



INDIAN OCEAN  
COMMISSION

**PREVENTION, REDUCTION AND CONTROL  
OF MARINE PLASTIC POLLUTION IN AFRICAN  
AND INDIAN OCEAN DEVELOPING  
ISLAND STATES (AIODIS)**

BACKGROUND DOCUMENT







# **PREVENTION, REDUCTION AND CONTROL OF MARINE PLASTIC POLLUTION IN AFRICAN AND INDIAN OCEAN DEVELOPING ISLAND STATES (AIODIS)**

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## Acronyms and Abbreviations

|            |   |        |   |
|------------|---|--------|---|
| 3RI        | 3R Initiative   | EoL    | End-of-life   |
| \$         | US dollar   | EPR    | extended product responsibility   |
| ABNJ/ BBNJ | areas beyond national jurisdiction/<br>biodiversity beyond national<br>jurisdiction | ETS    | European Trading System (for<br>carbon credits)   |
| AC         | Abidjan Convention  | EU     | European Union  |
| AIODIS     | Africa Indian Ocean Developing<br>Island States                                     | FAO    | Food and Agriculture Organisation   |
| AIR        | avoid, intercept, redesign  | FP     | focal point   |
| ALDFG      | abandoned lost or discarded<br>fishing gear   | GEF    | Global Environment Facility   |
| AMCEN      | African Ministerial Conference on<br>the Environment                                | GESAMP | Joint Group of Experts on the<br>Scientific Aspects of Marine<br>Environmental                              |
| APEC       | Asia-Pacific Economic Cooperation   | GG     | Gulf of Guinea  |
| AU         | African Union   | GAIA   | Global Alliance for Incinerator<br>Alternatives   |
| BAU        | business-as-usual   | GPA    | Global Programme of Action<br>for the Protection of the Marine<br>Environment from Land-based<br>Activities |
| BRC        | Basil and Rotterdam Conventions   | GPML   | Global Partnership on Marine Litter   |
| CBD        | Convention on Biological Diversity  | GRP    | glass-reinforced-plastic<br>(fibreglass)  |
| CE         | circular economy  | HDPE   | high density polyethylene   |
| CGF        | Consumer Goods Forum  | IEA(s) | international environmental<br>agreement(s)   |
| COMESA     | Common Market for Eastern and<br>Southern Africa                                    | IMO    | International Maritime<br>Organisation  |
| COP        | Conference of the Parties   | IOC    | Indian Ocean Commission   |
| ECCAS      | Economic Community of Central<br>African States                                     | IORA   | Indian Ocean Rim Association  |
| ECOWAS     | Economic Community of West<br>African States  | IOTC   | Indian Ocean Tuna Commission  |

|          |   |           |  |
|----------|---|-----------|--|
| IPR/IP   | intellectual property rights  | REC(s)    | regional economic commission(s)                                  |
| ISO      | International Standardisation Organisation                              | RSC(s)    | Regional Seas Convention(s)                                      |
| LBS/LBSA | land-based sources / land-based sources and activities                  | SADC      | Southern African Development Community                           |
| LBSMP    | land-based sources of marine pollution                                  | SCM       | WTO Subsidies and Countervailing Measures Agreement.             |
| LCA      | life-cycle assessment/ analysis   | SDGs      | Sustainable Development Goals                                    |
| LDC      | Less developed country  | SIDS      | Small Island Developing State(s)                                 |
| LDPE     | Low density polyethylene  | SUP       | single use plastic(s)  |
| MARPOL   | The International Convention for the Prevention of Pollution from Ships | SWM       | solid waste management   |
| MoU(s)   | Memorandum(a) of understanding  | TBT       | WTO Technical Barriers to Trade Agreement                        |
| MPP      | marine plastic pollution  | tons      | metric tons  |
| MR       | Mechanical recycling  | UN        | United Nations   |
| MSFD     | Marine Strategy Framework Directive (EU)                                | UNCED     | United Nations Conference on Environment and Development         |
| MSW      | municipal solid waste   | UNCLOS    | United Nations Convention on the Law of the Sea                  |
| NC       | Nairobi Convention  | UNDOA-LOS | United Nations Department of Ocean Affairs and Law of the Sea    |
| NGO(s)   | non-governmental organisation(s)  | UNEA      | United Nations Environment Assembly                              |
| NIMBY    | not in my backyard  | UNEP      | UN Environment Programme/ UN Environment                         |
| NMP      | Nano-Microplastics  | UNESCO    | United Nations Educational, Scientific and Cultural Organization |
| OECD     | Organisation for Economic Co-operation and Development                  | UNFCCC    | United Nations Framework Convention on Climate Change            |
| PA       | polyamide   | UNGA      | United Nations General Assembly                                  |
| PAH      | polycyclic aromatic hydrocarbon   | UNIDO     | UN Industrial Development Organisation                           |
| PBTs     | bioaccumulative and toxic compounds                                     | WEEE      | Waste electrical and electronic equipment                        |
| PC       | polycarbonate   | WEF       | World Economic Forum   |
| PCB      | polychlorinated biphenyl  | WFD       | Waste Framework Directive (EU)                                   |
| PE       | polyethylene  | WHO       | World Health Organisation  |
| PENAF    | Ports Environmental Network-Africa                                      | WIEGO     | Women in Informal Employment: Globalizing and Organizing         |
| PET      | polyethylene terephthalate  | WIO       | Western Indian Ocean   |
| POPs     | persistent organic pollutants   | WIOMSA    | Western Indian Ocean Marine Science Association                  |
| PP       | polypropylene   | WTO       | World Trade Organisation   |
| PPHMN    | Port Harbour Masters Network  |           |  |
| PS       | polystyrene   |           |  |
| PSMA     | Port State Measures Agreement   |           |  |
| PBTs     | persistent bioaccumulative and toxic compounds                          |           |  |
| PTER     | private transnational environmental regulation                          |           |  |
| PVC      | polyvinyl chloride  |           |  |

## Foreword

By Dr. Charlotte de Fontaubert, World Bank

We are pleased to be associated with the publication of these reports on the circular economy in the island states of Africa and of the Indian Ocean, which aim at accelerating a development that respects the environment and that is resilient to climate change. These documents, produced by the Indian Ocean Commission (IOC) as part of the implementation of the sub-component AIODIS of the second project on the Governance of fisheries and shared growth in the South-West Indian Ocean (SWIOFish2), deal with three important aspects of circular economy in the AIODIS countries: (i) the state of the circular economy, (ii) the questions of intellectual property with regard to innovative projects and (iii) the prevention, reduction and control measures of marine plastic pollution.

The World Bank has supported, since 2015, the countries of Africa and of the South-West Indian Ocean to meet the Sustainable Development Goals (SDGs) of the United Nations. To this end, we help several countries in their transition to a more sustainable ocean economy (SDG 14). The principle of blue economy is precisely a sustainable use of marine resources to stimulate economic growth, livelihoods and employment, while preserving the health of the ocean ecosystems. In that sense, the World Bank finances regional programmes on fisheries management in the islands of the Pacific, the Caribbean, West Africa and South-West Indian Ocean. It is in this context that lies our SWIOFish2 project in coordination with the IOC.

The first objective of the project is to assist these States to grasp and to increase the economic, social and environmental advantages of blue economy. This can be achieved by improving the management of their marine resources, namely by limiting the depletion of the fish stocks. This is also possible through an increase in alternative livelihood activities for targeted fishermen, and a reinforced regional cooperation in this sector.

With the sustainability of these resources under serious threat, addressing the sources of these multiple and interconnected threats requires us to rethink our entire economy. From the World Bank's perspective, this is why we are committed to supporting these states in their journey towards a circular economy that is best described as a restorative or regenerative industrial system by intent and design.

We are confident that by pooling their experiences and their initiatives through the AIODIS cooperation mechanism, these States will be able to better face their common challenges. Overcoming these challenges will require the use of sufficient technical and financial means coming from institutional frameworks and infrastructure conducive to the development of a circular economy. Thus, it was essential to identify them for each country, so as to set up the foundations of a framework that is adapted to different socio-economic contexts. Endowed with this new knowledge, we can henceforth move forward together towards a circular economy that brings sustainable and inclusive growth opportunities.

