INDIAN OCEAN COMMISSION

CIRCULAR ECONOMY IN THE AFRICAN AND INDIAN OCEAN DEVELOPING ISLAND STATES

EXISTING STRATEGIES AND STATE OF PLAY

Review report

SWIOFISH 2

WORLD BANK GROUP

INDIAN OCEAN COMMISSION

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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

Natural resources use and material consumptions have exponentially increased in the past 20 years (Schandl et al., 2018; Wiedmann et al., 2015). They have led to various environmental problems such as the biodiversity crisis but also socio-economic issues with the widening of the inequality gap (Marques et al., 2019; Teixidó-Figueras et al., 2016). The global economic system and the capitalist manners of exploiting natural resources have been seen as major contributors to the situation (Seis, 2001). Since the 1960s, alternative systems have been promoted including the need for a circular economy (CE) that is restorative by design (Winans et al., 2017). The concept is now becoming mainstream and has seen its implementation under other concepts such as the green and, more recent, blue economies (D'Amato et al., 2017; Twomey & Washington, 2016).

Among existing definitions of CE, Kirchherr et al. (2017) provided a useful one for the current Indian Ocean Developing Island States project (IODIS): an "economic system that replaces the 'end-of-life' concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes.". The CE operates at different level from the micro level (products, companies, consumers), the meso-level (eco-industrial parks) and the macro level (city, region, nation and beyond) (ibid). The CE has also been increasingly associated as a necessary step to achieve sustainable development (Suárez-Eiroa et al., 2019). It has received increasing attention from governments, the private sector and academia (D'Adamo, 2019; Suárez-Eiroa et al., 2019). The European Union (EU), for example, adopted the CE Action plan in 2015 to help stimulate the EU's transition towards a CE (Domenech & Bahn-Walkowiak, 2019). Countries like France or the Netherlands are seen as championing in CE implementation. Global initiatives are also burgeoning, such as the Global Plastic Action Partnership, Circular Electronics Action Partnership or the Global Battery Alliance (WEF, 2020). For the African and Indian Ocean Developing Island States (AIODIS) and African countries in general, excluding Reunion Island, the circular economy is still a nascent concept (Desmond & Asamba, 2019). However, it represents an opportunity to overcome the challenges that the AIODIS face as island states, including the reliance of import for goods and material and the accumulation of waste that degrades the environment (Dussaux & Glachant, 2019; Romero-Hernández & Romero, 2018).

The aim of the report is to look at the level of implementation of CE in AODIS. In the current blue economy agenda that many AIODIS have adopted, it presents the opportunity to build a strong blue economy that could be less reliant on external inputs. It is especially relevant for key areas of blue economy that build on harvesting/extraction, the use of renewable and non-renewable resources, and commerce and trade. Implementing a CE represents the opportunity to achieve sustainable and inclusive blue growth. The CE framework that is used in this report is that of the Ellen MacArthur Foundation, which has been pioneering and promoting the implementation of CE since 2013. The framework is based on three principles: preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows (P1), optimise resource yields by circulating products, components, and materials at the highest utility at all times in both technical and biological cycles (P2), and foster system effectiveness by revealing and designing out negative externalities (P3) (EMF 2015).

The report starts with a brief description of the theoretical framework based on the CE system diagram, it then presents the current frameworks and strategies within AOIDIS that can relate to a CE. It continues with a discussion of challenges to achieve a CE in AIODIS. It concludes with the opportunities that can be developed with the AIODIS to boost their CE and contribute to sustainable blue economies.

1 Defining the Circular Economy for the AIODIS

The circular economy as defined in the introduction is a fairly new concept for the majority of the AIODIS. However, under the global framework of sustainable development and more recently the adoption a blue economy agenda, the AIODIS have increasingly adopted sustainable practices in terms of production and consumption. These are, however, dispersed and often siloed under sectoral policies.

In this report, a framework is provided to analyse where the AIODIS are in implementing a circular economy. To address both natural resources extraction and material consumption, the circular economy system diagram of the Ellen MacArthur Foundation is used as a theoretical framework (Figure 1). The diagram puts together the biophysical and technical cycles to address both our use of natural resources and our material production and consumption.

Within the technical cycle that addresses material stock management, the framework of ReX has been integrated. The ReX framework has been designed to cover different strategies of circularity within material stock management. It goes beyond the 3R framework (reduce, reuse, recycle) that is commonly used (Jiao & Boons, 2014) and integrates other concepts within extended frameworks such as 4R or 9R (Table 1). It also provides a straightforward picture of the three main stages of production "Pre-Use, Use and Post-Use" (Figure 2).

Table 1: Different frameworks and strategies within the CE

Strategies	Frameworks			
Reduce	3R	4R	9R	ReX
Reuse				
Recycle				
Recover				
Repair				
Refurbish				
Remanufacture				
Repurpose				
Rethink				
Refuse				

Source: EU (2008), Yoshida (2007), Potting et al. (2017), Sihvonene & Ritola (2015)

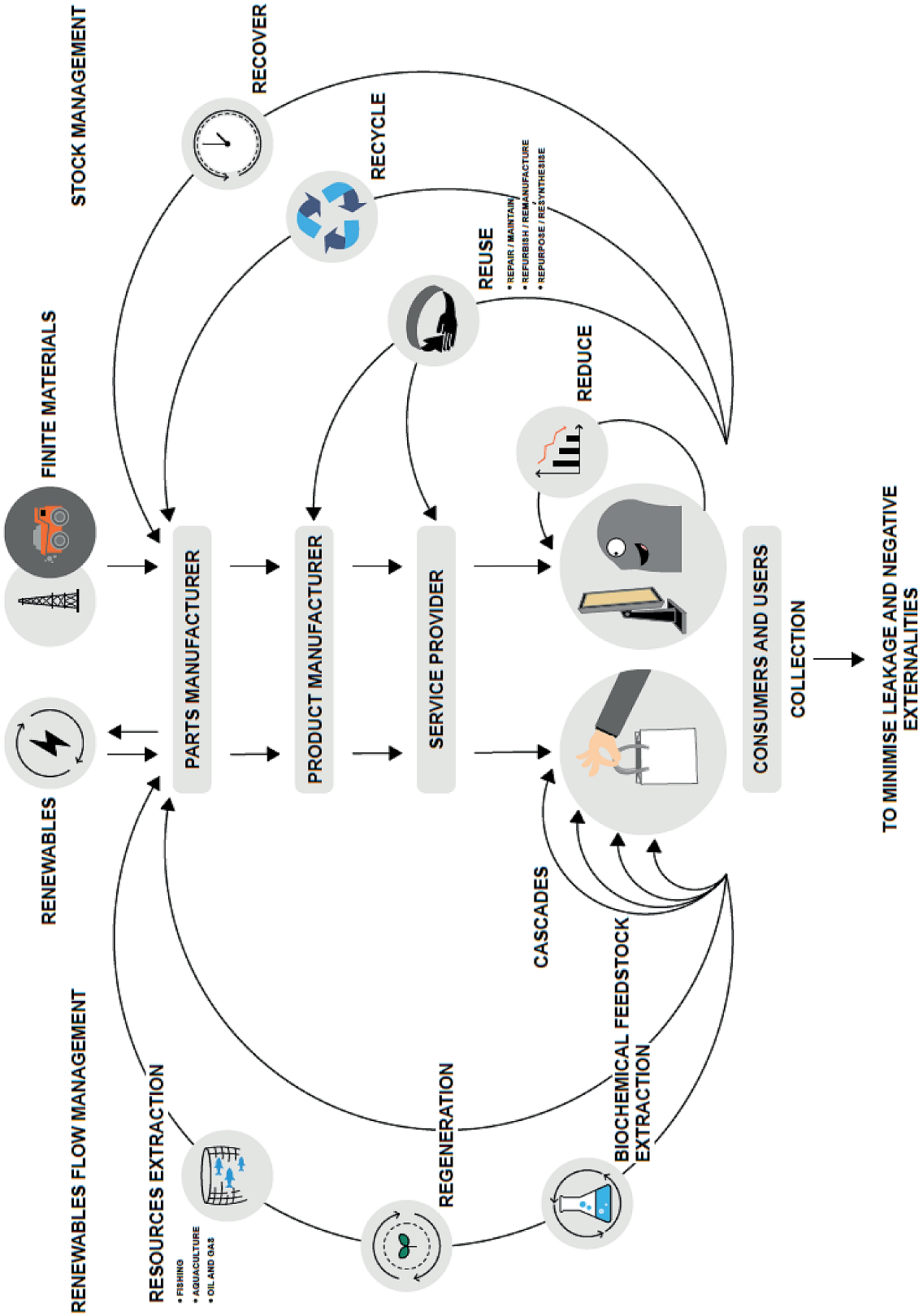
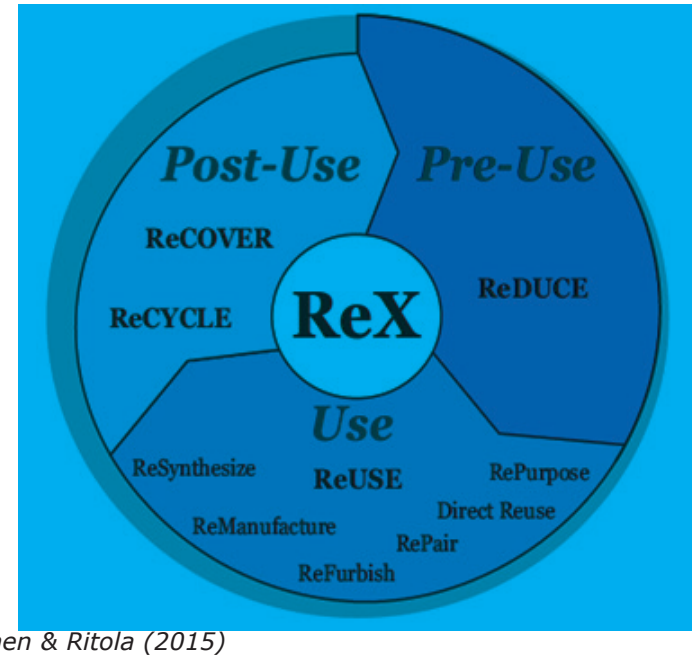


Figure 1: Circular economy system diagram adapted from the Ellen MacArthur Foundation and the ReX Framework

Figure 2: ReX Framework



Source: Sihvonen & Ritola (2015)

To discuss the state of play regarding CE within the AIODIS, three methods have been used:

- Online research on each country regarding initiatives of marine resource use and conservation, waste and plastic management, and specific CE policy and projects
- A gathering of AIODIS presentations during the launch meeting to assess the countries' comprehension of CE nationally
- A compilation of data from global databases that link to the state natural resources and material uses (see Table 2).

Table 2: CE indicators and sources

Indicators	Database/Source
Fisheries production	FAO's Fishery and Aquaculture Statistics (2018)
Marine protected area coverage	Marine Protection Atlas
Material consumption	UN IRP Global Material Flows Database
Resources extraction	
Renewable Energy Consumption	World Bank, Sustainable Energy for All database
Waste generation	World Bank's What a waste Report (2018)
Export and Import	World Bank, WITS
Country profiles	World Bank and FAO databases

Source: Author's conception

2 Circular Economy Strategies within the AIODIS

2.1 Policy and legal frameworks promoting a circular economy within AIODIS

For African countries, including AIODIS, the implementation of the CE concept is still very recent (Desmond & Asamba 2019). However, the AIODIS have different laws and policies that promote the principles of a CE despite not addressing it directly (Table 3). All 9 of the AIODIS have laws and policies that cover the use of natural resources and management of renewable flows (See details in Annex 4). These include texts that regulate forestry and fisheries activities, specific forestry and fisheries codes, environmental laws and biodiversity strategies. They also cover specific texts aimed at protecting ecosystems and species such as protected areas and water codes.

In terms of stock management, all of the countries have developed policies and laws that relate to waste management especially regarding solid waste. The majority of the AIODIS have also addressed the issue of plastic by prohibiting the use of plastic bags or single-use plastics. Countries that have not implemented such prohibition have adopted phasing out policies. Mauritius and Reunion Island in particular have regulations regarding recycling and the activity of recycling.

Table 3: Types of laws and policies available within the AIODIS relating to CE

		CVI	COI	GBS	MDG	MDV	MAU	REU	STP	SEY
Renewable Flow Management	Environmental protection/ Biodiversity Conservation	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Fisheries management	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Forestry management	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Protected Areas	✓			✓	✓	✓	✓	✓	✓
	Water management			✓	✓	✓	✓		✓	
	Renewable Energy						✓	✓		
Stock Management	General waste management	✓	✓	✓	✓	✓	✓	✓	✓	
	Solid waste management	✓	✓	✓					✓	✓
	Recycling						✓	✓		
	Plastic Bag Ban/Phase out	✓			✓	✓	✓	✓		✓

In terms of performance of the countries regarding CE policy development, Reunion Island can be considered the most advanced. In addition to those mentioned above, it has adopted laws on energy transition (2019), a ban on plastic bags and recently a law on the fight against waste and the circular economy (2020). Under the impulsion of France, Reunion Island also adopted a Regional Action Plan for the Circular Economy. The plan has five objectives including coordinating the transition towards a CE, activating the levers of the transition, improving production and consumption, and developing loops.

