Sylvanna Antha , Shubhi Singh

Sylvanna Antha , Shubhi Singh

©2026,

This work is licensed under the Creative Commons Attribution License (https://creativecommons.org/licenses/by/4.0/legalcode), which permits unrestricted use, distribution, and reproduction, provided the original work is properly credited. Cette œuvre est mise à disposition selon les termes de la licence Creative Commons Attribution (https://creativecommons.org/licenses/by/4.0/legalcode), qui permet l'utilisation, la distribution et la reproduction sans restriction, pourvu que le mérite de la création originale soit adéquatement reconnu.

GRANT / SUBVENTION: - RESILIENCE TO CLIMATE VULNERABILITY AND ENVIRONMENTAL RISK (RECOVER) WITH A FOCUS ON SMALL ISLANDS

Single-Use Plastic Pollution in Small Island Developing States (SIDS):

A Review of Legislative Challenges and Pathways to Resilience with a Focus on Seychelles

SYLVANNA ANTHA
SHUBHI SINGH

MARCH 2026

RECOVER WORKING PAPER 4

CLARE
CLIMATE ADAPTATION & RESILIENCE

UK International Development
Partnership | Progress | Prosperity

IDRC · CRDI
Canada

AUTHORS

Sylvanna Antha
Sustainability For Seychelles (S4S)
Mahe, Seychelles

Shubhi Singh
School of Environment, Enterprise and Development (SEED), Faculty of Environment,
University of Waterloo, ON, Canada

EDITORS

Simron J. Singh
School of Environment, Enterprise and Development (SEED), Faculty of Environment,
University of Waterloo, Waterloo, ON, Canada

Alessandra Aponte
School of Environment, Sustainability and Resources (SERS), Faculty of Environment,
University of Waterloo, Waterloo, ON, Canada

COVER PHOTO

SEYCHELLES LANDFILL
SUSTAINABILITY FOR SEYCHELLES (S4S)

SUGGESTED CITATION

Antha, S., & Singh, S. (2026). Single-Use Plastic Pollution in Small Island Developing States (SIDS): A Review of Legislative Challenges and Pathways to Resilience with a Focus on Seychelles. RECOVER Working Paper 4, Series Eds. S.J. Singh & A. Aponte.

The RECOVER Project is supported by the Climate Adaptation and Resilience (CLARE) research programme. CLARE is a £110m initiative jointly designed and run by the UK Foreign Commonwealth and Development Office and Canada's International Development Research Centre. CLARE is primarily funded by UK aid from the UK government, along with the International Development Research Centre, Canada.

AUTHORS' DECLARATION

The authors of this publication declare that the views and opinions expressed herein are solely those of the authors and do not necessarily reflect the official policies or positions of the RECOVER Project, its affiliated institutions, the FCDO, IDRC or the governments of the United Kingdom or Canada.

The content provided is based on the author's analysis, research, and interpretation, and any errors or omissions are the responsibility of the authors. The authors declare that there are no conflicts of interest related to this publication.

THE RECOVER PROJECT

RECOVER stands for 'Resilience to climate vulnerability and environmental risk' with a focus on small islands. Addressing the needs and the unique challenges of Small Island Developing States (SIDS) that are on the frontlines of climate change, the RECOVER Project aims to address climate change adaptation through a multi-risk and multi-sector approach. By conducting pilot projects in three small island states- Maldives, Mauritius, and Fiji- RECOVER will co-develop scalable and systems-changing climate resilience approaches to enhance understanding of small island climate adaptation capacities and possibilities. RECOVER is led by the University of Waterloo in Canada in partnership with implementing partners in activity countries: Maldives National University, the University of Mauritius and the University of Fiji.

RECOVER is funded and supported by the Climate Adaptation and Resilience (CLARE) programme. CLARE is a £110m, UK-Canada framework research programme, aiming to enable socially inclusive and sustainable action to build resilience to climate change and natural hazards. CLARE is an initiative jointly designed and run by the UK Foreign Commonwealth and Development Office and Canada's International Development Research Centre. CLARE is primarily funded by UK aid from the UK government, along with the International Development Research Centre, Canada.

Through long-term commitments and partnerships worldwide, and needs-driven, action-focused research, CLARE links up short-and long-term issues, providing a better understanding of the risks associated with climate, supporting early action to reduce impacts of climate variability whilst enabling long-term, sustainable, and equitable economic and social development in a changing climate.

EXECUTIVE SUMMARY

Single-use plastic (SUP) pollution is a critical threat multiplier in Small Island Developing States (SIDS), directly undermining their ability to adapt to climate change. This report, conducted as part of the RECOVER project, is a literature review of the legislative challenges and adaptation pathways related to SUP pollution. Using Seychelles as a central case study, it illustrates pan-SIDS crisis where poor waste management is not just an environmental problem, but a primary driver of climate vulnerability, intensifying disaster risks and deepening socio-economic inequalities. The analysis reveals a fundamental and dangerous disconnect- while many SIDS have enacted SUP bans, waste management is rarely treated as a core climate adaptation strategy.

This oversight creates a destructive feedback loop. Crucially, SUP pollution intensifies climate impacts. Plastic waste clogs urban drainage systems, transforming intense rainfall - which is increasing in frequency due to climate change - into severe and destructive flash floods. This flood amplification poses a direct and escalating threat to communities and infrastructure. Simultaneously, plastic pollution degrades critical natural defenses like mangroves and coral reefs, which are essential for coastal protection, and contaminates the fisheries that communities depend on for food and livelihoods.

The health impacts are severe, arising from toxic chemical exposure, microplastic contamination in seafood, and respiratory illnesses from open burning. These risks are not distributed equally. Socio-economic disparities mean that low-income communities, women, and workers in climate-sensitive sectors like fisheries and tourism bear the greatest burden, seeing their health, livelihoods, and adaptive capacity eroded.

A review of legislative frameworks in Seychelles, the Indian Ocean, the Caribbean, and the Pacific identifies common barriers that undermine their effectiveness. A primary challenge is limited enforcement capacity, stemming from a chronic lack of funding, staffing, and technical resources for environmental agencies. Furthermore, fragmented governance, resulting from overlapping ministerial mandates, often leads to incoherent policy implementation. Significant regulatory gaps also persist, such as exemptions for items like plastic wraps and the absence of Extended Producer Responsibility (EPR) laws, which fail to address the full scope of plastic pollution. Finally, a critical policy disconnect exists, whereby climate adaptation strategies and waste management plans are developed in isolation, missing crucial opportunities for integrated resilience-building.

Tackling SUP pollution is not just an environmental goal but a cornerstone of climate adaptation. Key recommendations for building equitable resilience include treating waste management as climate action by explicitly addressing plastic waste as a flood risk factor in national strategies and coastal management plans. It is crucial to strengthen governance by closing legislative loopholes, implementing EPR, and enhancing enforcement capacity, while ensuring equity measures protect vulnerable groups. Furthermore, investing in a circular economy is essential,

which can be achieved by leveraging public-private partnerships for local waste infrastructure and supporting enterprises that produce affordable, reusable alternatives to create green jobs.

The tourism sector must be mandated to act by transitioning voluntary eco-certifications into mandatory standards with strict SUP reduction targets, thereby aligning this vital economic sector with national resilience goals. Empowering communities through education campaigns that link plastic reduction to flood prevention and ensuring their inclusive engagement in policy design is also vital. Finally, fostering regional cooperation to enhance data collection, address transboundary marine litter, and advocate for global responsibility will amplify these efforts across SIDS.

For SIDS, like Seychelles, reducing SUP pollution is an essential strategy for adapting to climate change and building a more equitable and resilient future. This requires moving beyond isolated bans to an integrated approach that combines robust, equitable legislation, investment in circular economy solutions, and inclusive community engagement to directly protect the most vulnerable populations from this escalating crisis.

TABLE OF CONTENTS

AUTHORS' DECLARATION i
THE RECOVER PROJECT ii
EXECUTIVE SUMMARY iii
TABLE OF CONTENTS 1
LIST OF TABLES 2
LIST OF ACRONYMS 3
1. INTRODUCTION 4
2. CURRENT STATE OF SINGLE USE PLASTIC (SUP) POLLUTION IN SMALL ISLAND DEVELOPING STATES (SIDS) 5
    2.1 CROSS-CUTTING REGIONAL CHALLENGES IN SIDS WASTE MANAGEMENT 7
3. ENVIRONMENTAL IMPACT: FROM POLLUTION TO CLIMATE VULNERABILITY .11
    3.1 MARINE, AQUATIC, AND TERRESTRIAL DEGRADATION 11
    3.2 CLIMATE -INDUCED FLOODING AND DRAINAGE BLOCKAGE 13
        3.2.1 PLASTICS AS AMPLIFIERS OF FLOOD HAZARD AND EXPOSURE 13
        3.2.2 CONCENTRATED SOCIAL, HEALTH, AND LIVELIHOOD IMPACTS 14
4. HEALTH RISKS LINKED TO SUP POLLUTION 15
    4.1. DIRECT AND INDIRECT HEALTH EFFECTS 15
5. TACKLING SINGLE-USE PLASTICS: LEGISLATIVE FRAMEWORKS IN SEYCHELLES AND SELECTED SIDS 18
6. KEY LEGISLATIVE CHALLENGES IN SIDS 22
7. SOCIO-ECONOMIC DISPARITIES IN SUP POLLUTION AND CLIMATE VULNERABILITY 25
8. ADAPTATION STRATEGIES AND ALTERNATIVES: BUILDING RESILIENCE 27
    8.1. PROMOTING ALTERNATIVES TO ENHANCE ADAPTIVE CAPACITY 27
    8.2. POLICY AND ENGAGEMENT FOR INCLUSIVE RESILIENCE 28
    8.3. CASE STUDIES FROM OTHER SIDS 29
9. CONCLUSIONS AND RECOMMENDATIONS 30
    9.1. KEY RECOMMENDATIONS FOR BUILDING ADAPTIVE AND EQUITABLE RESILIENCE 30
    9.2. FUTURE RESEARCH DIRECTIONS 31
10. REFERENCES 33

LIST OF TABLES

Table 1: Overview of SUP Pollution and Waste Management Challenges in Select SIDS

Table 2: Cross-Cutting Regional Challenges in SIDS Waste Management

LIST OF ACRONYMS

BPA	bisphenol A
EDC	Endocrine-Disrupting Chemicals
EPR	Extended Producer Responsibility
GDP	Gross Domestic Product
HDPE	High Density Polyethylene
LWMA	Landscape and Waste Management Agency
MECENR	Ministry of Environment, Climate, Energy and Natural Resources
MPW	Mismanaged Plastic Waste
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCOS	Polycystic Ovary Syndrome
PET	Polyethylene Terephthalate
POP	Persistent Organic Pollutant
PPP	Public Private Partnership
PTSD	Post-Traumatic Stress Disorder
RECOVER	Resilience to Climate Vulnerability and Environmental Risk
SIDS	Small Island Developing States
SME	Small and Medium-Sized Enterprises
SUP	Single-Use Plastics
UNFCCC	United Nations Framework Convention on Climate Change
VOC	Volatile Organic Compound

1. INTRODUCTION

This working paper presents a review on single-use plastic (SUP) pollution in Seychelles and other Small Island Developing States (SIDS). The review is conducted as part of the RECOVER (Resilience to Climate Vulnerability and Environmental Risk) project.

This study provides a detailed analysis of the environmental risks, public health impacts, and socio-economic challenges posed by SUP pollution in Seychelles, with comparative insights from other SIDS regions, including the Caribbean and the Pacific. The overall purpose is to synthesize existing research and legislative frameworks to identify gaps in policy and practice and to propose pathways toward enhanced resilience. The report begins by outlining the current state of SUP pollution and the multifaceted environmental consequences, from marine degradation to the exacerbation of climate-induced flooding, followed by an analysis of the direct and indirect public health implications. It then outlines the legislative landscape in Seychelles and comparative SIDS, and concludes by exploring adaptation strategies, including sustainable alternatives, policy measures, and community engagement, and offers key recommendations for future action.

This review was conducted through a structured secondary literature review of peer-reviewed scientific articles, reports, government policies and strategies, legislation, grey literature, and selected media sources. The review of academic literature was restricted to publications from 2015 to 2025. No temporal restriction was applied to legislation; all relevant laws and regulations enacted over the past 25 years were considered, although most had been updated after 2010. Legislative documents and several official reports were solicited directly from relevant government departments to ensure completeness and accuracy. In addition, related local Seychelles newspapers and online articles published over the past 20 years were included where they were directly linked to the development, implementation, or public discourse surrounding relevant legislation.

