



INDIAN OCEAN
COMMISSION

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

BACKGROUND DOCUMENT





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

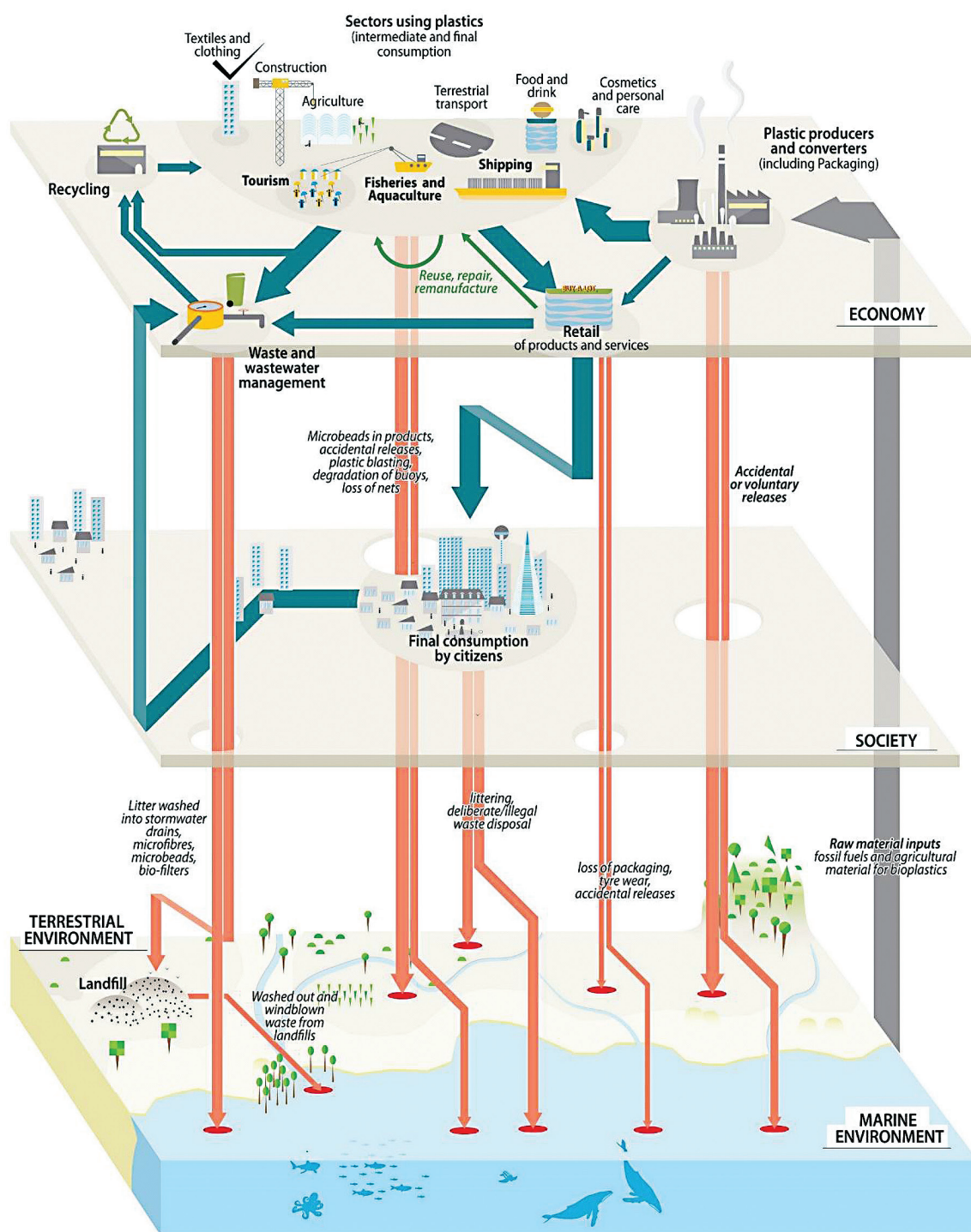
The report sets out and builds on several conclusions:

- 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.

2 Guinea-Bissau

2.1 Marine plastic pollution in Guinea-Bissau

Although Guinea-Bissau regulates plastic bags, the country does not currently have a comprehensive national strategy or plan to address marine plastic pollution (MPP).¹⁸ This report is a first step to develop a dialogue and action plan on MPP with a particular emphasis on developing awareness among key stakeholders and identifying practical steps.

2.1.1 Sources of marine plastic pollution

This note provides a preliminary estimate of marine plastic pollution (MPP) in Guinea-Bissau, provides a synthesis of available information on MPP. There are three main sources of MPP in Guinea-Bissau:

- mismanaged, or unmanaged solid waste, which is by far the most important. This can be subdivided into two main categories: (i) urban waste from Bissau; and (ii) waste from rural coastal areas and coastal or riverine municipalities, or districts
- marine sources are mainly fishing activities and shipping with a minor contribution from marine tourism
- some plastics may also be transported by ocean currents from other countries.

Plastic waste is just one part of a much broader waste management problem, one of a range of sustainable development challenges faced by Guinea-Bissau. Guinea-Bissau's population of almost 2 million is 45 percent urban, of which over 40 percent lives in the capital Bissau. Mismanaged urban solid waste in Bissau and suburbs is considered to be the single greatest source of MPP, as Bissau and its catchment area are coastal. All coastal and estuarine settlements with mismanaged waste are potential sources of MPP, particularly as Guinea-Bissau has a tidal range of over 5 meters. Flooding mainly affects inland area (to a lesser extent the coastal south-east) and may not play a major part in flushing plastic waste into the ocean, except in urban areas.