## Foreword

### **Plastic: a marker of our times and a responsibility for action**

By Prof. Vêlayoudom Marimoutou,  
Secretary General of the Indian Ocean Commission

**“The obligation to suffer gives us the right to know.”  
Jean Rostand**

Biologist Commoner draws our attention on one of the characteristics of human action: *"its capacity to produce materials that cannot be found in nature"*, and therefore *"to introduce in the system substances that are utterly unknown to it"*. The great circular economy of nature, in which *"nothing is lost, but everything is transformed"*, is more and more upset and disturbed by human manoeuvres.

The Modern world is also a world of pollution and, as Barnosky said in 2014, today *"there are few places on earth that are not affected by man-made environmental pollutants. It is common to find traces of pesticides and industrial pollutants in samples of soil and tree bark of any forest in the world, in whales' fat, in the body of polar bears, in fishes of most of the rivers and oceans"*. Pollution has become one of the major problems of our times; local or global, of agricultural, industrial or urban origin, it contaminates the lands, the waters and the atmosphere, jeopardising the health of the ecosystems and thereupon that of humans.

### **Plastic is emblematic of pollution in general**

In 2016, J. Zalasiewikz and his colleagues propose to use plastic as an emblematic signature of the general pollution of the Earth's ecosystem characterising the Anthropocene epoch. Plastics are polymers manufactured from petrochemicals, although some are made from cellulose (8% of petrol extracted on the planet, half as raw material). Adapted to multiples uses, plastic impresses with its theoretical capacity to infinite recycling and to the promise of saving natural resources, and because of its hygienic qualities which led to its adoption in pharmacies and hospitals. From the 1950s onwards, it has grown with mass consumption, on the back of synthetic materials and on the rising production of disposable items. It has rapidly become an essential component of electronics and informatics.

Despite its theoretical infinite recycling capacity, we are far from the mark: it is estimated that 50% is recycled or converted into energy (pyrolysis), the proportion recycled being 15% to 25% in Europe and less than 5% in the USA. We therefore have an idea of the amount of plastic debris dispersed each year, in the form of fragments smaller than 5 mm, or even nano plastics, in the environment. Lightweight, easily transported by wind or water, plastic debris has invaded the entire planet, including the oceans, where it is dispersed from the surface to the bottom of ocean basins. The lightest plastics form areas of highest concentration around the 5 major ocean gyres. They represent a total of 25,000 tonnes of floating debris on the sea surface.



### **Invasion, resistance and toxicity**

The problem posed by this pollution is two-fold.

The first is its resistance. Depending on their composition, the degradation of plastics takes between 50 years and 5 centuries, or even millennia for debris to sink to the deep seabed. If we take into account both this resistance to degradation and the 5 to 13 million tonnes of debris that reach the world's oceans each year, we can see the scale of the problem we are building. And according to B. Montsaignon, 'bioplastics' cannot provide a real solution: their manufacture from plant materials does not guarantee the biodegradability of polymers, and moreover it increases industrial pressure on agricultural land; as for those that are claimed to be compostable or fragmentable, they are still derived from petrochemical products.

Second is its toxicity: 50% of the chemical components of plastics are classified as hazardous by the United Nations classification system for chemicals. Studies have also shown the ability of additives used in PVC to pass into the human bloodstream, as well as the carcinogenic risks of certain components of PVC, polystyrene, polyurethane and polycarbonate. Similarly, biologists have warned of the risks that plastic debris poses to fauna, from micro-organisms to whales or seabirds, which are part of the food chain right up to our plate.

### **Rethinking the models, blue and circular**

So, what should we do?

Regeneration, reinvention and restoration form a new framework for action to (re)think our strategies, to innovate and to provide solutions to this global challenge, which raises significant local issues in island territories. It is not a question of going to war against plastic, which has proved to be a useful, practical and inexpensive material. It is a question of analysing our relationship with this material, of defining new ways of consuming and producing it, and of developing innovative ways of disposing of it and reducing the pollution generated on our coasts and at sea.

To address the multifaceted challenge of marine plastic pollution in the islands of Africa and the Indian Ocean, the IOC and the World Bank, through the AIODIS component of the IOC-SWIOFish2 project, are publishing three studies on i) the state of the art of the circular economy, ii) intellectual property issues on innovative projects and iii) measures to prevent, reduce and control marine plastic pollution. We hope that they will prove useful to policy makers, entrepreneurs, and developers in the blue and circular economy sectors.

## Introduction

This is a background study for prevention, reduction and control of marine plastic pollution in Africa Indian Ocean Developing Island States (AIODIS). The AIODIS included in the study are: Cape Verde, Comoros, Guinea Bissau, Madagascar, Maldives, Mauritius, São Tomé and Seychelles. La Réunion is a member of the AIODIS group, but is not included in the study. The study has a particular focus on development of sensitisation strategies and the role of the circular economy.

**Part I** summarises global and regional characteristics of marine plastic pollution (MPP). It describes the complexity of the MPP problem and the challenges facing governments, industries and consumers. It describes the scale of the problem, the nature of plastics, the structure of the plastics economy and global trade in plastics. It quantifies the impacts on economies and on the environment and on biodiversity. Part I sets out the problem of MPP in the context of international law, describes initiatives to build an international convention to prevent, reduce and control plastic waste, and briefly describes actions under two regional seas conventions.

**Part II** addresses marine plastic pollution in AIODIS and builds on inputs from AIODIS stakeholders through Country Working Papers.

**Part III** describes the range of approaches and initiatives to prevent, reduce and control marine plastic pollution, with specific reference to the circular economy, to building awareness and to the challenges in AIODIS and small/ island economies.

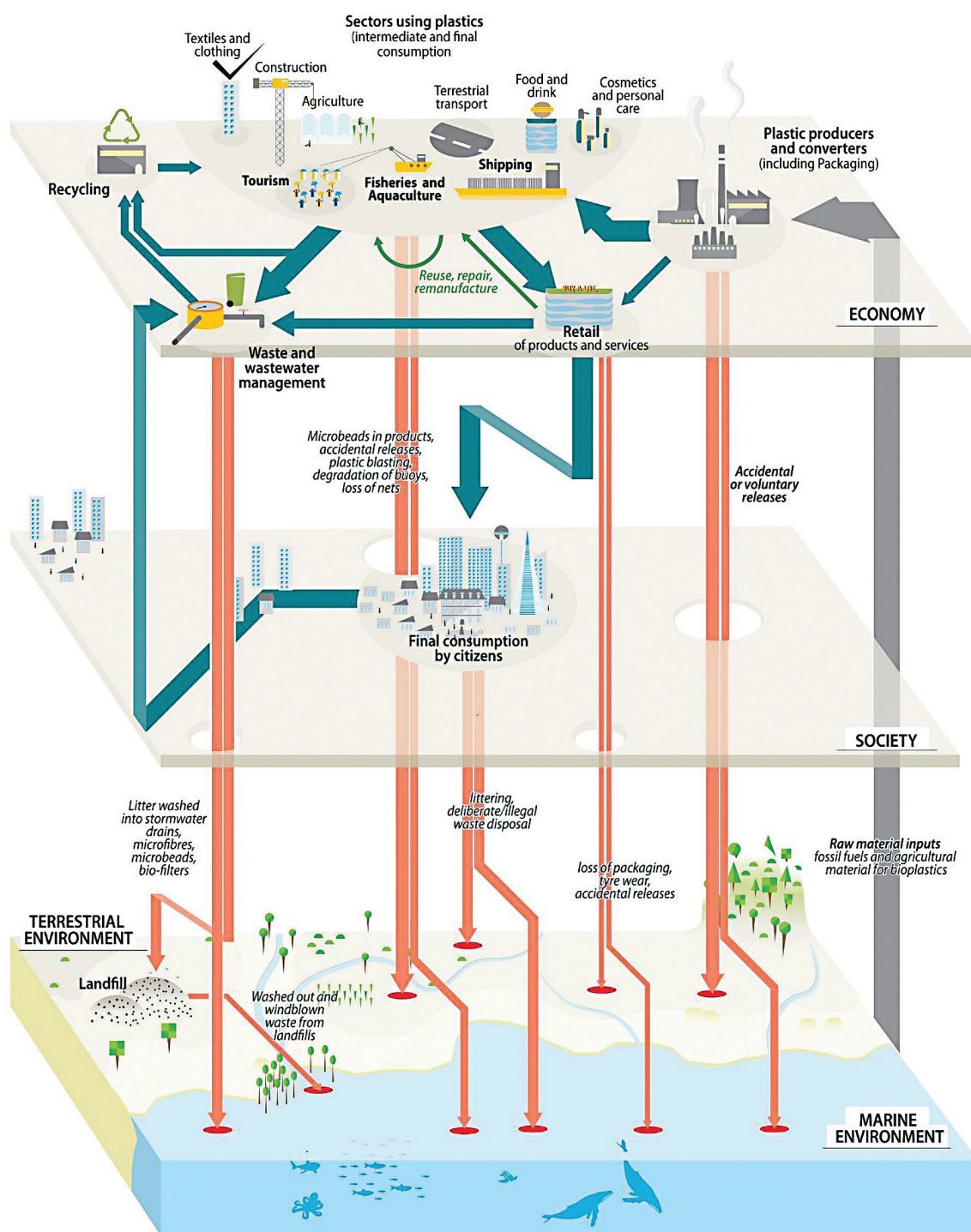
The report sets out and builds on several conclusions:

