and Indian Ocean Rim Association. The small island country is particularly vulnerable to the impacts of climate change, including heightened disaster risk with more extreme weather and hazards. However, Seychelles is actively working to increase its resilience in partnership with a range of regional and international stakeholders.

APPENDICES

Participation in International Organizations

Seychelles is a member of, participates in, or cooperates with the following international organizations and agreement frameworks either as a government or via a national NGO or other entity:

African Development Bank (AfDB), African Union (AU), Alliance of Small Island States (AOSIS), Common Market for Eastern and Southern Africa (COMESA), Commonwealth, Conference on Disarmament (CD), Extractive Industries Transparency Initiative (EITI, candidate country), Food and Agriculture Organization of the United Nations (FAO), Group of 77 (G-77), Indian Ocean Commission (IOC), Institute of Catastrophe Risk Management (ICRM), Inter-Parliamentary Union (IPU), International Atomic Energy Agency (IAEA), International Bank for Reconstruction and Development (IBRD), International Chamber of Conference (ICC-NGOs), International Civil Aviation Organization (ICAO), International Criminal Court (ICC), International Criminal Police Organisation (INTERPOL), International Development Association (IDA), International Federation of Red Cross and Red Crescent Societies (IFRC), International Finance Corporation (IFC), International Fund for Agricultural Development (IFAD), International Labour Organization (ILO), International Maritime Organization (IMO), International Monetary Fund (IMF), International Olympic Committee (IOC), International Organization for Migration (IOM of the UN), International Organization for Standardization (ISO - correspondent), International Organization of La Francophonie (OIF), International Telecommunications Union (ITU), Multilateral Investment Guarantee Agency (MIGA), Non-Aligned Movement (NAM), Organisation for the Prohibition of Chemical Weapons (OPCW), Organisation of African, Caribbean and Pacific States (ACP), Southern African Development Community (SADC), United Nations (UN), United Nations Conference on Trade and Development (UNCTAD), United Nations Educational, Scientific, and Cultural Organization (UNESCO), United Nations Industrial Development Organization (UNIDO), Universal Postal Union (UPU), World Customs Organization (WCO), World Health Organization (WHO), World Intellectual Property Organization (WIPO), World Meteorological Organization (WMO), World Tourism Organization (UNWTO), World Trade Organization (WTO)

Sendai Framework

The Sendai Framework for Disaster Risk Reduction 2015-2030 is the global blueprint and 15-year plan to build the world's resilience to natural disasters.[445] The Sendai Framework is the successor instrument to the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters.[446] Adopted at the Third United Nations World Conference on Disaster Risk Reduction in Sendai, Japan, in 2015, the Framework aims to achieve the substantial reduction of disaster risk and losses in lives, livelihoods, and health and in the economic, physical, social, cultural, and environmental assets of persons, businesses, communities, and countries over the next 15 years.[447]

The Framework outlines seven targets and four priorities for action to prevent new and reduce existing disaster risks.

The Seven Global Targets include:

- Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality rates in the decade 2020-2030 compared to the period 2005-2015.
- Substantially reduce the number of affected

people globally by 2030, aiming to lower average global figure per 100,000 in the decade 2020 -2030 compared to the period 2005-2015.
- Reduce direct disaster economic loss in relation to global GDP by 2030.
- Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030.
- Substantially increase the number of countries with national and local DRR strategies by 2020.
- Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this Framework by 2030.
- Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030.[448]

The Four Priorities of Action include:
- Understanding disaster risk
- Strengthening disaster risk governance to manage disaster risk
- Investing in disaster reduction for resilience; and
- Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation, and reconstruction.

Figure 37 shows the Sendai DRR Framework.[449]

The following narratives are taken directly from the Seychelles Mid-Term Review of progress toward the Sendai Framework objectives, unless otherwise noted.[450]

Priority 1: Risk assessment, information, and understanding

Seychelles has undertaken work to understand and assess disaster risk associated with sectors and organizations. Some sectors, such as telecommunications, financial services, and education, have attempted to understand their respective risks by devising and maintaining risks registers. They have also begun to construct Business Continuity Plans (BCP), appoint floor marshals, and launch safety training. Telecommunication service providers have also begun to build internal backup data systems, including backup satellite systems that prioritize certain essential services during emergencies.

There is some evidence that, despite not having plans, some sectors, such as agriculture, have considered some aspects of risk. The introduction of risk allowances, routine medical tests, and emergency drills are all indications that the notion of risk awareness does exist within these sectors.

Major efforts have been seen in the education sector to integrate aspects of DRR into the primary school curriculum, and DRR has been integrated into the teacher's curriculum at Seychelles Institute for Teachers Education (SITE). Nevertheless, there is no repository of local information and local knowledge that can be used for case studies in students' education.