The estimate relies on several assumptions (see). MPP in Guinea-Bissau is estimated primarily as a function of mismanaged solid waste.¹⁹ Guinea-Bissau has a total population of almost 2 million. The coastal population (population within 50km of the coast) was estimated at 1.2 million in 2010. The urban population in 2018 was over 800,00. The population of Bissau is about 380,000 and the population of the main coastal towns is about 50,000 (Bolama, Cacheu, Catio, Bubaque and Buba). If an additional 70,000 people are considered to live in close proximity to the coast, or the extensive estuaries, the coastal population which is likely to generate plastic waste and which may leak into the ocean would be about 0.5 million. This is the coastal population value used to estimate the potential MPP generated from solid waste.

Studies indicate a range of estimates for the amount of solid waste generated per person. This ranges from 0.6 kg per person per day to 0.45 kg/person/day.²⁰ A rate of 0.5 kg per day is used for the MPP estimate, partly because urban areas tend to generate more solid waste. Waste plastic has been estimated to comprise as much as 15 percent of waste in urban communal collector bins. For the estimate, a value of 10 percent is used, as a significant part of the plastic waste, and PET bottles

¹⁸ The terminology used in Lusophone countries generally refers to marine litter or debris ('lixo marinho'), rather than to marine plastic pollution. MPP is generally considered to account for about 80 percent of marine litter or debris. Because of the extensive estuarine and mangrove system in the case of Guinea-Bissau, there may be a high natural (rather than anthropogenic) content in marine debris (e.g., mangrove leaves, tree branches, tree trunks).

¹⁹ See Jambeck et al., 2014 and the main report for details of this methodology.

²⁰ World Bank. What a Waste 2.0. Some earlier estimates have a value as low as 0.2 kg/day.

in particular, are collected either for reuse or recycling before entering the 'mixed' waste stream. Information on plastic waste exports is not available.²¹

The collection of urban waste in Bissau does not appear to be consistent, particularly in areas served exclusively by the municipality. This is due to breakdown of waste collection trucks and other resource and logistics constraints. In some districts (bairros) waste collection may be non-existent. As a result, wastes are dumped in the streets or any adjacent unused ground and in some cases may be burned by the roadside or in gardens. Even when waste is dumped at the municipal landfills, it may lie unburied for some time. For the purposes of the estimate, 85 percent of the solid waste generated by the 'coastal population' is considered 'mismanaged'.

The mismanagement of solid waste means that the waste plastic can be leaked into the ocean by rainfall and flooding, by dumping directly into rivers or the sea, by dumping on the shore, or by wind which carries plastic from dumps, or plastic particles from burning plastic. The estimate assumes that 5 percent of mismanaged plastic waste is leaked into the marine environment. While this value is substantially below that used for preparing the 2014 global estimate²² it appears consistent with direct observations in several African countries. The impacts of MPP are addressed in the main report.

Guinea-Bissau's contribution to MPP is estimated at 409 tons per year (). For comparative purposes, information extracted from the 2014 global estimate is provided in Table 3.

Table 2. Estimated plastic waste generation in Guinea-Bissau

Item		Source/ Assumption
Population total (million)	2	World Bank 2019
Waste (kg/person/day)	0.5	World Bank/ other
Solid waste total (tons/year)	365,000	calculation
Coastal' population	500,000	estimate
Coastal' waste (tons/year)	91,250	calculation
Plastic (%) of waste	10%	assumption
Plastic waste (tons/year)	9,125	calculation
Mismanaged plastic waste (tons/year)	7,756	85% (assumption)
Marine plastic pollution(tons/year)	388	5% of mismanaged waste (assumption)
Fisheries and shipping (tons/year)	20	assumed (see below)
Microplastics	1	assumed (see below)
Non-Guinea-Bissau sources	-	no information
Estimated MPP (tons/year)	409	

²¹ While plastic represents less than 5% of waste collected by the Bissau municipality, much of the plastic waste of value has already been separated by catadores and others (see LVIA, 2015).

²² Jambeck et al., 2014 consider that 10-20% of mismanaged waste in the coastal area leaks into the marine environment. The 5% value used here appears consistent with direct observations made in some African countries.

Table 3. Mismanaged plastic waste in 2010

Coastal population (<50 km) (2010)	1,208,106	
Waste generation rate (kg/person/day}	0.6	
Plastic in waste stream (%)	9.0	
Inadequately managed waste (%)	83.5	
Littered waste (%)	2.0	
Waste generation (kg/day)	724,864	
Plastic waste generation (kg/day)	64,875	
Inadequately managed plastic waste (kg/day)	54,155	
Plastic waste littered (kg/day)	1,298	
Mismanaged plastic waste (kg/person/day)	0.05	
Mismanaged plastic waste in 2010 (tons)	20,240	
Mismanaged plastic waste in 2025 (tons)	51,947	

Source: Information extracted/ extrapolated from Jambeck et al., 2014.