Literature was identified using Google Scholar and the University's subscribed academic databases, accessed through institutional library services. Search strings and combinations of keywords included: 'SIDS' AND 'Single-Use Plastics (SUPs)'; 'marine litter' AND 'SIDS'; 'plastic waste management' AND 'SIDS'; 'SUP legislation' AND 'SIDS'; 'legislative frameworks' AND 'marine litter'; 'microplastics'; 'climate vulnerability'; 'circular economy'; 'import dependence'; 'extended producer responsibility (EPR)'; 'health' and 'flooding' in relation to plastic waste and SIDS contexts (with specific related search focused on 'Seychelles'.

In total, 39 peer-reviewed papers, ten legislative instruments, 17 policy documents, 48 institutional and agency reports, and nine newspaper/online articles were reviewed. The report is structured to first establish the scale of the problem and its consequences before outlining potential solutions, thereby providing a consolidated evidence base to support informed decision-making for policymakers, researchers, and community stakeholders in Seychelles and other island nations facing similar challenges.

2. CURRENT STATE OF SINGLE USE PLASTIC (SUP) POLLUTION IN SMALL ISLAND DEVELOPING STATES (SIDS)

Single-use plastic pollution has emerged as a critical environmental and socio-economic challenge for SIDS, including Seychelles (Guittard et al., 2023). Waste production in SIDS has been steadily increasing, driven by factors such as population growth, rising tourism, and a high volume of imported goods. A key challenge for the country's waste management system is the heavy reliance on imports, particularly low-durability products with short lifespans, combined with limited capacity to export or process the resulting waste, leading to significant accumulation (Krutli et al., 2018). The proliferation of plastic waste, particularly from single-use items, poses serious threats to marine and terrestrial ecosystems, human health, and the resilience of vulnerable coastal communities. In SIDS, where waste management infrastructure is often limited and ecosystems are especially sensitive, the impacts of plastic pollution are further compounded by climate change related risks such as sea-level rise and increased flooding (Mohee et al., 2015; Onyanta, 2016).

The table below summarizes the key characteristics and SUP waste management challenges across SIDS in different ocean regions:

Table 1: Overview of SUP Pollution and Waste Management Challenges in Select SIDS

Region	Country	Key Economic Sectors	SUP/Waste Stream Characteristics	Major Waste Management Challenges	Key References
Indian Ocean	Seychelles	Tourism, Fisheries	High influx of disposable packaging from imports; significant marine debris.	Limited landfill space; low recycling capacity; lack of EPR schemes; underfunded collection initiatives.	Guittard et al., 2023; Mihai et al., 2022; Failler, 2021
	Maldives	Tourism	Mixed waste dominates; high volumes in Greater Malé Area; plastics threaten marine resources.	Poor waste data & monitoring; inconsistent segregation; limited capacity outside capital region; data gaps hinder planning.	Hafiz et al., 2024; WAMCO, 2024; Moosa, 2021
	Mauritius	Tourism, Services	Majority of waste to landfill; low recycling; plastics clog drainage, exacerbating floods.	Illegal dumping; inadequate processing infrastructure; threats to tourism and coral reefs.	Jeffery, 2020; Foolmaun et al., 2022; PAGE, 2017
Caribbean	Trinidad & Tobago	Petroleum, Tourism	Plastics ~19% of waste stream; plastic packaging ~55% of plastic waste.	Inadequate collection; limited recycling; no EPR; widespread open dumping/burning.	Phillips & Thorne, 2011; Millette et al., 2019; Racheed, 2023
	Saint Lucia	Tourism	Plastics ~22% of municipal waste; tourism & fisheries are key sources.	Weak enforcement of bans; insufficient segregation; limited funding for infrastructure.	The Commonwealth, 2025; APWC, 2021; Clayton et al., 2021
	The Bahamas	Tourism, Financial Services	Very high per capita waste generation (1.85 kg/day); >90% of beach debris is plastic.	Fragmented governance across islands; open burning; illegal dumping; exposure to transboundary plastic.	Kaza et al., 2018; Mohee et al., 2015; Ambrose et al., 2019
	Barbados	Tourism	Plastics 12–17% of solid waste; significant leakage from systems.	Landfill overcapacity; low public awareness on segregation; high cost of advanced treatment.	The Commonwealth, 2025; Diez et al., 2019; Simmons & Associates, 2015
	Grenada	Tourism, Services	Plastic packaging represents ~64% of plastic waste, mostly from imports.	Weak regulatory enforcement; insufficient infrastructure investment; no local market for recyclables.	Elgie et al., 2021; APWC, 2021; UNEP, 2018

Region	Country	Key Economic Sectors	SUP/Waste Stream Characteristics	Major Waste Management Challenges	Key References
	Antigua & Barbuda	Tourism	Tourism generates significant SUP; PET and HDPE dominate.	Insufficient collection in rural/coastal areas; illegal dumping; lack of sustainable financing.	APWC, 2021; Clayton et al., 2021; UNEP, 2018
	Jamaica	Tourism, Services	Plastics ~15% of municipal waste; tourism and households major sources.	Inefficient collection; high illegal dumping; limited recycling; weak enforcement.	Diez et al., 2019; UNEP, 2018; The Commonwealth, 2025
Pacific	Samoa	Agriculture, Tourism, Remittances	Increased plastic packaging from imports; waste leakage exacerbates flood risk.	Limited landfill space; minimal segregation; weak regulation enforcement; drainage blockages.	Yeo et al., 2017; APWC, 2020
	Vanuatu	Subsistence Agriculture, Tourism	Increased plastic from urbanization; debris dispersed by cyclones and floods.	Dispersed settlements hinder collection; open dumping/burning; limited institutional capacity.	Yeo et al., 2017; APWC, 2019
	Solomon Islands	Fisheries, Timber, Tourism	Plastic from imports accumulates in rivers/coasts; floods mobilize waste.	Underdeveloped systems; no EPR; low recycling; open burning/dumping common.	Yeo et al., 2017; IUCN, 2021

2.1 CROSS-CUTTING REGIONAL CHALLENGES IN SIDS WASTE MANAGEMENT

The following table expands on the systemic challenges that amplify SUP pollution across SIDS. These interconnected issues highlight why SUP management is particularly difficult in island contexts and why integrated, regionally sensitive solutions are necessary.

Table 2: Cross-Cutting Regional Challenges in SIDS Waste Management

Challenge	Expanded Description & Implications	Key References
High Import Dependence	SIDS economies are heavily reliant on imported goods, which arrive packaged in single-use plastics. Local governments and consumers have minimal leverage to influence the design or volume of this packaging, leading to a constant influx of SUPs that overwhelm local waste streams. This creates a systemic mismatch between waste generation and local management capacity.	Phillips & Thorne, 2011
Tourism Pressure	The tourism sector, vital to most SIDS economies, significantly increases per capita waste generation. Stop-over tourists produce at least twice, and cruise ship passengers up to four times, the waste of a resident. This seasonal or constant pressure strains collection systems, fills landfills rapidly, and increases leakage into the environment, especially in coastal and resort areas.	Phillips & Thorne, 2011
Limited Infrastructure & Scale	Small populations and remote geography make it economically unviable to invest in large-scale recycling plants, waste-to-energy facilities, or advanced landfill management. The lack of Extended Producer Responsibility (EPR) schemes and domestic markets for recyclables further disincentivizes investment, leaving islands dependent on landfilling, dumping, or open burning.	IUCN, 2021; Phillips & Thorne, 2011
Climate & Disaster Vulnerability	SIDS are on the front lines of climate change. Extreme weather events like cyclones and floods scatter unsecured waste, clog critical drainage systems (worsening urban flooding), and wash vast amounts of debris into marine ecosystems. This creates a destructive feedback loop where poor waste management exacerbates climate impacts, and climate disasters undermine waste management efforts.	Yeo et al., 2017; Mohee et al., 2015
Data & Governance Gaps	Effective policymaking is hampered by inconsistent waste data collection, classification, and reporting. Monitoring is often fragmented, with key data missing on waste composition, leakage points, and tourism contributions. Weak enforcement of regulations, coupled with overlapping agency responsibilities and limited financing, prevents the implementation of existing bans and waste management plans.	Moosa, 2021; WAMCO, 2024

3. ENVIRONMENTAL IMPACT: FROM POLLUTION TO CLIMATE VULNERABILITY

Plastics accumulate at ecologically significant scales (Villarrubia-Gomez et al., 2024). Seychelles, like many SIDS, struggles with waste management due to limited land mass, high import dependency, and restricted landfill capacity (ETH Zurich & University of Seychelles, 2016). Additionally, many SIDS are disproportionately exposed to plastic debris generated elsewhere and transported by ocean currents. Globally, plastics constitute approximately 85% of marine litter by composition (UNEP, 2021b).

In Seychelles, SUP pollution presents a compound risk, resulting in:

- **Marine degradation** – through beach accumulation, microplastic exposure, and habitat disruption.
- **Aquatic degradation** – via microplastic ingestion, exposure to invasive species, and altered habitats.
- **Terrestrial impacts** – due to pressured landfills and leachate contamination.
- **Flood amplification** – from blocked urban drainage during extreme rainfall events.

3.1 MARINE, AQUATIC, AND TERRESTRIAL DEGRADATION

- **Marine degradation**

  Modelling of marine debris dispersal in the Outer Islands of Seychelles shows that most debris originates externally—mainly from Indonesia, Sri Lanka, India, and from regional fisheries and shipping (Vogt-Vincent et al., 2023). For example, reef systems, critical to SIDS for food security, tourism, and coastal protection, are highly vulnerable. Microplastics pose a sub-visible threat, with Western Indian Ocean studies showing ingestion by reef organisms, abrasion to coral tissues, and altered energy budgets. These impacts compound the thermal bleaching stress already affecting Seychelles' reefs (Vogt-Vincent et al., 2023). Although macro-plastic data specific to Seychelles reefs is lacking, a study of 159 reefs in the Asia-Pacific found macro-plastics smother corals, block light and oxygen, and function as vectors for diseases and invasive species (Lamb et al., 2018). These pressures amplify climate-related stressors (e.g., warming, bleaching) already well-documented for SIDS (IPCC, 2022).

  Marine megafauna and seabirds are at risk of entanglement and ingestion, especially from “ghost gear” (FAO, 2016; UNEP, 2021b). Microplastics are consumed by zooplankton, invertebrates, fish, turtles, and birds, with sub-lethal effects including reduced feeding, inflammation, and altered reproduction (Marcharla et al., 2024; Ali et al., 2023). In blue carbon ecosystems (mangroves, seagrasses), plastics are trapped by roots or blades,

potentially reducing growth. These ecosystems can serve as both long-term sinks and secondary plastic sources (Fauna & Flora, 2023). The degradation of marine ecosystems due to plastics also threatens tourism and has economic implications.

- **Aquatic degradation**
  Plastics enter aquatic systems via mismanaged land waste, riverine transport, stormwater, and sea-based losses (GESAMP, 2021). Once in water, plastics fragment into micro and nanoplastics, infiltrating sediments, biofilms, and aquatic organisms (Fauna & Flora, 2023). Plastics change water column dynamics, light regimes, and oxygenation, while biofilm-coated microplastics disrupt microbial communities and nutrient cycling (Witczak et al., 2024).

  In Seychelles, litter inventories conducted in 2019 and 2023 at 83 sites (categorized as Coastal, River, and Inland) revealed that river sites (highest at *Rochon River*, *Victoria library*, *Quebec-Mont Fleuri*, *Toryen-Anse Royale* and *Mont Plaisir River)* had the highest litter density, followed by coastal (highest at *North East Point beach*, *Ile au Soleil* and *Ile Aurore, Perseverance coast, Belombre.Beau Vallon*) and then inland (highest at *Glacis* and *Vilaz Trezor*) (Gonzalves, 2023).

- **Terrestrial degradation**
  SIDS often lack space and funding for transport costs, and sanitary landfills, leading to open dumping and burning, which release toxic gases and leachates into shallow aquifers (UNEP, 2019; 2021). Microplastics can migrate from landfills to waterways and coastlines (Sajjal et al., 2022; UNEP, 2021b). In soils, micro and nanoplastics alter physical properties, including bulk density, porosity, water retention, and enzymatic activity. They are also known to disrupt soil biota and plant performance (de Souza Machado et al., 2018).

  On beaches and flats, plastics smother vegetation, increase microplastic exposure along beaches and nearshore habitats, and disrupt fauna (Lawen et al., 2024). Plastic debris can threaten turtle nesting habitats, entangle fauna, and can be transported inland by birds and wind. In Seychelles, sooty terns have been recorded importing plastic into nesting colonies on Bird Island. Regional studies confirm seabird ingestion risks across the southwest Indian Ocean (Crommenacker et al., 2022). Reports from Aldabra document tortoise encounters with stranded plastic, reinforcing land-based risks on remote atolls (UNESCO, 2020). In the Inner Islands, foam debris, PET bottles, and flip flops dominate beach litter. Most debris are trapped by vegetation, rocks, and the backshore zone (Lawen et al., 2024). For SIDS, such terrestrial litter affects tourism reputation and leads to high cleanup costs (UNESCO, 2020).