- a clear understanding of the integrated nature of the problem of MPP is important for development of a national action plan to combat MPP
- public awareness of the problem is fundamental to building the political willingness for actions, as actions can incur costs for consumers, for businesses, for local authorities and to public finance
- consumers and businesses need to be engaged through stakeholder consultation and participation
- MPP is part of a more general waste management problem, in particular, the management of urban solid waste and waste generated by shipping and fisheries activities
- governments will require coherent policies, regulatory measures, public support for waste management, incentives for changes in consumer and business behaviours and support for innovation in and adoption of the circular economy in the business community
- in the AIODIS, national resources and efforts may need to be supplemented by external financial resources, including for private sector investment and technologies
- national actions should ideally be complemented with regional and global actions to be effective, as the problem of MPP is global, requiring actions across sectors and economies
- given the small size of many AIODIS economies, actions to combat MPP can benefit from a regional approach on trade in plastics and plastic waste which may generate the economies of scale and opportunities for a circular economy approach.

This report is a companion report for other reports to be prepared under this project. These other reports will examine the role of the circular economy in addressing plastic waste and plastic pollution in more detail and will also examine intellectual property rights, particularly those associated with circular economy technologies and initiatives.

This work is financed by the World Bank under the 'Promotion of African & Indian Ocean Island Developing States Blue Economy' component of the regional 'South West Indian Ocean Fisheries Governance and Shared Growth Project' (SWIOFish2). The component is managed by the Indian Ocean Commission.

**Figure 1. How plastic pollutes the marine environment**



Source: Grid Arendal, Riccardo Pavettoni

## EXECUTIVE SUMMARY

### Key Messages

The **objective** of the study is to compile and present information on key aspects of marine plastic pollution to enable AIODIS to consider national and regional actions to combat marine plastic pollution with particular emphasis on awareness and the circular economy.

#### A. What is the Marine Plastic Pollution problem?

1. Marine Plastic Pollution (MPP) is growing in AIODIS and worldwide. There are numerous social, economic and environmental impacts. The impacts are complex, cumulative, largely irreversible and difficult to quantify.
2. MPP results in estimated global losses of over \$2 billion/year. The losses are disproportionately suffered by island economies. Losses for AIODIS have not been estimated but are considered significant, particularly for tourism, public health and the cumulative loss of ecosystem function.
3. MPP is part of a more general solid waste management (SWM) problem, in particular the management of urban solid waste and waste generated by shipping and fisheries.
4. Global, regional and national actions are not significantly halting or reversing global MPP.
5. Multiple actions across the entire plastics value chain with greater commitments by business stakeholders and concerted international actions are considered fundamental to effectively prevent, reduce and control MPP.

#### B. How are AIODIS combatting Marine Plastic Pollution?

1. Countries are developing increasing awareness of 'the plastics problem'. All AIODIS have introduced restrictions on single-use-plastic bags. All countries have beach clean-up activities.
2. Only one country has a comprehensive action plan on MPP.
3. Only South Asia has a regional action plan on marine debris.
4. There are no regionally binding measures on MPP and no regional agreements facilitating sustainable trade in plastic waste.
5. The implementation and effectiveness of the two existing regional protocols on land-based sources of marine pollution has not been evaluated in relation to MPP.
6. All countries face technical, resourcing and institutional fragmentation challenges with respect to SWM. Deficient solid waste management (SWM) is the major cause of MPP.
7. There is limited business engagement in combatting MPP. Circular economy initiatives and extended producer responsibility schemes are in their infancy.

## **C. What more can be done to prevent, reduce and control MPP?**

### **National actions**

1. Countries can develop implement comprehensive national MPP action plans.
2. The plan should be an integral part of the national SWM plan, engage stakeholders across the plastics value chain, link to the national vision, the SDGs, and to relevant national environmental, social and economic initiatives.
3. The plan should have a strong regional cooperation component and address trade issues.

### **Regional actions**

1. MPP requires global and regional cooperative efforts, as the problem and the solutions are beyond the capabilities of single countries.
2. Actions at all levels will benefit from enhanced regional cooperation.
3. Ideally, regional action plans should be prepared with effective engagement of the regional economic communities and organisations.
4. A regional action plan should include a trade dimension, help access resources and finance, and help establish a regional position on MPP.
5. Ideally, the action plan should foster development of a binding agreements on measures to combat MPP.

## 8 Seychelles

### 8.1 Marine plastic pollution in Seychelles

Although Seychelles pursues a range of actions to curb plastic pollution, Seychelles does not currently have a comprehensive national strategy to address marine plastic pollution (MPP).<sup>315</sup> This report is a first step to estimate the scale of MPP, to describe the sources of MPP and to develop a national dialogue and action plan on MPP. It places particular emphasis on the existing solid waste management system and awareness-building initiatives; on environmental sustainability policies, on development of the circular economy, on regional cooperation and on identifying practical steps to combat MPP. The report is a working paper intended as a basis for stakeholder consideration and to be used to develop more in-depth analyses, to help align existing activities in Seychelles, to identify possible gaps and areas requiring additional efforts.

#### 8.1.1 Sources of marine plastic pollution

There are three main sources of MPP in Seychelles:

- mismanaged, or unmanaged solid waste and litter - the most important
- marine sources - mainly local and foreign fishing activities, shipping and tourism, and
- plastics that may be transported by ocean currents from other countries.

The different sources are discussed in more detail below. Plastic waste is part of a broader waste management problem, one of a range of sustainable development challenges faced by Seychelles. The following sections provide a preliminary estimate of marine plastic pollution (MPP) in Seychelles and provides a synthesis of available information on MPP, including on microplastic marine pollution.

#### 8.1.2 Estimate of marine plastic pollution and its basis

MPP is estimated primarily as a function of mismanaged land-based solid waste in Seychelles with some additions to reflect the marine sources.<sup>316</sup> The estimate of MPP relies on several assumptions, based on population, on solid waste generation, on the proportion of plastic in the waste and the amount of mismanaged plastic waste that is transported into the marine environment. The basis for these assumptions is set out below. Alternative approaches to estimating mismanaged plastic waste have not been explored at this stage.<sup>317</sup>

MPP in Seychelles is estimated at about 400 tons per year (Table 1). The information sources and assumptions are provided in the table or in the following text. As additional or more accurate information becomes available, this preliminary estimate can be adjusted accordingly.

<sup>315</sup> MPP is generally considered to account for about 80 percent of marine litter or debris. Jambeck et al. (2019) suggested the development of a 'marine litter action plan' for Seychelles.

<sup>316</sup> See Jambeck et al., 2014 for a description of the methodology.