2.1.2 Management of solid waste

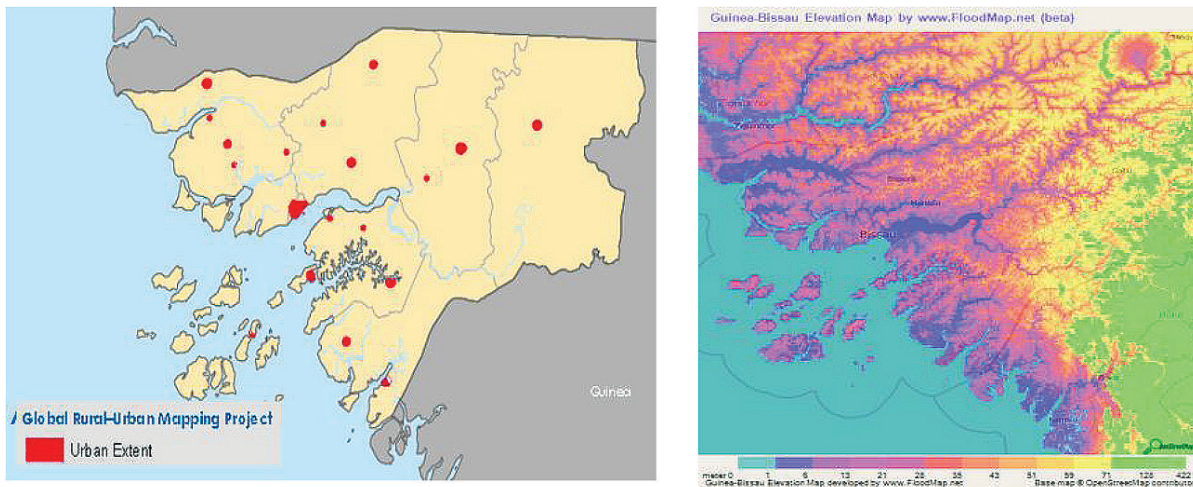
Estimates of the amount and composition of solid waste which are derived from analysis of waste collected by the municipalities are not necessarily representative, as households carry out considerable sorting for reuse or resale. In particular, glass, cans, plastic bottle and cardboard may be separated. Food waste is also extensively used to feed chicken, pigs or other animals, while any excess food is frequently shared in the community. As cooking may be done with charcoal, ash may form a significant portion of waste. Similarly, yard sweepings mixed with soil and sand may also be a significant component by weight. As a result, the waste profile is not directly comparable to the profile of many other AIODIS municipalities or urban areas.²³

Municipal solid waste in Guinea-Bissau has been estimated at 290,000 tons per year.²⁴ In 2015, the Bissau municipal authority (Câmara Municipal de Bissau) estimated that the capital produced 250,000 tons of waste per year and more recently estimated waste production at 300,000 tons. Surveys done in parts of Bissau city indicate that collection was 'practically non-existent' and that rubbish accumulated in the streets for lengthy periods.²⁵ The municipal authorities are responsible for waste management but generally lack the resources to operate or maintain the solid waste management services (collection, maintenance of dump sites, public waste bins, vehicles).

²³ Ferrari, K., S. Cerise, R. Gamberini, B. Rimini, and F. Lolli. 2016. An International Partnership for the Sustainable Development of Municipal Solid Waste Management in Guinea-Bissau, West Africa. Paper presented at the Twenty-First Summer School "Francesco Turco"—Industrial Systems Engineering. Naples, Italy, September 13–15.

²⁴ World Bank, What a Waste global database. <https://datacatalog.worldbank.org/dataset/what-waste-global-database/resource/>

²⁵ Djonú, P. et al. 2018. Objetivos do desenvolvimento sustentável e condições de saúde em áreas de risco. Ambiente & Sociedade São Paulo. Vol. 21, 2018.

Figure 2 The extent of urban settlements; flood vulnerability map

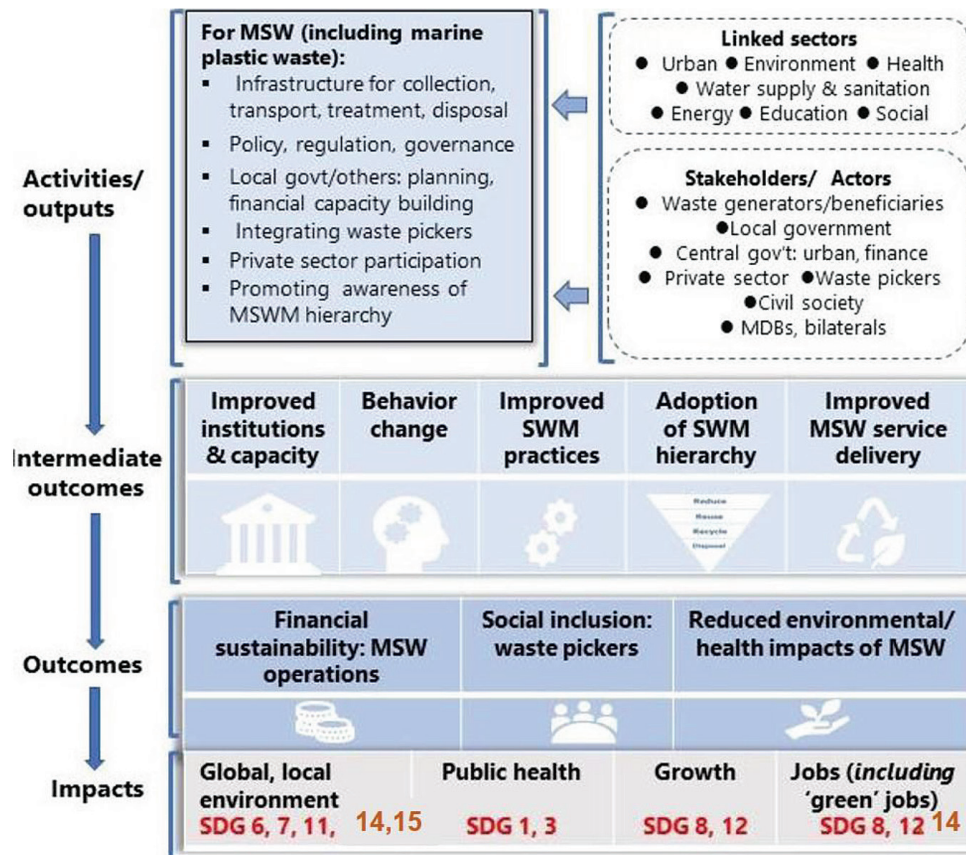
The disposal of solid waste in rural areas is unclear. However, based on reports of practices in many sub-Saharan rural communities, much of the waste is burned, placed in household waste pits, or in unmanaged communal dump sites. There is also likely to be a higher proportion of organic or compostable waste in solid waste generated by rural households and enterprises. Additional information would be required for a more accurate accounting of the scale and disposal of plastic waste from rural households, such as the reuse or disposal of plastics in agriculture (e.g. fertiliser bags or rice sacks). The extensive estuarine system and substantial tidal suggest that some more inland areas may be sources of MPP. However, the extensive mangrove cover also suggests that may macroplastics may be trapped in the mangroves of in the sediments and remain a 'hidden' fraction of MPP.