3.2 CLIMATE -INDUCED FLOODING AND DRAINAGE BLOCKAGE

Climate change is increasing the frequency and intensity of heavy rainfall, storm surge, and sea-level rise in coastal and island settings, as documented in regional climate assessments and national adaptation policy frameworks. These hazards interact with poor solid-waste management and mismanaged plastic waste (MPW) to create a compound risk for vulnerable coastal communities (OECD, 2023; Yeo et al., 2017). Plastic litter clogs urban drainage systems, exacerbating pluvial flood risks, especially in areas where intense rainy-season floods are already common (MACCE, 2025; Polynext, 2025). Examples from Port Louis (Mauritius) and other island cities show that clogged drainage increases flood severity. Pacific urban risk assessments link solid-waste clogging to flood severity and recommends litter traps, improved collection, and public education (GFDRR, 2024; UN-Habitat, 2020). With climate change expected to intensify rainfall, the flood-aggravating role of plastic waste in drains and culverts becomes a compound hazard that disproportionately affects those with the least capacity to cope (Marsh, 2023, Yeo et al., 2017).

3.2.1 PLASTICS AS AMPLIFIERS OF FLOOD HAZARD AND EXPOSURE

- **Drainage blockage and intensified pluvial flooding**
  Plastics and other waste accumulate in gutters, culverts, and creek mouths; during heavy rainfall, these blockages reduce conveyance, increase flood depths and slow drainage, often turning short, intense rains into destructive flash floods. Pacific urban flood guidance documents this dynamic, recommending litter traps and routine clearance as cost-effective mitigation measures. Consistent with wider global findings, Mismanaged Plastic Waste (MPW) research shows that plastic debris in drains and canals alters hydraulic performance, increases water levels at culverts and racks, and heightens flood likelihood during extreme rainfall (MacAfee & Lohr, 2024; Marsh, 2023).

- **Degradation of nature-based coastal defences**
  Mangroves, seagrasses, and coral reefs provide critical buffering functions by attenuating waves and reducing inundation. When stressed or smothered by plastic debris, these ecosystems lose protective capacity, increasing exposure for nearby low-lying settlements. Regional environmental and climate policy frameworks highlight safeguarding blue-carbon ecosystems as central to reducing coastal flood impacts. During floods, MPW is also redistributed into estuaries and nearshore habitats, compounding ecological degradation and weakening natural defences over time (MacAfee & Lohr, 2024; GoS, 2020a).

- **River and sediment dynamics**
  Accumulated debris can obstruct river mouths and alter sediment transport, creating localised erosion hotspots or ponding that disproportionately affect informal settlements on

floodplains and low-lying coastal strips. National urban planning analyses emphasise how unregulated coastal development increases exposure (UN-Habitat, 2020).

3.2.2 CONCENTRATED SOCIAL, HEALTH, AND LIVELIHOOD IMPACTS

- **Public health risks**
  Blocked drainage and post-flood debris create stagnant water pools that increase mosquito breeding and elevate risks of vector-borne diseases such as dengue. Polluted floodwaters raise exposure to diarrheal illnesses and leptospirosis, with vulnerable households facing the highest burden. MPW flood studies show that floodwaters redistribute plastic waste through neighbourhoods, increasing contact with hazardous debris and contaminated water (MacAfee & Lohr, 2024; OECD, 2023).

- **Livelihoods and food security**
  Coastal residents dependent on nearshore fisheries, gleaning, and small-scale tourism face significant income and food-security losses when floods and debris degrade reefs, beaches, and fishing grounds. Damage to gear and landing sites further undermines household stability. Coastal and climate policy analyses highlight how ecosystem degradation disproportionately impacts coastal economies and subsistence livelihoods (MacAfee & Lohr, 2024; OECD, 2023; GoS, 2020a).

- **Displacement, assets, and mental health**
  Recurrent flooding, exacerbated by waste-blocked drainage, causes repeated damage to homes and assets, temporary displacement, and heightened psychosocial stress. Elderly residents, women-headed households, renters, and informal waste workers face elevated vulnerability due to limited financial buffers and exposure to unsafe waste and flood conditions. Urban flood management guidance underscores the importance of preparedness and social protection (OECD, 2023; MacAfee & Lohr, 2024; UN-Habitat, 2020).

- **Policy and governance gaps**
  Waste management, coastal resilience and flood-risk management are often addressed in separate sectoral frameworks, resulting in missed opportunities to recognise MPW as a flood-risk driver, and the subsequent impact on vulnerable communities. National climate and coastal policies in SIDS emphasise integrated, cross-sectoral and “ridge-to-reef” approaches to avoid these silos. The MacAfee & Löhr (2024) review stresses that treating MPW and flooding as unrelated governance domains obscures the socio-ecological feedbacks linking urbanisation, waste leakage, and climate-intensified rainfall.

4. HEALTH RISKS LINKED TO SUP POLLUTION

SUP pollution constitutes a growing public health emergency in SIDS, where limited waste management infrastructure and high plastic consumption create unique exposure pathways. The health impacts operate through both direct toxicological mechanisms and indirect environmental degradation, while socio-economic factors determine vulnerability (Lachmann et al., 2017; UNEP, 2018). This section provides a comprehensive analysis of these risks, supported by regional case studies and Seychelles-specific data where available.

4.1. DIRECT AND INDIRECT HEALTH EFFECTS

The direct health impacts of single-use plastic pollution in small islands manifest primarily through three pathways: toxic chemical exposure, microplastic ingestion, and respiratory/dermal hazards. Plastic products contain over 4,000 chemical additives, including phthalates, bisphenol A (BPA), and flame retardants, which readily leach into food and water -— a process accelerated by tropical conditions (Mihai et al., 2022; Lachmann et al., 2017; Hahladakis et al., 2018). According to the World Bank (2024), Seychelles imported approximately 885,506 kilograms of plastic packaging materials in 2023, primarily for goods packaging; with food imports often arriving in plastic packaging. This means Seychellois households experience frequent exposure to plastic-related contaminants through everyday consumption. Bisphenol A (BPA) exposure is associated with adverse female reproductive health outcomes, such as polycystic ovary syndrome (PCOS), diminished ovarian reserve, and implantation failure (Stavridis et al., 2022), while prenatal phthalate exposure associates may increase the risk of childhood asthma (Xiang et al., 2025). Phthalates are industrial chemicals used to make plastics more flexible and durable, and they are commonly found in products such as food packaging (Lachmann et al., 2017).

Who is most vulnerable and why?

Chemical exposures from plastics disproportionately affect women, including pregnant women, infants, and children, due to heightened physiological sensitivity during reproductive and developmental stages. Low-income households are also at greater risk, as they tend to rely more on low-cost, highly packaged foods and may lack alternatives to plastic-wrapped staples. These groups bear a disproportionate burden of endocrine-disrupting chemical exposure embedded within everyday consumption patterns (UNEP, 2018; Stavridis et al., 2022; Xiang et al., 2025).

Microplastic contamination presents a critical threat, particularly given Seychelles' heavy reliance on seafood. Evidence shows that toxic chemicals can be transferred from ingested plastics into animal tissues (UNEP, 2018). Studies have found higher concentrations of microplastics in fish caught closer to shore compared to those further offshore, and concentrations also increase with trophic level (Thiemann, 2023). Emerging research further indicates that microplastics can alter the gut microbiomes of marine species, leading to gastrointestinal dysbiosis (Thiemann, 2023). As a result, fish may harbor higher levels of pathogens, some of which can affect human health, especially if the fish are undercooked, potentially making them vectors for human disease (Buchmann & Karami, 2024).

Improper waste disposal creates additional health risks, particularly for communities living closest to informal dumping sites, landfill peripheries, or areas without regular municipal collection. These are often economically disadvantaged households, informal settlement residents, and migrants, who have less political influence over service provision (Yeo et. al, 2017; McAfee & Lohr, 2024; UN-Habitat, 2020). The LWMA in Seychelles warns that illegal dumping and unsanctioned burning of domestic waste, contaminate soil and waterways, and attract disease vectors such as rodents and mosquitoes. An estimated 90,000 tons of waste are generated annually across the islands, with collection and transport systems frequently overwhelmed. Where regulatory infrastructure, or the Providence landfill, falls short, open burning often takes place, releasing toxic pollutants and increasing public health risks (Seychelles Nation, 2024; Mols et al., 2020; MACCE, 2025).

Open burning, commonly practiced in low-infrastructure settings, emits a range of hazardous air pollutants including dioxins, furans, polychlorinated biphenyls (PCBs), heavy metals, polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), and fine particulate matter (PM_{25}) (Mohee et al., 2015; Mols et al., 2020; Fadel, 2021; Gurav et al., 2024). Those most affected tend to be children, older adults, people with chronic respiratory condition, and low-income families (Xiang et al, 2025; UNEP, 2018). In Seychelles, officials have explicitly linked the burning of plastics and household waste with the generation of persistent organic pollutants (POPs)—including dioxins and furans, which are strongly associated with cancer, reproductive disorders, and other chronic illnesses (Seychelles Nation, 2005). Beyond direct toxicological pathways, SUPs play a substantial role in contributing to a variety of indirect health effects. These impacts are particularly acute in SIDS, such as Seychelles, where the intersection of environmental degradation, inadequate waste management infrastructure, and heightened climate vulnerability creates a perfect storm of public health risks (UNEP, 2018).

Improper disposal of SUPs frequently results in the accumulation of plastic debris that traps stagnant water, especially in densely populated urban and peri-urban areas. These conditions provide ideal breeding grounds for mosquitoes, thereby facilitating the spread of mosquito-borne diseases such as dengue fever and chikungunya. These impacts disproportionately affect people living in low-elevation coastal zones prone to standing water, communities without proper sanitation or paved roads, and people with disabilities or limited mobility, who cannot easily relocate during outbreaks (UNEP, 2018; Onyanta, 2016; Krystosik et al., 2020). Additionally, poorly managed plastic waste contributes to the clogging of drainage systems, which not only increases the frequency and severity of flooding but also elevates human exposure to contaminated water and raw sewage. This, in turn, raises the incidence of waterborne illnesses such as leptospirosis and gastrointestinal infections (UNEP, 2018; Krystosik et al., 2020; Cooper & Letsinger, 2023; UNDRR, 2024; Phillips & Thorne, 2011).

The indirect health consequences of plastic pollution also include significant psychosocial stressors. In the context of SIDS, recurrent flooding, often made worse by plastic-blocked drainage infrastructure, can lead to the loss of homes and personal belongings, disruption of livelihoods, and forced displacement. Such events are strongly associated with increased levels of psychological distress, including anxiety, depression, and post-traumatic stress disorder (PTSD), particularly among already vulnerable populations that may have limited access to

mental health care services (Cooper & Letsinger, 2023; Nnoko, 2024; MacAfee & Lohr, 2024; Sonmez & Hocaoglu, 2023).

Furthermore, plastic pollution along coastlines and in marine environments has serious implications for fisheries. It leads to the degradation of marine ecosystems, diminishes fish populations, and increases the contamination of seafood with microplastics and pathogens (Thiemann, 2023; Buchmann & Karami, 2024). These environmental changes pose indirect threats to nutritional security and food safety, especially in low-income households that rely heavily on seafood as an affordable primary protein source, women who often manage food provisioning and bear responsibility for household nutrition, and limited rural coastal communities with limited access to alternative proteins. In the case of Seychelles, where the per capita fish consumption is 53.9 kilograms annually - one of the highest in the world, such impacts carry far-reaching public health implications (UNEP, 2021a; Wesolowska et al., 2024; FAO, 2025).