<sup>317</sup> Cordier, M. et al, 2020. Plastic pollution and economic growth: the influence of corruption and the lack of education. 2020. <https://hal.archives-ouvertes.fr/hal-02862787..>

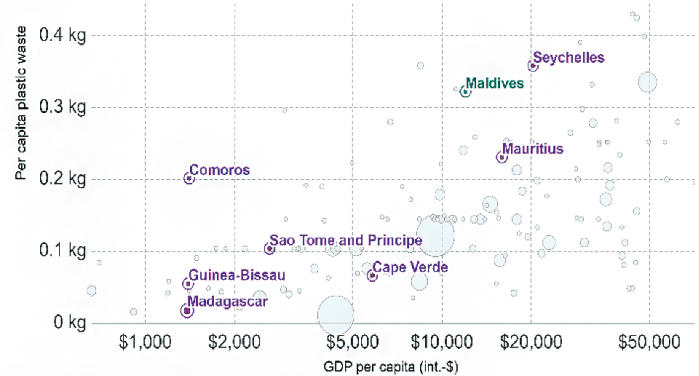
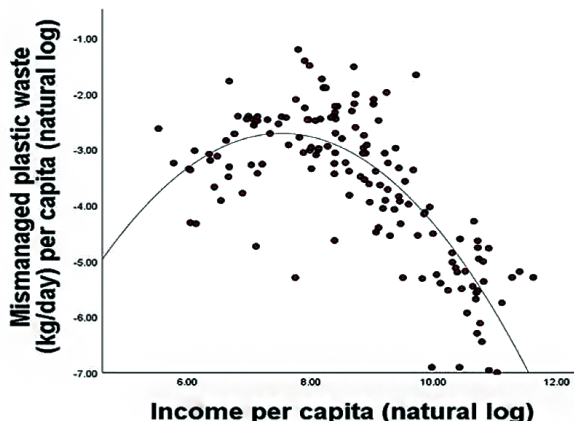
**Table 19. Estimated marine plastic pollution in Seychelles**

| Item   | Total      | Source/ Assumption                             |
|--|------------|--|
| <b>Land-based sources (LBS)</b>                      |            |  |
| Population   | 98,000     | World Bank 2020 (projection); 100% coastal     |
| Waste average (kg/person/day)                        | 1.6        | World Bank, What a Waste 2.0; see text         |
| Total waste (tons/year)                              | 56,159     | calculation                                    |
| Plastic (%) of waste                                 | 10%        | assumption, see text                           |
| Plastic waste (tons/year)                            | 5,616      | calculation                                    |
| Mismanaged plastic waste (%)                         | 5%         | assumption, see text                           |
| Mismanaged plastic waste (tons/year)                 | 281        | calculation                                    |
| Transport to marine environment (%)                  | 50%        | Assumption (100% os Seychelles is 'coastal')   |
| Less beach/ coastal marine debris/ litter collection | -10%       | assumption based on Jambeck 2019.              |
| MPP from mismanaged solid waste (tons/year)          | 112        | calculation                                    |
| plus microplastics (tons)                            | 17         | see table 2                                    |
| Total from LBS (tons/year)                           | 129        | calculation                                    |
| <b>Marine sources</b>                                |            |  |
| Domestic shipping (tons/year)                        | 2          | assumption domestic shipping / port operations |
| Domestic fisheries (tons/year)                       | 26         | assumption, based on import of nets (as proxy) |
| <b>Non-Seychelles ocean sources</b>                  |            |  |
| International shipping                               | 5          | assumption (shipping in transit through EEZ)   |
| Foreign fishing                                      | 236        | assumption                                     |
| MPP from ocean currents                              | 5          | assumption                                     |
| <b>Estimated MPP (tons/year)</b>                     |            |  |
| - domestic sources                                   | 157        | calculation                                    |
| - foreign sources                                    | 246        | calculation                                    |
| <b>TOTAL (tons/year)</b>                             | <b>403</b> | calculation                                    |

There is a relationship between plastic waste and income levels (Figure 1).<sup>318</sup> In Seychelles, tourism is a major generator of plastic waste and while tourism has temporarily declined, this may be slightly offset by the increase in the use of plastics to combat the pandemic.

<sup>318</sup> Barnes, Stuart J. 2019. Understanding plastics pollution: The role of economic development and technological research. *Environmental Pollution* 249, December 2019. <https://www.sciencedirect.com/science/article/abs/pii/S0269749119306505>

**Figure 41. Relationship between income and mismanaged plastic waste**



Source: Jambeck et al. (2015) & World Bank – WDI

Sources: Barnes, 2019; Jambeck, et al. 2015.

### 8.1.3 Mismanged solid waste

The Seychelles has 115 islands has a population of over 98,000 (2020), of which 56 percent are considered urban (2019).<sup>319</sup> Population density is 214 per km<sup>2</sup> for a total land area of 460 km<sup>2</sup>. For the purposes of the MPP estimate, the entire population is considered to be 'coastal'. This means that mismanaged plastic waste in any part of Seychelles could potentially be transported to the sea by rain, flooding, wind, or by deliberate dumping or littering on the shore, or at sea.

The country generates an estimated 56,000 tonnes of waste per year, which is projected to increase as a function of population growth and tourism.<sup>320</sup> The Solid Waste Masterplan (2020-2035) projects an increase from 48,000 to 60,000 tons/ year over the plan period.<sup>321</sup> LWMA provides a value of 51,554 tons of municipal and commercial waste alone for 2020 and indicates total waste of over 95,000 tons/ year (including scrap metal green waste and other wastes). LWMA indicates that over 41,000 tons was received at the Providence waste dump in 2019, of which 88 percent was from Mahé (9 percent and 3 percent from Praslin and La Digue respectively). The Ministry of Environment indicates that 70,000 tons of waste is generated per year and estimates of waste received at Providence ranges as high as 75,000 tons in 2010.<sup>322</sup> As indicated above, a value of 56,000 tons is used for the purposes of the MPP estimate and could be adjusted as may be required. There is reported to have been a 100 percent increase in waste dumped during the last 15 years.<sup>323</sup>

There are no official values on municipal waste collection efficiency. The Solid Waste Masterplan for Seychelles (2020-2035) assumes a rate of 90 percent efficiency (apparently based on a 2016 study by ETH).<sup>324</sup> However, in addition to the formal waste collection, informal waste collection is significant as 'waste pickers' benefit from a number of schemes that enable payment for used aluminium cans and PET bottles. An older study suggested that PET bottles collected and recorded at the redeem

<sup>319</sup> World Bank, 2020. <https://data.worldbank.org/>.

<sup>320</sup> Based on 1.57kg/cap/day (World Bank, What a Waste 2.0, 2018), a value which is used for the purposes of this study. A lower value is provided for 'municipal waste generation' in the Solid Waste Masterplan for Seychelles (2020-2035), which assumes that the rural population generate less waste (or that the rural organic waste does not enter the 'formal' waste management/ collection system). A 2017 study (Darmstadt University) suggested a rate of 2.45 kg/cap/day for Mahé. A definitive value for waste generation is difficult to establish.

<sup>321</sup> COWI, 2020. Solid Waste Masterplan for Seychelles (2020-2035).

<sup>322</sup> <http://www.meecc.gov.sc/index.php/what-we-do/waste-management/>.

<sup>323</sup> Presentation, Victoria Alis (The Ocean Project Seychelles) citing TdLab, 2018.

<sup>324</sup> Lai A., Hensley J., Krütli P., & Stauffacher M. (Eds.) (2016). Solid Waste Management in the Seychelles. USYS TdLab Transdisciplinary Case Study 2016. ETH Zürich, USYS TdLab.



centre originated in equal shares from the informal sector, from households and businesses. Given the important informal sector and that most if not all hotel waste is effectively managed, waste collection efficiency is assumed to be 95 percent, meaning that 5 percent of waste is considered 'mismanaged'. MPP can result from illegal dumping, 'accidental' leakage during waste collection/ disposal, or littering and it is assumed that all mismanaged plastic waste can be washed into the marine environment. A 2019 study suggests that some of the leakage of litter to the marine environment may be offset by beach and urban clean-ups.<sup>325</sup> The 5 percent leakage of mismanaged waste has been adjusted to reflect this activity (an assumed 20 percent reduction).

Studies suggest that between 9.7 percent and 13 percent of municipal solid waste is plastic. However, some studies exclude 'green waste' (i.e., from garden maintenance) and these values probably refer to household waste that excludes some green waste which may be composted at household level. A value of 10 percent is used for the purposes of this estimate, but the recent introduction of bans on some plastics may significantly reduce this proportion in the near future.

#### 8.1.4 Management of solid waste

The Ministry of Environment, Energy and climate Change is responsible for the development and the implementation of all waste management policy, legal and regulatory frameworks. The Landscape and Waste Management Agency (LWMA) is the Agency responsible for the cleaning and beautification of Seychelles. Waste Management Trust Fund (WMTF) coordinates the levy on aluminium cans and PET bottle at six redeem centres. A number of NGOs are active in addressing plastic pollution, engaged in policy and advocacy, in beach clean-ups or development of alternative products. The tourism industry is also prominent in efforts to combat MPP.

Various studies have identified several issues. These include:

- the high quantities of packaging waste and consumer plastic per person
- the limited capacity for landfill<sup>326</sup>
- lack of waste separation at household level
- cost of transport of waste from islands to the landfill site on Mahé.