Gaps remain in understanding risk in some sectors, especially technology. With a worldwide increase in technological advancement, many stakeholders have become aware of cyber-attacks. In the decade 2012-2022, information systems in Seychelles have been victims of several cyber-attacks, including Automatic Teller Machine (ATM) fraud and card copying machines, pyramid schemes, and ransomware. Nevertheless, there appears to be a lack in education and awareness that is connected to the mass media, which is considered important as it is a tool for purposes such as early warning. Some observers indicate that, to date, the local media have evinced defiance in aspects of risk reduction as they are not equipped to prepare, respond (media coverage), and recover from any emergency/disaster. The lack of training, personal protective equipment (PPE), and risk assessments indicate that the media sector lags far behind in understanding their respective risk and role. Seychelles does have laws for broadcast and publication houses but lacks laws for

Chart of the Sendai Framework for Disaster Risk Reduction
2015-2030

Scope and Purpose
The present framework will apply to the risk of small-scale and large-scale, frequent and infrequent, sudden and slow-onset disasters, caused by natural or manmade hazards as well as related environmental, technological, and biological hazards and risks. It aims to guide the multi-hazard management of disaster risk in development at all levels as well as within and across all sectors
Expected Outcome
The substantial reduction of disaster risk and losses in lives, livelihoods, and health and in the economic, physical, social, cultural, and environmental assets of persons, businesses, communities, and countries
Goal
Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political, and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience

Targets						
Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality during 2020-2030 compared to 2005-2015	Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 during 2020-2030 compared to 2005-2015	Reduce direct disaster economic loss in relation to global GDP by 2030	Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030	Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020	Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this framework by 2030	Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030

Priorities for Action			
There is a need for focused action within and across sectors by States at local, national, regional, and global levels in the following four priority areas.			
Priority 1 Understanding disaster risk	**Priority 2** Strengthening disaster risk governance to manage disaster risk	**Priority 3** Investing in disaster risk reduction for resilience	**Priority 4** Enhancing disaster preparedness for effective response, and to "Build Back Better" in recovery, rehabilitation, and reconstruction
Disaster risk management needs to be based on an understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics, and the environment	Disaster risk governance at the national, regional, and global levels is vital to the management of disaster risk reduction in all sectors and ensuring the coherence of national and local frameworks of laws, regulations, and public policies that, by defining roles and responsibilities, guide, encourage, and incentivize the public and private sectors to take action and address disaster risk	Public and private investment in disaster risk prevention and reduction through structural is non-structural measures are essential to enhance the economic, social, health, and cultural resilience of persons, communities, countries, and their assets, as well as the environment. These can be drivers of innovation, growth, and job creation. Such measures are cost-effective and instrumental to save lives, prevent and reduce losses, and ensure effective recovery and rehabilitation	Experience indicates that disaster preparedness needs to be strengthened for more effective response and to ensure capacities are in place for effective recovery. Disasters have also demonstrated that the recovery, rehabilitation, and reconstruction phase, which needs to be prepared ahead of the disaster, is an opportunity to "Build Back Better" through integrating disaster risk reduction measures. Women and persons with disabilities should publicly lead and promote gender-equitable and universally accessible approaches during the response and reconstruction phases

Figure 37: UN Sendai Framework for Disaster Risk Reduction 2015-2030

unlawful use of social media.

When it comes to understanding risk, emphasis has been placed on the lack of a structured information management system (IMS). Emergency-/disaster-related data, records, documents, audits, and assessments are scattered among agencies, and the Seychelles as a whole does not capture such data as there is no common platform for stakeholders. Furthermore, there is a gap in the way risk is perceived or understood. As a result, there is a need for a standardized way to understand risk. For instance, there are limitations in understanding risk in fragile and complex contexts, such as family vulnerability. The current risk assessment mechanism is centered on financial aspects of households, rather than vulnerability holistically.

The vague and random use of disaster risk and management terminology has also been highlighted as one of the main issues in understanding risk. Such use can be seen among government agencies but most importantly among the mass, broadcast, and social media, and such use may contribute to the population's confusion.

The Sendai Framework places emphasis on the use of indigenous/traditional/local knowledge to guide decision making in disaster management. The country's mid-term review brought to light that, to date, indigenous local knowledge is only considered in limited ways. In the education sector, especially private schools, the use of local knowledge is almost non-existent as they need to adhere to the British curriculum and their respective case studies. In addition, arguments show that indigenous/local knowledge has not been documented; there is no sufficient supportive data online. Despite many people recognizing its necessity in decision making, to date, local knowledge in the Seychelles is not valued sufficiently to stir change.