5. TACKLING SINGLE-USE PLASTICS: LEGISLATIVE FRAMEWORKS IN SEYCHELLES AND SELECTED SIDS

The PET Plastic Regulations (Trades Tax Imports Regulations) 2005 in **Seychelles** were part of the country's early efforts to manage the importation of polyethylene terephthalate (PET) plastic products through trade taxation (GoS, 2011). This was followed in 2008 by the Environment Protection (Restrictions on Plastic Bags) Regulations (GoS, 2011), established under the Environment Protection Act 1994. These regulations restricted the manufacture, trade, and distribution of plastic bags below 30 microns in thickness, with importers required to obtain permits from the then Trades Tax Division, provided approval was given by the Ministry responsible for Environment. These regulations were repealed in 2017, and the Seychelles Environment Act (2016) was amended in 2017 to include the Environment Protection (Restriction on manufacturing, importation, distribution and sale of Plastic Bags) Regulations (GoS, 2017a) and the Environment Protection (Restriction on importation, distribution and sale of Plastic Utensils and Polystyrene Boxes) Regulations (GoS, 2017b). The Environment Protection (Restriction on the manufacturing, importation, distribution and sale of Plastic Straws) Regulation was added in 2019 (GoS, 2019), the Environment Protection (Environmental Levies on PET, Plastic and Glass Bottles and Cans) Regulations in 2020 (GoS, 2020b), and the Environment Protection (Prohibition of Balloons) Regulations, in 2021(GoS, 2021). These regulations aligned with the Seychelles Sustainable Development Strategy 2012—2020 (GoS, 2011); and the Seychelles National Development Strategy 2024—2028 (MFNPT, 2023).

These legislations also established several key enforcement measures including **import restrictions** on banned plastic items, **manufacturing ban** on plastic utensils and polystyrene boxes, **penalties** in the form of fines for selling banned products, and **confiscation** where authorities can seize prohibited items. The responsibility for enforcement is shared by both the Seychelles Licensing Authority and the Department of Environment.

Despite these legal instruments banning select single-use plastic, several loopholes and exemptions undermine their effectiveness. For example, plastic utensils in the regulation refers to "*fork, spoon, knives, plates, bowls, cups and trays made of plastic*" but does not include plastic packaging materials (e.g. plastic wraps for food and imported goods, sachet & pouches for sauces, condiments and hygiene products, and thin-film plastics like cling-film and bubble wrap). Similarly, the regulation on plastic bags includes an exemption list which allow, among others, Ziplock bags, bags for packaging and sealing food, and for repacked or prepacked food, as well as bags "*carried by (passengers) disembarking from an aircraft or a ship for the purpose of carrying personal belongings*." Most of these items are highly prevalent in importation and local retail, difficult to recycle and usually end up in landfills or the ocean (Mihai et al., 2022).

In **Mauritius**, non-biodegradable plastic bags have been banned since 2016 under the Environment Protection (Banning of Plastic Bags) Regulations 2015. In 2021, the government introduced the Environment Protection (Control of Single Use Plastic Products) Regulations 2020,

which prohibited the importation, manufacture, possession, sale, supply, and use of more than ten types of non-biodegradable single-use plastic products, including non-woven polypropylene bags. Furthermore, the Environment Protection (Banning of Plastic Bags) Regulations 2020, which also came into effect in 2021, extended the ban to cover the manufacture, importation, distribution, possession, use, and sale of additional types of non-biodegradable plastic bags. The banned items include a wide range of everyday plastic products. These include plastic cutlery such as forks, knives, and spoons, as well as plastic plates, cups, bowls, and trays.

The regulations target plastic beverage stirrers and plastic hinged containers commonly used for takeaway food. Plastic lids designed for single-use plastic products are banned as well, along with receptacles of any shape, whether they have lids or not, which are used to contain food intended for immediate consumption. In addition, packaging bags and bags carried by passengers into the country are included in the ban. The use of plastic straws and plastic trays is also prohibited under these regulations. More recently, two regulations were approved to further tighten control on plastic bags and other single-use products. These are the Environment Protection (Banning of Plastic Bags) (Amendment) Regulations 2025, and the Environment Protection (Control of Single-Use Plastic Products) (Amendment No. 2) Regulations 2025. These regulations expand the definition of 'plastic' to include fourteen petroleum-based materials and distinguish between 'biodegradable,' 'compostable,' and 'conventional' plastics, with 'conventional' plastics defined as those that do not meet international standards for biodegradability and compostability (Barrowclough & Eugui, 2021; Foolmaun, et al., 2021; Le Mauricien, 2025).

In the **Maldives**, recent policy developments have strengthened efforts to reduce single-use plastics. The Ban Decree 12021/9 (2021), aligned with the Single-Use Plastic Phase-Out Plan (2020), prohibits the production and sale of selected single-use plastic items. In the same year, the 5th Amendment to the Waste Management Regulation (2021/R-109) introduced mandatory source separation of selected waste streams at the household level, promoting recycling, reuse, and recovery—specifically targeting items like single-use plastic bottles. In 2023, the Regulation on Collecting Plastic Bag Fees (2023/R-76) was enacted. It outlines procedures for entities registered for Goods and Services Tax (GST) with the Maldives Inland Revenue Authority (MIRA) to collect plastic bag fees, in accordance with Chapter 8 of the Waste Management Act (Hafiz et al., 2024).

All three countries have laws and policies that support the circular economy, particularly in the management of renewable resources and waste. They address plastic pollution by banning plastic bags or other single-use plastics, and, where applicable, have implemented phase-out policies. Mauritius also has specific regulations governing recycling activities (Failler, 2021). Targeted projects are also addressing waste management, including single-use plastics, in these countries. One example is the ISLANDS Indian Ocean Child Project, which focuses on managing chemicals and hazardous waste- including persistent organic pollutants, or POPs (additives in plastics of formed during plastic disposal), and marine litter (ISLANDS, 2025). Additionally, Seychelles, with support from the World Bank, is implementing a solid waste management project aimed at reducing waste generation, increasing recycling rates, and strengthening the resilience of its waste management infrastructure.

In the Caribbean, several SIDS have implemented legislation to curb the use of SUPs, with varying degrees of success. **Antigua and Barbuda** were among the pioneers, introducing the External Trade (Shopping Plastic Bags Prohibition) Order, 2017 and the Litter Control and Prevention Act, 2019. These laws progressively banned the importation, manufacture, trade, and distribution of plastic shopping bags at the point of sale. They also prohibited the import and use of food service containers, including clamshell and hinged containers, hot dog containers, bowls, plates, and hot and cold beverage cups. Additional bans targeted plastic utensils (such as spoons, forks, and knives), straws, fruit trays, meat and vegetable trays, egg cartons, and eventually "naked" Styrofoam coolers. These measures collectively led to a 15.1% decrease in plastics entering landfills. Similarly, **The Bahamas** enacted the Environmental Protection (Control of Plastic Pollution) Bill, 2019, which came into force in early 2020. This legislation banned plastic bags, Styrofoam containers, SUP food ware, non-biodegradable single-use plastic bags, and even balloons. In **Barbados**, the Control of Disposable Plastics Act, 2019–11 banned the import, distribution, sale, and use of single-use plastic containers and cutlery, as well as the import or manufacture of petro-based plastic bags.

Other Caribbean SIDS have followed suit. **Grenada** introduced the Non-Biodegradable Waste Control (Plastic Bags) Order, 2019; **Jamaica** enacted both The Trade (Plastic Packaging Materials Prohibition) Order, 2018 and The Natural Resources Conservation Authority (Plastic Packaging Materials Prohibition) Order, 2018; and **Saint Lucia** passed The Styrofoam and Plastics (Prohibition) Act No. 22 of 2019. **Trinidad and Tobago** announced a ban on the importation of polystyrene foam products, effective from 2019, along with a broader national ban on the use and importation of single-use plastic and polystyrene items. The country also removed customs duties on eco-friendly alternatives to encourage their adoption. The relative success of these legislative efforts has been attributed to inclusive stakeholder consultations, public awareness campaigns, improved access to affordable alternatives, and a strong emphasis on environmental protection and conservation (Clayton et al., 2021; UNEP, 2018).

Countries like Barbados, Jamaica, and the Bahamas have secured external funding to improve waste infrastructure and strengthen legal frameworks. Saint Lucia has introduced national legislation, and Barbados implements an integrated solid waste management programme (Phillips & Thorne, 2011). With the growing threat to the region's tourism industry, the Caribe Circular Alliance, established in 2022, is promoting circular economy-based waste solutions. Its goal is to develop a shared regional vision, facilitate knowledge exchange, and support policy reforms to aid countries in their transition toward a circular economy (Weiss, 2024). In addition, the **ISLANDS Caribbean Project**, similar to its counterpart in the Indian Ocean, targets chemicals and hazardous waste, including Persistent Organic Pollutants (POPs), as well as marine litter. The project is guided by the UNEP Caribbean Waste Management Action Plan, which prioritizes environmentally and financially sustainable waste management strategies, promotes waste-to-resource approaches, and supports the preservation of landfill capacity (ISLANDS, 2025).

In the Pacific, **Vanuatu** has taken legislative action by enacting the Waste Management Regulations Order No. 15 of 2018 and the Waste Management (Penalty Notice) Regulation Order No. 17 of 2018, which ban single-use plastic bags, plastic straws, and polystyrene takeaway containers. In addition, there are other relevant legislations and strategies that address waste management and control of pollution, including Pollution Control Act No 10 of 2013,

Environmental Protection and Conservation Act [Cap 283], and the Regional Waste Management and Pollution Control Strategy 2016—2025 'Cleaner Pacific 2025' (Binetti, 2020; APWC, 2019).

The **Solomon Islands** introduced a regulation, gazetted in 2023, to ban the import, manufacture, distribution, sale, and supply of single-use plastics. The banned items under this regulation include plastic shopping bags, plastic straws, plastic cups, plates, and cutlery, polystyrene takeaway containers, plates, and cups, as well as polyethylene terephthalate (PET) water bottles smaller than 1.5 litres (SIG, 2023).

The **Marshall Islands** has enacted the Styrofoam and Plastic Products Prohibition Act 2016, which prohibits the importation, manufacture, and use of single-use plastic carrier bags, as well as Styrofoam and plastic cups, plates, and packaging materials. Other Pacific Island nations have also taken similar action. **Samoa** introduced the Waste (Plastic Bag) Management Regulations 2018, banning the import, manufacture, and distribution of single-use plastic shopping bags, packing bags, and straws. In 2020, the ban was expanded to include polystyrene (Styrofoam) food containers and cups. **Papua New Guinea** has implemented a ban on the issuance of permits for, and the importation of, single-use plastic shopping bags by manufacturers (Barrowclough & Eugui, 2021; APWC, 2020).

The **ISLANDS Pacific Project** mirrors efforts in the Indian Ocean and Caribbean regions, addressing the growing importation of waste, including plastics. It focuses on strengthening chemicals and waste management legislation, restricting single-use plastics, and promoting locally manufactured alternatives (ISLANDS, 2025).

Similarly to **Seychelles**, exemptions to the bans exist in other SIDS. In **Vanuatu**, for example, the ban excludes certain plastic packaging materials, heavy-duty plastic bags marketed as reusable, and plastic garbage bags, including those used by waste management operators (GoV, 2018).

6. KEY LEGISLATIVE CHALLENGES IN SIDS

Addressing plastic pollution in SIDS is not merely a question of passing legislation. It requires cohesive, well-resourced, and context-specific governance frameworks. While many SIDS have enacted laws aimed at reducing SUPs, persistent legislative and institutional challenges undermine their implementation and impact. These include limited enforcement capacity, fragmented institutional responsibilities, and regulatory gaps tied to import dependence. Coupled with insufficient data, weak infrastructure, and a disconnect between waste and climate policies, these issues present significant obstacles to effective waste management. This section examines these key legislative challenges, using Seychelles as a case study to illustrate common barriers faced across SIDS.

- **Limited enforcement capacity**: Even when legislation aimed at reducing SUPs exists, enforcement in SIDS is often weak due to a combination of institutional, financial, and technical constraints. Environmental agencies and municipal authorities typically operate with limited budgets, outdated equipment, and insufficient staffing levels, which significantly undermine their ability to monitor compliance, conduct inspections, or carry out enforcement actions. A further challenge is the shortage of personnel with specialized training in environmental law, waste management, and pollution control. Without adequate capacity-building programs or ongoing professional development, enforcement officers may lack the necessary expertise to interpret legislation, identify violations, or engage effectively with businesses and the public on compliance matters. Additionally, loopholes and exemptions in the law allow the continued use of unregulated plastics, undermining the effectiveness of bans. This contributes to persistent issues such as marine pollution and increased flooding caused by clogged drainage systems. This challenge is further exacerbated by the heavy reliance of SIDS on tourism as a key pillar of economic development—an industry that generates significant amounts of single-use plastic waste. (UNEP, 2018; Guittard et al., 2023,Phillips & Thorne, 2011).

- **Fragmented legal frameworks**: In many SIDS, waste management laws, enforcement mechanisms, and permit acquisition processes are fragmented across multiple ministries and agencies (Wang et al., 2021; EU Switch-Asia, 2024). In Seychelles, the primary responsibility lies with the Ministry of Environment, Climate, Energy and Natural Resources (MECENR) and the Landscape and Waste Management Agency (LWMA). However, other entities, such as the Ministry of Health, which addresses sanitation and public health risks, and the Ministry of Finance, National Planning and Trade, which issues trade-related permits, also play limited but relevant roles. Institutional fragmentation often lacks strong coordination and sustained inter-agency collaboration, leading to overlapping mandates, operational inefficiencies, and inconsistent policy implementation. These governance challenges are particularly pronounced in areas that require integrated responses, such as disaster management and climate change adaptation (MACCE, 2025).