A limited number of waste management companies undertake waste collection and disposal.<sup>327</sup> Some households compost bio-waste and several industries have specific means of waste disposal and may transport waste to the only managed sanitary landfill site where all unused, or non-recycled waste is disposed.<sup>328</sup> A ban on single use plastic bags came into force in 2017 and has reduced the amount of plastic waste disposed at the landfills.

<sup>325</sup> Jambeck, J.R. et al. 2019. Seychelles Circularity Assessment Protocol (CAP): Plastic Leakage Results and Recommendations A Report to the World Bank. <https://documents1.worldbank.org/curated/en/615801576750964577/pdf/Seychelles-Circularity-Assessment-Protocol-Plastic-Leakage-Results-and-Recommendations-A-Report-to-the-World-Bank.pdf>

<sup>326</sup> While methane emissions from landfill are included in the Seychelles NDC under the Paris Agreement, the extent to which planned mitigation measures have been implemented is unclear.

<sup>327</sup> E.g., <http://www.wastea.sc/>.

<sup>328</sup> Seychelles export of plastics was US\$255,000 during 2019 (Comtrade).

Figure 42. Forms of waste management



### 8.1.5 Plastic pollution on beaches

There is a negative relationship between the amount of beach litter and beach visits, which potentially can influence the image of Seychelles as a tourist destination.<sup>329</sup> Local authorities, hotels and NGOs organise beach clean-ups and awareness events on keeping Seychelles' beaches clean (Figure 3). The NGOs and initiatives involved include: the Island Conservation Society (ICS), the Seychelles Islands Foundation (SIF), the Ocean Project Seychelles (TOP), Dive against Debris and Parley. For example, the Ocean Project hosted over 40 coastal clean ups, engaging 1200 volunteers that collected over 8 tons of beach/ marine debris. The LWMA and the Seychelles Sustainable Tourism Foundation (SSTF) hosted the "Seychelles' Biggest Beach Clean Up", where plastic comprised 51 percent of the debris by number of items. Plastic comprises over 55 percent of items on all clean-ups: almost 2 kg of debris per kilometre of beach.<sup>330</sup> In general, plastic from food and drink containers dominate the 'urban' beaches, while fishing gear and flip-flops tend to dominate the marine debris collected on the outer islands.

Figure 43. Beach clean-up, FAD removal, and marine debris removal from Aldabra



The clean-up operation on Aldabra atoll is of particular note. About 3.5 tons of marine debris was collected and removed at a cost of \$8,900 per tonne. About 70 percent (by weight) of the debris was plastic, 83 percent of which was attributed to fisheries and 7 percent comprised flip-flops originating from outside the Seychelles. An estimated 513 tons of marine debris remains on Aldabra. Its removal from the World Heritage site would cost an estimated \$4.68 million.<sup>331</sup>

<sup>329</sup> Brouwer, R. 2017. The Social Costs of Marine Litter Along the European Coasts March 2017. Ocean & Coastal Management 138:38-49.

<sup>330</sup> <https://www.coastalcleanupdata.org/>.

<sup>331</sup> Burt, A.J., Raguain, J., Sanchez, C. et al. 2020. The costs of removing the unsanctioned import of marine plastic litter to small island states. Sci Rep 10, 14458.

### 8.1.6 Fisheries

As there is no direct information on MPP from fisheries in Seychelles, the estimate given in Table 1 should be considered as a 'place-holder' until such time as further information is available. Both local small-scale and large-scale fisheries and foreign fishing are potential sources of MPP through lost gear and at-sea garbage disposal.<sup>332</sup> The import of fishing nets is used as a proxy for generation of MPP from fisheries, i.e., from lost nets, lines, ropes, buoys, fish containers, FADs and degradation of GRP (fiberglass) vessels. In 2018, Seychelles import of nets (HS 56811) was over 1,300 tons.<sup>333</sup> A significant proportion of the imported fishing gear is destined for the domestic and foreign tuna purse seine fleet, where losses of netting is low and some waste netting is collected for recycling and export from Seychelles. Nevertheless, there is a significant loss of purse seine FADs and longline gear (buoys, lines) within the Seychelles EEZ which is the most heavily fishing EEZ in the region.<sup>334</sup> It is assumed that 1 percent of the imports are used for domestic non-tuna fisheries and 9 percent of the imports are used by the Seychelles tuna fleet. Assuming 20 percent annual loss of fishing gear, the domestic fishing industry is estimated to generate 26 tons/ year of MPP. On this basis, and assuming a similar loss of gear, the foreign tuna fishing activities generate an additional 236 tons/year of MPP.

Recorded exports of netting from Seychelles is low but recorded exports of plastic waste (which may include netting) are in the order of 500-700 tons/year. The Seychelles Department of Blue Economy in collaboration with the Organisation of Frozen Tuna Producers (OPAGAC) and the Seychelles Fishing Authority are studying the scale of the issue and options to reduce/reuse/recycle waste netting and fishing gear.<sup>335</sup>

### 8.1.7 Shipping

Galley waste from shipping can be a source of MPP, particularly if the waste disposal arrangements at ports are inadequate. Most major ports have waste reception facilities and implement the controls required under MARPOL Annex V. There are no reported irregularities regarding the access to waste disposal in AIODIS main ports. In addition, in some countries, growing offshore oil/gas exploration activities can be a source of MPP and effective waste management may require to be specified or included in any revisions of the legislation on marine pollution or in the terms and conditions of concessions. The cruising industry may also generate significant waste, though in general, cruise lines adhere to MARPOL rules.

**Figure 44. Shipping, scrapped GRP boats and tourism are sources of MPP**



<sup>332</sup> FAO, 2016. Abandoned, lost and discarded gillnets and trammel nets: methods to estimate ghost fishing mortality, and the status of regional monitoring and management. FAO Technical Paper No. 600. Rome. Italy.

<sup>333</sup> <https://wits.worldbank.org/trade/comtrade/en/country/ALL/year/2018/tradeflow/Exports/partner/SYC/product/560811#> .

<sup>334</sup> This is also evidenced by a study on marine debris on Aldabra atoll, where 80% of the debris was fishing gear.

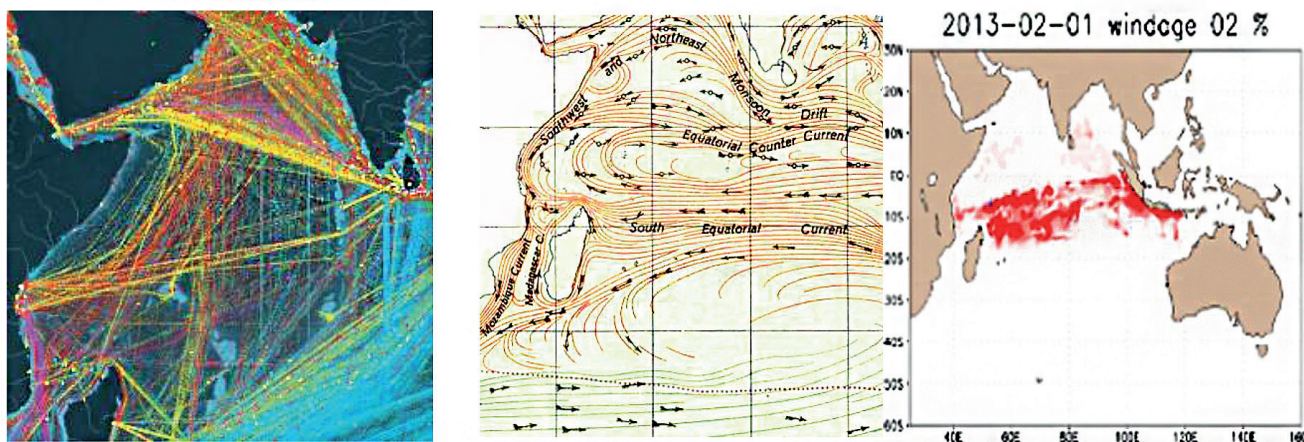
<sup>335</sup> <http://www.seychellesnewsagency.com/articles/15261/Seychelles+looks+to+re-use%2C+recycle+fishing+nets%2C+saving+landfill+space>

Comprehensive information on MPP from shipping and from non-Seychelles sources is not available. The values in Table 1 are placeholders which can be replaced with estimates based on any future assessments. In addition to MPP from shipping, the construction and disposal of fiberglass (GRP) boats for fishing or leisure is a potential source of MPP, particularly as GRP presents difficulties in recycling (Figure 4). Disposal of GRP boats can be costly, such that owners may allow boats to sink or 'rot' on the beach. A range of other plastics are also used in the marine sector – marine paints, pontoons, sails, cordage and products used in ship and vessel repair or maintenance and all contribute to MPP.