Most of the AIODIS have also developed Blue Economy laws and strategies that promote the sustainable use of marine resources, protection of marine ecosystems and waste management. That is the case of Cabo Verde (Blue Growth Charter), Comoros (the Strategic Framework for A Policy National on Blue Economy), Mauritius (Ocean Economy Roadmap), Reunion Island (Law on the Blue Economy)

and Seychelles (Blue Economy Strategic Roadmap and Blue Economy Action Plan). Countries that are to develop such Blue Economy policies, including Guinea Bissau, Madagascar and Sao Tomé and Principe, have the opportunity to build from the AIODIS region's experience, especially in ensuring that blue growth does not impede on the sustainability of natural resources.

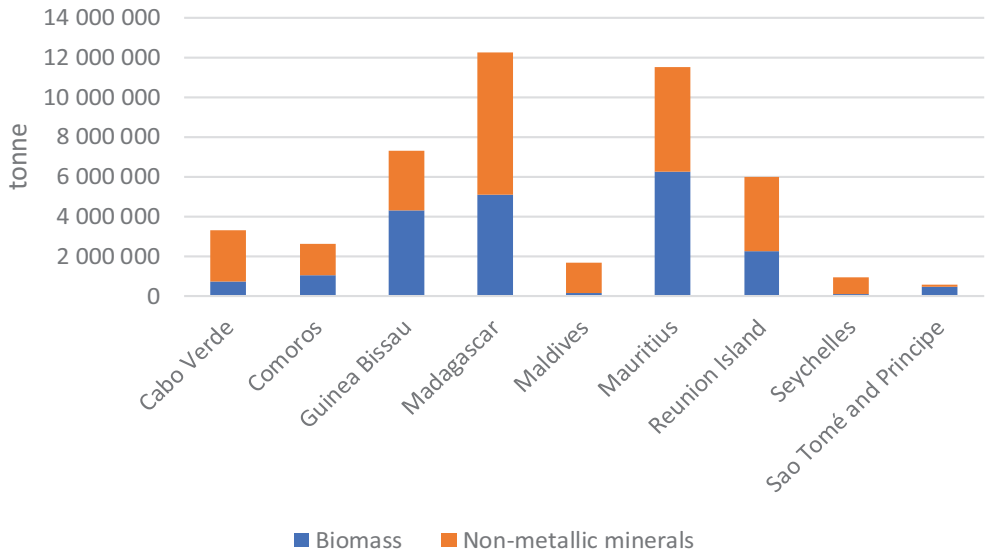
2.2 Renewable flow management: from extraction to regeneration

This section refers to the first part of the CE system diagram on management of renewable flows. Renewable flow management refers to the use of natural resources flows towards multiple cycles, yet in a regenerative way. It allows the rebuilding of natural stocks as well as the re-entering of nutrients into the environment (EMF 2019). In this section, interventions relating to this management will be presented for AIODIS. It is divided into three parts: extraction of natural resources, regeneration of ecosystems and species, and energy recovery and extracting feedstock.

2.2.1 State of natural resources extraction and CE-related interventions

For the AIODIS, the extraction of natural resources is an essential part of economies. Most AIODIS have experienced an increase in their domestic extraction in the past 40 years with countries like Cabo Verde or Comoros with a more than 500% increase of domestic extraction (WU Vienna 2019). Every year, about 45 millions of tonnes of resources are extracted from the AIODIS (Figure 3).

Figure 3: Resources extraction within the AIODIS in 2017



Source: Compilation from WU Vienna (2019) and Cornélus et al. (2016) for Reunion Island

The extraction of natural resources can be divided into extraction of living resources and non-living resources. In a circular economy, such extraction is aimed at manufacturing products with the aim that products have multiple life cycles. For living resources, the case of fisheries, aquaculture and bio-prospection represent sectors for AIODIS that are integral parts of the CE.

In ***fisheries***, the 9 AIODIS have important production levels (Table 4) that are key to the national economies but also for the food security of the countries. The AIODIS have a combined yearly production of around 500,000 tonnes every year (FAO, 2018).

Table 4: Fisheries production of AIODIS (2017)

Countries	Fisheries production (tonne)
Cabo Verde	18,673
Comoros	17,021
Guinea Bissau	6,735
Madagascar	171,724
Maldives	143,258
Mauritius	26,243
Reunion Island	2,259
Seychelles	136,178
Sao Tomé and Principe	10,808
Total	532,899

Source: FAO (2018)

In terms of life cycles, fisheries products can have various uses beyond consumption, the production of fishmeal from fish waste is widely practised within the AIODIS. However, the production is low. The entire African production of fishmeal does not exceed 200,000 tonnes (as of 2018) which represents less than 3% of global production. Within the AIODIS, the use of fish parts could also be replicated on other islands. Operating by some private companies (for example, Marine Biotechnology Products, Goia Tuna Oil), Mauritius has produced fish oil from tuna heads un-used in the canning industry. The fish oil is sold as a food supplement.

For ***aquaculture***, the production within AIODIS is still very low following the trend in Sub-Saharan Africa. Fish production from aquaculture in Sub-Saharan African still represents less than 1% of the global production. AIODIS countries such as Madagascar, Reunion Island and Mauritius have been involved in aquaculture and mariculture. While the aquaculture sector within the IOC countries alone is estimated at EUR 23,3 million/year, the production is mainly for consumption and exports (Breuil & Yvergniaux, 2017). Activities to improve life cycles for the countries involved in aquaculture would include waste management and water treatment, two aspects that are recognised as requiring improvement in aquaculture practices.

In terms of ***bioprospecting***, there is little literature about this topic within the AIODIS. As ocean-based economies, marine products present opportunities for potential diversity of uses. Some countries have developed such initiatives and can serve as a model and lessons learnt for other AIODIS countries. These include:

- Seaweed Aquaculture (in Madagascar). Blue Ventures, an NGO based in Madagascar has developed seaweed aquaculture (red "cottonii" seaweed - *Kappaphycus alvarezii*) with local communities. The products are bought by cosmetic companies outside the country.
- Aquatic algae production (in Madagascar). Private companies and research institutes have grown algae (Spirulina nei - *Spirulina spp*.) to be used as a food supplement.

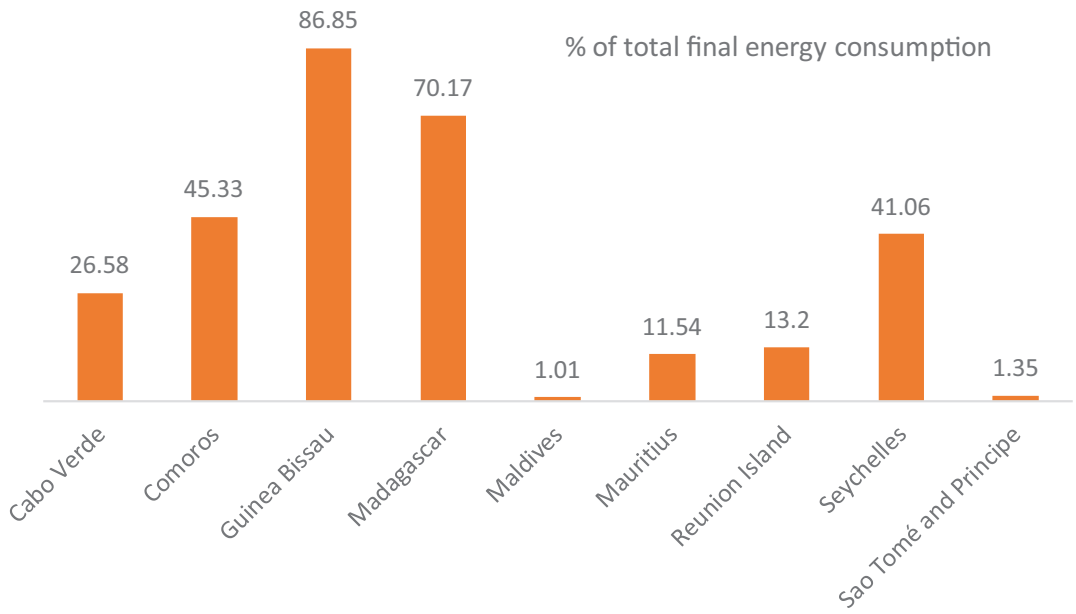
For non-living resources such as **oil and gas** as well as renewable energy and minerals, the AIODIS have not fully developed activities in these areas, despite the substantial potential.

Regarding oil and gas, in 2014 important deposits were discovered within the Mozambique Channel and provide potential of extraction for countries in the region (Richmond, 2016). AIODIS such as Maldives and Guinea Bissau also have existing deposits that present the opportunity of exploitation. Since the discovery of oil and gas deposits within AIODIS, exploration activities have taken place in countries

like Madagascar, Guinea Bissau and Seychelles. Activities pertaining to oil and gas exploration have also started in the Extended Continental Shelf in the Mascarene Plateau region jointly managed by Mauritius and Seychelles. Since extraction itself has not taken place yet, there is an opportunity to build a strong framework integrating circular economy principles within the future of these activities. Water and technical materials of refineries in particular have been recycled and reused in other countries (Alnuaim, n.d.; Kun & Jian, 2011).

For ***renewable energy***, the AIODIS have different levels of consumption (Figure 4). Countries like Guinea Bissau and Madagascar strongly rely on renewable energy whereas countries like Maldives, Mauritius or Sao Tome Principe have a very low consumption.

Figure 4: Percentage of renewable energy consumption within total consumption in the AIODIS in 2015



Source: Compilation from Cornélus et al. (2016); World Bank (2016)

The western Indian Ocean has been assessed presenting the potential for developing energy from ocean-based sources such as deep-ocean temperature, tidal energy, ocean current and wave energy (Richmond, 2016). The technologies for such options are not available yet for the countries of the Indian Ocean although prototypes have been developed (EMR in Réunion and low-cost prototype in Mauritius). Some AIODIS, part of the IOC, however, are taking part in the ENERGIE Project, a 15-million-euro project started in 2015 and funded by the EU to develop renewable energy within the IOC countries. As of 2019, more than 10 projects have been funded covering solar energy, hydroelectricity and biogas (examples in Table 5).

Table 5: Sample of projects funded under the ENERGIE project.

Country	Renewable Energy Projects
Comoros	- Production of energy-saving wood-fired cookers - Biogas production from household waste - Reforestation of ylang-ylang to reduce reliance on fuelwood
Madagascar	- Social enterprise through solar lamps selling and making (Jito-Ve, Femsolar) - Locally made turbines for a hydroelectric plant (Jiro Meva) - Use of Jatropha grains from Jatropha oil production to generate local fuel (Gemaha) - Biogas production from household waste (Biogaz Diana) - Solar panel centres in remote villages
Mauritius	- Desalinisation of sea water through solar energy (Osmosun) - Biogas production from household waste

Source: IOC (2019)

Finally, a resource that is key for the AIODIS is ***freshwater***. Most AIODIS countries have developed desalination plants, and processes seawater into freshwater. Countries like Cabo Verde, Maldives, Madagascar, Mauritius (and Rodrigues) and Seychelles have built desalination plants to improve their input in freshwater. This re-use of seawater can be seen as a key step within the CE principle of increasing life cycles within biological flows.

Overall Diagnostic - Regarding the extraction of natural resources, the AIODIS countries have lessons to share amongst them in terms of fisheries and aquaculture as well as renewable energy. Existing initiatives fit within the CE principles and can be developed further. For other fields such as oil and gas, offshore renewable energy and bioprospection, the AIODIS have not developed these activities yet. This represents an opportunity to build frameworks and policies for these activities that comply with the needs of a circular economy.

2.2.2 Regeneration of ecosystems and protection of species

Another important principle within the CE is regeneration or "the promotion of self-renewal capacity of natural systems with the aim of reactivating ecological processes damaged or over-exploited by human action" (Morseletto, 2020, p7). Within a CE, high priority is given to the natural systems from their use to their flourishing.

For the AIODIS, in addition to terrestrial systems, the marine system plays an essential role in sustaining economies especially considering the large national water and high seas that surround the AIOSIS. Therefore, various biodiversity conservation policies and actions as well as initiatives towards sustainable management of fisheries and marine resources can be included within this regeneration.

The AIODIS share common practices of regeneration that, while not labelled as such, contribute to the reactivation of ecological processes. The following activities are found amongst the AIODIS:

- The establishment of marine protected areas (Table 6). Each AIODIS has established one or more marine protected areas to help species flourish without human action threat.
- The adoption of legislation protecting endangered species such as sharks from being harvested
- Protection and restoration of coral reefs and wetlands

Table 6: Extent of marine areas protected within the AIODIS

Countries	EEZ size (km²)	Marine surface protected (km²)	Number of MPAs	Coverage of the EEZ
Cabo Verde[1]	800 561	5	0	<1%
Comoros	163 752	620	0	<1%
Guinea Bissau	123 725	9 197	11	8,6%
Madagascar	1 225 259	54 463	47	3,6%
Maldives	923 322	472	39	<1%
Mauritius	2 203 542	637 909	16	29%
Reunion Island	315 000	35	11	<1%
Sao Tome and Principe	131 397	6	0	<1%
Seychelles	1 336 559	208 618	26	26%
Total		910 690	124	

Source: https://mpatlas.org/countries/ and https://www.protectedplanet.net/ (for Cabo Verde and Comoros) Accessed October 8th, 2020.