Priority 2: Risk governance and management

Observers have noted an apparent failure to adjust existing government policies to line up with the Sendai Framework. Governance plays a vital role in DRR and disaster management in the way it guides direction and influences perception and prioritization. Arguments have pointed out that it is quite challenging to report on implementation of the Sendai Framework as it has not been localized, adopted, shared, or simplified for SIDS. Stakeholders point out that, most of the time, they are on the receiving end (implementation) of what has already been chosen and endorsed by the cabinet, and the public is, thus, less empowered.

To date, the DRMD has had limited human resources capacity in terms of qualified personnel in the discipline of risk and disaster management. However, the Division has tried to partner with tertiary education institutions and invest in human resources development. Moreover, the DRMD has initiated the mainstreaming of DRR into various government sectors. The Sendai Framework places emphasis on the notion of shared responsibility; however, this objective might be impossible due to jurisdiction and mandate issues. Critics have argued that, for DRR and risk management to become shared responsibilities, the Disaster Risk Management Act (2014) needs to be implemented as well as the National Disaster Risk Reduction Strategic Plan (2021-2030).

Some aspects of DRR governance have been seen in the tourism and education sectors, and opportunities exist for international cooperation as the country lacks a formal reporting mechanism for early warning of international events and incidents. Moreover, there appears to be complacency and a lack of continuity among stakeholders and the general public. The risks imposed by these factors were illustrated in the health sector, where the COVID-19 pandemic took precedence, and the Integrated Disease Surveillance and Response (IDSR) committee ceased to perform its normal function.

Priority 3: Investment in risk reduction and resilience

Strong criticism has pointed out that investment for emergency-/disaster-related purposes depends on the political agenda or how invested the heads of respective organizations

are. Seychelles agencies and organizations are highly dependent on donations, sponsorships, and grants to invest in DRRM. Critics have pointed out that small but critical projects are not considered in annual governmental budgets, and projects only gain importance after a disaster event. There is a feeling that the government budget is for day-to-day operations rather than for operationalization of projects and programs. Nonetheless, some investment has been seen in fragile sectors, such as the financial sector, where there has been a push to develop safety nets, such as insurance policies.

Established international cooperation has invested in risk reduction through funding and donations for particular events, e.g., COVID-19 vaccination. Similar cooperation can be seen in the agricultural sector, where there is an attempt to strengthen resilience through technical support and capacity building funded by international entities such as the IAEA, EU, UNDP, FAO, and COMESA. Nonetheless, those donations and sponsorships may actually increase risk in fragile sectors since these donations or sponsorships may adversely affect the country's diplomatic status.

Priority 4: Disaster preparedness, response, and "Build Back Better"

Seychelles is not spared from external shocks and, as a result, it has been argued that there is a need to stay abreast with international events and incidents. One way of staying alert is through an Early Warning System (EWS). Seychelles lacks a national, multi-hazard EWS, which is necessary for internal preparation and response. There are ongoing projects that would address EWS, but they are still in their early phases of implementation.

Many arguments suggested that, on a local basis, the adoption of the Sendai Framework has failed as preparedness and response across the country are not consequences of the adoption but rather reactive approaches to incidents/events. Moreover, overstepping and duplicating work during and after an incident indicate that there is room for improvement and that the DRMD should place emphasis on an Integrated Emergency Management System (IEMS).

Additional Theme: Collaboration, Partnership, and Cooperation

Critics have pointed out that the national focus has mainly been on national collaboration and that implementation of the Sendai Framework has failed to consider the links among other international agendas, such as the Paris Agreement and the SDGs. Seychelles faces the threat of strictly stratified international cooperation and aid due to its status as a "High Income Country" (HIC). The country still depends on international bodies for projects and consultancies. Despite ample invitations for technical support and capacity building in emergency-/disaster-related fields, critics indicate that HIC status entails a need to review and assess the country's priorities and areas for cooperation and make necessary amendments and negotiations. There is an apparent reliance on international bodies for consultancies and projects and, thus, a need to prioritize technical support and capacity as SIDS are generally only the recipients of international projects.

Additional Theme: Context Shifts and Emerging Issues

Due to a lack of data, there is an apparent failure to understand the influence of emerging issues on local implementation of the Sendai Framework. Emerging issues, such as COVID-19, led to a slight change in mindset and away from the conventional way of doing things. While stricter measures have been applied in certain aspects, such as travel, changes are required in other arenas. The increase in virtual platforms, development of BCPs, and flexible working hours have all been part of adapting to COVID 19.