### 8.1.8 Ocean current and MPP

Quantification of the external sources of MPP is challenging. A distinction must be made between MPP present in the EEZ (e.g., suspended in the water column) and beached MPP (lying on the shore), which may not be representative of MPP as a whole. Several studies (on Aldabra, Alphonse Islands (Seychelles) and similar studies on St. Brandon (Mauritius) and in the Chagos indicate that substantial quantities of beached plastic originates from Asian sources, from disposal at sea by shipping and from fisheries activities.<sup>336</sup> A more recent study on Cousine Island indicates an accumulation rate of almost 3,000 items per km<sup>2</sup> per year, of which 80 percent is plastic.<sup>337</sup> However, it is not possible to make a realistic estimate of the quantity of MPP in Seychelles which is attributable to non-Seychelles sources.<sup>338</sup> Studies of beach debris in South Africa suggest a useful approach to determining origins.<sup>339</sup> No information is available on the quantities of MPP in the WIO water column. In summary, other than fisheries and shipping, the main external source of MPP is the waste carried from Southeast Asia and possibly a smaller amount from South Asia, mainland Africa and the Middle East. Models suggest that this MPP is driven by the South Equatorial Current through the southern part of the Seychelles EEZ (Figure 5). An assumed value of 5 tons per year is included in the estimate as a 'holding' figure which should be revised when relevant information on external sources of MPP becomes available.

**Figure 45. Shipping traffic density, current eddies and plastic carried by ocean currents**



*Images : AIS shipping, surface currents, model of plastic transport from SE Asia*

<sup>336</sup> Details of these studies are presented elsewhere in this report.

<sup>337</sup> S.W.Dunlop et al. 2020. Plastic pollution in paradise: Daily accumulation rates of marine litter on Cousine Island, Seychelles. *Marine Pollution Bulletin*. Volume 151, February 2020, 110803

<sup>338</sup> The quantities of beached plastic depend on numerous factors, e.g., the location and orientation of the beach, current systems, such that it is not possible to extrapolate to entire shorelines. In addition, the attribution of many plastic items to a source can be problematic, especially if the item is degraded and conversion of item numbers to weights is problematic.

<sup>339</sup> Ryan, P.G. 2019. Rapid increase in Asian bottles in the South Atlantic Ocean indicates major debris inputs from ships. 20892–20897 *PNAS* October 15, 2019 vol. 116 no. 42. [www.pnas.org/cgi/doi/10.1073/pnas.1909816116](http://www.pnas.org/cgi/doi/10.1073/pnas.1909816116).

### 8.1.9 Microplastics

The level of marine microplastic pollution depends on a wide range of factors. Population, density of housing and the type of treatment of waste water are important. In Seychelles, the hydrography and high rainfall means that a significant proportion of microplastic pollution is likely to get flushed into the ocean. The main sources are likely to be road runoff of rainwater containing microplastics from car tyre abrasion; untreated waste water (microbeads in cosmetics, cleaning agents, microfibers from laundry); air-borne microplastics from paints and building materials; breakdown of macroplastics by wind and sun; and the degradation of macro plastics in the marine environment.

Microplastic pollution is estimated on the basis of car tyre abrasion which is considered to represent about 30 percent of microplastic pollution.<sup>340</sup> Two estimates are made: (i) as a function of the number of vehicles; and (ii) as a function of tyre imports (Table 2). In 2018, the stock of motor vehicles in Seychelles was 20,334 each of which generates about 1.8 kg of microplastic waste per year, as tyres are compound of plastics and rubber.<sup>341</sup> Seychelles imported 640 tons of tyres in 2019.<sup>342</sup> As most of the roads in Seychelles are surfaced, microplastics from tyre abrasion are likely to be washed into storm drains and into the sea, although studies suggest that up to 90 percent may be retained in the soil. The preliminary estimate of microplastic marine pollution from car tyres ranges from 4-6 tons/year as set out in Table 2. If tyre wear is considered to contribute 30 percent, then the total microplastic MPP load ranges from 12-21 tons/ year – an average of 17 tons/year. This value is provided as a basis for more accurate future estimates.

**Table 20. Estimates of Seychelles microplastic marine pollution based on car tyre degradation**

|  | A.<br>tyres | B.<br>vehicles | source/ assumptions                 |
|--|-------------|----------------|-------------------------------------|
| Tyre imports 2019 (tons)                 | 640         |                | UN Comtrade, imports 2019           |
| Vehicles in service (numbers)            |             | 20,334         | Seychelles Licensing Authority 2018 |
| A. Annual microplastic loss (tons)       | 64          |                | 10% Kole et al.                     |
| B. Weight loss all /vehicles/year (tons) |             | 37             | 1.84 kg/vehicle/year based on India |
| Transport to the ocean (tons)            | 6           | 4              | 10% (90% retention by soil, Kole)   |
| Total estimated microplastic MPP         | 21          | 12             | Tyre wear 30% of microplastics      |

Source Kole et al.<sup>343</sup>

## 8.2 Existing and potential measures to combat MPP

### 8.2.1 Policy and planning

The relevant policies and plans draw on several foundational policy instruments including those on sustainable consumption, environmental conservation and development of the blue economy. The National Waste Policy 2018-2023 is a key policy instrument (an update to the Solid Waste Management Policy 2014–2018).<sup>344</sup> The policy refers to guiding principles for waste management including: the

<sup>340</sup> Boucher, J. and Friot D. (2017). Primary Microplastics in the Oceans: A Global Evaluation of Sources. Gland, Switzerland: IUCN. 43pp.

<sup>341</sup> <http://www.sla.gov.sc/statistics/traffic-statistics/>. Tyres contain up to 30% plastic resins and/or textiles.

<sup>342</sup> HS Code 410110. <https://comtrade.un.org/data>.

<sup>343</sup> Kole, P.J. et al. 2017. Wear and Tear of Tyres: A Stealthy Source of Microplastics in the Environment. Int. J. Environ. Res. Public Health 2017, 14, 1265; doi:10.3390/ijerph14101265.

<sup>344</sup> Seychelles National Waste Policy 2018-2023 was approved in December 2018. The overall goal is to ensure that "Waste is managed in a sustainable manner, following the set guiding principles and approaches, in order to protect the integrity of the environment and improve the quality of life in Seychelles".

waste hierarchy, extended producer responsibility (EPR), the polluter-pays principle and the 'reduce, reuse, recycle' approach. It recognises the challenge of reducing waste going to the landfill and the role of a circular economy. More recently, a Solid Waste Masterplan has been prepared.<sup>345</sup> A range of studies have informed the policies and plans.<sup>346</sup> The Landscape and Waste Management Agency (LWMA) is charged with a number of tasks under the policy and is responsible for the cleaning and beautification of Seychelles. It administers waste management contracts for waste collection and landfill management, monitors and manages the different contractors for waste collection, landfill management, and beach and road cleaning in the Seychelles. Policy implementation faces the problems common to small island economies, including: economies of scale, finance, waste which cannot be recycled or reused at island level and a reliance on packaged imports.<sup>347</sup>

The Masterplan (2020-235) highlights a number of issues: weak implementation of previous plans, gaps in the regulatory framework, lack of competition in waste management contracting, financing and capacity challenges and lack of economies of scale.

### 8.2.2 Regulation

Key primary legislation includes the environment protection act and its regulations.<sup>348</sup> There are import and/or manufacture/distribution ban on plastic bottles and other single-use plastics including bags and polystyrene takeaway boxes, plates, cutlery and cups (2017) and drinking straws (2019).<sup>349</sup> These bans suffer from certain defects. There are exemptions for certain plastic bags and use of certain plastic products. Biodegradable and compostable plastic product are not banned, although Seychelles lacks the appropriate industrial composting facilities and waste separation. It is reported that enforcement of the plastic bag regulations is weak.<sup>350</sup>

Under the Customs Management Act (2011) there is an import levy on PET bottles. Part of the resulting revenues are transferred to the Waste Management Trust Fund (WMTF) to fund the recycling scheme, under which the waste is collected and exported for re-cycling.<sup>351</sup> As of 2020, there is no regulation of products that contain microbeads.<sup>352</sup> Seychelles is party to the relevant international conventions on waste management and has the required action plans and other measures for medical waste, for dangerous chemicals, and for implementation of obligations under international conventions (e.g., Basel, Bamako, mercury).