Plastics comprise 0.76 percent of imports by value (about \$316,000).²⁶ However, this excludes the import of drinks and liquids which account for 27 percent of imports by quantity; excludes the import of some 127 tons of synthetic clothing; and excludes plastics used for construction (e.g. pipes, panels) and other purposes.

In conclusion, the main driver of MPP in Guinea-Bissau is deficient solid waste management, particularly in coastal urban areas. MPP and plastic waste in general is just one part of a much broader waste management problem resulting from underlying governance issues which result in lack of investment in infrastructure, weak financial and human resources and erratic waste management services. The relationship of MPP and solid waste management in general to the SDGs is shown in the following figure.

²⁶ <https://tradingeconomics.com/guinea-bissau/imports>

Figure 3. Links between management of municipal solid waste and the SDGs



Source: World Bank, Independent Evaluation Group.

Note: MSW = municipal solid waste; MDB = multilateral development bank; MSWM = municipal solid waste management; SWM = solid waste management.

Fisheries. Both local small-scale and large-scale fisheries and foreign fishing are sources of MPP through lost gear.²⁷ Losses are generally related to the type of gear and location where the fishing takes place. In 2017, small-scale and industrial catches were estimated at over 300,000 tons/year of which 8 percent was contributed by local small-scale fisheries. About 160 industrial vessels from 17 countries (including Comoros) are licensed annually (2017 data), of which many only fish on a seasonal basis.²⁸ The tuna fishing fleet (40-50 vessels) are mainly EU-flagged and may also fish in the waters of the other AIODIS countries (tuna catches in Guinea-Bissau waters are relatively low). FADs are likely to be the main source of marine debris from this fleet.

A large licensed or chartered fleet of mainly Asian trawlers operates in Guinea-Bissau. Because of the predominantly 'soft' nature of the bottom (mud and sand), trawl gear is unlikely to be lost, although some losses may occur from entanglement in sunken tree trunks. Analyses of beach litter from the Western Indian Ocean suggest that garbage from Asian fishing vessels can contribute significantly to MPP. As few of the industrial vessels operating in Guinea-Bissau visit port, there is a lack of information on vessel garbage disposal, or disposal of waste fishing gear by industrial vessels.

²⁷ 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.

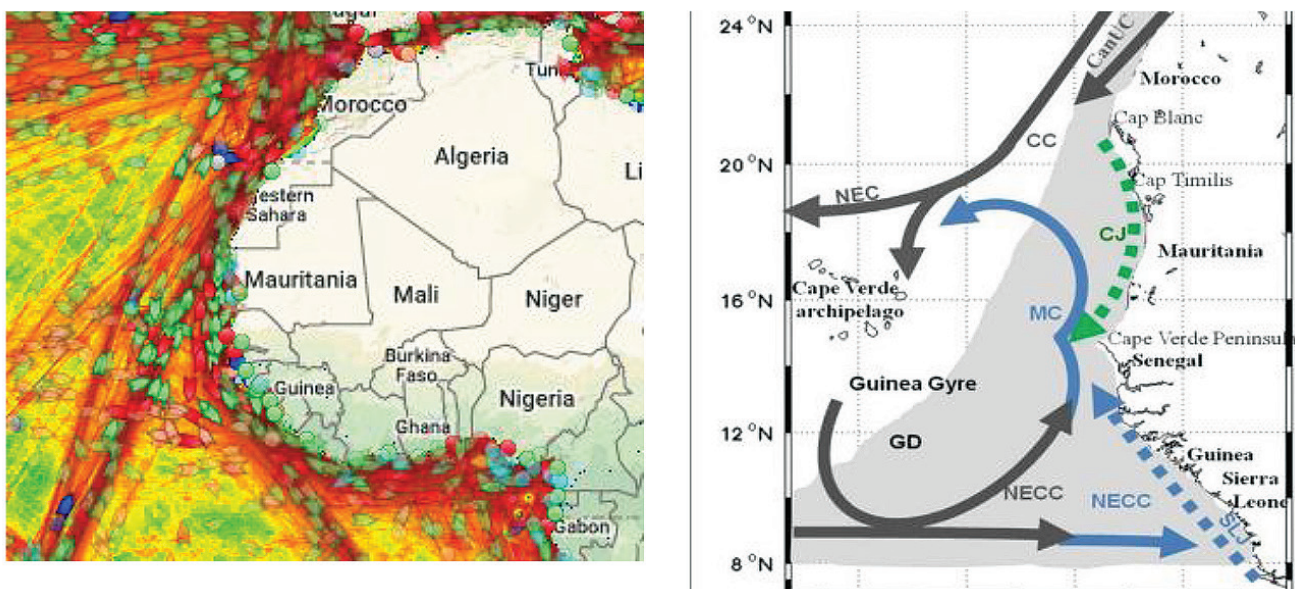
²⁸ Unreported and illegal fishing activities are considered to be high so that catch information may be unreliable. See: Intchama, J.F. et al., 2018. Assessing Guinea Bissau's Legal and Illegal Unreported and Unregulated Fisheries and the Surveillance Efforts to Tackle Them. Front. Mar. Sci., 04 April 2018. <https://doi.org/10.3389/fmars.2018.00079>.