Specific ***regeneration*** initiatives that are undertaken by some countries that present some potential of replication are:

- **The setup of fisheries closures** (in Madagascar, Mauritius and Comoros). In the three countries, fisheries such as octopus, crab or lobster are managed under temporary closures of the fishery to ensure that species reach maturity and that juveniles are not caught.
- **The setup of LMMAs - locally managed marine areas** (in Madagascar and soon in the Seychelles) and Voluntary Marine Conservation Areas (in Mauritius). These areas are specific marine areas, often coastal, that are managed by local communities. The management is shaped by a set of rules that prevent destructive use and designates specific areas that cannot be accessed by users in order to protect juvenile species.
- **Marine Spatial Planning (MSP)** (in Seychelles). MSP is a process that allows government and natural resource users to determine together the various use and zoning of national waters. Seychelles has been leading such a process and finalised its MSP in 2019. Through MSP, the Seychelles have been able to designate 30% of its national waters to be protected.
- **Certification of fisheries products** (in Maldives). Certification schemes such as the Marine Stewardship Council for fisheries products like tuna in the Maldives allow the resources to be managed under environmental criteria and rules that the fish stocks can benefit from.
- **Adoption of catch limits** (In the Indian Ocean). To recover the overfished status of yellowfin tuna in the Indian Ocean, member parties to the Indian Ocean Tuna Commission have adopted catch limits on their fishing effort in the region.

Overall Diagnostic - The AIODIS have progressed towards protecting natural systems from degrading. However, efforts are still very limited in terms of protecting marine areas compared to the size of EEZs. Efforts are also not consistent within the region with some countries like Seychelles and Mauritius much more advanced in protection targets. Lessons can be exchanged between countries. Considering the reliance of the AIODIS on the oceans, regeneration is a key component in achieving a CE.

[1] In late October 2020, two islands in Cabo Verde were classified as a UNESCO world biosphere reserve. This new classification is not reflected yet in the mpatlas.org data

2.2.3 Energy recovery and extracting feedstock from island environments

The last component under renewable flow management is energy recovery and feedstock extraction. They can take place at post-harvest as well as post-consuming phases and aim to regenerate nutrients in the biological cycle (EMF 2020). This principle is therefore at the interface between the biological and the technical cycles.

Within the AIODIS, energy recovery in the biological cycle takes place through the use of biological material to generate energy. Some AIODIS, especially those members of the IOC, have developed biogas systems through the use of organic waste and could be replicated across the other countries (IOC 2019). Countries like Madagascar and Mauritius also recover energy from solar panels or from the use of plants like Jatropha or sugarcane that can also generate biofuel (Sonnleitner et al., 2013; Sultan & Khoodaruth, 2013; Whitehouse, 2020). Mauritius and Reunion Island have also extracted biomass from mix electronics. They have built infrastructures for such energy recovery, often from external funding, and should be supported in their activities as well as in the promotion of lessons learnt from these initiatives.

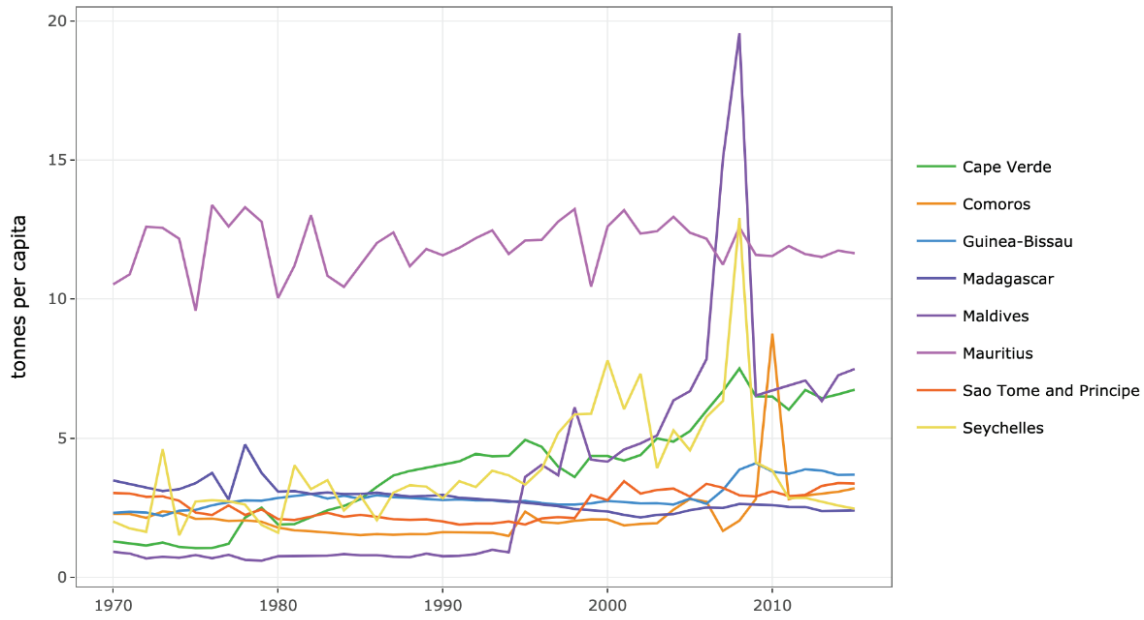
In terms of extracting feedstock, initiatives such as compost making (as it will be developed in the next section) are part of practices that help extract feedstock and regenerate nutrients in soil. As far as the ocean is concerned, such regeneration is possible by inducing less anthropogenic stress in the marine ecosystem (for example through pollution) (Duarte & Krause-Jensen, 2018; McCrackin et al., 2017). Marine conservation-based activities of AIODIS are therefore key in this strategy. The Maldives, for example, is building a sewerage treatment plant with financial support from the World Bank in the capital city to prevent untreated sewage from being released into the ocean.

Overall Diagnostic - While there are initiatives that constitute a good start on energy recovery and feedstock extraction, these are localised and of small scale. Activities that specifically address marine ecosystems are also limited but could be enhanced through ongoing conservation activities.

2.3 Material stock management: implementing ReX strategies for consumption and waste management

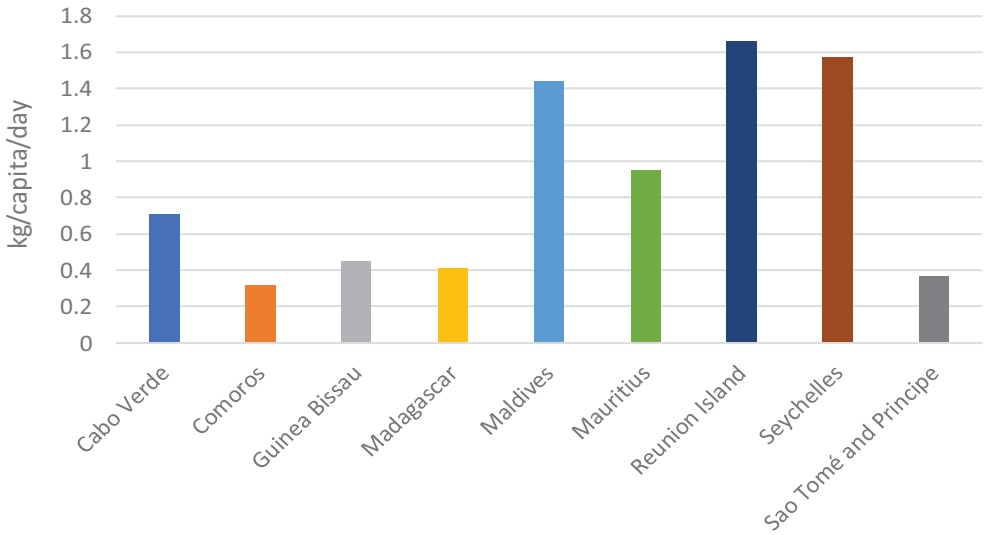
This section refers to the second part of the CE system diagram on material stock management. The management of material stock has the aim to ensure that products have a longer life span. In the context of AIODIS, considering their geographical isolation, the question of material stock management is especially relevant to address issues such as the high consumption of material, including plastic and waste management. In line with their development status, more advanced AIODIS have higher material consumption and waste per capita compared to developing AIODIS (Figures 5 and 6). The issue of plastic in particular represents an important threat to the ecosystems of the AIODIS. With a total plastic consumption of more than 450,000 tonnes in 2010 (Ritchie & Roser, 2018), the AIODIS and especially more developing ones such as Maldives, Mauritius and Seychelles have a high quantity of plastic per capita (Figure 7).

Figure 5: Domestic material consumption per capita within AIODIS (excluding Reunion Island: 10,4 tones/capita in 2015)



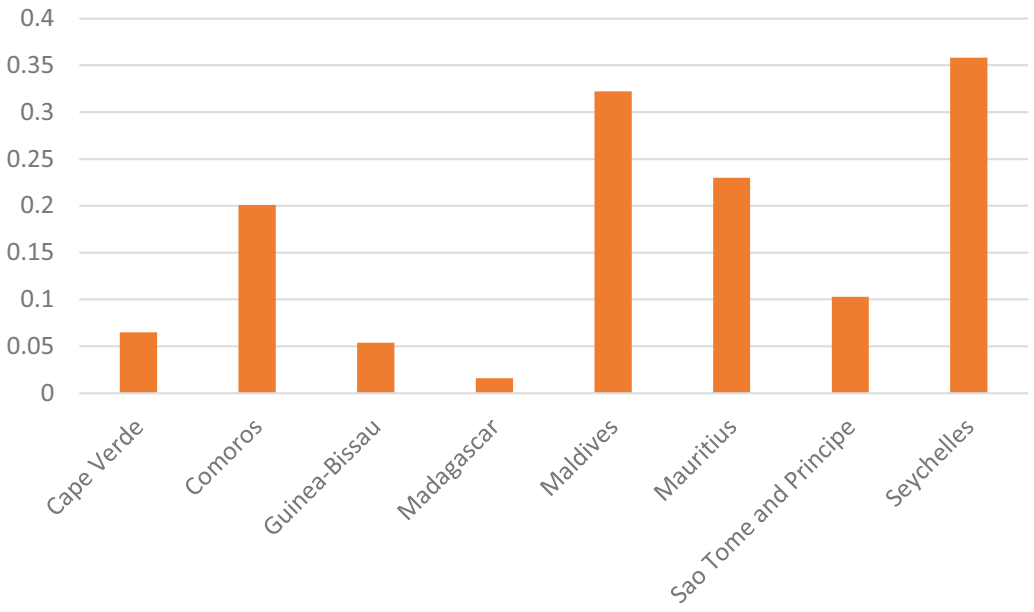
Source: materialflows.net. Accessed October 8th, 2020 and Cornélus et al. (2016)

Figure 6: Waste Generated within the AIODIS



Source: World Bank (2020); Brink et al. (2017)

Figure 7: Plastic waste generated (in kg) per capita within AIODIS (excluding Reunion Island). Source: Ritchie & Roser (2018)



As material consumption and waste management have increasingly become pressing issues, especially in the AIODIS, we will mobilise the ReX framework (presented in Figure 2) to provide a picture of existing initiatives within the strategies of Reduce, Reuse, Recycle and Recover.

2.3.1 Reducing material consumption and waste generation

The concept of Reduce at the pre-use stage involves various ideas including eco or sustainable design, designing products that last longer or have multiple life cycles, and the use of less material in production or dematerialisation. It also covers the idea of consuming less, using products longer or building more emotional attachments to products to avoid discard.

For the AIODIS, a range of activities and initiatives are in place to promote the reduction of consumption, especially linked to single use plastics. Industries such as tourism and fisheries have been at the forefront of taking part in such initiatives. Common initiatives across the AIODIS include:

- Campaigning against the use plastic bags and bottles (see for example in Table 7)
- Environmental education of the general public regarding reduction of consumption and waste management
- The use of biodegradable fishing aggregating devices (FADs) rather than plastic based FADs in tuna fisheries in the Indian Ocean

Table 7: Sample of projects within AIODIS on Reducing consumption of plastic

Country	Activity	Project/Initiator
Maldives	Promotes source-to-sea solutions to reduce marine littering in tourism	PROMISE PROJECT
	A pledge to reduce plastic use, boost recycling, and support the creation of new materials and methods.	Parley AIR (Avoid, Intercept, Redesign)
Seychelles	Education (online and offline) and action-oriented and policy and research on plastic bags use	SYAH Free from Plastic Bag Campaign

There are also ***Reduce*** schemes established in specific countries that could be replicated across AIODIS:

- **Deposit-refund scheme on glass bottles (in Mauritius)**. The scheme establishes a deposit fee for each 700- and 330 ml glass bottles. The initiative is led by local manufacturers (such as Phoenix Bev, Oxenham, QBL). It helps to ensure that the glass bottles are returned to the retailer and then collected by the beverage manufacturers.
- **Excise Duty on Non-Biodegradable Plastic Food Containers (in Mauritius)**. The scheme promotes responsible consumption and production by imposing a tax on single-use plastic food containers, thereby reducing the generation of single-use non-biodegradable plastic food containers and greatly reduced its use.
- **Use of ecological material for construction (in Madagascar and Reunion Island)**. The government has supported the structuring of bio-sourced materials sectors in Réunion Island and the creation of ecovillages in Madagascar within which ecological materials found locally are used to build houses.