- **Dependence on imported goods and packaging**: SIDS are heavily reliant on imported goods due to limited domestic manufacturing capacity, constrained natural resources, and small local markets. This dependence extends across nearly all sectors, including food, household products, personal care items, and industrial supplies, many of which are packaged in SUPs. As a result, a significant proportion of the plastic waste generated in SIDS originates from imported products over which these countries have little control in terms of packaging design or material choices. However, most existing regulations do not include EPR provisions, which would require importers and producers to take responsibility for the management and disposal of packaging waste. This regulatory gap results in a higher volume of un-managed plastic waste and limits the ability of SIDS to influence or regulate upstream plastic production effectively (UNEP, 2018; Wang et al., 2021; EU Switch-Asia, 2024).

- **Insufficient data and monitoring**: SIDS often face challenges in data collection, particularly regarding waste generation and pollution sources. This lack of reliable and detailed information hampers the ability to develop targeted legislation and assess the effectiveness of existing policies (Mohee et al., 2015). In Seychelles, for example, the National Bureau of Statistics publishes Statistical Bulletins on Merchandise Trades, which include data on the annual value of imports by country, section, and division. While the bulletin lists imports under the section "Products of the chemical or allied industries N.E.S.," which includes pharmaceuticals, fertilizers, and hygiene products, it only notes the value of imported "Plastics and articles thereof" at SCR142,549 for the last quarter of 2024 (NBS, 2024). No further details on plastics are provided, nor is there any breakdown by specific industry use. Similarly, statistics from LWMA record waste received in bins and at the landfill but do not disaggregate this data by industry. Furthermore, SUPs are not reported separately; instead, they are grouped under "Class 1: Municipal Solid Waste (LWMA, 2022)." This lack of disaggregated and sector-specific data impedes evidence-based policymaking and weakens Seychelles' capacity to meet international reporting obligations.

- **Inadequate waste infrastructure and funding**: While legislation in some SIDS may mandate recycling and safe waste disposal, the physical infrastructure needed to support these mandates, such as materials recovery facilities, recycling plants, or properly managed landfills, is often lacking or insufficient. This gap leads to the illegal dumping of SUPs, open burning of waste, and overflow into coastal and marine ecosystems. These practices not only degrade the environment but also increase health risks and contribute to flooding, particularly in vulnerable coastal areas (Wang et al., 2021; Mohee et al., 2015; Phillips & Thorne, 2011).

- **Tourism waste-driven pressures**: Tourism is a major economic driver for many SIDS, often contributing a substantial share of national GDP, employment, and foreign exchange earnings. However, it also significantly contributes to the generation of SUPs, particularly through items such as bottled water, takeaway food containers, plastic bags, straws, and travel-size toiletries. The high turnover of tourists, especially during peak seasons, places considerable pressure on already strained waste management systems, leading to increased littering, overfilled landfills, and pollution of coastal and marine environments. Despite the clear link between tourism and plastic waste, most SIDS have yet to effectively

integrate tourism-related waste management into their broader environmental or land-use planning frameworks. In Seychelles, for instance, the Sustainable Seychelles Eco-certification encourages tourism businesses to adopt environmentally friendly practices (Tourism Department, 2021). However, the certification remains voluntary and lacks strong emphasis on green procurement, limiting its overall impact on reducing plastic waste within the sector (Meylan et al., 2018; Wang et al., 2021; EU Switch-Asia, 2024).

- **Climate change policy disconnect**: In many SIDS, including Seychelles, climate adaptation policies and waste management strategies are often developed in isolation. This disconnect results in missed opportunities to address plastic pollution as a contributing factor to climate-related risks, such as flooding caused by clogged stormwater systems (Onyanta, 2016). For example, the Seychelles Coastal Management Plan 2019—2024 does not reference waste or plastics as contributors to coastal hazards or flooding. Similarly, the Solid Waste Master Plan (2020—2035) acknowledges the need to integrate waste management into national climate strategies but fails to make this connection explicit (Mols et al, 2020). The Seychelles National Waste Policy 2018—2023 also lacks integration with climate adaptation goals (MEECC, 2018). Notably, the National Climate Change Strategy 2009 includes a general commitment to improving waste collection and management as a means of reducing flood risks (not included in the Updated National Climate Change Strategy 2022, although this refers to integration of adaptation guidelines into development planning) (SNCCC, 2009). The Third National Communication to the UNFCCC links climate adaptation to waste only through the lens of greenhouse gas emissions, without addressing broader environmental and resilience impacts associated with poor waste management (MACCE, 2023). This siloed approach limits the effectiveness of both climate and waste policies and overlooks the potential of circular economy solutions to support national adaptation goals.

7. SOCIO-ECONOMIC DISPARITIES IN SUP POLLUTION AND CLIMATE VULNERABILITY

SUP pollution does not affect all communities equally. In SIDS like Seychelles, which are on the frontline of the climate crisis, the impacts of SUP pollution are shaped by and exacerbate deep-rooted socio-economic inequalities. This literature review explores how SUP pollution acts as a threat multiplier, intensifying climate vulnerabilities for marginalised populations. By examining key areas of disparity, this section highlights how SUP pollution intersects with poverty, gender, and livelihoods to undermine adaptive capacity, revealing that addressing plastic pollution is critical for effective climate adaptation and social justice (UNEP, 2018; UNEP, 2021a).

- **Compounding climate risks in low-Income communities:** Low-income households often live in densely populated, poorly serviced areas that are frequently more exposed to climate hazards, while having limited access to waste collection services. They are more likely to reside near illegal dump sites or landfills. SUP pollution compounds risks by clogging drainage systems, increasing the severity of flooding events, and creating stagnant water that becomes breeding grounds for climate sensitive diseases. Furthermore, these communities often face greater exposure to toxic emissions from the open burning of plastics waste, a common disposal method where waste collection is limited, which worsens respiratory illnesses that are aggravated by climate-related heatwaves and pollution (APWC, 2019;UNEP, 2023; Seychelles Nation, 2024).

- **Gendered vulnerabilities in a changing climate:** Women and children, due to their roles in household management, food preparation, waste sorting, and household sanitation, face disproportionate health risks from SUP pollution that are intensified by climate change. For instance, contamination of water sources by plastic leachate, combined with climate-induced water scarcity, heighten their exposure to harmful endocrine-disrupting chemicals (EDCs). These exposures, linked to reproductive disorders and other illnesses, can undermine women's health, and consequently reduce their capacity to cope with and respond to climate shocks and stresses (UNEP, 2018;UNEP, 2023; Stavridis et al., 2022).

- **Erosion of climate-resilient livelihoods:** Climate change already threatens key sectors like fisheries and tourism. SUP pollution directly undermined these same climate-vulnerable livelihoods. Fishers experience reduced catches due to habitat degradation from plastic waste, and in some cases, fish contaminated with microplastics or pollutants may be unsellable, further undermining financial stability. Meanwhile, beach vendors and tourism operators, face income losses as plastic-laden shores deter visitors. For informal waste pickers, who are often among the most economically marginalised, the increasing volume of plastic waste does not represent an economic opportunity. Instead, it exposes them to greater health hazard from handling toxic materials, while climate-related disruptions like heavy rain and flooding destabilise their already precarious incomes, further eroding their ability to adapt to economic and environmental shocks (Singh & Biswas, 2023; UNEP, 2018; UNEP, 2021a).

- **Constrained access to adaptation alternatives:** A key aspect of climate adaptation is the ability to adopt resilient practices and technologies. However, socio-economically disadvantaged groups are less able to access alternatives to SUP, such as reusable or biodegradable products, which are often more expensive or unavailable in more 'rural' and/or outer islands. While wealthier consumers and businesses, and in areas where there are efforts to support the transition, may adopt eco-friendly products, others are left with few options. This lack of choice locks vulnerable communities into a cycle of plastic dependence, which in turn exacerbates the local environmental degradation that magnifies climate impacts like flooding and pollution, limiting their overall adaptive capacity (APWC, 2019; EU Switch-Asia, 2024; Clayton et al., 2020; Guittard et al., 2023).

- **Policy gaps in building inclusive climate adaptation:** Many national plastic and waste policies lack explicit equity and adaptation considerations. Without inclusive stakeholder engagement, measures like plastic bans can unintentionally increase the cost of living for the poor or disrupt informal recycling economies that provide a critical safety net. Such oversight fails to protect the most vulnerable from unintended consequences, ultimately weakening the social resilience needed for communities to withstand and adapt to the combined pressures of plastic pollution and climate change (Guittard et al., 2023; Singh & Biswas, 2023).

8. ADAPTATION STRATEGIES AND ALTERNATIVES: BUILDING RESILIENCE

In Seychelles and other SIDS, SUP pollution is not just a waste management issue but a direct threat to climate adaptation. It exacerbates flooding, damages critical ecosystems like coral reefs and mangroves that provide natural coastal protection and undermines the livelihoods and health of the most vulnerable communities. Therefore, strategies to reduce SUP pollution are essential components of climate adaptation.

8.1. PROMOTING ALTERNATIVES TO ENHANCE ADAPTIVE CAPACITY

This section explores alternatives to SUPs, policy measures, and community-driven initiatives that specifically aim to enhance climate resilience by addressing the root causes and unequal impacts of plastic pollution (Barrowclough & Eugui, 2021; Moshood et.al., 2021). Addressing challenges like higher costs through subsidies and Public-Private Partnerships (PPPs) ensure these adaptive alternatives are accessible to all, not just the wealthy (Moshood et al., 2021).

- **Biodegradable materials for ecosystem health**: Encouraging plant-based alternatives (e.g., bamboo, sugarcane bagasse, or cassava starch) for food packaging, utensils, and bags, reduces long-term land and marine pollution. This is a critical adaptation measure because it helps prevent the clogging of urban drainage systems, a major factor in exacerbating climate-related flooding, and supports the recovery of coastal ecosystems that act as natural buffers against storms and sea-level rise (Meylan et al., 2018; Barrowclough & Eugui, 2021).

- **Reusable systems to reduce vulnerability**: Implementing reusable container schemes through incentives such as discounts or deposit-refund (e.g., for bottles and shopping bags) directly cuts waste volumes. For vulnerable groups, programs that provide affordable access to reusables can reduce their exposure to the health risks of plastic pollution and the financial stress of repeatedly purchasing disposable items, thereby increasing their overall adaptive capacity (Barrowclough & Eugui, 2021; UNEP, 2023; Stavridis et al., 2022).

- **Circular economy and local production**: Supporting local production of alternatives, boosts economic diversification, a key adaptation strategy for SIDS. Initiatives that integrate waste pickers into formal recycling systems, transforming their role from hazardous, informal labour to recognised and safer employment, such as Green Phenix's (2024) community-focused programs in Curacao that transform plastic waste into new products, provide a powerful model. This approach not only cleans the environment but also creates resilient green jobs, improves the livelihoods and safety of marginalised workers, reduces import dependence, and engages community in building a circular economy that is less vulnerable to external shocks (Barrowclough & Eugui, 2021, Failler, 2021, Green Phenix, 2024).

8.2. POLICY AND ENGAGEMENT FOR INCLUSIVE RESILIENCE

Effective policies must be explicitly designed to build social and ecological resilience to climate change. They require a multilevel approach that spans regulatory reform, institutional capacity, private sector collaboration, and community-level resilience. The following approaches highlight different mutually reinforcing pathways:

- **Strengthening legislation for risk reduction:** Expanding existing bans to include exempted items (e.g., plastic wraps and sachets) and introducing EPR laws are fundamental adaptation policies. By holding importers and producers accountable for the full lifecycle of products, EPR schemes can fund improved waste management infrastructure, directly reducing the pollution that compounds climate risks like flooding and marine ecosystem degradation (Failler, 2021).

- **Enforcement and incentives for effective implementation:** For legislations to be effective, robust enforcement is needed. This can be enhanced through training for customs and environment officers and the use of technology (e.g., digital monitoring of imports). Concurrently, offering tax breaks or grants for businesses adopting sustainable practices makes compliance easier and fosters innovation. These incentives are crucial adaptation measures as they accelerate the transition to a more resilient, low plastic economy and protect businesses, especially Small - Medium Enterprises (SMEs), from economic shocks during the transition (UNEP, 2018; Asia Pacific Waste Consultants, 2021).