There are over 1,500 small-scale vessels operating.²⁹ Some pirogues can be over 15 meters. Loss of nets by local small scale fishers is likely to be low unless fishing in reef areas, as the nets used can be retrieved in the relatively shallow estuarine and island archipelagic waters, while many fishers target pelagic species where no entanglement is likely. Losses of gear from large Senegalese pirogues fishing for higher value demersal species (e.g., snappers) may be significant. As there is no direct information on MPP from fisheries in Guinea-Bissau, the estimate given in should be considered as a 'place-holder' until such time as further information is available.

While there are a range of guidelines available to prevent marine debris from fishing vessels, and various workshops have been held, it is unclear to what extent best practices are implemented in Guinea-Bissau and regionally. A 2019 regional workshop indicated a low level of awareness on the scale of lost or abandoned gear and nature of appropriate solutions.³⁰ 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. These will accumulate as plastic waste and may degrade to marine microplastics if abandoned on beaches. Most countries have no provision for appropriate disposal of GRP vessels.

Shipping. Galley waste from shipping, including from cruise ships, 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. However, the Bissau commercial port is known to have maintenance and service challenges and has (understandably) prioritised investments in key areas, such as dredging. Arrangements for disposal of ships garbage in smaller ports or landing sites in Guinea-Bissau would need attention as marine transport to the islands and along the estuaries is an important component of the transport network.

Figure 4. Shipping traffic density and ocean currents in West Africa



²⁹ <http://spcsrcp.org/en/guinea-bissau>

³⁰ Macfadyen, G., Huntington, T., and Cappell, R. 2009. Abandoned, lost or otherwise discarded fishing gear. UNEP Regional Seas Reports and Studies No.185; FAO Fisheries and Aquaculture Technical Paper, No. 523. Rome, UNEP/FAO. 2009. 115p.; FAO 2020. Report of 2019 FAO Regional workshops on best practices to prevent and reduce abandoned, lost or discarded fishing gear in collaboration with the Global Ghost Gear Initiative. Port Vila, Vanuatu, 27–30 May 2019. Bali, Indonesia, 8–11 June 2019. Dakar, Senegal, 14–17 October 2019. Panama City, Panama, 18–23 November 2019. FAO Fisheries and Aquaculture Report No 1312. Rome. <https://doi.org/10.4060/ca9348en>.

Foreign sources of MPP. Some MPP may occur through the transport of marine debris and MPP from other countries by ocean currents. However, information on these sources is not available. Plastic pollution may also originate in adjacent where countries as some river basins are shared. However, the upper catchments of Guinea-Bissau (Geba and Corubal rivers) have a low population density and are unlikely to be significant sources of water pollution.³¹

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 factors. Where there are slow-moving rivers and extensive estuaries microplastics may become trapped before entering the sea, as is the case in Guinea-Bissau. The main sources are likely to be waste water (cosmetics, cleaning agents, laundry), road runoff of rainwater containing microplastics from car tyre abrasion, and air-borne microplastics resulting from burning and breakdown of macroplastics by wind and sun. As the area of tarmac road is relatively small, most tyre microplastics are probably trapped in the soil before reaching the sea.

2.2 Existing and potential measures to combat MPP

MPP needs to be seen in the context of overall waste management in Guinea-Bissau, the level of poverty, governance challenges, the competing national development priorities, and the scarcity of human and financial resources. In 2018, Guinea-Bissau was ranked 178 out of 189 countries with respect to the Human Development Index (HDI). Despite an improvement of over 17 percent in the HDI between 2005 and 2018, per capita GNI only increased by 1.8 percent.³² To put this in context Guinea-Bissau (GB) compares as follows to the rest of Sub-Saharan Africa (SSA) in 2018:

Table 4. Development indices for Guinea-Bissau (2018)

Indicator	Guinea-Bissau	Sub-Saharan Africa
Per capita GNI (\$)	1,993	3,443
Mean years schooling	3.3	5.7
Population below poverty line (%)	67	41 (Liberia)
HDI	0.46	0,54

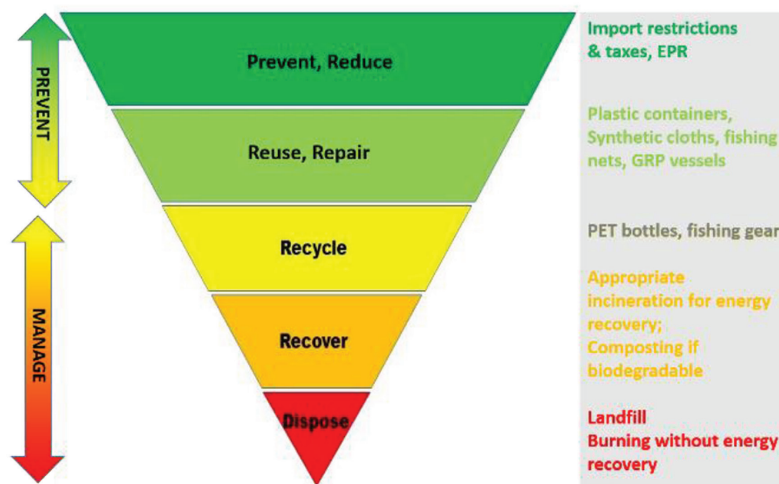
³¹ Robalo, H., no date. Programme D'action Mondial pour la Protection du Milieu Marin contre la Pollution due aux Activites Terrestres. Elaboration des rapports nationaux des pays du Courant des Canaries. Guinée-Bissau.