Overall diagnostic - The main challenge within the Reduce strategy is within the production cycle and promotion of sustainable designs, where there are little recorded initiatives so far. Since AIODIS strongly rely on imports for their goods, production is also often out of the hands of countries. However, local industries have the opportunity to develop innovative designs.

2.3.2 Reusing natural biomass

The concept of reuse covers various strategies within the CE that promotes a sharing economy. According to Sihvonen and Ritola (2015), Reuse includes strategies from direct reuse to remanufacture or resynthesise (Table 8).

Table 8: Six concepts under the Reuse strategy

Reuse concepts	Definition
Resale and direct reuse	Reuse as it is or for another market
Repurpose	Using same product for new purposes without any adjustment
Repair	Restore the product into a 'working order'
Refurbish	Restore product to the extent it is not altered substantially
Remanufacture	Reach the quality of a new product, 'like-new' or 'as new'
Re-synthesise	Creating a new artefact different from original purposes

Source: Author's conception

For the AIODIS, the reuse strategy is key in ensuring circularity and reduce reliance on imports (see figures in Annexe 1). The initiatives that are shared and mainstream amongst the AIODIS include:

- Compost production (Table 9)
- Campaigns against food waste (such as the FOODWISE initiative in Mauritius)

Table 9: Examples of reuse practices through composting within AIODIS

Country	Activity	Project/Initiator
Comoros	Collection of organic waste to produce natural pesticides	Mouniat Compost
	Creation of a national platform for composting	
Madagascar	Collection of organic Collection of organic waste for compost and fuel bricks waste for compost and fuel bricks	Madacompost
	Resale of metal and plastic components to local handcraft businesses	Fakofia Le Relais
	Collection of municipal organic waste for sorting and composting	Fakofia Le Relais
Mauritius	Provision of home compost bins to households to encourage source segregation of wastes and promote the practice of compost production and usage.	Home Composting scheme
Reunion Island	Management of platforms of composting and shredding of farming waste	Green Tropical Circle
	Management and collection of organic waste to alleviate storage issues	ProxiCompost

There are ***Reuse*** schemes established in specific countries that could be replicated across AIODIS:

- **Ressourceries and Good Shop** (Reunion Island and Mauritius). The structures collect objects considered as waste. By reusing or recovering materials, the collected objects are valorised. The managing associations make products available for a modest price, after being repaired and customised for a second life.
- **Water resource management project** (Cabo Verde): The project aims at solving the problem of water scarcity and makes use of waste water for agriculture. The project targets all existing water, including groundwater for consumption and reuses wastewater for agriculture drop by drop.
- **An online platform of repair artisans** (Reunion Island): The platform allows the public to find individuals or companies that are experts in repairing various products including electronics, furniture, etc.

Overall diagnostic - The AOISIS have developed a vast array of initiatives for the Reuse strategy. One of the challenges of the Reuse strategy for the AIODIS is to build the capacity in the different industries to repair, repurpose and refurbish products. However, in developing AIODIS, the informal sector represents a rich field of exploration as it is where different repair, reuse or resale takes place widely. There is, however, limited data regarding these practices that are key to the CE. This requires more research and investigation on the potentiality presented by such activities.

2.3.3 Recycling organic and plastic waste

Recycling is one of the most mainstream and accepted strategies within the production and consumption cycle. Recycling can be defined as "any recovery operations by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes" (Sihvonen & Ritola, 2015). Recycling involves restoring products through their original or downgraded state so that they can be suitable for different purposes.

For the AIODIS, the strategy of recycling has been adopted at different levels and in different forms. Common initiatives include:

- Integration of recycling within waste management policies, including through the creation of recycling centres
- Establishing collecting points of recyclable waste
- Development of recycling activities at different levels, including within communities (for the case of Maldives and Seychelles), the private sector (for the case of Mauritius, Reunion Island, Madagascar, Guinea Bissau and Comoros) and at the state level (for the case of Cabo Verde)
- Transformation of recycling waste into needed material, including for construction and public infrastructure like streets (Table 10)

Table 10: Samples of recycling activities within the AIODIS

Country	Activity	Project/Initiator
Cabo Verde	Turning Glass bottles into sand for construction	Tinenê factory
	Transforming plastic waste into tile	Santo Antão Island
Comoros	Recycling household waste into tiles and bricks	2Mains initiative
	Recycling discarded clothes material into bags	Yang Creation
Guinea Bissau	Transforming plastic waste into road construction material	Binedou Global Service
Madagascar	Recycling household waste into tiles and bricks	Madacompost
	Transforming plastic waste into tiles and pavement material	Fakofia
Maldives	Regional waste management system	Clean Environment Programme
	Transforming plastic bottles into shoes and clothes through Parley recycling plants	Parley Maldives
Mauritius	Recycling glass bottles into construction and decoration material	Plankton Recycling
Reunion Island	Methanisation of organic waste producing a biogas transformed into green electricity	Biocarbo
	Recycling old tyres into tiles, mats and other construction materials	Solygom
Seychelles	Transforming Glass bottles into construction material	Seychelles Breweries

Source: Author's conception

Within recycling operations, some AIODIS have also developed Recycle strategies and incentives to boost productivity from recycling:

- **Financial incentive for recycling bottles locally** (in Mauritius). The government provides a financial incentive of Rs 15 per kg of PET recycled/exported for recycling. The incentive is higher for recycling done domestically. About 40% of PET bottles are collected annually out of a volume of about 120 million units produced per year. There is also a PET Tax of Rs 2 per bottle on production collected by the government
- **Regional strategy for recycling specific waste** (amongst IOC members). Five countries of the AIODIS, members of the IOC have developed a regional strategy targeting specific types of waste, notably plastic, batteries, oils and tyres. The aim of the strategy is to improve their value after transformation. One of the priorities of the strategy includes reinforcing technical knowledge regarding these specific types of waste and identifying the needs and potentialities of added value, per country.

Overall diagnostic - While recycling exists within the AIODIS, existing operators are not able to respond to the large demand of waste management required. Therefore, in current times, only key products such as PET and glass bottles are widely recycled. There is a need to better investigate the availability of other types of recyclable waste and especially build technical skills at different levels to implement transformation activities. The activities presented above show the diversity of experiences within the AIODIS and from which the replicability could be studied. Countries with similar socio-economic contexts such as Mauritius, Maldives, Reunion Island and the Seychelles could learn from each other and so could less advanced countries such as Comoros, Madagascar, Guinea Bissau and Cabo Verde. Initiatives in this direction have begun, notably the ongoing cooperation between Reunion and Mauritius on the structuring of a circular economy. AFD supports the waste strategy in these countries. The Reunion Region also supports the structuring of the EPR sector with the public and private sectors.

2.3.4 Recovering energy and e-waste parts

Recover is one of the less mainstream strategies with the R framework. Adopted by the European Union (2008) and within the 4R to 9R framework, it is less developed in terms of its implementation globally and especially in developing or coastal countries (World Bank, 2018). Sometimes considered as covering reuse and recycle, the recover strategy in the RX framework involves retrieving valuable or hazardous materials during the post-use phase (Sihvonen & Ritola, 2015). This strategy involves for example energy or metal compound recovery processes (ibid).

For the AIODIS, the strategy of recovery can be embedded within recycling practices. The generation of biogas from household waste, a practice developed in various AIODIS can be considered an energy recovery strategy.

In terms of material recovery countries have had different involvements. A common practice within the AIODIS and especially in less developed AIODIS likes Madagascar, Comoros, Guinea Bissau and Cabo Verde, is the recovery of metal and other components by informal recyclers (Ferrari et al., n.d.; Lazare et al., 2010). These recovery activities target different types of metal as well as e-waste (Lazare et al., 2010). For more advanced countries such as Mauritius and Reunion island, the private sector has been a key player in developing recovery activities:

- **The recovery of energy and metal from old batteries and e-waste** (in Mauritius and Reunion Island). Companies (Wecycle, Recyclage Valorisation Environnement - RVE) have developed processes to collect and recover material from e-waste that can be reused for refurbishment purposes or for an entirely different use.

- **Industrial waste collection and recovery** (in Reunion Island). A private company (Inter'Val) that collects and recovers parts of industrial waste (filter, containers, paints, etc.) to be exported.

Overall diagnostic - There are few records of initiatives that directly refer to the recover strategy. It is however possible that the recovery sector is more developed than what it appears within AIODIS especially considering the informal activities that are taking place in some of the AIODIS. What is therefore missing is a promotion and boosting of these activities to create more value for the countries and also provide more benefits for workers involved in such activities.

3 Challenges and Opportunities

3.1 Challenges around fostering CE in AOIDIS

The results in section 3 have shown that the AIODIS are already involved in some CE interventions. However, they are not coordinated under the CE as an overarching concept but more siloed in various sectors of environmental protection and waste management. The novelty of CE for the AIODIS represents the main driver for this lack of harmonisation. Therefore, in addition to existing challenges in implementing sustainable ocean-based activities, implementing a CE also presents additional challenges. These can be gathered under four types: technical, socio-economic, institutional and ecological.

3.1.1 Limited technical capacity

One of the key challenges that AIODIS face in transitioning to a CE is the lack of technical capacity. The low population in most of the AIODIS implies that technical capacities are not always available to implement interventions or to develop a national strategy. Even in Reunion Island, the boosting of the CE[2] stems from France's advanced CE policy. One of the key challenges for AIODIS is therefore the limited human resources that have the expertise to develop technically advanced CE activities. The AIODIS also lack human resources to implement activities such as those within the ReX framework and especially in waste management. In the latter in particular, recycling and recovering of waste is often not considered an attractive employment for local people and is sometimes associated to a marginalised segment of the population (Lazare et al., 2010; World Bank, 2018). Another important gap is the limited data available as well as the capacity for data collection. Lack of data in the majority of countries[3] affects both knowledge on natural flows as well as knowledge on material and waste. Consequently, it can be difficult to adopt the best strategy in the different spheres of the CE where data is scarce for the needs of new initiatives. Furthermore, there is also a limited collection of data that assess the effectiveness of existing projects.

The AIODIS requires capacity building in six key areas:

- the development of a CE national strategy[4]
- technical knowledge in energy recovery and feedstock extraction initiatives
- expertise in expanding recycling beyond plastic and PET bottles
- technical knowledge in material recovery
- data collection regarding natural flows and material use
- data collection assessing existing initiatives and projects

The field of reuse within AIODIS is also one that requires more development. While some skills might be available for small repair of material, and common in developing economies, capacities around refurbishment and remanufacturing are close to non-existent.

[2] Through the Regional Plan for Waste Prevention and Management - PRPGD or the Regional Action Plan for the Circular Economy
[3] Characterisation study of waste in Réunion by ADEME in 2019
[4] Except in the case of Reunion Island benefiting from the Regional Action Plan for the Circular Economy

In terms of management of natural flows, the AIODIS have succeeded in adopting environmental policies and implementing projects and activities towards the protection of natural ecosystems and marine resources. These, however, still need to be reinforced. A number of lessons learned within the AIODIS (presented in section 3) could guide countries that are less advanced.

In terms of awareness about the CE, more campaigns are also needed at all levels of the population and especially at the production and policy levels. Within the general public, knowledge about the CE economy is extremely limited[5] if not non-existent. However, the AIODIS population are increasingly aware of the need for environmental protection and waste management, including problems related to consumption and plastic. What is then missing is a broader awareness campaign on how current and future initiatives could contribute to a circular economy that would be beneficial to the AIODIS populations. A stronger effort that is needed is at the production level especially for developing AIODIS. Companies extracting natural resources and producing goods in Africa (including in the AIODIS) have not integrated a CE approach yet (Desmond & Asamba, 2019). This is mainly due to the fact that production and extraction in AIODIS and generally in developing countries are following a linear and accumulative approach that relates to achieving growth (ibid). The benefits of a CE approach is then little known within companies. The experience of Reunion Island in involving companies and promoting the private sector's involvement in building a CE is a key experience for the AIODIS and represents an opportunity for exchanges between similar industries. At the policy level, governments of the AIODIS have only engaged in CE discussions in the past five years, with the exception of Reunion Island. Governments are minimally aware of the requirements and benefits of the CE especially in achieving a sustainable and inclusive blue economy.

Finally, the limitation of funds is a key challenge in developing and implementing activities within the CE. As a common issue that developing AIODIS in particular face, the lack of financial resources available and the reliance on foreign aid to develop projects are an important limitation for the AIODIS. Even within the current blue economy agenda, main initiatives are led by funders such as the World Bank or the IOC. Seychelles is one of the AIODIS that has managed to raise US$15 million in funds from international investors for "blue bonds" designed to support sustainable marine and fisheries projects (SeyCCAT, 2019). Furthermore, while Reunion Island has raised most of its funds for CE through its state budget, other AIODIS might not have the budget to specifically foster CE interventions.

