Sea level rise in the Seychelles

Trends and vulnerabilities

This review aims to summaries some key findings from literature to provide an overview of sea level rise trends and vulnerabilities in the Seychelles. However, as its scope is limited by time and available resources, the review will not cover all trends and vulnerabilities of sea level rise in the Seychelles.

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1. Introduction

Sea-level rise (SLR) is primarily driven by ocean warming and the melting of glaciers and ice sheets, both of which are direct consequences of climate change. Since 1880, global mean sea levels have risen approximately 20–23 centimetres, with the rate of increase over the past decade exceedingly twice that observed during the first decade of satellite records (1993–2002). Sea level rise (SLR) in the SWIO region is about 4–6 mm/year over the past 30 years, corresponding to a rise of 2–3 times higher than the global average (Doorga et al., 2024). SLR in the Seychelles are projected to increase between 0.51 to 1 meter, and under scenario SSP3-7.0, 0.87 meters (Climate Change Knowledge Portal, 2021).

Geography and economy

The Republic of Seychelles is an archipelago made up of 115 islands (CIA, 2025). The Seychelles consists of two primary island groups: the Mahé group, which comprises over 40 central granitic islands (to the northeast), and a second group of more than 70 coralline islands (World Bank, 2025a). The Mahe group is characterised by narrow coastal strips and a rocky, mountainous region in the interior, while other island groups are relatively flat coral atolls or have elevated reefs (CIA, 2025). The Seychelles has a population of approximately 121.355 people, with over 85% residing on the island of Mahé, primarily concentrated along its eastern coastal plain, and around 58.8% of the total population is living in urban areas (CIA, 2025; World Bank, 2025b).

Like many Small Island Developing States (SIDS), the Seychelles faces a wide range of climate hazards, including rising sea levels, extreme precipitation events, drought, and coastal erosion; however, the Seychelles lies outside the cyclone belt, making storms rarer (Campbell et al., 2023; CIA, 2025). The geophysical nature of the Seychelles - with its narrow coastal plain and central mountainous region - makes the region especially susceptible to sea level rise and rain events (Maillard et al., 2020).

The Seychelles has Africa's highest gross domestic product (GDP) per capita, which is highly dependent on tourism and fisheries (World Bank, 2025b). Tourism employs around 60% of the population, and fisheries contribute 80% of export revenues, which employ about 11% of the population (Maillard et al., 2020).

2. Sea-level rise and associated risks

The Seychelles faces significant risks from sea level rise, including coastal erosion, loss of critical infrastructure, changes in biogeographical patterns, increase risk of storm surges and flooding, as well as damage to freshwater resources due to saltwater intrusion. As a low-lying island nation, rising seas threaten key economic sectors such as tourism and fisheries by damaging infrastructure, beaches, coral reefs, and marine ecosystems.

2.1 Environmental risks

Most of the population of the Seychelles lives in low-lying coastal areas that are at risk of being impacted by SLR. SLR compounded by global warming intensifies coastal hazards, such as storm surges, tsunamis, and flooding (Trisos et al., 2022). The Seychelles has a risk of tropical storms, tsunamis, and flooding; however, it is not frequent events (ReliefWeb, 2025). The Seychelles (particularly Mahé) experience recurrent flooding, especially due to narrow coastal plains, compounded by mountainous runoff (ReliefWeb, 2025). A sea level event with a 100-year return period, currently reaching 1.38 meters, is expected to occur as often as once every 5 years by 2050 under the RCP4.5 scenario. However, 100-year sea level events will become annual occurrences with just 1.5°C of global warming on the Seychelles (World Bank & GFDRR, 2016).

Mangroves and seagrass meadows, key for coastal protection, biodiversity support, and carbon sequestration, are currently decreasing on the island (Campbell et al., 2023; Wartman et al., 2025). SLR will continue to alter biogeographical patterns, particularly threatening mangrove ecosystems and coral reefs (Ramarokoto et al., 2024). The overall reef growth is declining, and single events, such as the coral bleaching in 2016, had a reef mortality of around 70% (Etongo et al., 2021). The loss of coral reefs and mangroves is exposing the coasts of many Seychelles Islands to even more erosion with rising sea levels and wave energy impacts (Campbell et al., 2023; Sheppard et al., 2005).

Further, SLR exacerbates the risk of coastal erosion. Erosion involves the breaking down and removal of material along a coastline by the movement of wind and water. Almost 85% of the current population is living within the vicinity of the coastal areas, making them more at risk of coastal erosion (MACCE, 2025). Erosion can also heighten the risk of saline intrusion. Saltwater intrusion is another critical consequence of SLR, threatening freshwater resources and soil quality

essential to coastal farming communities (Hove et al., 2025; Pandey et al., 2024). Additionally, aquifers on small islands are at risk of salinisation due to low elevations and limited adaptive capacity, and present risks will be exacerbated by SLR (Stanic et al., 2024).

2.2 Infrastructure

Coastal damage is another critical consequence of SLR. The costal damages are profound on the Seychelles that will have larger effects due to climate change (MACCE, 2025). Even at mild projections of SLR, coastal infrastructure is expected to be exposed to flooding by 2100. The risks are attributed to the relatively higher levels of physical development at lower island elevations, including schools, hospitals, roads, airports, ports, etc. (Doorga et al., 2024). According to the government of the Seychelles, the four severely impacted districts are Aux Cap, Beau Vallon, Northeast Point, and Anse La Blague (Republic of Seychelles, 2024).