UN Framework Convention on Climate Change

Seychelles signed the UNFCCC on 10 June 1992 and ratified it on 22 August 1992, thus

binding itself to the terms of the Convention when it came into force in 1994. The UNFCCC was established at the UN Conference on Environment and Development in June 1992 in Rio de Janeiro, Brazil, with the aim of limiting dangerous climate change. The UNFCCC has near universal membership with 198 Parties to the Convention.[451] It is the parent treaty of both the 2015 Paris Agreement – which aims to keep the global average temperature rise this century to 1.5°C above pre-industrial levels – and the 1997 Kyoto Protocol – which operationalizes the UNFCCC by committing industrialized countries to limit and reduce GHG emissions with agreed individual targets.[452] As part of the UNFCCC, all Parties to the Convention are required to publish and periodically update their national inventories of sources of GHGs and GHG removals by carbon sinks. Parties are mandated to cooperate in research and take climate change into consideration in relevant social, economic, and environmental policies and actions.

Nationally Determined Contributions

Parties to the Convention are required to prepare, communicate, and update NDC, which reflect the country's ambitious goals and strategies for mitigation and adaptation.

1st NDC — In its 2015 Intended Nationally Determined Contribution, which became the country's first NDC upon signature of the Paris Agreement in April 2016,[453] Seychelles committed to reducing its economy-wide absolute GHG emissions by 122.5 kilotons of carbon dioxide (CO_2) equivalent ($ktCO_2eq$; 21.4%) in 2025 and 188 $ktCO_2eq$ in 2030 (29.0%) relative to baseline emissions.[454] The 188 $ktCO_2eq$ reduction in yearly emissions by 2030 was estimated to cost US$309 million.[455]

2nd NDC — Seychelles started updating the NDC in June 2020; it provided its Updated Nationally Determined Contribution submission in July 2021; in this NDC, it committed to reducing economy-wide absolute GHG emissions by 293.8 $ktCO_2eq$ in 2030 (26.4%) compared to business as usual (BAU) scenario. Mitigation contributions include shifting to low carbon transport, starting with public transportation; increasing electricity generation from renewable sources, improving energy efficiency across sectors, and securing a sustainable and resilient water management system through water supply mobilization; ensuring that sewage systems and wastewater treatment facilities include nutrients and energy recovery; and ensuring "responsible tourism" by reducing GHG emissions in the sector. The updated contribution is notable for also including Blue Economy and coastal adaptation targets:[456]

- Seychelles will protect its blue carbon ecosystems, i.e., at least 50% of its seagrass and mangrove ecosystems by 2025, and 100% of seagrass and mangrove ecosystems by 2030.
- Seychelles will establish a long-term monitoring program for seagrass and mangrove ecosystems by 2025 and include the GHG sink of Seychelles' blue carbon ecosystems within the National Greenhouse Gas Inventory by 2025.
- Seychelles commits to the implementation of its adopted Marine Spatial Plan and the effective management of the 30% marine protected areas within the Seychelles' EEZ.[457]

National Communications

NC1 — Seychelles submitted its First National Communication (NC1) in October 2020; it was based on guidelines provided at the Second Conference of the Parties (COP 2). It is comprised of five chapters: 1) National circumstances; 2) GHG inventory: Sources and sinks; 3) Technologies and measures for mitigation; 4) Vulnerability, impact and adaptation options; and 5) Capacity building needs and priorities.[458] NC1 was an academically-oriented investigation that noted the limited participation of stakeholders at the time.

NC2 — After preparation over a three-year period, Seychelles submitted its Second National Communication (NC2) in December 2011. It covered five similarly themed chapters as NC1. NC2 aimed to more robustly influence

policy change and mainstream the National Communication process into the government agenda by facilitating:

- Institutionalization of climate change responses
- Production of knowledge and information on the basis of national priorities
- Mechanism of policy dialogue for effective actions; and
- Public education and awareness for mainstreaming climate change concerns at different levels in society.[459]

NC3 — Seychelles submitted its Third National Communication (NC3), also referred to as Biennial Update Report (BUR), in December 2023. NC3 adopted a multi-stakeholder approach involving the government, private sector, and civil society organizations, including research institutions and non-governmental organizations. Noting that NC1 and NC2 dealt with the limitations of climate change science in providing an appropriate downscaled model for impacts and projections, each chapter of NC3 is evidence-based and includes sets of recommendations for actions. It covers six chapters: 1) National circumstances; 2) GHG inventory; 3) Vulnerability and adaptation assessment; 4) Mitigation measures and options; 5) Other information considered relevant to the achievement of the objective of the convention; and 6) Constraints and gaps, and related financial, technical, and capacity needs.[460]