- **Public Private Partnerships (PPPs) for infrastructure:** PPPs can drive tangible progress by partnering with private firms to build local recycling facilities or composting plants (such as the Seychelles government and recycler company PET scheme) and forging alliances with tourism stakeholders (such as through the Sustainable Seychelles Recognition and Certification) to phase out SUPs through bulk dispensers and reusable kits. Co-funding startups that produce local alternatives build economic resilience and reduces plastic waste stream (Rapold et.al., 2019; GoS, 2018; Moshood et.al., 2021).

- **Tourism sector engagement for a resilient economy:** Integrating SUP reduction into tourism policies is a direct economic adaptation strategy. Mandating eco-certifications like "Sustainable Seychelles" and collaborating with hotels and airlines to eliminate single - use travel-size toiletries, as well as inclusion of levies and tax incentives protects the pristine beaches and marine life that the tourism sector, and the national economy, depends on. This helps build a tourism industry that is more resilient to the environmental degradation exacerbated by both SUP pollution and climate change (Asia Pacific Waste Consultants, 2021; GoS, 2018).

- **Community awareness and social resilience:** Educational programs that link waste reduction to climate adaptation (e.g., how proper disposal prevent flooding) empower communities to be active agents of resilience. Awareness campaigns can shift public behavior, fostering a collective responsibility that is essential for surviving climate impacts (Rapold et.al., 2019; Asia Pacific Waste Consultants, 2021).

8.3. CASE STUDIES FROM OTHER SIDS

Learning from successful initiatives in other SIDS can provide valuable insights for Seychelles' strategies to combat SUP pollution. Below are case studies highlighting key approaches, outcomes, and lessons learned:

Antigua and Barbuda pioneered comprehensive SUP bans through the External Trade (Shopping Plastic Bags Prohibition) Order (2017) and the Litter Control and Prevention Act (2019). These laws progressively prohibited plastic shopping bags, Styrofoam containers, and utensils, while promoting alternatives like reusable bags and biodegradable packaging. Stakeholder collaboration, including public awareness campaigns and partnerships with local businesses, was critical to their success. As a result, the country achieved a 15.1% reduction in plastics entering landfills within two years (Clayton et al., 2021; UNEP, 2018). Key lessons range from:

- Phased implementation: Gradual bans allowed businesses to adapt.
- Inclusive policymaking: Engagement with retailers and importers ensured compliance.
- Affordable alternatives: Subsidies for reusable products minimized resistance.

Vanuatu's Waste Management Regulations (2018) banned plastic bags, straws, and polystyrene takeaway containers, with exemptions for essential items like medical packaging and heavy-duty agricultural bags. The government partnered with NGOs and regional bodies (e.g. the Pacific Islands Forum) to fund waste audits and community education. Despite challenges in enforcement, Vanuatu's approach balanced environmental goals with practical needs, reducing coastal plastic litter by 30% in urban areas (APWC, 2019). Key lessons include

- Flexible exemptions: Avoiding overly rigid bans improved compliance.
- Regional cooperation: Leveraging international programs like Cleaner Pacific 2025 enhanced capacity.

Mauritius implemented some of the strictest SUP regulations, including the Environment Protection (Control of Single-Use Plastic Products) Regulations (2020), which banned 10+ plastic items (e.g. cutlery, trays, and non-woven bags). However, enforcement gaps, such as smuggling of banned plastics via tourism channels, undermined effectiveness (Foolmaun et al., 2021). This case underscores:

- Need for robust monitoring: Weak border controls led to illegal imports.
- Tourism sector engagement: Policies must target high-waste sectors directly.

Seychelles can draw several comparative insights from other island states. Like Vanuatu, Seychelles could exempt critical items (e.g. medical supplies) while introducing and tightening bans on tourism-related SUPs. Antigua's model highlights the value of involving businesses early in policy design and partnering with initiatives like the Indian Ocean Commission could bolster funding and technical support.

9. CONCLUSIONS AND RECOMMENDATIONS

SUP pollution in Seychelles and other SIDS is a profound threat multiplier that intensifies climate vulnerability and deepens socio-economic inequalities. This analysis confirms that existing legislative measures, while a critical first step, are insufficient to address the scale of the challenges. Key barriers, including limited enforcement capacity, fragmented governance, import dependency, and critical disconnect between waste and climate policies, undermine resilience, and perpetuate disproportionate risks for low-income communities, women, and climate sensitive sectors like tourism and fisheries. Effectively tackling SUP is, therefore, not merely an environmental imperative but a cornerstone of climate adaptation and social justice (Guittard et al., 2023; UNEP, 2018; Mihai et al., 2022; Lachmann et al., 2017; Singh & Biswas, 2023).

9.1. KEY RECOMMENDATIONS FOR BUILDING ADAPTIVE AND EQUITABLE RESILIENCE

The following recommendations propose an integrated pathway forward, focusing on building systemic resilience by aligning plastic reduction with climate adaptation goals, economic diversification, and inclusive governance.

- **Integrate SUP reduction into national climate adaptation planning**:
  Explicitly incorporate SUP pollution as a key risk factor in national climate strategies (e.g., National climate change strategy), coastal zone management plans, and disaster risk reduction frameworks. This should include mapping how plastic waste exacerbates specific climate impacts like flooding and ecosystem degradation. This approach directly addresses the identified policy disconnect, ensuring that waste management is recognised and funded as a critical adaptation measure to protect infrastructure, public health, and ecosystems (Onyanta, 2016; Guittard et al., 2023).

- **Strengthen governance through coordinated enforcement and equitable policies:**
  Close regulatory loopholes (e.g., on plastic food wraps, sachets and, cling films), implement EPR schemes and significantly enhance enforcement capacity through targeted training, technology (e.g., digital import monitoring), and inter-agency coordination. This tackles the core challenges of limited enforcement and fragmented frameworks. Crucially, policies must be designed with equity considerations to avoid burdening vulnerable groups, for example, by using EPR revenues to subsidise alternatives for low-income communities (Failler, 2021; Wang et al., 2021; EU Switch-Asia, 2024, UNEP, 2018).

- **Prioritise investment in circular economy infrastructure and local green jobs:**
  Leverage PPPs to develop context-appropriate infrastructure, such as material recovery facilities and composting plants. Actively support local enterprises manufacturing reusable and biodegradable alternatives, creating resilient green livelihoods. This addresses inadequate infrastructure and import dependence while building economic resilience. Crucially, this transition must include a strategy to integrate informal waste pickers into the

formal economy. Following models like Green Phenix (2024) would transform their work from hazardous and precarious labour into safe, dignified employment with stable incomes, strengthening both the social safety net and the circular economy (Moshood et al., 2021; Meylan et al., 2018; Barrowclough & Eugui, 2021).

- **Mandate and incentivise SUP reduction in the tourism sector:**
  Transition eco-certification such as the 'Sustainable Seychelles' from a voluntary to a mandatory standard with strict SUP reduction targets. Provide tax incentives for hotels and tour operators that adopt bulk dispensers, reusable kits, and sustainable procurement practices. As tourism is a primary source of tourism waste -driven pressures, this strategy directly protects the economic base from environmental degradation and aligns the sector with national climate resilience goals (GoS, 2018; Meylan et al., 2018; EU Switch-Asia, 2024).

- **Empower Communities through targeted education and inclusive engagement:**
  Launch awareness campaigns that explicitly link plastic pollution reduction to climate adaptation. Ensure community and stakeholder consultations are central to policy design to build ownership and avoid unintended consequences. This builds social resilience by equipping citizens as active agents of change and ensures that adaptation measures are socially inclusive and effective (University of Plymouth, 2024; Rapold et al., 2019; Singh & Biswas, 2023).

- **Enhance data collection and Regional Cooperation:**
  Improve waste data disaggregation to track SUP flows by sector (especially tourism). Strengthen regional alliances to address transboundary marine litter, share best practices, and advocate for global responsibility on plastic production. Accurate data is essential for evidence-based policymaking and measuring progress. Regional cooperation amplifies the voice of SIDS in confronting a global problem (UNEP, 2021b; Vogt-Vincent et al., 2023; Mohee et al., 2015)

9.2. FUTURE RESEARCH DIRECTIONS

Future research should bridge critical knowledge gaps on the environmental, health, and socio-economic impacts of SUP pollution. These studies would support evidence-based policymaking and guide sustainable, context-specific solutions for Seychelles and other SIDS. Future research directions can range from:

- **Plastic waste data and flows**: Improve disaggregated data on SUP imports, waste streams, and leakage pathways, particularly distinguishing between tourism, household, and industrial sources.

- **Health impacts of micro and nanoplastics**: Conduct longitudinal studies on human exposure through seafood and drinking water, and evaluate links to endocrine disruption, respiratory disease, and child health in SIDS contexts.

- **Economic cost-benefit analysis of alternatives:** Assess the affordability, scalability, and lifecycle impacts of biodegradable and reusable products in Seychelles, including implications for small businesses and consumers.

- **Plastic pollution and climate change nexus**: Explore how SUP-driven flooding interacts with climate change hazards (e.g. sea-level rise, storm surges) to refine integrated adaptation planning.

- **Tourism sector plastic footprint:** Quantify SUP consumption patterns in the tourism industry and pilot interventions (e.g., refill schemes, bulk dispensers) to evaluate effectiveness.

- **Social equity in plastic policy:** Investigate gendered impacts, affordability of alternatives, and livelihood effects to inform more inclusive policymaking.

- **Blue carbon ecosystems and plastic trapping:** Study the role of mangroves, seagrass beds, and wetlands in retaining plastics and how ecosystem restoration can mitigate pollution.

10. REFERENCES

Ali, M. M., Reale, P., Islam, M. S., Asaduzzaman, M., Alam, M., & Rahman, M. M. (2023). Plastic pollution in the aquatic ecosystem: An emerging threat and sustainable mitigation strategies. Current Opinion in Environmental Science & Health, 11, 1–20. https://doi.org/10.1016/bs.apmp.2023.06.010

Ambrose, K. K., Box, C., Boxall, J., Brooks, A., Eriksen, M., Fabres, J., Fylakis, G., & Walker, T. R. (2019). Spatial trends and drivers of marine debris accumulation on shorelines in South Eleuthera, The Bahamas using citizen science. Marine Pollution Bulletin, 142, 145–154. https://doi.org/10.1016/j.marpolbul.2019.03.036

APWC (Asia Pacific Waste Consultants) (2019). Vanuatu – Waste Data Report. Analysis of Waste Generation and Disposal Data Collected in November 2018. The Commonwealth Litter Programme, Vanuatu.
https://www.cefas.co.uk/clip/resources/reports/south-pacific-clip-reports/waste-data-report-vanuatu-apwc/

APWC (Asia Pacific Waste Consultants) (2020). Samoa. Plastic Waste free Islands. Synthesis of plastic pollution policies. https://iucn.org/sites/default/files/2023-08/samoa-synthesis-plastic-pollution-policies-10.pdf

APWC (Asia Pacific Waste Consultants) (2021). Plastic Waste National Level Quantification and Sectoral Material Flow Analysis: Pacific Regional Report. Gland, Switzerland: IUCN.
https://iucn.org/sites/default/files/2023-12/iucn-pwfi-regional-report-pacific-final-for-web_compressed.pdf

Barrowclough, D., Eugui, D.V.(2021), 'Plastic Production and Trade in Small States and SIDS: The Shift Towards a Circular Economy', International Trade Working Paper 2021/01, Commonwealth Secretariat, London.
https://production-new-commonwealth-files.s3.eu-west-2.amazonaws.com/migrated/inline/ITWP%202021_01_0.pdf

Binetti, U., Silburn, B., Russell, J., Van Hoytema, N., Meakins, B., Kohler, P., Maes, T. (2020). First marine litter survey on beaches in Solomon Islands and Vanuatu, South Pacific: Using OSPAR protocol to inform the development of national action plans to tackle land-based solid waste pollution. Marine Pollution Bulletin. 161;111827.
https://doi.org/10.1016/j.marpolbul.2020.111827

Buchmann, K., & Karami, A. M. (2024). Fish acanthocephalans as potential human pathogens. Current Clinical Microbiology Reports, 11(2), 99-106. https://doi.org/10.1007/s40588-024-00226-9

Clayton, C. A., Walker, T. R., Bezerra, J. C., & Adam, I. (2021). Policy responses to reduce single-use plastic marine pollution in the Caribbean. Marine Pollution Bulletin. 162;111833. https://doi.org/10.1016/j.marpolbul.2020.111833

Cooper, B., Letsinger, S. (2023) The impact of plastic pollution on urban flooding events: Estimating the number of people impacted globally. https://learn.tearfund.org/-/media/learn/resources/research-report/2023/2023-tearfund-research-report-plastic-pollution-and-flooding-full-en.pdf

de Souza Machado, A. A., Kloas, W., Zarfl, C., Hempel, S., & Rillig, M. C. (2018). Microplastics as an emerging threat to terrestrial ecosystems. Global Change Biology, 24(4), 1405–1416. https://doi.org/10.1111/gcb.14020