3.1.2 Differentiated socio-economic contexts

The second set of challenges that the AIODIS face in the context of a CE are inherently linked to their socio-economic contexts. The AIODIS are composed of countries with different levels of development. Some countries are more advanced (such as Reunion Island (France), Maldives, Mauritius or Seychelles) while the rest are at a developing stage (Table 11). Some AIODIS such as Guinea Bissau, Madagascar or Comoros are ranked at the very bottom of the human development index of the UNDP (Table 11).

[5] Mauritius has the Sign'Natir Pact established by Business Mauritius (https://www.signenatir.mu/) which promotes aspects of the circular economy

Table 11: HDI Ranking of AIODIS countries

Countries	HDI ranking
Cabo Verde	126
Comoros	156
Guinea Bissau	178
Madagascar	162
Maldives	104
Mauritius	66
Reunion Island (France)	26
Seychelles	62
Sao Tomé and Principe	137

Ranking based on 189 countries assessed. Source: UNDP, 2020

In this context, the AIODIS have very diverse national priorities. The more advanced countries are at the stage where some reflexion of circularity can be undertaken especially in light of increasing consumption and accumulation of waste. The less advanced countries, however, are still aiming at achieving development often relying on more extractive and linear economies. To this is added the issue of waste management that developing countries are increasingly facing. That said, a CE economy represents an opportunity for developing countries to achieve development under a CE framework that is more regenerative for natural resources and address waste issues from the material production stage to post-use. The challenge then lies within changing the paradigm at the highest level for less advanced countries. AIODIS like Comoros have already started this reflexion in its blue economy strategy and could serve as an example for other developing AIODIS.

Another aspect is the engagement of the AIODIS in developing their blue economies. There is a need to align national priorities with circularity rather than growth. Some prospective activities under the blue economy aspirations of countries are strongly related to linear growth. Visions such as increasing seabed mining or further development of fisheries might have contradicting values with the CE principles. It can therefore be a challenge for countries to achieve blue growth within a CE.

Another challenge is to show the relevance of CE for local realities. As the implementation of a CE is emerging in western countries, making such a concept applicable to developing AIODIS is an important issue. In countries like Madagascar or Guinea Bissau, extraction of resources is where wealth resides and consumption of goods is seen as a sign of progress. Applying a CE economy approach in such a context therefore can be seen as a way backward. In countries where the majority of the population rely on day-to-day income and expenditure, concepts such as extracting or consuming less can appear contradictory to development and economic growth. Within the developing AIODIS in particular, CE can be seen as a western concept that will impose limits on individual and national economic growth. On the other hand, in more advanced AIODIS, the implementation of a CE might affect many industries that have strongly relied on extraction such as fisheries. Industrial fishing, for example, is an important source of revenue for AIODIS in the Indian Ocean. Implementing a CE might require a different approach to fisheries that is more geared towards protection of resources and reduce production to a more sustainable level. Economies of countries like Seychelles that are highly reliant on tuna fisheries, for example, might need to adjust their industrial fisheries practices for more circularity and better use of resources.

The diverse socio-economic context within AIODIS can represent a strong obstacle to a harmonised CE strategy. While the principles of CE could be agreed amongst countries as helping to achieve sustainable development, their implementation requires a highly differentiated approach that considers the specificities of each AIODIS.

3.1.3 Institutional and political obstacles

The next set of challenges are closely linked to the socio-economic context of countries. They include the institutional and political obstacles that countries face in order to develop a CE. First, as presented in section 3.1, there is currently no CE framework that is readily available to implement for AIODIS, with the exception of Reunion Island. Countries have different interventions that can be related to implementing a CE without being directly labelled as such. While it shows that there are already opportunities to develop the CE, it also presents the risk of having uncoordinated and potentially contradictory policies that do not comply with the CE principles. Similarly, laws and regulations on specific CE activities are lacking in all the AIODIS, with the exception of Reunion Island.

A second challenge is the limited means that are currently available at the state level especially for implementation of a CE. This includes limited financial means as presented above but also institutional structures and infrastructure that are needed to develop and especially implement circularity. This is evidenced by current initiatives in waste management which is often project-based rather than being long-lasting initiatives. Efforts such as recycling or material recovering require substantial infrastructures and equipment that are not necessarily available within the AIODIS, especially developing ones.

The third challenge is political. While the AIODIS have committed to achieving sustainable development, including by implementing a CE (the mandating of this report being a token of that engagement), political will is not homogenous within each country. Many of the AIODIS are also subject to political instability and crisis. In this context, undertaking a systemic transformation such as the shift towards a CE will be highly dependent on national priorities of political leaders. In countries like Madagascar or Guinea Bissau, recurrent political crises represent a serious threat to enabling a systemic change. Governments that have agreed to a CE agenda today could be replaced tomorrow. The lack of policy continuity will strongly affect the ability of politically unstable AIODIS to fulfil their commitments towards a CE.

In line with this instability, power relations between governments and extractive/exploitative industries often dominate decision-making, especially in developing countries (Childs, 2018; Teixidó-Figueras et al., 2016). Industries such as mining or industrial fishing have strong influence on state actors and on environmental policy making. Often presenting their financial contribution to national economies, they can be reluctant in policy change and influence decision makers through lobbying. Such power dynamics are often overlooked especially in developing countries and require particular attention if any systemic change is to be achieved.

3.1.4 Complex ecological and geographical contexts

While implementing circularity refers to changing the paradigm in the economic system, there are some important ecological factors that can make the implementation of a CE challenging in the AIODIS. The first one is climate change which has serious impacts for island countries. The AIODIS are exposed to sea-level rise and global warming. In such context, implementing new ocean-based activities could be put at risk.

Another ecological challengethat AIODIS face is their geographical isolation and size. Some of the AIODIS such as the Maldives and the Seychelles are constituted by small remote islands that are separated from each other either by lagoons or deep-sea channels. The lack of connection between the islands can make it difficult to implement a national framework of CE. On the other hand, Madagascar has large landmass with a lack of connection between towns. In this context, implementing national policies is also challenging. Connected cities such as capital cities benefit from initiatives and leave

remote areas behind. The AIODIS therefore face both external and internal environmental challenges that can directly affect the implementation of a CE policy.

3.2 Opportunities in adopting a circular economy

The challenges presented above might strongly affect the ability of AIODIS countries in fostering their CEs. However, the CE also presents an array of opportunities that the AIODIS could benefit from.

3.2.1 Safeguarding sustainable blue economies

The first key opportunity that the CE presents to the AIODIS is the potential to achieve sustainable and inclusive blue economies. As most of the AOIDIS have now embraced the blue economy agenda, the CE principles could help the AIODIS develop ocean-based activities that are both regenerative and rely on the management of material stock. This is particularly relevant for prospective activities within the blue economy such as seabed mining, bioprospection, or offshore oil and gas extraction. Such activities can have negative impacts on natural flows and could affect the biodiversity and ecosystems in the long term (Allsopp et al., 2013; Cordes et al., 2016).

Another venue for the blue economy to be better implemented through a CE approach is by adopting the system perspective within the CE which looks at implementation at three levels (Sihvonene & Ritola 2015). First is the landscape which represents the external context that actors cannot influence in the short term but since it is highly dynamic, it requires consideration in planning action (such as climate change). The next level is the regime level which is constituted of structures (social, technological, economic, environmental and political) within which institutions and actors shape the system. This is where policies can be adopted to comply with the CE principles. Finally, there is the niche-innovation level where innovation and transformative change take place. This is where actors at the local level and businesses could be involved. Implementing the blue economy agenda with this framework would allow for a consideration of actions needed at all levels from considering environmental conditions to policy and local initiatives.

3.2.2 Job creation within a CE

The second substantial opportunity from the CE is job creation. While technical capacity is currently lacking within AIODIS towards the implementation of a CE, there are, however, areas especially within material stock management that will benefit from job creation. From recycling to reuse and repair frameworks, there are strong opportunities to create jobs and reinforce human resources in these areas. If part of a national strategy, these activities can be promoted by governments as key to sustainability. Waste and material management in particular have notable potential. Reunion Island has started to use the CE framework to promote initiatives and businesses that address circularity. It is an opportunity for the AIODIS to undertake learning exchange[6].

3.2.3 Tackling plastic and waste issues

Another opportunity for the blue economy agenda is to strongly address the issue of plastic waste that represents a real threat for the coasts and marine ecosystems of the AIODIS. By promoting circularity, the question of waste, and plastic waste in particular, is addressed holistically from reduction of consumption to recycling. Adopting a CE framework would provide AIODIS a strong framework to tackle plastic waste. It can also bring interest and funding to the AIODIS. At the global level, various

[6] Funding is available for example from INTERREG and the Réunion Region - in particular a cooperation fund of €63 million for the countries of the IOC area

initiatives are now underway to tackle the plastic issue (for example the MARPLASTICCS project and many more). With a CE framework, the AIODIS would be provided with the right policy framework to benefit from various funding that addresses the problem of plastic.

Waste management has been a key area to make progress for different countries that have adopted a CE. It is therefore an important field where the AIODIS would benefit from external experiences but also from support by various entities involved in waste management. African countries like South Africa have recently adopted this approach by establishing a national plan for waste management that are based on the CE principles (IUCN, 2020).

3.2.4 Learning exchanges within the AIODIS

Finally, the CE also presents the opportunity for the AIODIS to build from the experience of more advanced islands such as Reunion Island as well as build its capacity. As presented in section 3.2, different AIODIS are involved in activities that can be integrated within a CE framework. Furthermore, advanced countries like Reunion Island have started the implementation of a CE. The AIODIS therefore can learn from each other and share the challenges and opportunities that they have. The increased interest for the CE offers opportunities of funding to foster these exchanges for the benefit of all the AIODIS.

Learning exchanges can take place at different levels from government level to explore the development of CE policies, to businesses to exchange skills and initiatives. It can also take place at the public level which would require more awareness activities regarding the value of a CE.

From the analysis of challenges and opportunities above, the AIODIS face challenges but are also presented with opportunities in fostering CE. In order to make progress efficiently in the adoption of a CE in AIODIS, governments and concerned stakeholders need to strongly consider the strengths, weaknesses, opportunities and threats in the region (Table 12) and in each country (see Annex 3).

Table 12: SWOT analysis

Strength	Weakness
- A vast number of initiatives already ongoing - Interests of governments in sustainability through their blue economy agendas - An array of policies and regulations that can be mobilised and harmonised towards a CE - Each country has advanced in an area or more of the CE that can be a lesson learnt - Existence of regional collaboration already on different initiatives	- No overarching framework for the CE, except for Reunion Island - Limited technical capacities and means of implementation - Limited data regarding informal activities relating to the ReX framework - CE as a novel concept for governments, businesses and the public - Current dependency on external funding to implement innovations
Opportunities	**Threat**
- Promotion and support of existing initiatives and policy - Increase of interests of funders in implementing CEs - Global and regional platforms that promotes CE initiatives - Learning from more advanced islands such as Reunion Island	- Climate change and sea-level rise - Political weight of extractive industries - Potential competing agenda between CE and blue growth - Differentiated socio-economic context amongst AIODIS can lead to different national priorities

To conclude, the AIODIS have initiated various strategies that comply with the CE principles and framework. However, they are implemented under different policies and regulations. This prevents a holistic approach to achieve a CE. The AIODIS need overarching frameworks that link natural resource extraction and material consumption as described by a CE. This will allow a more coordinated approach and will promote regenerative activities that might b marginal at the moment such as marine protected areas or waste recycling.