Legislation and policies that Seychelles has enacted related to climate change include the 1994 Environmental Protection Act, environmental management plans, and 2020 Climate Change Policy. In 1994, the Government enacted the Environmental Protection Act, which covered the integrated management of the coastal zone and protection of the atmosphere. The act also empowered legal authorities to conduct research, surveys, and management plans for the coastal regions and develop the appropriate policy responses to climate change. The Environment Management Plan of the Seychelles (EAMPS) was prepared for the period 1990-2000, detailed actions to be implemented to protect the environment, and set priorities on environmental issues for the country to implement through certain management programs and projects. In conjunction, in June 1990, the Government launched a plan covering the period 1990-1994; it was aimed at promoting sustainable development to ensure future development would conform with the need to preserve and protect the environment.[461] The 2020 Climate Change Policy has the following objectives: 1) advance understanding of climate change and its impacts on Seychelles, 2) strengthen capacity and social empowerment at all levels to adequately respond to climate change, 3) mainstream and integrate climate change considerations into all relevant sectors and all levels of government, 4) achieve transition to a low carbon economy, 5) put in place measures to adapt, build resilience, and minimize vulnerability to the impacts of climate change, and 6) contribute effectively to regional and global negotiations on climate change.[462] Seychelles' National Climate Change Committee (NCCC) deals with climate change at an institutional level. The NCCC meets every quarter and consists of representatives from relevant ministries, parastatal institutions, and NGOs, with representatives from the Meteorological Services and the Environment Division as co-chairs.[463]

Sustainable Development Goal #13

Seychelles has embarked on the path to the implementation of the SDGs, contained in the 2030 Agenda for Sustainable Development, adopted in 2015 by all UN member states.

SDG 13 is "Take Urgent Action to Combat Climate Change and Its Impacts." It integrates three main targets and two targets specific to developing countries, and each target integrates various indicators of progress.

- Target 13.1 - Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

    - Indicator 13.1.1 - Number of deaths, missing persons, and directly affected persons attributed to disasters per 100,000 population
    - Indicator 13.1.2 - Number of countries that adopt and implement national DRR strategies in line with the Sendai Framework
    - Indicator 13.1.3 - Proportion of local governments that adopt and implement local DRR strategies in line with national DRR strategies
- Target 13.2 - Integrate climate change measures into national policies, strategies, and planning
    - Indicator 13.2.1 - Number of countries with nationally determined contributions, long-term strategies, national adaptation plans, and adaptation communications, as reported to the secretariat of the UNFCCC
    - Indicator 13.2.2 - Total GHG emissions per year
- Target 13.3 - Improve education, awareness-raising, and human and institutional capacity on climate change mitigation, adaptation, impact reduction, and early warning
    - Indicator 13.3.1 - Extent to which global citizenship education and education for sustainable development are mainstreamed in national education policies, curricula, teacher education, and student assessment
- Target 13.a - Implement the commitment undertaken by developed-country parties to the UNFCCC to a goal of mobilizing jointly US$100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible
    - Indicator 13.a.1 - Amounts provided and mobilized in US$ per year in relation to the continued existing collective mobilization goal of the US$100 billion commitment through to 2025
- Target 13.b - Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing states, including focusing on women, youth, and local and marginalized communities
    - Indicator 13.b.1 - Number of least developed countries and small island developing states with NDCs, long-term strategies, national adaptation plans, and adaptation communications, as reported to the secretariat of the UNFCCC[464]

As of 2023, the UN SDG monitor reported that the extant climate actions and plans for action to address climate change were insufficient and that the lives of more than 3 billion people worldwide would be at risk because of this insufficiency. Barring a sharp reduction in GHG emissions in the 2020s, the UN projected an increase in the incidence and deadliness of heatwaves, drought, flooding, wildfires, and sea level rise, and the consequences of these hazards, including food insecurity and famine. Nonetheless, there was some progress on the SDG 13 Targets.

- Target 13.1 - The number of deaths and missing persons due to disasters per 100,000 population has steadily decreased from 1.64 during 2005-2015 to 0.86 during 2012-2021. The average disaster mortality stood at 47,337 in absolute terms in 2015-2021. However, the number of persons affected by disasters per 100,000 people rose from 1,198 during 2005-2015 to 2,113 during 2012-2021. The number of countries with national strategies for DRR has increased from 55 in 2015 to 126 by the end of 2021. Based on this, a total of 118 countries have reported having some level of policy coherence with other global frameworks, such as the 2030 Agenda and the Paris Agreement.
- Target 13.2: Global temperatures have already hit 1.1°C, with the rise attributed to increasing global GHG emissions, which

reached record highs in 2021. Real-time data from 2022 showed emissions continuing an upward trajectory. Instead of decreasing emissions as required by the target to limit warming, carbon dioxide levels increased from 2020 to 2021 at a rate higher than the average annual growth rate of the last decade and is already 149% higher than pre-industrial levels. Projected cumulative future carbon dioxide emissions over the lifetime of existing and currently planned fossil fuel infrastructure exceed the total cumulative net carbon dioxide emissions in pathways that limit warming to 1.5°C (>50%) with no or limited overshoot.