³² UNDP. 2019. Human Development Report 2019. Briefing note for countries on the 2019 Human Development Report. Guinea-Bissau.

2.2.1 Policy and planning

Despite a recent EU-financed project, policies and plans for municipal solid waste management remain vague.³³ The national development plan mentions the establishment of a solid waste handling centre, but comprehensive plans to address the management of waste do not feature.³⁴ This lack of a 'plano director' is well recognised.³⁵ Any initiative to combat MPP will need to take a realistic and strategic approach taking account of the limited resources available and the relatively low priority of MPP in the overall development agenda. If it is assumed that, in the medium term, waste management will have to rely largely on existing resources, several of the actions described below could be envisaged.

Figure 5. The waste hierarchy



A draft, or outline national plan to combat MPP could be prepared with a particular focus on municipal waste management. The plan could affirm widely accepted principles for managing waste efficiently and sustainably and preventing, reducing and controlling plastic pollution, such as the waste hierarchy, cost recovery and the circular economy (Figure 5).

A task force, or working group could be established to share information and improve cooperation between key institutions. These could include representatives of the environment ministry,³⁶ municipal authorities, fisheries administration, port authority, and ministry, chamber of commerce, the media and concerned NGOs (Box 1). The NGOs could include resident's associations and representatives of the 'catadores'. Devolution of some responsibilities or contracts with resident's associations and well-organised catadores' associations could gradually develop locally adapted and effective waste management practices, including greater separation of wastes and improved opportunities for reuse and recycling.

³³ Sá Pereira, Luís Filipe. 2020. Opinião: gerenciamento sustentável dos resíduos sólidos urbanos na Guiné-Bissau. *Jornal Odemocrata* 28/06/2020; Notícias, DW. 2020. Bissau está "cansada" do problema do lixo. 20.08.2020. <https://www.dw.com/pt-002/bissau-está-cansada-do-problema-do-lixo/a-54636646>; Sanhá Na Maba, Ramalho. 2010. Gestão de resíduos sólidos em Guiné-Bissau, 1975 – 2010: Gerenciamento e manejo de resíduos sólidos em Bissau "uma co-administração das ocorrências". Universidade Federal da Bahia.

³⁴ República da Guiné-Bissau, 2015. Plano Estratégico e operacional Terra Ranka-2015-2020. Março de 2015. "Criação dum centro de tratamento de resíduos sólidos".

³⁵ Diretor Geral da Cooperação Internacional, 2020. Relatório final. Implementação do programa de acção de istambul na Guiné-Bissau 2011-2020. Bissau, 9 Março de 2020. https://www.un.org/ldc5/sites/www.un.org.ldc5/files/guine_bissau_ipoa_national_report.pdf.

³⁶ Direcção de Ambiente Urbano e Controle das Poluições, or equivalent.

Box 1. State actors will need to coordinate and cooperate to combat plastic pollution

The authorities responsible for the environment (Lei no. 1/2011, Lei de Bases do Ambiente) include the Secretaria de Estado do Ambiente e Biodiversidade. The Conferência Nacional de Ambiente (Decreto-Lei no. 11/96) is a high level consultation mechanism and could establish an MPP working group. The Conselho Consultivo (environment ministry) helps coordinate inter-ministerial actions and resource mobilisation, including with development partners. The Instituto Nacional do Ambiente (under environment ministry) fosters environmental protection and can have a role in awareness raising.

Municipal authorities (Decreto Lei no. 7/96) have financial autonomy and are directly responsible for waste management

The health ministry (Ministério da Saúde Pública) has a role in monitoring and advising on health measures related to waste management.

The education ministry (Ministerio de Educação e Ensino Superior) has a key role in environmental education and raising awareness on waste management and MPP as does the environment authority's Direcção de Informação, Formação, Documentação e Educação Ambiental.

The ministries responsible for tourism and for fisheries have the competence to regulate and promote sustainable and environmentally-responsible practices

The Ministério das Infraestruturas, Habitação e Desenvolvimento Humano has a role in the investment in waste management infrastructure

Other stakeholders include the business community, the actors engaged in waste management and consumers and users of plastic products.

Further reduction in import of non-essential plastics, selected SUPs using economic instruments and prohibition of selected products containing microbeads could be envisaged. Guinea-Bissau already has a ban on plastic bags.³⁷ However, it is reported that this ban is not widely respected or enforced. Introducing import taxes on selected non-essential plastics could potentially reduce consumption and provide revenue while possibly creating a market for local production (e.g. products from used rice bags).

If solid waste management is included in the 'list' of development priorities, opportunities are likely to arise to insert small but catalytic actions to combat MPP and plastic pollution into projects and initiatives that target the related SDGs (Figure 3).

Ideally, plans for solid waste management would involve both investment and recurrent financing components.³⁸ The government has already closed the unsanitary Antula waste dump and opened a new landfill at Safim, some 16km from Bissau. Investments in sanitary landfills will need to ensure that the landfills can be maintained and, if possible, that facilities for catadores (storage of sorted wastes, sanitation) are included.³⁹ Investments could possibly prioritise the various forms of community actions, including voluntary local clean-ups, deployment of youth groups, innovation in reuse and recycling and partnerships with business with a view to the use of unskilled labour to add value to waste.⁴⁰ Greater community engagement could potentially secure the resources which are not available to municipal authorities through voluntary efforts or labour paid through adding value to waste.