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Annex 1: Country indicators

	Population (in 2019)	Landmass (km2)	EEZ (km2)	2019 GDP (in US$ Bil)	Exports (in US$ Mil)	No. Of products	Imports (in US$ Mil)	No. Of products	Export and Import		Sectors contribution (% of GDP)	
									Agriculture	Industry	Manufac-turing	Services
Cabo Verde	549 935	4 030	800 561	1.982	75	58	815	3 233	5	20	7	61.4
Comoros	850 886	1 860	163 752	1.186	10	92	115	1 882	33	9	N/A	53.5
Guinea Bissau	1 920 922	36 130	123 725	1.34	23	32	112	1 315	53	13	10	37.2
Madagascar	26 996 307	587 290	1 225 259	18.084	3 133	1 761	4 082	3 773	23	17	N/A	52.4
Maldives	530 953	300	923 322	5.729	182	68	2 961	2 669	6	13	2	67.9
Mauritius	1 265 711	2 040	2 203 542	14.18	1 988	2 228	5 669	3 915	3	17	11	67.3
Reunion Island	858 00	2 512	315 000	18.53	294	N/A	4 700	N/A	1.5	6.6	N/A	87
Sao Tome and Principe	215 056	960	131 397	0.429	12	372	148	2 559	11	15	7	71.8
Seychelles	96 762	460	1 336 559	1.699	847	325	1 137	3 410	2	11	6	72.1

Source: Compilation from World bank databases and INSEE reports for Reunion Island

Annex 2: CE profile of each country based on CE intervention samples

Sample of CE interventions		CVI	COI	GBS	MDG	MDV	MAU	REU	STP	SEY
Regeneration	% of EEZ protected	<1%	<1%	8,6%	3,6%	<1%	29%	<1%	<1%	26%
Renewable energy	% renewable energy consumption (2015)	26,58%	45,33%	86,85%	70,17%	1,01%	11,54%	13,2%	41,06%	1,35%
Feedstock extraction	Biogas production	No	Yes	No	Yes	No	Yes	Yes	No	N/A
Reduce	Policy banning single use plastic	Yes	No	No	Yes	No	Yes	Yes	No	Yes
Reuse	Composting initiatives	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recycle	Material recycled in country	Glass Plastic	Biomass	Plastic	Biomass Plastic	Plastic	Glass Plastic E-Waste Biomass	Metal Glass Paper Cardboard Biomass E-Waste	Biomass	Can Glass Paper PET
Recover	e-waste recovery	N/A	N/A	N/A	N/A	N/A	Yes	Yes	N/A	N/A

N/A: No data was available
Source: Author's analysis based on online research, literature review and the World Bank database

Annex 3: Individual countries' SWOT analysis

Country	Strength	Weakness	Opportunities	Threat
Cabo Verde	- Low Level of consumption, waste generation per capita and resource extraction - Waste management policy - Start of recycling activities	- Low marine protection to allow regeneration - Limited materials recycled - No recorded activities in recover/reuse/ feedstock - Low level of renewable energy consumption	- Supporting and replicating recycling initiatives - Untapped and unrecorded informal sector in waste management	- High level of resources extraction - Strong influence of extractive industries
Comoros	- Low Level of consumption, waste generation per capita and resource extraction - Waste management policy	- Low marine protection to allow regeneration - Low implementation of existing policies	- Develop the recycling sector - Untapped and unrecorded informal sector in waste management	- High level of resources extraction - Strong influence of extractive industries
Guinea Bissau	- Low Level of consumption, waste generation per capita and resource extraction - Waste management policy	- Low marine protection to allow regeneration - Low implementation of existing policies - No recorded activities in recover/reduce/ feedstock	- Develop the recycling sector - Untapped and unrecorded informal sector in waste management	- High level of resources extraction - Strong influence of extractive industries
Madagascar	- Low Level of consumption, and waste generation per capita - Waste management policy	- Low marine protection to allow regeneration - High level of resources extraction - Low implementation of existing policies	- Untapped and unrecorded informal sector in waste management - An array of activities in feedstock/composting to support	- High level of resources extraction - Strong influence of extractive industries
Maldives	- Low level of resource extraction - Waste management policy	- Low marine protection to allow regeneration - High level of resources extraction - Low level of renewable energy consumption	- Interests of the tourism industry to fight waste generation	- High level of material consumption and waste generation

Annex 3: Individual countries' SWOT analysis (Cont'd)

Country	Strength	Weakness	Opportunities	Threat
Mauritius	- Recycling policies - Broad recycling activities - Waste management policy	- Low level of renewable energy consumption	- Favourable business environment to support more recycling in country - A vast array of existing activities to support	- High level of material consumption, waste generation and resources extraction
Reunion Island	- Recycling policies - Broad recycling activities - Waste management policy - CE framework	- Low marine protection to allow regeneration - Low level of renewable energy consumption	- Strong state support and funding - A vast array of existing activities to support	- High level of material consumption, waste generation and resources extraction
Sao Tome and Principe	- Low Level of consumption, waste generation per capita and resource extraction - Waste management policy	- Low marine protection to allow regeneration - Low level of renewable energy consumption - Low implementation of existing policies - No recorded activities in recover/reduce/ feedstock	- Untapped and unrecorded informal sector in waste management	- High level of resources extraction - Strong influence of extractive industries
Seychelles	- Low level of resource extraction - Waste management policy - Broad recycling activities	- Low level of renewable energy consumption - No recorded activities in recover//feedstock	- Interests of the tourism industry to fight waste generation - Available funding under blue bonds	- High level of material consumption and waste generation

Annex 4: Legal and policy framework available in AIODIS

Cabo Verde

Circular Economy framing	Relevant law and policy
Renewable flow management	- Act No. 86/IV/93 defining environmental policy (1993) - Decrees on the management of protected areas (2003, 2006) - Decree-Law 53/2005 defining the Policy on Sustainable Exploitation of Fisheries Resources.
Stock Management	- Decree-Law No. 56/2015 establishing the general regime for prevention, production and management of waste. (2015) - Law No. 99/VIII Prohibiting the production, importation, distribution into the market and use of conventional plastic bags for packaging (2015) - Decree-Law No. 26/2020 approving the Legal Regime for Urban Waste Management Services (2020)

Comoros

Circular Economy framing	Relevant law and policy
Renewable flow management	- Framework Law related to the Environment (1994 and 1995) - Law nº 82-015 relating to the activity of foreign fishing vessels in Comorian maritime zones. (1982) - National Strategy and Action Plan for the Conservation of Biological Diversity (2000)
Stock Management	- National policy raising awareness on non-compostable waste - Comoros Emergent Plan 2030 promoting the circular, blue and green economy (2019) - Framework Law related to the Environment (1994 and 1995) – including waste management measures

Guinea Bissau

Circular Economy framing	Relevant law and policy
Renewable flow management	- Law No. 1/2011 approving the Basic Legislation on Environment (2011) - Decree-Law No. 10/2011 approving the Basic Fishing Legislation (2011) - Decree-Law No. 5/2011 approving the New Forestry Law (2011) - Decree-Law No. 5-A/1992 establishing the Water Code (1992) - National Framework on Biotechnology and Biosafety of Guinea-Bissau (2008)
Stock Management	- Environmental Law N.1/2011 defining waste and good practices of waste management - Resolution N.22 of CMB/2010 for the management of Bissau municipal solid waste

Madagascar

Circular Economy framing	Relevant law and policy
Renewable flow management	- Law 2015-053 on Fisheries and aquaculture Code (2015) - Law 2015-015 on Protected areas code (2015) - Law 97-017 revising forestry regulation (1997) - Law 98-029 on Water code (1999) - National Strategy on the Restoration of Forest Landscapes and Green Infrastructure (2017) - Environmental Programme for Sustainable Development (2016)
Stock Management	- Law on the management of industrial pollution (1999) - Law setting fees for urban sanitation (2013) - Decree prohibiting the production, importation, stockpiling and use of plastic bags and sacks on the national territory (2017)

Maldives

Circular Economy framing	Relevant law and policy
Renewable flow management	- Law No. 4/93 on Environmental Protection and Preservation Act of Maldives (1993) - Law No. 4/93 on Fisheries Act of the Maldives - Protected Areas Regulation (No. 2018/R-78) (2018) - Regulation on the Protection and Conservation of Environment in the Tourism Industry. (2006)
Stock Management	- A national waste management policy (2015) with objectives including the introduction and application of the 3R concept - National Water and Sewerage Policy (2017) - Regional Waste Management Strategy and Action Plan - Malé 3R Declaration - Single Use Plastic Phase-out policy for 2020-2023

Mauritius

Circular Economy framing	Relevant law and policy
Renewable flow management	- Environment Protection Act 2002 (No. 19 of 2002). - Fisheries and Marine Resources Act 2007 (Act No. 27 of 2007) - Forests and Reserves Act 1983 (Act No. 41) National Native Terrestrial Biodiversity and National Parks Act 2015 (No. 14 of 2015) - Biodiversity Strategy and Action Plan 2017 – 2025 (2017) - National Water Policy of 2014
Stock Management	- Environment Protection Regulation on sound management of PET bottles (2001) - National Environment Policy – including waste management (2007) - Waste Water Management Authority Act. (2004) - Registration of Recycler and Exporter Regulations (2013) - Environment Protection Regulation on the Banning of Plastic Bags (2015)

Reunion Island

Reunion Island has been strongly involved in developing policies towards the circular economy, notably through impulsion of the French national strategy. Notably the island has a Regional Action Plan for the Circular Economy. The plan has five objectives including coordinating the transition towards a CE, activating the levers of the transition, improving production and consumption, and developing loops.

Circular Economy framing	Relevant law and policy
Renewable flow management	- Environmental code (2000 and 2018) - Law nº 2006-436 relating to national parks, marine natural parks and regional natural parks (2006) - Rural and Maritime Fisheries Code (2018) - Forestry code (2018) - Law of 20 June 2016 for the blue economy (2016) - Law no. 2019-1147 relating to energy and the climate (2019) - National Strategy for Ecological Transition to Sustainable Development 2015-2020 (2015)
Stock Management	- Law on Energy Transition for Green Growth (LTECV) requiring regions to set up Regional Plan for Waste Prevention and Management (2015) - Law on the fight against waste and the circular economy (2020) - Ban on plastic bag policy (2016)

Sao Tomè & Principe

Circular Economy framing	Relevant law and policy
Renewable flow management	- Environmental Law No. 10/99 (1999) - Fisheries Law No. 9/2001 (2001) - Forestry Law No. 5/2001 (2001) - Water Resources Framework Law No. 07/2018 (2018) - Law No. 11/99 on Flora and Fauna conservation and protected areas (1999) - National Biodiversity Strategy and Action Plan 2015-2020 (2015)
Stock Management	- Decree No. 36/99 regulating solid waste disposal (1999) - Decree-Law No. 64/2013 creating the Environmental Impact Tax (TIA) (2003 then 2013)

Seychelles

Circular Economy framing	Relevant law and policy
Renewable flow management	- Environment Protection Act 2016 (No. 18 of 2016) (2016) - Forest Reserve Act (1976) - Fisheries Act (No. 20 of 2014). (2014) - National Parks and Nature Conservancy Act (1986) - Petroleum Mining (Pollution Control) Act (1976 then 2012) - Wild Animals (Whales Shark) Protection Regulation (2003) - Fisheries Sector Policy and Strategy 2019 (2019) - Seychelles Coastal Management Plan 2019 - 2024 (2019) - Seychelles' National Biodiversity Strategy and Action Plan 2015-2020. (2015) - Seychelles' Protected Areas Policy (2013) - 2012–2020 Seychelles Sustainable Development Strategy
Stock Management	- Environmental Protection Act 2016 prohibiting the import, manufacture, distribute, or sell of Plastic bags, plastic utensils, and polystyrene boxes - 2014–2018 Solid Waste Management Policy (SWM Policy)

5

Country Reports

INDIAN OCEAN COMMISSION

National Circular Economy Framework & Guide for Entrepreneurs for Cabo Verde

Country report

WORLD BANK GROUP

SWIOFISH2

Table of Contents

Introduction

Circular economy (CE) has been on the rise across the globe due to a growing concern about resource extraction rates and pollution arising from production processes under the linear economic model. The CE is "an industrial system that is restorative or regenerative by intention and design" (EMF 2013). The CE goes beyond recycling and waste reduction as it aims to value waste and keep materials in circulation for as long as possible. It is about extracting higher value from fewer resources by increasing productivity and efficiency, and moving from ownership to access of products, creating a sharing mindset allowing to reduce consumption thanks to increased efficiency of asset use. For island states, the CE is highly relevant due to their vulnerability to climate change and pollution but also due to the reliance of countries on import of most products consumed. The Indian Ocean Commission has therefore secured funding from the World Bank to support the SWIOFish regional project and increase efforts to set up a circular economic model for the supply and production chain to reduce downstream marine pollution. The CE Project's aim for each AIODIS country is to foster a circular economy and protect the environment and natural assets while aiming for economic growth.

The objective of the report is to present a national policy framework and guidelines for entrepreneurs. Through collaboration with local experts and government officials, local agencies and international foundations, an understanding of the current situation has been established in the review report. Possible approaches and actions have now been identified to move forward. These actions are gathered within the present document. Thanks to policy instruments and various green incentives made throughout the past decade, Cabo Verde has been working to create and develop the foundations for moving towards the effective implementation of an ever more solid and real circular economy. Involvement from the civil society and the private sector has additionally increased the understanding of the concept of a circular economy and cornerstones have been laid within the society.

The document is divided into two parts. First, it presents a policy framework to foster CE and respective suggested legislative implementations for Cabo Verde. To facilitate the connection between authorities and policies and the private sector it is important to guarantee a common understanding and the comprehension on how to proceed, with the goal of a circular economy in mind. The second part of this document then presents CE guidelines for entrepreneurs. Implementing a CE goes beyond recycling and waste reduction as it aims to value waste and keep materials in circulation for as long as possible. It encourages extracting higher value from fewer resources by increasing productivity and efficiency. Therefore, to move towards a circular economy it is crucial to involve local businesses and the private sector in order to facilitate the collaboration, implementing respective practices along the path within production, distribution and treatment facilities. The guidelines for entrepreneurs are linked to the policy framework and legislative suggestions made during the first phase. Explanations on how to set up a business in Cabo Verde with a circularity target, as well as the transition toward more sustainable business practices for established companies will be included and offer step-by-step advice along the way. This will allow to close a gap of informality within different sectors and better involve authorities and businesses in the common quest toward a circular economy.