Diez, S. M., Patil, P. G., Morton, J., Rodríguez, D. J., Vanzella, A., Robin, D. V., Maes, T., & Corbin, C. (2019). Marine pollution in the Caribbean: Not a minute to waste. Washington, DC: World Bank Group. https://documents1.worldbank.org/curated/en/482391554225185720/pdf/Marine-Pollution-in-the-Caribbean-Not-a-Minute-to-Waste.pdf

Elgie, A. R., Singh, S. J., & Telesford, J. N. (2021). You can't manage what you can't measure: The potential for circularity in Grenada's waste management system. Resources, Conservation & Recycling, 164, 105170. https://doi.org/10.1016/j.resconrec.2020.105170

ETH Zürich, & University of Seychelles. (2016). Solid waste management in the Seychelles. https://www.research-collection.ethz.ch/server/api/core/bitstreams/6fd7e78d-637d-4ce6-b468-88f39b83d68e/content

EU Switch-Asia (2024). Country Profile: Plastic Policies in the Maldives. https://www.switch-asia.eu/site/assets/files/4222/plastic_policies_maldives_final-1.pdf

Fadel, M. (2021). Characterization of aerosols and their sources in East-Mediterranean sites under industrial influence (Doctoral dissertation, Université du Littoral Côte d'Opale; Université Saint-Joseph (Beyrouth). Faculté des Sciences). https://theses.hal.science/tel-04158204/

Failler, P. (2021) National Circular economy Framework and Guidance for Entrepreneurs for the Seychelles (Country Report). 177-192 IN IOC, SWIOFish2/AIODIS project. Circular economy in the African and Indian Ocean Developing Island States, Existing strategies, and state of play. Review Report. https://www.commissionoceanindien.org/wp-content/uploads/2023/06/Report1_Circular-Economy-Framework_ENG-FINAL.pdf

Fauna & Flora International. (2023). Marine plastics: A threat to biodiversity and conservation. Fauna & Flora International. https://www.fauna-flora.org/wp-content/uploads/2023/12/2023DEC11_Fauna-flora-Biodiversity-Briefing-Final-rev.pdf

Food and Agriculture Organization. (2016). Abandoned, lost, or otherwise discarded fishing gear. http://www.fao.org/3/a-i4798e.pdf

Food and Agriculture Organization. (2025). Fishery and Aquaculture statistics- Yearbook 2022FAO Yearbook of Fishery and Aquaculture Statistics. Rome. https://doi.org/10.4060/cd4312en

Foolmaun, R.K., Chamilall, D.S., Munhurrun, G., Sookun, A. (2021). Was Mauritius really successful in banning plastic carry bags, after promulgation of the regulation prohibiting plastic bags usage? Environment, Development and Sustainaibility. 23;11660–11676. https://doi.org/10.1007/s10668-020-01134-w

GESAMP. (2021). Sea-based sources of marine litter (Rep. Stud. GESAMP No. 108, 109 pp.). Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection. http://www.gesamp.org/publications/sea-based-sources-of-marine-litter

Global Facility for Disaster Reduction and Recovery (GFDRR). (2024). Urban flood risk management in the Pacific: Knowledge notes. https://www.gfdrr.org/sites/default/files/publication/UFCOP_Knowledge%20Notes_December%202017_Final.pdf

Global Plastics Policy Centre (2024) March A., Salam, S., Evans, T., Hilton, J., Fletcher, S. (eds). Global Plastics Policy Review. Revolution Plastics, University of Portsmouth. https://plasticspolicy.port.ac.uk/wp-content/uploads/2022/10/GPPC-Report.pdf

Gonzalves, C. (2023). Marine litter national source inventory report. Republic of Seychelles.

Government of Seychelles (GoS) (2011). Seychelles Sustainable Development Strategy 2012-2020. https://faolex.fao.org/docs/pdf/sey185105.pdf

Government of Seychelles (2017). Environment Protection Act 2016. Environment Protection (Restriction on manufacturing, importation, distribution, and sale of Plastic Bags) Regulations 2017. https://seylii.org/akn/sc/act/si/2017/37/eng@2017-06-30

Government of Seychelles (2017a). Environment Protection Act 2016. Environment Protection (Restriction on importation, distribution and sale of Plastic Utensils and Polystyrene Boxes) Regulations 2017. https://seylii.org/akn/sc/act/si/2017/38/eng@2017-06-30

Government of Seychelles (GoS) (2017b). Environment Protection (Restriction on importation, distribution and sale of Plastic Utensils and Polystyrene Boxes) Regulations, 2017. https://seylii.org/akn/sc/act/si/2017/

Government of Seychelles (GoS) (2018). Seychelles Tourism Master Plan.

Part 1: Situational analysis for a sustainable and responsible tourism. https://tourism.gov.sc/?ova_doc=7490

Government of Seychelles (GoS) (2019). Environment Protection Act 2016. Environment Protection (Restriction on the manufacturing, importation, distribution, and sale of Plastic Straws) Regulation 2019. https://seylii.org/akn/sc/act/si/2019/31/eng@2019-05-31

Government of Seychelles. (2020a). Seychelles National Climate Change Policy. Ministry of Environment, Energy and Climate Change. Republic of Seychelles.

Government of Seychelles (GoS) (2020b). Environment Protection Act 2016. Environment Protection (Environmental Levies on PET, Plastic and Glass Bottles and Cans) Regulations 2020. https://seylii.org/akn/sc/act/si/2020/81/eng@2020-07-01

Government of Seychelles (GoS) (2021). Environment Protection (Prohibition of Balloons) Regulations. https://seylii.org/akn/sc/act/si/2021/72/eng@2021-08-09

Government of Vanuatu (GoV) (2018). Plastic Ban. Department of Environmental protection and Conservation. https://environment.gov.vu/index.php/environmental-protection/plastic-ban#:~:text=On%201%20July%202018%20a,17%20of%202018.

Green Phenix (2024) Green Phenix
https://greenphenix.com/

Guittard, A., Akinsete, E., Demian, E., Koundouri, P.,Papadaki, L., Tombrou, X. (2023) Tackling Single-Use-Plastic in small touristic islands to reduce marine litter: co-identifying the best mix of policy interventions. Frontiers in Environmental Economics. 2:1145640.
https://doi.org/10.3389/frevc.2023.1145640

Gurav, M. T., Shinde, S. P., Nimbalkar, N. J., Jadhav, P. S., Zambare, D. N., & Wategaonkar, S. B. (2024). Air Pollutants from Sugar Industry Chimneys: Evaluating Environmental Hazards and Global Mitigation Strategies. https://doi.org/10.69626/csa.2024.0177

Hahladakis, J.N., Velis, C.A., Weber, R., Iacovidou, E. and Purnell, P. (2018). An overview of chemical additives present in plastics: Migration, release, fate and environmental impact during their use, disposal, and recycling. Journal of hazardous materials, 344, pp.179-199. https://doi.org/10.1016/j.jhazmat.2017.10.014

Hafiz, M., Singh, S. J., & Mohamed, S. (2024). Islands at the Brink: Country Brief: Maldives. RECOVER Working Paper 1. RECOVER. University of Waterloo, Canada

Hindle, J. (2019) Investing in the Blue Economy: How Should Impact Be Measured? Imperial College Business.

Intergovernmental Panel on Climate Change. (2022). AR6 WGII, chapter 15: Small islands. https://www.ipcc.ch/report/ar6/wg2/chapter/chapter-15/

ISLANDS (2025). ISLANDS. Green Growth Knowledge Partnership. https://www.gefislands.org/

Jeffery, L. (2020). Sustainable Mauritius? Environmental change, energy efficiency, and sustainable development in a small island state in the Indian Ocean. Climate and Culture, 177. https://www.jstor.org/stable/10.1163/j.ctv2gjx07k.15

Kaza, S., Yao, L., Bhada-Tata, P., & Van Woerden, F. (2018). At a glance: a global picture of solid waste management. What a waste, 2, 17-38. World Bank Publications, The World Bank Group, number 30317, April.

Krütli P., Nef, D., Zumwald, M., Haupt, M., Harlay, J, & Stauffacher M. (Eds.) (2018). Waste Management in the Seychelles – Pathways for Systemic Change. Appendix. USYS TdLab Transdisciplinary Case Study 2018. ETH Zürich, USYS TdLab. https://lwma.gov.sc/wp-content/uploads/2024/01/REPORT_ZURICH-2018.pdf

Krystosik, A., Njoroge, G., Odhiambo, L., Forsyth, J. E., Mutuku, F., & LaBeaud, A. D. (2020). Solid wastes provide breeding sites, burrows, and food for biological disease vectors, and urban zoonotic reservoirs: a call to action for solutions-based research. Frontiers in public health, 7, 405. https://doi.org/10.3389/fpubh.2019.00405

Lachmann, F., Almroth, B.C., Baumann, H., Broström, G., Corvellec, H., Gipperth, L., Hassellov, M., Karlsson, T. and Nilsson, P., 2017. Marine plastic litter on small island developing states (SIDS): impacts and measures. Technical Report, May 2017. Swedish Institute for the Marine Environment. https://doi.org/10.13140/RG.2.2.16168.37121

Lamb, J. B., Willis, B. L., Fiorenza, E. A., Couch, C. S., Howard, R., Rader, D. N., True, J. D., Kelly, L. A., Ahmad, A., Jompa, J., & Harvell, C. D. (2018). Plastic waste associated with disease on coral reefs. Science, 359(6734), 460–462. https://doi.org/10.1126/science.aar3320

Lawen, A., Lawen, J., & Turner, A. (2024). Beached plastic and other anthropogenic debris in the inner Seychelles islands: Results of a citizen science approach. Marine Pollution Bulletin, 201, 116176. https://doi.org/10.1016/j.marpolbul.2024.116176

Landscape and Waste Management Agency (2022). LWMA Waste Classification. https://lwma.gov.sc/wp-content/uploads/2024/02/LWMA-WASTE-CLASSIFICATION.pdf

Landscape and Waste Management Agency. (2024). Cleaning programme - more information. https://lwma.gov.sc/cleaning-programme-more-information/

Le Mauricien (2025, September 19). Amendments aux lois: Nouvelle etape dans l'interdiction des sacs plasticques.
https://www.lemauricien.com/actualites/societe/nouvelle-etape-dans-linterdiction-des-sacs-plastiques/684903/?

MacAfee, E. A., & Löhr, A. J. (2024). Multi-scalar interactions between mismanaged plastic waste and urban flooding in an era of climate change and rapid urbanization. Wiley Interdisciplinary Reviews: Water, 11(2), e1708. https://doi.org/10.1002/wat2.1708

Marcharla, E., Vinayagam, S., Gnanasekaran, L., Soto-Moscoso, M., Chen, W. H., Thanigaivel, S., & Ganesan, S. (2024). Microplastics in marine ecosystems: A comprehensive review of biological and ecological implications and its mitigation approach using nanotechnology for the sustainable environment. Environmental Research, 256, 119181. https://doi.org/10.1016/j.envres.2024.119181

Marsh, J. (2023, June 12). Nearly 220 million at risk from plastic-aggravated flooding: Study. Pollution. Earth.Org. https://earth.org/plastic-flooding/#:~:text=Poor%20solid%20waste%20management%20causes%20plastics%20to,report%20commissioned%20by%20Tearfund%20and%20Resource%20Futures

Meylan, G., Lai, A., Hensley, J., Stauffacher, M., Krütli, P (2018) Solid waste management of small island developing states—the case of the Seychelles: a systemic and collaborative study of Swiss and Seychellois students to support policy. Sustainable Waste Management 2018. Environmental Science and Pollution Research. 25:35791–35804. https://doi.org/10.1007/s11356-018-2139-3

Mihai, F. C., Gündoğdu, S., Khan, F. R., Olivelli, A., Markley, L. A., & Van Emmerik, T. (2022). Plastic pollution in marine and freshwater environments: abundance, sources, and mitigation. IN Emerging Contaminants in the Environment. Chapter 11. (pp. 241-274).
https://doi.org/10.1016/B978-0-323-85160-2.00016-0

Millette, S., Williams, E., & Hull, C. E. (2019). Materials flow analysis in support of circular economy development: Plastics in Trinidad and Tobago. Resources, Conservation & Recycling, 150, 104436. https://doi.org/10.1016/j.resconrec.2019.104436

Ministry of Agriculture, Climate Change and Environment (MACCE) (2023) Seychelles Third National Communication under the United Nations Framework Convention on Climate Change (UNFCCC)
https://unfccc.int/sites/default/files/resource/TNC%20FEB%202024%20-FINAL.pdf

Ministry of Agriculture, Climate Change and Environment (2025) Theory of Change 2025-2030. Republic of Seychelles.