<sup>345</sup> EU, COWI, 2020. Solid Waste Masterplan for Seychelles (2020-2035).

<sup>346</sup> These studies include: Lai A., Hensley J., Krütli P., & Stauffacher M. (Eds.) (2016). Solid Waste Management in the Seychelles. USYS TdLab Transdisciplinary Case Study 2016. ETH Zürich, USYS TdLab; Nina Seraina Rapold, 2019. A Pathway Towards the Implementation of an Electronic Waste Management System in Seychelles Status Quo Analysis and Assessment of Future Strategies. (Thesis) ETH Zurich, Switzerland, June 2019; Nippon Koei Co., Ltd., 2019. Coastal Waste Management Infrastructure in a Changing Climate. Seychelles Risk Assessment Report. World Bank Group. Washington, D.C. <http://documents.worldbank.org/curated/en/688371576750442818/Coastal-Waste-Management-Infrastructure-in-a-Changing-Climate-Seychelles-Risk-Assessment-Report>

<sup>347</sup> See: Wang, K.C.M. et al. 2021. Solid Waste Management in Small Tourism Islands: An Evolutionary Governance Approach. Sustainability 2021, 13, 5896.

<sup>348</sup> Government of Seychelles. 2016. Environment Protection Act, Act 18. <https://www.seylli.org/sc/Act%2018%20of%202016%20Env%20Protn%20Act.PDF>; Government of Seychelles. 2017. Environment Protection Regulations. [https://members.wto.org/crnattachments/2017/TBT/SYC/17\\_0650\\_00\\_e.pdf](https://members.wto.org/crnattachments/2017/TBT/SYC/17_0650_00_e.pdf).

<sup>349</sup> S.I. 38 of 2017 Environment Protection (restriction on importation, distribution, and sale of plastic utensils and polystyrene boxes) Regulations 2017.

<sup>350</sup> ICRI. Summary of legislative and regulatory mechanisms for the protection of coral reefs and associated ecosystems. Seychelles.

<sup>351</sup> COWI, 2020.

<sup>352</sup> In the region, only South Africa is preparing regulations. Eunomia, 2018. Investigating Options for Reducing Releases in the Aquatic Environment of Microplastics Emitted by Products. Eunomia. 23rd February 2018.

### 8.2.3 A national MPP action plan?

Within the context of the national integrated solid waste management strategy, a national action plan on MPP could be prepared. A specialised MPP working group could be established and include, e.g., environment ministry, municipal authorities, waste management companies, finance ministry, chamber of commerce, the tourism sector, media representatives and concerned NGOs. The groups could also draw on the Seychelles Fishing Authority, the Seychelles Port Authority and enterprises involved in the plastics and retail industries. The development of a plastics circular economy may require an additional industry/ innovation/ investment- targeted working group.

A strategic action plan on MPP could include some or all of the following elements:

- anchoring the action plan in existing policies, plans, legislation and institutions
- establishing the scale of MPP with greater accuracy, the main causes and the responsibilities for addressing the leakages
- further development of the vision of a low/no plastic waste society, identifying long-term aspirational goals, immediate and longer-term actions, suggested investments and means of coordination, monitoring and review
- focused awareness campaigns, for example in relation to household waste separation and opportunities to reduce or substitute plastic packaging
- development of codes of conduct to reduce plastic waste and MPP, e.g. through tourism organisations, cruise lines, supermarkets, beach users and fisher associations
- development of a coordinated approach by businesses to efficiently sort plastic waste and the progressive introduction of EPR schemes, fiscal measures and possible cross-support to waste management value chains which may be less economically viable
- identification of resources and financing which may be required, including for innovation and the plastics circular economy, and in any catalytic measures required
- consider regional initiatives, including on exploring opportunities for harmonised product bans or 'environmental import tariffs'; for regional 'agreements' with major soft drinks suppliers for economies of scale in regional EPR and recycling.

### 8.2.4 Fisheries

Analyses of beach litter from other Seychelles and other WIO countries suggests that FADs deployed by the purse seine tuna fleet is a significant regional source of marine debris and that garbage from Asian fishing vessels can contribute significantly to MPP, even if not fishing in the Seychelles EEZ. FAO regional workshops have indicated a generally low level of awareness on the scale of lost or abandoned gear. There are a range of guidelines available to prevent marine debris from fishing vessels. It is unclear to what extent best practices are implemented in Seychelles.

Given the nature of the small-scale fisheries, comprehensive marking of fishing gear and 'fishing' for lost gear may not be practical, except near marine parks or prime tourist/ dive sites, or where volunteer divers can be used.<sup>353</sup> Designation of sites for collection of waste fishing gear could be envisaged, possibly through collaboration between the Seychelles Fishing Authority and the Seychelles Fishing Boat Owners Association. EPR arrangements with importers to ensure responsible disposal could be of value in addressing fisheries MPP. EPR initiatives could also be envisaged at a regional level through the Fédération des Pêcheurs Artisans de l'Océan Indien, (FPAOI).

<sup>353</sup> Small-scale fishers often create local or 'proprietary' systems of marketing fishing gear to prevent theft, or help in the recovery of lost gear. In the EU, about 20% of fishing gear is lost annually. However, this varies considerably by area and gear. Fishers report a relatively low loss of gillnets in the EU (<5%).

For larger, 'port-based' vessels, reception facilities based on MARPOL Annex V requirements can be applied to fishing vessels.<sup>354</sup> Recycling of nets and ropes may require the economies of scale which may only be feasible through regional schemes (e.g. catalysed by SWIOFC, IOTC, or IOC), through close engagement with businesses and possibly with economic support from EPR arrangements with importers.<sup>355</sup>

Reduction of MPP from licensed foreign fishing vessels requires a regional approach, particularly as the vessels make port calls throughout the region (e.g., Port Louis, Durban). This could start with resolutions by IOTC and SEAFO, possibly phasing in MARPOL Annex V requirements for vessels; applying measures to mark gear and FADs; and specifying responsibility for recovery of lost gear. Enforcement could be through the PSMA. Appropriate requirements could eventually become part of minimum terms and conditions of access, included in licenses for vessels, and could be an agreed regional management measure. Fisheries support vessels could be included in such a scheme. FAO could be requested to provide support for design of a phased approach and the issue could be raised in the context of any future EU fisheries access agreement.

Although many small-scale fishing vessels are wooden, fibreglass (GRP) fishing vessels and other GRP vessels are progressively reaching the end of their useful life. Abandoned GRP vessels present a growing plastic waste problem and are likely to progressively degrade to marine microplastics if abandoned (Figure 4). Most countries have no provision for appropriate disposal of GRP vessels. Rules specifying means of disposal and setting out the responsibilities of owners or importers could be considered. Measures could include a requirement that the annual vessel registration fee is paid until appropriate disposal is certified. EPR schemes may be difficult to design given the life of these boats.

### **8.2.2 Shipping and tourism**

Ensuring that Seychelles meets its obligations under MARPOL Annex V is the key action required. The Seychelles Ports Authority is the key actor. Dialogues with vessel operators and ships agents may help in separation of recyclables in ship's garbage and help reduce landfill.<sup>356</sup> Dialogues with IMO and regional port authorities could help ensure coordinated measures to prevent dumping of waste by shipping in the region and to foster codes of conduct for regional shipping lines.<sup>357</sup> MARPOL Annex V also applies to the disposal of garbage from fixed or floating platforms engaged in the exploration or exploitation of seabed oil and gas and should be stipulated in any such authorisations.

The Sustainable Tourism Label Seychelles (SSTL), a sustainable tourism certification programme designed specifically for the Seychelles, could include specific provisions for plastics and gradually make such requirements mandatory within the industry.

<sup>354</sup> Huntington, T.C., 2016. Development of a best practice framework for the management of fishing gear. Part 2: Best practice framework for the management of fishing gear. Confidential report to World Animal Protection; Also see the Global Ghost Gear Initiative.

<sup>355</sup> Coast of dismantling gear and contamination of ropes or netting by seaweed or other marine organisms are known challenges to recycling of gear.