1 Policy framework

The framework to lay out possible paths moving forward based on the particularities of Cabo Verde and feedback from the local expert participating in this work. Acting upon present circumstances in place legislation will be promoted to develop a circular economy further while aiming to identify additional opportunities to expand the economy and improve aggregate efficiency of materials.

1.1 Establish regulations for the country's Circular Economy

National Policy goal: The government needs to adopt a statement committing to a circular economy and fill the legal gaps. A number of legal texts exist in the country but they are not harmonised to address CE (See Annex 1).

Rationale: There is some interaction between industry and authorities for common action. The government made its target for a circular economy known and offered a clear indication on how to follow through with it. In Cabo Verde, the polluter pays principle (PPP) is established in the National Strategic Plan for Waste Management (PENGeR). It is controlled and monitored by the National Environment Department (DNA). The industry is responsible for the financial burden of the pollution costs. Cabo Verde has in place the Extended Producer Responsibility (EPR) along the supply chain to prevent extensive pollution and reduce the impact on PPP. EPR and PPP are generally recognised in the legislation about waste management. Despite their existence, they are not developed enough to provide a CE basis and reduce different forms of pollution and in particular marine pollution.

Specific actions needed: To achieve the national policy goal, it is suggested that the country adopts a declaration or an umbrella legislation that promotes integration of actors and harmonisation actions towards a CE. Commitment to the CE could be integrated into existing blue economy policies of the country. There is also a need to adopt specific legislations that are currently missing to foster a CE. These legislations include texts on recycling.

1.2 Educate through awareness and education campaigns

Mobilising actors for the CE: To achieve a CE in Cabo Verde, it is essential to increase literacy on CE at all levels, especially in key sectors of the blue economy. The Concept of CE is still new at the national level, but the population and governmental departments are aware of what the CE can provide.

Rationale: There are efforts from the government, civil society or private companies to sensitise population through agencies

Specific actions needed: To achieve the above goal, examples of specific actions needed include:

- Continue awareness campaigns in place engaging society at large.
- Build collaboration between large industrial partners and authorities.
- Reintroduce school campaigns to raise awareness within youth.
- Increase interaction with companies to introduce them to circular economic models and make them understand the necessity of it.

There is also a need to support and replicate existing initiatives and other educational activities in place at the level of government, businesses and the population. In Cabo Verde, awareness campaigns about the CE are very recent and can be seen in the sectors of tourism, agriculture, fisheries, services and communication (see Annex 2).

1.3 Improve material stock management

1.3.1 Collection and sorting system

Optimising Waste value: To improve waste management processes currently in place, it is recommended to optimise existing collection and sorting systems. This is also acknowledged in the report on Marine plastic under the AIODIS project. While waste is collected, it is not done uniformly across the country. Waste sorting procedures are not efficient and do not allow an efficient valorisation of waste.

Rationale: Waste is collected daily in most of the localities through containers and kerbside collection. Collection and transport of waste are the responsibility of the municipality. However, there is no waste sorting system in place.

Specific actions needed: From the above it is then necessary to increase collection points, establish sorting procedures and introduce a treatment site that is more sustainable than landfill. Another important step in this process is to support existing companies doing collection and sorting and replicate nationally. There are currently no companies that responsibly collect and sort waste.

1.3.2 Waste treatment facility

Improving efficiency of waste treatment sites: Addressing processes at waste treatment facilities represent a key step towards achieving circularity. To do so, the country needs to increase efficiency of current facilities and introduce more sustainable sites like landfill with gas congestion, incineration with energy recovery, waste sorting and cleaning sites, recycling stations. Existing facilities do not allow valorisation of waste and do not achieve their goals of reducing waste.

Rationale: The government has started discussion to improve and replace current landfill sites. Options to open incineration plants, landfill with anaerobic congestion, recycling plants are being evaluated by the authorities. Missing efforts include implementing waste sorting, increasing waste collection, reducing littering and introducing recycling.

Specific actions needed: To achieve circularity, existing solutions include implementing high efficiency recycling and biogas creation. For Cabo Verde, options include upscaling existing companies treating waste with circular motives and creating new ones. Current companies that have existing waste valorisation processes do not exist (See annex 3).

1.3.3 Dumping and littering

Reducing pollution through improved waste management: For the country's blue and circular economy, reducing waste and related pollution at all levels and especially in the ocean is paramount. There is currently a low level of industrial pollution and accumulation of waste from littering in cities and on beaches.

Rationale: In Cabo Verde, the PENGeR establishes anti-dumping and littering. Related legislations and fines are in place. A body of control is in place and operated by the public sector and responsible for monitoring company waste streams. Industrial dumpsters are supervised by the municipality and the National Environment Department.

Specific actions needed: For Cabo Verde, the solution lies within supporting existing program for industrial waste monitoring and a subsequent penalty system. The country could better monitor industrial waste and establish fines, introduce material use understanding across sectors such as tourism, fisheries or agriculture.

1.4 Restore and better manage the use of natural flows

Managing natural resources: To achieve a sustainable use of natural resources within a CE, Cabo Verde needs to upscale and further support existing initiatives. They aim at regenerating natural flows especially in the blue economy sectors such as fisheries, tourism, oil and gas exploration and bioprospection. Cabo Verde has in place various biodiversity and blue economy related strategies aiming to increase environmental protection of marine and coastal ecosystems. While there is a wide range of environmental texts, there are also high levels of biomass extraction through fisheries for example.

Rationale: There are agencies and research centres in place responsible for the monitoring of natural resources such as fish stocks, forest abundance, wildlife preservation and water pollution. As a follow-up on existing monitoring efforts of natural resources, there are extensive controlling efforts like implementation of resource use permits.

Specific actions needed: Available solutions include increasing protection of EEZ, reinforcing monitoring of existing MPAs and areas-based management, and increasing restoration activities. A first step for Cabo Verde could be to improve existing monitoring practices and capabilities. Building better knowledge on the use of natural resources will provide evidence for future resource extraction decision-making. To address regeneration of natural flows, a parallel step is to support and upscale existing activities such as fishery closures during breeding seasons, locally managed marine areas and MPAs.

1.5 Incentivise businesses

Putting businesses at the centre of the CE: Increasing the involvement of businesses and entrepreneurs is a stepping stone towards achieving circular and blue economy activities. Businesses and entrepreneurs are aware of the opportunity the CE presents. Those already involved in CE related activities are not well supported yet.

Rationale: The public sector has limited awareness of private sector initiatives and efforts toward a circular economy and does not monitor circular business practices with the optimum frequency. The government has encouraged green and circular economy related aims within businesses by supporting them financially through tax reductions and operative advice. The existing governmental monitoring of business practices and the understanding of circular efforts allows there to be grouping of companies according to equipment, material use and production practices to allow for a closed loop or industrial collaboration.

Specific actions needed: To promote the adoption or transition to a CE business, the government needs to improve structural and financial support to businesses including through:

- The creation of a circular economy office within one or several of the government departments
- The creation of company grouping according to business activity, material use, equipment requirements and proximity to improve material use and infrastructural efficiency while reducing supply chain and waste treatment costs by sharing them among a group of firms
- Undertaking a dialogue with industry to create valorisation of waste materials
- Support existing tax relief systems such as the eco-tax, tax benefits according to environmental practices or a 3-5 years starting period complete tax-free or reduced
- Cutting repair and refurbish value-added tax to encourage reuse businesses

Existing initiatives of tax reductions, sectoral funds and operative advice need better promotion amongst businesses. Increasing the number of partnerships between the government and the private sector will also be key to advance the circular economy of the country.

2 Guide for entrepreneurs

To implement a circular economic model within businesses and across sectors through synergies both governmental and private sector efforts are required to create the right environment. Since private sector actors are able to decide and act quickly, companies can be the driving power toward a local circular economy. Businesses are currently in the position where they can drive the change by taking initiative and transition toward circular economic practices and influence governmental decisions on the matter to follow accordingly.

In order to engage businesses in efforts to achieve a circular economy, it is necessary to provide them with guidelines on how to set up and transition toward a circular production cycle. Through consultation of local experts and governmental officials this document pinpoints to existing good practices as well as barriers and opportunities for a circular economy. Feasible solutions and possible stakeholders to become involved in the process have been identified and the guidelines are designed to create discussion across sectors to form synergies and break the linear economic model. Identifying and pointing out possible company collaborations as well as step-by-step guidelines for sustainability seeking businesses are starting points towards the final goal of protecting maritime resources and reducing ocean pollution.

The guidelines can help start-ups as well as existing companies to establish business models that allow for more efficient resource management while phasing out waste creation and thereby counteract maritime pollution at its source. The guidelines offer upcoming entrepreneurs advice to set up their business and identify the main modalities of implementation for a circular economy. For existing businesses, the guidelines include step-by-step council on how to transition toward sustainable production and system processes that are associated with a circular economy. The guidelines conclude with in-depth solution proposals and opportunities for companies to pick up upon and implement in their ongoing quest for sustainable processes. Based on the content of this document companies will be able to make relevant progress leading to improved resource management, reduced waste generation and diminished maritime pollution.

2.1 Creating a new CE business

2.1.1 Establish the mission, vision and objectives of the company

Identify the company's mission must embody its essence and reason for being. The vision comes as the way the company is envisioned in the mid-long term. Objectives of the company derive from the founders' goals (personal and professional motivations) and should tackle environmental and social challenges, and to satisfy customer needs.

For a CE business, these three elements should refer to one of the CE principles: (1) preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows, (2) optimise resource yields by circulating products, components, and materials at the highest utility at all times in both technical and biological cycles, and (3) foster system effectiveness by revealing and designing out negative externalities.

In Cabo Verde, the tourism, fishery, agriculture, manufacture and communication sectors have been identified as key sectors. They offer the most impactful and far-reaching opportunities to reduce maritime and land pollution and introduce circularity in Cabo Verde.

2.1.2 Identify key stakeholders and customer segments

This step involves identifying and prioritising those stakeholders that will play a significant role in achieving the objectives of the project. Stakeholders include the team (co-founders and employees), partners, beneficiaries and customers (beneficiaries are those who benefit from the value the project generates). Customers are at the core of the business model as they buy the services or products. The project's main impact in society has to be intrinsically linked to the local community and cover a local demand that is to be met. Another task is to develop a sound understanding of our potential customer base (customer identification and profiling) and the existing market around it (market assessment).

To promote a CE in Cabo Verde, it is essential at this stage to include stakeholders like governments, civil society organisations promoting CE, institutions like the Ellen MacArthur Foundation. To identify key stakeholders, entrepreneurs should target main suppliers, intermediaries, processing associates as well as customers and public partners of interest. In the above identified sectors of tourism, fishery, agriculture, manufacture and communication some key stakeholders are essential (Please refer to Annex 4).

2.1.3 Develop the value proposition

CE businesses create environmental value by tackling circularity and environmental challenges (that is a key driver for their existence) through their business solutions and operations. They create social value by empowering their stakeholders (including employees, suppliers, communities and future generations) and meeting the needs of their customers.

To achieve this, it is suggested to create strong collaboration across the board and involve customers and stakeholders in the process of designing and delivering the value proposition (through co-creation).

In Cabo Verde, addressing the following issues can offer a good value proposition: marine pollution, excess waste generation, missing waste responsibility, extensive resource extraction and lack of locally accessible material inputs.

2.1.4 Identify the modalities of implementation

2.1.4.1 Key activities and resources

Key activities define what we must do in order to define and offer a value proposition to a specific customer segment. They include problem-solving (such as consulting or counselling), production (manufacturing etc), platform/network/sale, and supply chain management.

Activities within CE businesses should include those proposed in the different business models (in section 4 of these guidelines).

Key resources represent all the elements and aspects that are essential for making the business work properly. They include human resources, physical assets, intellectual resources, financial resources and natural resources. For the latter, a special focus should be on the use of recycled materials, sustainable or renewable resources as input materials.

Entrepreneurs also need to consider incoming legislative changes in Cabo Verde such as potential laws on recycling. At this stage it can also be helpful to enquire for possible governmental support like tax reduction, investment subsidies and specific funds per sector.

2.1.4.2 Customer relationships and channels

Different types of relationships can be established with customers such as personal assistance, self-service, automatic service, community based or co-creation.

To properly establish the different types of relations with customers, doing a customer journey map of the particular segment of customers can be useful. A map is an oriented graph that describes a user's journey by representing the different touchpoints that characterise his/her interaction with the service or product.

You will also have to distinguish between the way (channels) to get the customer's attention and how to establish and maintain a close relationship with them. Channels include all means of communication and distribution to reach customers and deliver a value proposition to them.

For CE businesses in Cabo Verde, it is possible to explore existing initiatives towards sharing economies, introduce take-back options for customers to return products and help materials stay within company while exploiting options to continue to interact with customers.

2.1.4.3 Cost structure

It is important to carefully classify costs (fixed and variable costs) so that the business can analyse and improve its performance.

Within a CE, it is useful to explore potential costs linked to niche CE areas and identify cost savings arising from CE practices such as equipment sharing, recycled material purchases or supply and transport costs from abroad.