SLR effect on erosion can undermine foundations and disrupt transportation and communication networks, limiting access and increasing repair costs (Campbell et al., 2023). The risk of land loss is heightened, making more people in coastal communities vulnerable to SLR. Like previously mentioned, around 85% of the population lives in coastal areas, and 80% of the Seychelles' critical infrastructures are located on the coastline and are exposed to floods, erosion, and sea level rise (Etongo & Arrisol, 2021; MACCE, 2025). This heightens the vulnerability of SLR for the population on the islands.

2.3 Economy

Economic sectors like tourism will be affected by climate change and the SLR. Although the Seychelles has the highest GDP per capita in Africa and the World Bank graduated it to "high income" status in 2015, due largely to its profitable tourism and fishing industries, the economic sector is vulnerable (Saddington, 2023). Tourism employs 60% of the population, which is predicted to be largely disrupted by effects such as erosion, disruption of transportation and communication networks, increased hazards, and changes in biogeographical patterns (Maillard et al., 2020). The tourism sector's main infrastructure (airport, hotels, roads) is in the exposed coastal plains and is dependent on natural resources such as beaches, coral reefs, and freshwater supplies

that are sensitive to climate variations, sea-level rise, and other stressors (Hinkel et al., 2022; UNFCCC, 2024).

Fisheries face threats from shifting fish stocks due to warming oceans and habitat degradation (Saddington, 2023). Fisheries contribute about 80% of export revenues and employ about 17% of the population, and those that are directly dependent on small-scale fisheries correspond to 30% (Etongo & Arrisol, 2021; Maillard et al., 2020). The fishery sector is an essential source of revenue, employment, food security, and foreign exchange in the Seychelles, given that land-based activities such as agriculture and large-scale industrial activities are constrained by the relatively small land size of 455 km2, of which 50% of the land area is protected (Etongo & Arrisol, 2021). Sea level rise and coastal erosion are likely to contribute towards the degradation of land-based infrastructures such as landing sites, thereby leading to disruption in fishing activities (Etongo & Arrisol, 2021). Similarly, the ecological degradation, intensified by SLR, will lead to a decrease in fish stocks, disrupting the fishing activities.

2.4 Social and health risks

Sea level rise in the Seychelles poses severe social risks to families, including economic stability, displacement from low-lying homes, and threats to food and water security. SLR can create the loss of livelihoods, especially for communities dependent on fishing or tourism (UNFCCC, 2024). Since tourism and fisheries are the two main sectors of the Seychelles' economy, SLR directly threatens household incomes and the national economic stability. These sectors are highly sensitive to coastal changes, making the population especially vulnerable to rises in sea levels.

SLR will affect the food and water security for the Seychelles in various ways. Firstly, SLR undermines the long-term persistence of freshwater-dependent ecosystems on the island, mainly due to saltwater intrusion (Campbell et al., 2023). Secondly, agricultural land only occupies 1540 hectares, which corresponds to 3.4% of the country's land area, with most of the farmland being located along the coast (Etongo et al., 2022). The agriculture land is therefore threatened by saltwater intrusion as well as intensity of flooding events, invasive alien species, and crop pest (Etongo et al., 2022). Finally, SLR, as previously mentioned, affects the fishing sector. Not only

can it affect food security on the island, but the projected decline in local production can raise food prices and import dependency, affecting household incomes (Hinkel et al., 2022).

Additionally, the health of coastal populations is at risk as saline intrusion affects coastal aquifers that can compromise drinking water and irrigation. SLR can therefore lead to reduced access to safe drinking water, increasing the risk of dehydration, kidney stress, and waterborne diseases, particularly among children and the elderly (World Bank & GFDRR, 2016).

3. Adaptation measures

Enhancing adaptive capacity, including climate-resilient infrastructure, is recognised as essential for the Seychelles. The Republic of Seychelles has currently tried to employ seawalls, rock armouring, timber piling, beach nourishment, sand dune management, coral restoration, mangrove reforestation, rainwater harvesting, and Ecosystem-based Adaptation (Campbell et al., 2023; Etongo et al., 2021; UNDP, 2025). However, some challenges exist with adaptation strategies, for example, the shorelines of the Seychelles get littered with broken seawalls and groynes, while the functioning seawalls and other hard shoreline structures invariably shift problems of shoreline erosion and lowland inundation elsewhere (Campbell et al., 2023).

Further challenges in adaptation strategies lie in the lack of capital, limited developable land, and insufficient capacity (Maillard et al., 2020). According to WMO, the Seychelles needs to strengthen technical and institutional capacity for monitoring and research of climate change, improve quality of forecast, early warning systems and climate information services. They also need to develop and strengthen early warning systems that enable prompt action to mitigate the impacts of climate hazards on health and well-being as well as building capacity to monitor risks and hazards related to climate impacts (WMO, 2024).

As of 2023, the Seychelles' disaster management and climate change impacts programs are handled separately (CFE-DM, 2024). However, the Seychelles and United Nations Office for Disaster Risk Reduction (UNDRR) have developed a roadmap to enhance integrated disaster risk reduction (DRR) and climate change adaptation (CCA) planning (UNDRR, 2024).

Continuing, the Disaster Risk Management (DRM) Policy of the Republic of Seychelles, along with the Disaster Management Act of 2014, provides the framework and guidance for disaster risk reduction (DRR) and response efforts in the Seychelles. These documents emphasise the government's role in safeguarding communities and the environment through the establishment of the Disaster Risk Management division (Etongo et al., 2025). The Seychelles also has various policies, strategies, and action plans to address DRR and CCA, which includes SLR. For example, the Seychelles National Climate Change Policy (Government of Seychelles, 2020), the Seychelles National Disaster Risk Reduction Strategic Plan 2021–2030 (DRMD, 2021), and the Seychelles Blue Economy: Strategic Policy Framework and Roadmap – Charting the Future 2018–2030 (Government of Seychelles, 2018).

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