- Target 13.3: An analysis of 100 national curriculum frameworks reveals that nearly half (47%) do not mention climate change. In 2021, despite 95% of teachers recognizing the importance of teaching about climate change severity, only one-third are capable of effectively explaining its effects in their region. Additionally, in 2022, 70% of young people could only describe the broad principles of climate change.
- Target 13.a: According to the OECD, total climate finance provided and mobilized by developed countries for developing countries amounted to US$83.3 billion in 2020, a 4% increase from 2019, but still short of the US$100 billion target. Climate finance remains primarily targeted to mitigation; adaptation finance continues to lag, with international finance flows to developing countries 5-10 times below estimated needs.[465]

Figure 38 is the UN's infographic regarding the status of climate change in 2023 and the need for additional action.[466]

Seychelles was excluded from the 2023 SDG Index due to insufficient data.[467] However, the SDG dashboard provides a snapshot of Seychelles' status regarding progress on the three indicators that fall under SDG 13, Climate Action.

1. CO_2 emissions from fossil fuel combustion and cement production – Major challenges remain with a stagnating trend.
2. CO_2 emissions embodied in imports – Information is unavailable.
3. CO_2 emissions embodied in fossil fuel exports – SDG achieved.

Figure 39 visually depicts these indicators' status.[468]

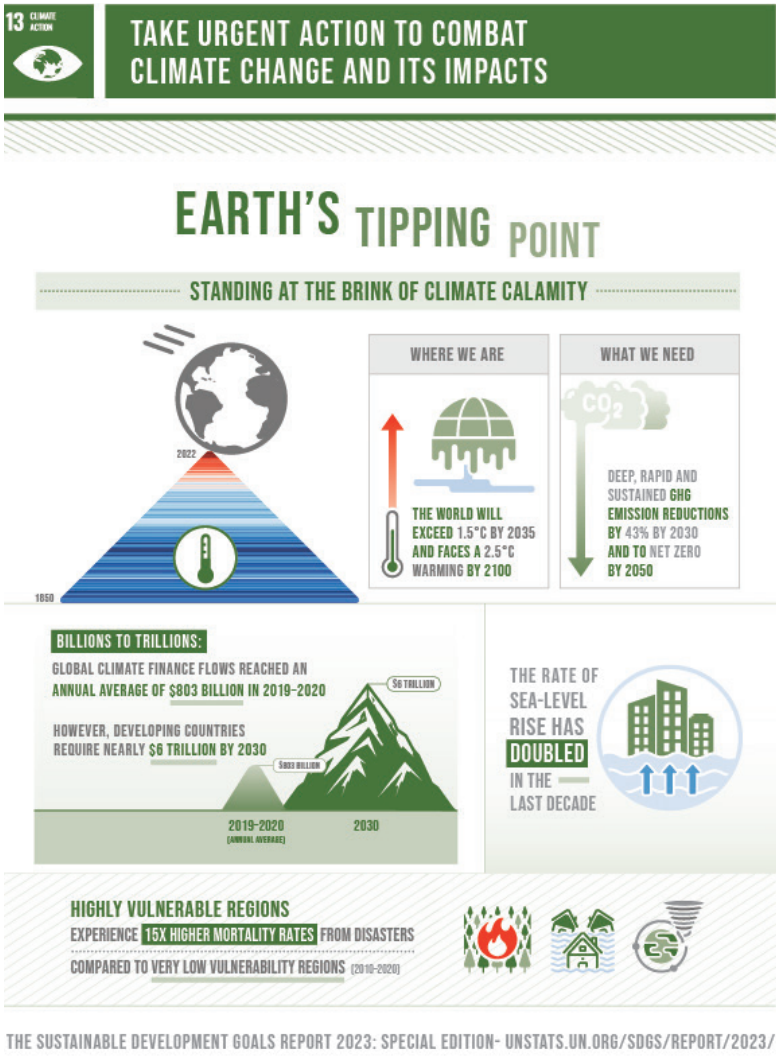

Figure 38: SDG 13 Infographic

SDG 13: Climate action

CO_2 emissions from fossil fuel combustion and cement production

GHG emissions embodied in imports

CO_2 emissions embodied in fossil fuel exports

Dashboards: SDG achieved | Challenges remain | Significant challenges remain | Major challenges remain | Information unavailable