<sup>356</sup> A wide range of IMO guidelines are available: Prevention of Pollution by Garbage from Ships <https://www.imo.org/en/OurWork/Environment/Pages/Garbage-Default.aspx>; Resolution MEPC.220(63) Guidelines for the Development of Garbage Management Plans; 2017 Guidelines for the implementation of MARPOL Annex V. <https://wwwcdn.imo.org/localresources/en/OurWork/Environment/Documents/MEPC.1-Circ.834-Rev.1.pdf>; IMO, 2018. Consolidated guidance for port reception facility providers and users. <https://wwwcdn.imo.org/localresources/en/OurWork/Environment/Documents/MEPC.1-Circ.834-Rev.1.pdf>.

<sup>357</sup> UK Chamber of Shipping, 2020. Best Practice on combatting Single-Use Plastic in Shipping; Carnival Corporation & PLC, 2019. Sustainability from Ship to Shore FY2019 Sustainability Report.



### 8.2.3 Circular economy

The Seychelles blue economy strategic framework advocates a circular economy approach which aims at reducing waste at all levels of the value chain, especially within the fisheries sector.<sup>358</sup> Seychelles already implements a number of circular economy initiatives in relation to plastics, notably in relation to collection and export of PET bottles.

**Figure 46. Waste fishing nets – opportunity for a circular economy**



Through cooperation between the Seychelles blue economy initiative, the Spanish tuna vessel operators association and the Seychelles Fishing Authority (SFA), opportunities to develop a circular economy for waste fishing gear are under study.<sup>359</sup> Other CE initiatives include a project to compost seaweed collected from Seychelles beaches which may also contribute to removal of other marine debris from beaches.<sup>360</sup> Composting of green waste is widespread. The 2020 Masterplan emphasises the need for waste separation at source to enable a circular economy, but also flags the weak economies of scale which constrain CE initiatives.

Several generic reports outline alternative approaches to re-use and recycling, including practices, economic and financing issues and lessons from Asia and small islands.<sup>361</sup> The companion report on circular economy, prepared under this project, also provides additional perspectives.

### 8.2.4 Awareness of MPP

There is a high level of awareness of MPP in the Seychelles, including the personal engagement of the President of the Seychelles in a range of ocean health issues.<sup>362</sup> Seychelles has ratified the Nairobi Convention's LBSA Protocol, MARPOL Annex V and enacted national legislation on plastic bags and SUPs. In 2020, Seychelles hosted the first meeting of the Basel Convention Plastic Waste Partnership working group.

Several NGOs have been closely involved in raising awareness at all levels, not only on MPP, but also on waste reduction and on the circular economy. A number of Seychellois have been trained in collection

<sup>358</sup> Seychelles Blue Economy: Strategic Policy Framework and Roadmap 2018 –2030 is based on wealth creation, social equity, improvement of livelihoods, and environmental conservation.

<sup>359</sup> The Organisation of Associated Producers of Large Freezer Tuna Vessels (OPAGAC) is an association of the operators of 47 tuna purse-seiners fishing in the Atlantic, Indian, and Pacific oceans. See: <https://www.nation.sc/articles/10024/new-circular-economy-opportunities-from-discarded-industrial-fishing-nets>.

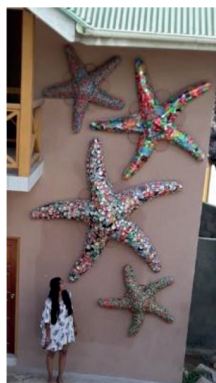
<sup>360</sup> The Seychelles Conservation and Climate Adaptation Trust (SeyCCAT) is supporting Women in Action and Solidarity Organization (WASO), <http://vlscop.vermontlaw.edu/2021/01/08/healing-ocean-and-nature/>.

<sup>361</sup> Lachmann et al. 2017. Marine plastic litter on Small Island Developing States (SIDS): Impacts and Measures. Appendix 3: Details for initiatives that (re-)use plastic litter; Weekes, J.G. et al. 2020. Solid waste management system for small island developing states. Global Journal of Environmental Science and Management (GJESM) <https://www.gjesm.net/>; UNCDR, 2020. UNCRD 10th 3R Forum. State of Plastics Report. <https://sdgs.un.org/documents/uncrd10th-3r-forumstate-plastics-report-25105>

<sup>362</sup> <http://www.seychellesnewsagency.com/articles/9274/President+of+Seychelles+shocks+G+meeting+with+photos+of+ocean+trash>

and analysis of MPP.<sup>363</sup> The Seychelles Sustainable Tourism Foundation (SSTF) has partnered with other NGOs to help integrate sustainability practices within the tourism sector. The clean-up campaigns have involved more than 1,300 volunteers. Other activities have involved creation of art work from the plastic collected in the beach clean-ups (Figure 7); The Last Straw Seychelles, a campaign to eliminate the use of plastic straws in Seychelles and screening of films on MPP and ocean health at schools and on TV.

**Figure 47. High level of awareness of MPP in Seychelles**



*Waste plastic art*



*Plastic Arch - youth engagement*



*Community engagement*

A key foundation for a coherent awareness campaign is the national waste management plan upon which a strategy to combat MPP can be developed. Any awareness campaign on MPP can be built on this foundation and target specific groups and issues, such as decision-makers, retailers, beach users, or environmental education in schools. Under the 2017 Plan, a range of education and awareness campaigns are proposed.<sup>364</sup> Generic approaches to developing a MPP strategy and awareness initiatives are described in the main report. The social and economic impact of marine litter and/or MPP in the Seychelles has not been assessed.<sup>365</sup>

### 8.2.5 Possible regional initiatives

Prevention, reduction, or control of MPP from foreign sources requires regional (and global) action. In cooperation with other countries, Seychelles could consider several initiatives:

- preparation of a joint strategic plan on MPP under the Nairobi Convention
- a COP resolution on monitoring and reporting on MPP and marine microplastic pollution as part of the implementing arrangements for the Nairobi LBSA Protocol
- preparation of a funding submission by the Nairobi Convention secretariat for a regional MPP monitoring programme, including from distant sources, collating information on beach clean-ups through existing initiatives, and preparation of a strategic plan on MPP
- further use of the regional projects supported by the IOC and Cap Business (e.g. in relation to recycling of PET bottles).

<sup>363</sup> Collaboration between UNEP / WIOMSA and Min Environment. <https://www.marine.science/2021/04/01/seminar-tackling-plastic-pollution-in-the-indian-ocean/>

<sup>364</sup> See the GoM/AFD 2017 Plan, Strategic Area V, which proposes 8 inter-related tasks, including enhanced stakeholder consultation/ cooperation and waste monitoring and 30 awareness/ education campaigns per year over 2 years with a cost of about \$350,000.

<sup>365</sup> For an approach to such an estimate see: Werner, S., et al. 2016. Harm caused by Marine Litter. MSFD GES TG Marine Litter - Thematic Report; JRC Technical report.

In conjunction with other countries, Seychelles could also consider initiating a dialogue in the regional economic commissions (COMESA, SADC) on trade issues related to MPP and plastic waste management in general. In particular, regional arrangements on trade in plastic waste (and other recyclable waste) would be useful to enable economies of scale in recycling. Regional measures to reduce or eliminate un-necessary plastics, such as microbeads in household products and selected SUPs would also foster innovation in development of local substitutes. Regional initiatives could also underpin a dialogue on EPR with regional suppliers, such as agents for fishing nets, soft drinks (e.g., development of regional deposit return schemes). Regional measures also invoke market power in relation to the behaviour of major users of plastics (e.g. PET bottles), can underpin dialogues with major corporate sources of MPP (such as bottled drinks manufacturers - see main report), and inform ongoing discussion on plastic and the environment within the WTO.

At the level of AIODIS and Africa, Seychelles could consider contributing to a common AIODIS position on MPP, possibly with a view to consolidating actions and positions through existing AMCEN and SIDS initiatives. Such engagement could also contribute to the oceans agenda of UNGA and UNEA.<sup>366</sup> A regional action plan could also enable access to resources, including from global partnerships on plastic waste (see main report).

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The main project report provides greater detail and discussion of option for recycling of plastic waste and resourcing and financing opportunities. Reference can also be made to companion report on the circular economy (in preparation under a separate consultancy).

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<sup>366</sup> Wienrich, N., Weiand, L., & Unger, S. (2021). Stronger together: The role of regional instruments in strengthening global governance of marine plastic pollution. IASS Study, February 2021; Carlini, G., & Kleine, K. (2018). Advancing the international regulation of plastic pollution beyond the UNEA resolution on marine litter and microplastics. *Review of European, Comparative and International Environmental Law*, 27(3), 234–244. <https://doi.org/10.1111/reel.12258>.



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