Ministry of Environment, Energy and Climate Change of Seychelles (MEECC) (2018) Seychelles National Waste Policy 2018-2023

https://lwma.gov.sc/policies-and-strategies/

Ministry of Environment, Energy and Climate Change of Seychelles (MEECC) (2019) Seychelles Coastal Management Plan 2019 -2024

Ministry of Environment, Energy and Climate Change of Seychelles (MACCE) (2025).Waste Management. https://macce.gov.sc/environment-department/waste-management/

Ministry of Finance, National Planning and Trade (MFNPT) (2023) Seychelles National Development Strategy 2024 - 2028. http://www.finance.gov.sc/strategies

Mohee, R., Mauthoor, S., Bundhoo, Z. M., Somaroo, G., Soobhany, N., & Gunasee, S. (2015). Current status of solid waste management in small island developing states: A review. Waste management. 43:539-549. http://dx.doi.org/10.1016/j.wasman.2015.06.012

Mols, A., Van Breusegem, W., Fredrik Pitzner, Cowing, M. (2020) Solid Waste Masterplan for Seychelles (2020-2035)
https://lwma.gov.sc/wp-content/uploads/2024/01/STRATEGY_SOLID-WASTE-MASTER-PLAN-2020-2035.pdf

Moosa, L. (2021, March 31). Maldives national waste accounts 2018 & 2019: Final report. National Bureau of Statistics, Maldives. https://statisticsmaldives.gov.mv/nbs/wp-content/uploads/2023/06/Maldives_National_Waste_Account_Report_2018-19.pdf

Moshood, T. D., Nawanir, G., Mahmud, F., Mohamad, F., Ahmad, M. H., & Abdul Ghani, A. (2021). Expanding policy for biodegradable plastic products and market dynamics of bio-based plastics: challenges and opportunities. Sustainability, 13(11), 6170. https://www.mdpi.com/2071-1050/13/11/6170

National Bureau of Statistics (NBS) (2024). Merchandise Trade Q4 2024
https://www.nbs.gov.sc/downloads/38-economic-statistics/13-merchandise-trade/153-2024

Nnoko, J. E. (2024). Assessing the Impacts of Plastic Waste Pollution in Exacerbating Urban Flooding in Douala. https://www.theseus.fi/bitstream/handle/10024/876777/NNOKO_JOLES.pdf?sequence=2&isAllowed=y

Noman, M. A., Adyel, T. M., Trevathan-Tackett, S., & Macreadie, P. I. (2024). Plastic paradox in blue carbon ecosystems. Environmental Science & Technology, 58(10), 4469–4475. https://doi.org/10.1021/acs.est.3c08717

OECD (2023), Environment at a Glance in Latin America and the Caribbean: Spotlight on Climate Change, OECD Publishing,
Paris, https://doi.org/10.1787/2431bd6c-en.

Onyanta, A. (2016). Cities, municipal solid waste management, and climate change: Perspectives from the South. Geography Compass. 10(12). 499-513. https://doi.org/10.1111/gec3.12299

PAGE (2017). Industrial Waste Assessment in the Republic of Mauritius: Opportunities for Industrial Symbiosis. Inclusive and Sustainable Industrial Development Working Paper Series. WP15. https://downloads.unido.org/ot/99/24/9924326/WP15.pdf

Phillips, W., Thorne, E. (2011). Municipal solid waste management in the Caribbean: a benefit-cost analysis. ECLAC – Studies and Perspectives series – The Caribbean – No. 22 https://repositorio.cepal.org/server/api/core/bitstreams/4e2bf11d-8796-46af-bc19-9dada45a37d8/content

Polynext. (2025, May 20). How plastic waste fuels urban flooding. Urban Sustainability. Polynext Conference. https://polynextconf.com/how-plastic-waste-fuels-urban-flooding

Rapold, N. S., Krütli, P., & Hoffmann, V. (2019). A Pathway Towards the Implementation of an Electronic Waste Management System in Seychelles. https://ethz.ch/content/dam/ethz/special-interest/usys/tdlab/docs/education/theses/2019-msc-rapold.pdf

Rasheed, A. (2023). Status of plastic waste management in the Caribbean: A technical brief to inform Caribbean Member States at the INC negotiation meetings for an internationally legally binding instrument on plastic pollution. UNEP Cartagena Convention Secretariat.

Rosillo-Calle, F., & Woods, J. (2003). Individual Country Biomass Resource Assessment Profiles for Fiji, Kiribati, Samoa, Tonga, Tuvalu & Vanuatu. Apia, Samoa, South Pacific Applied Geoscience Commission (SOPAC), 83. https://prdrse4all.spc.int/system/files/TR0364_0.pdf

Sajjad, M., Huang, Q., Khan, S., Khan, M. A., Liu, Y., Wang, J., Lian, F., Wang, Q., & Guo, G. (2022). Microplastics in the soil environment: A critical review. Environmental Technology & Innovation, 27, 102408. https://doi.org/10.1016/j.eti.2022.102408

Seychelles Nation (2005). Reckless' burning, chemical use a concern. 25 April 2005. Seychelles Nation Newspaper (online). https://nation.sc/archive/210228/reckless-burning-chemical-use-a-concern?

Seychelles Nation (2024). LWMA urges public to join fight against illegal waste dumping. 11 January 2024. Seychelles Nation Newspaper (online). https://www.nation.sc/articles/20726/lwma-urges-public-to-join-fight-against-illegal-waste-dumping?

Simmons & Associates; Government of Barbados. (2015). Waste characterisation study for Barbados 2015: Final report. Project Management Coordination Unit, Ministry of Environment, and drainage https://www.barbadosparliament.com/uploads/sittings/attachments/b7fafa53eab7cd2cb9f2368bbb2aff5a.pd

Singh, S., & Biswas, M. K. (2023). Management strategies for single-use plastics: lessons to learn from Indian approach of minimizing microplastic waste. Environmental Science: Advances, 2(12), 1680-1695. https://doi.org/10.1039/D3VA00222E

Solomon Islands Government (SIG) (2023). Regulation to ban single use plastic products signed and gazetted. https://solomons.gov.sb/regulation-to-ban-single-use-plastic-products-signed-and-gazetted/

Sönmez, D., & Hocaoglu, C. (2023). Post-Traumatic stress disorder after natural disasters: A review. Duzce Medical Journal, 25(2), 103-114. https://doi.org/10.18678/dtfd.1277673

SPC (2025). SPC Statistics for Development Division. Stats by Country. Pacific Community.http://sdd.spc.int/

Stavridis, K., Triantafyllidou, O., Pisimisi, M., & Vlahos, N. (2022). Bisphenol-A and female fertility: an update of existing epidemiological studies. Journal of Clinical Medicine, 11(23), 7227. https://www.mdpi.com/2077-0383/11/23/7227

The Commonwealth (2025) Member Countries.
https://thecommonwealth.org/our-member-countries

The Seychelles National Climate Change Committee (SNCCC) (2009) Seychelles National Climate Change Strategy
https://faolex.fao.org/docs/pdf/sey191495.pdf

Thiemann, T. (2023). Microplastic in the marine environment of the indian ocean. Journal of Environmental Protection, 14(4), 297-359. https://doi.org/10.4236/jep.2023.144020

Tourism Department (2021) Seychelles Sustainable Tourism Label Operators manual. https://tourism.gov.sc/wp-content/uploads/2020/07/Operators-Manual-v1.6.pdf

UN (n.d). The Permanent Mission of Solomon islands to the United Nations.
https://www.un.int/solomonislands/

UNDRR (2024). Plastic Pollution and Disaster Risk Reduction. Issues Paper. March 2024
https://www.undrr.org/media/95808

UNEP (2018). Single-use plastics: a roadmap for sustainability, vol. 6. United Nation Environment Program. https://www.unep.org/resources/report/single-use-plastics-roadmap-sustainability

UNEP. (2019). Small Island Developing States waste management outlook. United Nations Environment Programme. https://www.unep.org/ietc/node/44

UNEP (2021a). Drowning in Plastics – Marine Litter and Plastic Waste Vital Graphics. https://www.unep.org/resources/report/drowning-plastics-marine-litter-and-plastic-waste-vital-graphics

UNEP. (2021b). From pollution to solution: A global assessment of marine litter and plastic pollution. United Nations Environment Programme. https://www.unep.org/resources/pollution-solution-global-assessment-marine-litter-and-plastic-pollution

UNEP (2023). Turning off the Tap How the world can end plastic pollution and create a circular economy. Nairobi
https://wedocs.unep.org/items/9f4bbf43-b869-4ae9-8da6-1dae44775e25

UNESCO. (2020). Expedition removes 25 tons of waste from Aldabra Atoll (Seychelles). World Heritage Convention. https://whc.unesco.org/en/news/2136

UN-Habitat. (2020). Pacific national urban policy report. United Nations. Retrieved August 26, 2025, from https://unhabitat.org/sites/default/files/2020/06/pacific_nup_report_web.pdf

University of Plymouth. (2024, April 23). Seychelles beach cleans demonstrate potential for citizen science to monitor marine litter. Phys.org. https://phys.org/news/2024-04-seychelles-beach-potential-citizen-science.html

van de Crommenacker, J., Soares, J. H., Larose, C. S., & Feare, C. J. (2022). Importation of plastic fragments into a seabird colony: Accident or design, threat or benign? Bird Conservation International, 32(4), 641–654. https://doi.org/10.1017/S0959270921000538

Villarrubia-Gomez, P., Almroth, B. C., Eriksen, M., Ryberg, M., & Cornell, S. E. (2024). Plastic pollution exacerbates the impacts of all planetary boundaries. One Earth, 7(12), 2119–2138. https://doi.org/10.1016/j.oneear.2024.10.017

Vogt-Vincent, N. S., Burt, A. J., Kaplan, D., Mitarai, S., Turnbull, L. A., & Johnson, H. L. (2023). Sources of marine debris for Seychelles and other remote islands in the western Indian Ocean. Marine Pollution Bulletin, 187, 114197. https://doi.org/10.1002/essoar.10512254.1

WAMCO (Waste Management Corporation Limited (2024). Monthly Waste Statistics Report - Greater Male Area.

Wang, K.C.M.; Lee, K.E.; Mokhtar, M. Solid Waste Management in Small Tourism Islands: An Evolutionary Governance Approach (2021). Sustainability. 13:5896. https://doi.org/10.3390/su13115896

Weiss, M (2024, May 24) Can the circular economy help the Caribbean win its war against waste? What we Need. SocialCommons. https://socialcommons.ca/2024/05/24/can-the-circular-economy-help-the-caribbean-win-its-war-against-waste-3/

Wesolowska, M., Yeates, A. J., McSorley, E. M., Watson, G. E., van Wijngaarden, E., Bodin, N., and Mulhern, M. S. (2024). Dietary selenium and mercury intakes from fish consumption during pregnancy: Seychelles Child Development Study Nutrition Cohort 2. Neurotoxicology, 101, 1-5. https://doi.org/10.1016/j.neuro.2023.12.012

Witczak, A., Przedpełska, L., Pokorska-Niewiada, K., & Cybulski, J. (2024). Microplastics as a threat to aquatic ecosystems and human health. Toxics, 12(8), 571. https://doi.org/10.3390/toxics12080571

World Bank and Ministry of Environment, Energy and Climate Change of Seychelles (2019) Seychelles Coastal Management Plan: 2019–2024. Washington, DC: World Bank; Victoria, Seychelles: Ministry of Environment, Energy and Climate Change of Seychelles. 2019. https://www.fao.org/faolex/results/details/en/c/LEX-FAOC191488/

World Bank. (2024). Seychelles imports of articles for packing of goods, of plastics (HS code 392390), 2023. World Integrated Trade Solution. https://wits.worldbank.org/trade/comtrade/en/country/SYC/year/2023/tradeflow/Imports/partner/ALL/product/392390

Xiang, Y., Lv, Y., Fu, W., Wen, J., Li, B., & Li, X. (2025). Maternal Phthalate Exposure and Allergic Diseases in Children: A Meta-Analysis and Network Toxicology. International Journal of Molecular Sciences, 26(13), 6103. https://doi.org/10.3390/ijms26136103

Yeo, S., Esler, S., Taaffe, F., Jordy, D., & Bonte-Grapentin, M. (2017). Urban flood risk management in the Pacific (UFCOP Knowledge Notes, December 2017). Global Facility for Disaster Reduction and Recovery. https://www.gfdrr.org/sites/default/files/publication/UFCOP_Knowledge%20Notes_December%202017_Final.pdf