Trends: On track or maintaining SDG achievement | Moderately improving | Stagnating | Decreasing | Trend information unavailable

Figure 39: Seychelles' Progress on Indicators under SDG 13, Climate Action

Seychelles is still striving to achieve two of the three SDG 13 indicators. Data is available for one of these indicators, "CO_2 emissions from fossil fuel combustion and cement production," as depicted in Figure 40.[469] Seychelles' emissions of CO_2 in metric tons per capita (tCO_2/capita) were 3.97 in 2000, rose to a high of 5.87 in 2018, and stood at 5.36 in 2021. The long-term objective for this indicator is a value of 0.

While challenges remain, Seychelles continues to make policy efforts toward the SDGs. The government issued an official high-level statement endorsing the implementation of the SDGs and has integrated the SDGs into strategies and plans.[470] In July 2020, Seychelles reported on the SDGs for the first time through its Voluntary National Review (VNR) on the margins of the United Nations High-Level Political Forum.[471] In 2019, the Government launched Seychelles Vision 2033: Towards a Sustainable and Inclusive Future,[472] which aims for sustainable development, and the accompanying National Development Strategy (NDS) 2019-2023,[473] both of which complement Seychelles' efforts to meet the SDGs.

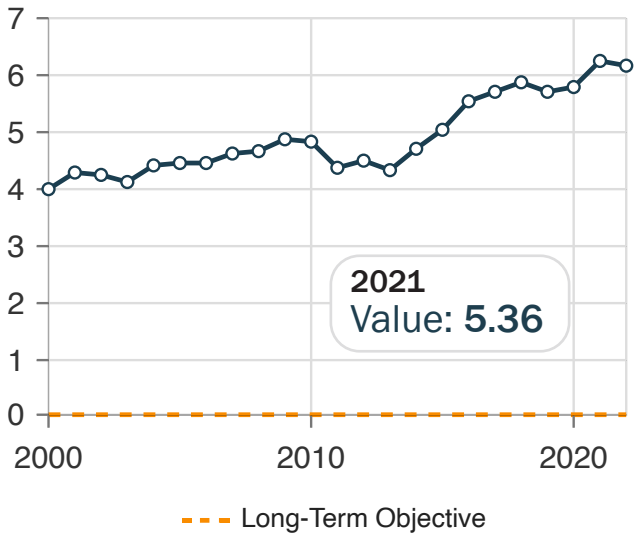

Figure 40: Seychelles' CO_2 Emissions from Fossil Fuels and Cement (tCO_2/capita)

Acronyms and Abbreviations

°	degree(s) – of temperature (C – Celsius; F – Fahrenheit) or of latitude and longitude (North [N], South [S], East [E], and West [W])
$	dollar(s) – of the U.S.
€	Euro(s)
AFD	Agence Française de Développement
AIS	Atlantic, Indian Ocean, and South China Seas
ALB	arm's length body
APDAR	Agency for the Prevention of Drug Abuse and Rehabilitation
AR6	Sixth Assessment Report (of the IPCC)
ARBE	Agriculture, Rural Development, Blue Economy, and Sustainable Environment
AU	African Union
BCP	Business Continuity Plan
BGF	Blue Grants Fund
BPoA	Barbados Programme of Action
CCA	climate change adaptation
CCS	Country Cooperation Strategy
CDC	Centres for Disease Control and Prevention
CEO	Chief Executive Officer
CEPS	Citizens Engagement Platform Seychelles
cm	centimeter(s)
CMP	Coastal Management Plan
COMESA	Common Market for Eastern and Southern Africa
COP	Conference of the Parties
COVID-19	Coronavirus Disease 2019
CP	Command Post
CWS	Cable and Wireless Seychelles
DCoC / JA	Djibouti Code of Conduct / Jeddah Amendment
DfCAPM	Department of Civil Aviation, Ports, and Marine
DoLT	Department of Land Transport
DRM	disaster risk management
DRMD	Disaster Risk Management Division
DRR	disaster risk reduction
DSAPTR	Division for Substance Abuse Prevention, Treatment, and Rehabilitation
DSRU	Disease Surveillance and Response Unit
EEZ	Exclusive Economic Zone
ENSO	El Niño Southern Oscillation
EOC	emergency operations center
EPA	Environment Protection Act