³⁷ Decreto no. 16/2013 prohibits the manufacture, import, sale and distribution of several types of plastic bags including those made from polyethylene and polypropylene.

³⁸ EC, União Europeia e Câmara Municipal de Bissau lançam o projeto "Gestão dos Resíduos Sólidos Urbanos em Bissau"

³⁹ Global Alliance of Waste Pickers. 2012. First Global Strategic Workshop of Waste Pickers: Inclusive Solid Waste Management Pune, India 2012 (globalrec.org). See models for Dakar and Bamako.

⁴⁰ Duarte, E.A.H.J.D., 2012. Contribuição para a organização e planeamento do sistema de gestão dos resíduos sólidos no município de Bissau, Guiné-Bissau. Universidade Federal de Santa Catarina.

The catalytic actions could include raising awareness of the health benefits of waste management, raising community pride in cleanliness, organisation of traders and catadores, supporting SMEs which can innovate and add value to waste.

The catadores have an important role in adding value to waste and plastic represents about 17 percent of the materials collected. Study suggests that basic organisation of these marginalised workers could improve market opportunities for recycled/ reused materials, reduce plastic pollution and contribute to management of municipal solid waste at least in Bissau.⁴¹

Figure 6. Waste items collected by catadores

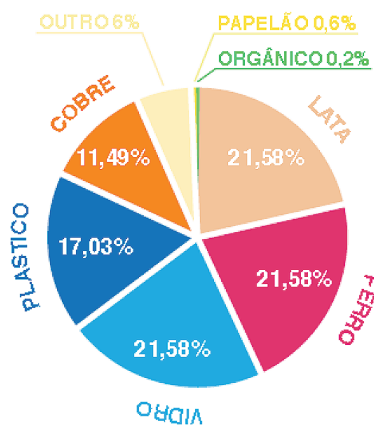
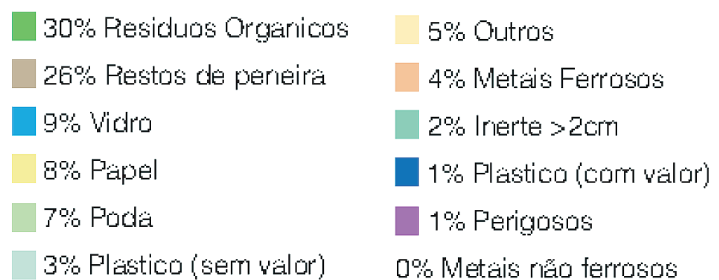


Figure 7. Composition of waste at Bissau city waste collection points



Source: LVIA, 2015

The national environmental management plan recognises the problem of pollution and waste management, but does not prioritise it.⁴² Desertification and land degradation, which have strong links to rural poverty, are seen as the priorities. A wide range of environmental studies and plans exist, often prepared in response to commitments under international initiatives such as those on climate change or biodiversity. As monitoring and evaluation of these activities is deficient, the level of execution of these plans remains unclear, but appears weak. This is partly attributable to a lack of human capacity, particularly at medium and lower levels and the permanent shortage of financial resources. National 'state of the environment' reports could include indicators on urban waste management (SDG 11), plastic consumption (SDG 12) and marine pollution (SDG 14).⁴³ Reference should be made to the main project reports for greater detail and discussion of recycling of plastic waste.

2.2.2 Fisheries

In Guinea-Bissau, marking of fishing gear, requirements for reporting loss and location of loss (i.e. with GIS reference), 'fishing' to recover lost gear, port reception facilities for waste gear and arrangements for recycling are all measures which can help reduce MPP from fishing.⁴⁴ Measures based on MARPOL Annex V can be applied to fishing vessels. The arrangements for collection and recycling of fishing gear collection and gear recycling programme require practical local solutions. Recycling of nets and ropes may require the economies of scale which are only feasible through regional schemes, through

⁴¹ LVIA, 2016. Os apanhadores de lixo de Bissau. Quem são e como trabalham? LVIA, CMB, EU.

⁴² Plano Nacional de Gestão Ambiental.

⁴³ PNUD, GEF. 2011. République de Guinée-Bissau. Autoévaluation des besoins en Renforcement des Capacités de Gestion de l'Environnement National et Mondial.

⁴⁴ 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.

close engagement with businesses and possibly with economic support from EPR arrangements with importers. Studies suggest that the direct economic costs and benefits of fishing gear EPR schemes, such as deposit-return arrangements, or 'environmental taxes' on fishing gear imports are considered to be about equal (excluding indirect environmental benefits). However, the distribution of costs can be skewed, e.g., if manufacturers simply increase the cost of gear to fishers to cover EPR.⁴⁵ Fishers could introduce local rules to curtail gillnets in rocky areas where nets are frequently lost, as ghost fishing impacts on all fishers.

Abandoned GRP vessels present a growing plastic waste problem. Rules for disposal are required and the responsibilities specified. 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.

Reduction of MPP from foreign fishing vessels requires a regional approach, particularly if vessels fishing in Guinea-Bissau land catches in Dakar, Conakry or Las Palmas and do not make port calls to Bissau. This could start with resolutions by ICCAT, SRFC, and COMAFAT phasing in MARPOL Annex V requirements for vessels and measures with respect to marking gear and FADs and to specify 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 be an approved regional management measure. Fisheries support vessels could be included. FAO might be requested to provide support for design of a phased approach.