EU	European Union
EWS	Early Warning System
FAO	Food and Agriculture Organization
FETP	Field Epidemiology Training Program
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	greenhouse gas
GIS	geographic information system
GWh	Gigawatt-hours
HCA	Health Care Agency
HCT	Humanitarian Country Team
IAEA	International Atomic Energy Agency
ICRC	International Committee of the Red Cross
ICS	Incident Command System or Island Conservation Society
ICSMP	Integrated Comprehensive Sanitation Master Plan
IDC	Islands Development Company
IDSR	Integrated Disease Surveillance and Response
IEMS	Integrated Emergency Management System
IFRC	International Federation of Red Cross and Red Crescent Societies
ILO	International Labour Organization
IMS	information management system
IOC	Indian Ocean Commission (first under health)
IOD	Indian Ocean Dipole
IOM	International Organization for Migration
IORA	Indian Ocean Rim Association
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature and Natural Resources
km / km^2	kilometer(s) / square kilometer(s)
$ktCO_2eq$	kilotons of carbon dioxide equivalent
kV	Kilovolt(s)
kW	Kilowatt(s)
LWMA	Landscape and Waste Management Agency
m / m^3	meter(s) / cubic meter(s)
MACCE	Ministry of Agriculture, Climate Change and Environment
Mb/s	megabits per second
MFA	Ministry of Foreign Affairs
mm	millimeter(s)
MoE	Ministry of Education
MoH	Ministry of Health

MoT	Ministry of Transport
MSI	Mauritius Strategy of Implementation
MW	Megawatt(s)
NASA	National Aeronautics and Space Administration
NC	National Communication (under the UNFCCC)
NCCC	National Climate Change Committee
NCCP	National Climate Change Policy
NCD	non-communicable disease
NDC	Nationally Determined Contribution
NEOC	National Emergency Operations Centre
NGO	non-governmental organization
NHSP	National Health Strategic Plan
NIEMP	National Integrated Emergency Management Plan
NIHSS	National Institute of Health and Social Studies
NISCC	National Information Sharing and Coordination Centre
NOAA	National Oceanic and Atmospheric Administration
OCHA	Office for the Coordination of Humanitarian Affairs (of the UN)
OECD	Organisation for Economic Co-operation and Development
PDC	Pacific Disaster Center
PEN	Package of Essential NCDs
PHA	Public Health Authority
PIROI	Plateforme d'intervention régionale océan Indien; Indian Ocean Regional Intervention Platform
PPE	personal protective equipment
PUC	Public Utilities Corporation
PV	photovoltaic
RCOC	Regional Coordination of Operations Centre
RCSS	Red Cross Society of Seychelles
RDRM – IO	Resilience Building and Disaster Response Management in the Indian Ocean
REOC	Regional Emergency Operation Centre
RRP	Regional Resilience Platforms
S4S	Sustainability 4 Seychelles
SADC	South African Development Community
SAMOA Pathway	SIDS Accelerated Modalities of Action Pathway
SBC	Seychelles Broadcasting Corporation
SCAA	Seychelles Civil Aviation Authority
SCG	Seychelles Coast Guard
SCR	Seychelles Rupee
SDCF	Sustainable Development Cooperation Framework
SDF	Seychelles Defence Forces
SDG	Sustainable Development Goals

SEC	Seychelles Energy Commission
SeyCCAT	Seychelles Conservation and Climate Adaptation Trust
SEYPOLY	Seychelles Polytechnic
SFRSA	Seychelles Fire and Rescue Services Agency
SIDS	small island developing state
SIF	Seychelles Islands Foundation
SITE	Seychelles Institute for Teachers Education
SLTA	Seychelles Land Transport Agency
SMA	Seychelles Meteorological Authority
SMSA	Seychelles Maritime Safety Authority
SMSP	Seychelles Marine Spatial Plan
SOE	state-owned enterprise
SPA	Seychelles Planning Authority or Seychelles Ports Authority
SPGA	Seychelles Parks and Gardens Authority
SPS	Seychelles Postal Services
SPTC	Seychelles Public Transport Corporation
TC	Tropical Cyclone
TNC	The Nature Conservancy
UHC	Universal Health Coverage
UK	United Kingdom
UN	United Nations
UNCT	United Nations Country Team
UNDP	United Nations Development Programme
UNDRR	United Nations Office for Disaster Risk Reduction
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNFPA	United Nations Population Fund
UniSey	University of Seychelles
UNODC	United Nations Office of Drugs and Crime
UNWTO	World Tourism Organization
USAID	United States Agency for International Development
USAR	urban search and rescue
WHO	World Health Organization
WMO	World Meteorological Organization
WPS	Women, Peace, and Security

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