2.2.3 Shipping

Ensuring that Guinea-Bissau meets its obligations under MARPOL Annex V is the key action. Engagement between vessels operators and agents, port officials and waste disposal enterprises can help to ensure compliance on ships garbage disposal. Clarity on responsibilities for control, for inspection of ship's waste management logbooks and monitoring of practices at smaller ports may require agreements between Enapor, responsible ministries and municipal authorities. Dialogues could also help in separation of recyclables in ship's garbage. Possible dialogues with IMO and regional port authorities could ensure coordinated measures to prevent dumping of waste by other shipping and foster codes of conduct by cruise lines.⁴⁶

2.2.4 Awareness of MPP

There is an awareness of MPP in Guinea-Bissau. This is evidenced by the Guinea-Bissau's endorsement of the Mindelo Declaration on marine litter; ratification of the Abidjan Convention's LBSA Protocol; ratification of MARPOL Annex V; and national legislation prohibiting plastic bags. The awareness exists at the level of decision-makers. However, a similar level of awareness may not exist among consumers and businesses as evidenced by the reported lack of compliance with the plastic bag regulations.

A range of approaches to raising awareness is detailed in the main AIODIS report. In the case of Guinea-Bissau, the existing awareness may need to be channelled into practical actions, such as the separation of plastic waste, access to sources of funding for recycling, possibilities with regard to EPR schemes and development of a business case for 'valorização' of waste streams. In 2020, the Câmara

⁴⁵ EC, 2018. Study to support impact assessment for options to reduce the level of ALDFG Final Report 22-02-2018. <https://webgate.ec.europa.eu/maritimeforum/en/system/files/Final%20Report%20Plastics%20from%20Fishing%20Gear%20Delivered.pdf>.

⁴⁶ 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 (see commitment on phasing out of SUPs).

Municipal de Bissau indicated that an awareness campaign on urban 'cleanliness' would be launched.⁴⁷ In addition to possible public awareness campaigns, awareness activities can build on the work of environmental NGOs and the development of materials for school curricula. Campaigns can also focus on voluntary actions and procurement policies, e.g., elimination of SUPs from public procurement, beach cleaning in the Bijagos and tourist areas, codes of industry conduct to reduce SUPs and plastic waste and EPR schemes to improve markets for waste products.

Specific attention may need to be directed to preparing consumers for possible measures on SUPs and raising awareness on microplastic pollution as this is less visible. Dialogue on a possible ban on the import of cosmetic and other household products which contain microbeads could also be envisaged.

2.2.5 Possible regional initiatives

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

- preparation of joint strategic plan on MPP under the Abidjan Convention
- a COP resolution on monitoring and reporting on MPP and marine microplastic pollution as part of the implementing arrangements for the Abidjan LBSA Protocol
- preparation by the Abidjan Convention of a funding submission for a regional MPP monitoring programme, including from distant sources, collating information on beach clean-up through existing initiatives, and preparation of a strategic plan on MPP
- further use of Comunidade dos Países de Língua Portuguesa in the context of a follow up to the Mindelo Declaration (2018).

In conjunction with other countries, Guinea-Bissau could also consider initiating a dialogue in ECOWAS on trade issues related to MPP and plastic waste management in general. In particular, regional arrangements on trade in plastic (and other) 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 substitutes and collection and recycling schemes and underpin a dialogue with regional suppliers, such as agents for soft drinks. 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 (see main report), and inform discussions within the WTO.

At the level of AIODIS and Africa, Guinea-Bissau 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. A regional action plan could also enable access to resources, including from global partnerships on plastic waste (see main report).

2.2.6 Resources

As already noted, solid waste management does not appear to have a high priority in the agendas of the development partners, or the problem has been 'dissipated' among other challenges, such

⁴⁷ Câmara Municipal de Bissau, 2020. «uma campanha que vai ser realizada na televisão e nas rádios de Bissau, destinada aos municípios». QW Noticias 20 August 2020. <https://www.dw.com/pt-002/bissau-est%C3%A1-cansada-do-problema-do-lixo/a-54636646>.

as health, infrastructure, public finance or education.⁴⁸ This implies increased attention to the cost-effectiveness of waste management, means to reduce wastes (e.g., import of packaging), application of 'polluter pays' charges on items such as plastic bottles and plastic packaging, recovery of waste collection costs and possible cross-subsidy for collection from remote communities. In the absence of major investment funds, low-cost actions, including awareness raising and change in consumer and household behaviour on waste management could be targeted. As suggested above, small interventions could be identified as part of projects that address the relevant SDGs. In particular, community initiatives to manage waste and improved synergies between any existing public and private efforts could be considered. Lessons could possibly be learned from the Dakar catadores (Association des Recuperateurs et Recycleurs de Mbeubeuss (BOKK DIOM)) which services households, commercial establishments, hospitals, markets and other producers of wastes. Further studies could be prepared as part of university theses, but organised in a way to fill gaps in understanding of waste management and to identify options for waste valuation or for local products to substitute plastics.

⁴⁸ Although the Istanbul IPOA calls for improved waste management. See: Fourth United Nations Conference on the Least Developed Countries, 2011. Programme of Action for the Least Developed Countries for the Decade 2011-2020. Istanbul, Turkey, 9-13 May 2011. <http://unohrrls.org/UserFiles/File/IPoA.pdf>. The national review of the Istanbul programme reviews the mobilisation of internal and external resources Director Geral da Cooperação Internacional, 2020. Relatório final. Implementação do programa de acção de istambul na Guiné-Bissau 2011-2020. Bissau, 9 Março de 2020. https://www.un.org/ldc5/sites/www.un.org.ldc5/files/guine_bissau_ipoa_national_report.pdf.