2.1.4.4 Revenue streams

The business must have an accurate idea of the importance of each revenue stream and which one best matches a particular customer segment and channel. Streams might include asset sale, usage fees, subscription fees, licensing, etc.

2.1.5 Test the product or service

Before fully implementing the modalities above, the entrepreneur needs to test key variables:

- Problems and needs identified should be tested by talking to experts in the field or by interviewing key stakeholders.
- Participation of key stakeholders should be verified through diverse types of consultations and meetings on the business objectives where multiple stakeholders can provide a good measure of their willingness to engage.
- Customer segments should be validated through focus groups, interviews, debate or conversations to check their needs, aspirations, gains and pains, etc. Focus groups, interviews, debates, and conversations could be used including on social media.
- Value proposition needs to be tested by building a prototype at small-scale or semi-functional versions of the services/products. Here, participants' reaction to the test might include satisfaction level, feedback, and curiosity/ demand for more.

Once hypotheses on the different variables have been tested and validated, the service/product has to be scaled up from prototype to the optimal market size where viability is attained.

To test the circular product or service, the business can mobilise existing platforms for entrepreneurs and green products such as MT Segredo or Biosfera (please refer to Annex 4 for more details).

2.1.6 Mobilise tools for implementation

When the business model is validated, implementation of the modalities presented above can be facilitated by various tools. **First** is establishing a financial plan with income statements, balance sheets and cashflow projections, and a funding plan identifying traditional investors and banks as well as other funding mechanisms such as crowdfunding, financial cooperatives, micro-credits, ethical banks. **Second** is having a legal management plan to choose the best-fitting legal form according to the needs and business model. **Third** is setting a roadmap to foresee the progress of the business from year 0 to the medium and long-term. **Fourth** is to have an operation and management plan which dictates how operations are performed and managed by staff and by assigning roles and responsibilities and setting a schedule. Tools used need to be adapted according to the CE business model adopted.

To find the appropriate tools, entrepreneurs can refer to existing governmental departments (Please refer to Annex 4 for more details).

2.1.7 Measure impacts and improve

Effectively measuring environmental and social impacts is essential to CE businesses. In addition to measuring how the business is doing regarding the achievement of objectives and mission, environmental indicators are needed to assess environmental performance. Environmental indicators should be used such as water consumption, material use, waste generated per service or product, or other CE related indicators. Constantly improving the business is key to achieve the circular economic objectives. Common areas of improvement include levels of participation of stakeholders, communication and marketing to incentivize customers, improve environmental performance, ensure green procurement and increase environmental awareness amongst the public.

2.2 Transitioning to a CE business

2.2.1 Map your impact and set priorities

Learn how to bring together an internal "sustainability team" to set objectives, define targets, review your environmental impact and decide on priorities. In this process, you need to evaluate impacts regarding natural flow use and material stock management. In Cabo Verde, key environmental impacts of the economic sectors include marine pollution, waste generation and loss of biodiversity.

2.2.2 Choose indicators and understand data needs

Identify indicators that are important for your business and learn about what data should be collected to help drive continuous improvement. To assess the circularity of your business, you can use CE related indicators such as: use of renewable energy, greenhouse gas intensity and energy intensity, intensity of your residuals, releases into the air and water.

2.2.3 Measure inputs used in production

Identify how materials and components used into your production processes influence environmental performance. Businesses can also measure CE related performance including: material consumption, resource extraction, renewable energy consumption, waste generation, import of inputs, non-renewable materials, restricted substances, recycled or reused materials. Businesses can check the availability of recyclable materials and monitor availability of waste materials/recycled materials as inputs into production process.

2.2.4 Assess the operations of your facility

Consider the impact and efficiency of the operations in your facility. Residual waste generation and excess material that can be phased out and managed more efficiently going forward (e.g. water consumption, energy intensity, greenhouse gas generation, emissions to air and water, waste generated). Efforts to improve production and material use efficiency toward circularity while reducing waste creation must be ongoing.

2.2.5 Evaluate your products

Identify factors such as energy consumption in use, recyclability and use of hazardous substances that help determine how sustainable your end product is. Businesses can use CE related indicators such as: recycled/reused content of your products, recyclability of your products, renewable materials used in your products, Non-renewable materials used in your products, restricted substances contained in your products, energy consumption in using your products, greenhouse gas emissions from the use of your products. You can also evaluate the possible incentives to recycle and engage customers to return products to possibly keep materials in cycle.

2.2.6 Understand your results

Learn to read and interpret your indicators and understand trends in your performance. Businesses can focus on CE related indicators that align with business models suggested.

Entrepreneurs and businesses can refer to existing governmental departments and companies that can provide assistance in this process such as the National Environment Department.

2.2.7 Take action to improve your performance

Choose opportunities to improve your performance and create action plans to implement them. CE businesses should focus on CE related indicators that align with business models suggested, and stay up to date with new arising sustainable opportunities and drive ongoing progress by pinpointing areas of improvement or non-circular practices.

2.3 Circular Business models for entrepreneurs

2.3.1 Circular design

This CE model relies on the following elements:

- Circular **product design**: use recyclable materials for goods and packaging that allow for a circular system and local supplies at a maximum

- Product/service design and provision: **access over ownership** and product service systems
- Local supplies and local demand for service/good
- **Economy of functionality** (rent resources rather than buy and own them)

There are no companies that currently operate based on an entirely circular design.

2.3.2 Optimal material and resource use

To adopt this model, the following activities can be undertaken:

- **Understand value** of waste materials and engage in opportunities from materials
- **Buy recycled materials** and reduce input material costs
- **Target recyclable and sustainable materials** and pioneer in industrial waste valorisation
- **Introduce industrial symbiosis**; internalise a maximum of production steps within the company on the same site to reduce transport costs. This also helps with waste creation as all accrues on the same site, making recycling or reusing easier since larger amounts hold more potential
- **Redefine retail**; skip retailers by directly interacting with consumers. Simplifies recycling practices, understanding of consumer behaviour and increases revenue
- **Inspect daily practices** to identify non-sustainable production practices such as use of single use plastics, equipment and garment
- **Adopt a closed-loop process**; use residual outputs and by-products as input for other production processes
- **Set up internal target rates** to increase recycling rates and encourage sorting to improve employee understanding of a circular economy and its benefits

There are very few companies that optimised resource use by functioning with renewable and recycled materials as input (Please refer to Annex 5 for key examples).

2.3.3 Value recovery

This CE model relies on the following elements:

- **Reuse and recycle**: Introduce ways to keep waste materials within the company and the production cycle; Increase material use efficiency
- **Repair and recondition**: produce goods and services to last (quality over quantity) and provide service to repair and refurbish products and services
- **Remake** products that did not meet standards and were considered waste
- **Consumer awareness**: inform customers of recycling and repair opportunities to incentivize closed-loop material use while explaining competitive advantage of your service/product compared to non-circular business models

There are very few companies that maximise the utility and value of some of their materials within their production cycle and reach higher production process efficiency leading to a minimized waste creation (Please refer to Annex 5 for key examples).

2.3.4 Collaborative economy

To adopt this model, the following activities can be undertaken:

- **Group businesses** that use similar materials to share transport supply costs and open channels to trade materials between firms
- **Foster cooperation**; exchange good practices and learning experiences between companies to accelerate transition toward circularity
- **Introduce a sharing economy**: collaborate with other businesses to build expensive infrastructure or purchase equipment to improve efficiency of usage (ex; cooling units, trucks, sorting site, …)

There are currently no companies that operate on the basis of a collaborative economy and exploit all potential side products and collateral uses that accrue during their production. Additionally, equipment and material sharing are not maximised through industrial networking.

3 Annexes

Annex 1: Types of laws and policies in Cabo Verde relating to CE

Renewable Flow Management	Environmental protection/ Biodiversity Conservation	✓	Act No. 86/IV/93 defining environmental policy (1993)\ Decree No. 7/2002, protecting endangered species of flora and fauna National Biodiversity Strategy and Action Plan (ENPAB) (2000) National Plan for Environmental Education 2013-2022 (PNEA) (2014)
	Fisheries management	✓	Decree-Law 53/2005 defining the Policy on Sustainable Exploitation of Fisheries Resources National Plan of Action to prevent, prohibit and eliminate illegal, unreported and unregulated fishing activity (IUU PAN) for the period 2015-2018
	Forestry management	✓	Strategy for Agro-silvopastoral and Environmental Development in the Maio Island (2018)
	Protected Areas	✓	Decrees on the management of protected areas (2003, 2006) National Strategy and Business Plans of Cabo Verde's Protected Areas (ENAP - 2015-2024)
	Water management	✓	Decree-Law 75/99 defining the regulation regarding the production, distribution of drinking water and the collection, treatment and reuse of liquid effluents (1999) National Plan of Action for Integrated Management of Water Resources (PAGIRE) (2010
	Renewable Energy	✓	National Action Plan for Renewable Energy (PNAER) Period [2015-2020/2030]
Stock Management	General waste management	✓	Decree-Law No. 56/2015 establishing the general regime for prevention, production and management of waste (2015) Decree-Law No. 26/2020 approving the Legal Regime for Urban Waste Management Services (2020)
	Solid waste management	✓	Decree-Law No. 32/2016 approving the National Strategic Plan for Waste Management (PENGeR) for the period 2015-2030
	Recycling	X	
	Plastic Bag Ban/ Phase out	✓	Law No. 99/VIII Prohibiting the production, importation, distribution into the market and use of conventional plastic bags for packaging (2015)

Annex 2: Existing awareness raising initiatives and campaigns towards CE in country

CE aspect addressed	Initiative name	Description of activity	Website/Contact
Waste reduction	Environmental education program of Quercus CV	Awareness campaigns on tv, through the radio and at schools and restaurants	quercuscv@gmail.com
Production efficiency	Simili	Plastics Reuse and Transformation, S. Vicente	https://www.facebook.com/similicaboverde
Waste reduction	Kabungosurf school	Sensitisation and education of tourists and children in the preservation, cleaning and reuse of rubbish on beaches and slopes. Tarrafal de Santiago.	https://www.facebook.com/kabungosurfschool
Regenerating natural flows/Recycling	Biosfera	Protection of the environment, with a particular focus on marine ecosystems and their associated fauna.	https://www.biosfera1.com/
Waste reduction	Câmara Municipal do Sal	Cleaning campaigns on the island's beaches	http://www.camaramunicipaldosal.info/

Annex 3: Examples of companies doing CE related activities in waste management

CE aspect	Company name	Description of activity	Website
Collection	Câmara Municipal do Sal	Cleaning campaigns on the island's beaches	http://www.camaramunicipaldosal.info/
Collection	Cavibel	Compacting the PET in the hotels, then sending it to the beach here and delivering it to a partner for recycling, but the partner was unable to take the project forward	https://www.eccbc.com/en/contact/cape-verde
Sorting	N/A	N/A	N/A
Treatment	Águas de Ponta Preta	Treatment of waste water to be reused for irrigation and other public cleaning	http://aguaspontapreta.cv/
Recycling and disposal	MT Segredo	Transformation of plastic into tiles	https://www.facebook.com/azulejosmtsegredo

Annex 4: Key sectors to foster CE and related stakeholders and entities supporting a CE

Key sector for CE	Identified key stakeholders	Relevance of the stakeholder	Entities that can support CE
Agriculture	Parque Natural do Monte Gordo (https://pt-pt.facebook.com/Parque-Natural-Monte-Gordo-137151123144445/)	Ensure efficient use of natural resources	Pró Empresa proempresa@proempresa.cv Funds for the environment www.maa.gov.cv anas@anas.gov.cv Social sustainability fund for tourism
Communication	Quercus CV	Communication/ awareness raising plan	
	Ministry of Culture and the creative industry (https://www.governo.cv/)	Provides support and deliver various licences	
	Sítio Agro-ecológico João Varela (sajovcvorganicos@gmail.com)	Works on efficiency in the use of natural resources	
Fisheries	IMAR (Instituto do mar I.P)	Monitors the fish stocks	
	Ministry of marine economy	Coordinate sustainable use of marine resources across sectors and issues licenses	
Manufacture	CAVIBEL (https://www.eccbc.com/en/contact/cape-verde)	Compacting the PET in the hotels, then sending it to the beach here and delivering it to a partner for recycling, but the partner was unable to take the project forward	
	Ministry of Industry, Trade and Energy (https://www.governo.cv/)	Delivers permits and licences	
Tourism	Hotel Odjo d'Agua (www.odjodagua_hotel.com)	A 40-room hotel unit on the island of Sal, addressing several environmental concerns	
	Spinguera ecolodge (http://www.spinguera.com)	A rural ecolodge, open for almost 14 years, which is 95%w powered by renewable energy (wind and photovoltaic).	
	National Environment Directorate www.maa.gov.cv	Department responsible for all environmental issues.	
	anas@anas.gov.cv		

Annex 5: Key examples of companies in Cabo Verde operating under CE business models

Business model	Name of the company	Activity	Address/Contact
Circular design	N/A	N/A	N/A
Optimal material and resource use	Tinenê factory	Turning Glass bottles into sand for construction	Situa-se em Ribeira Julião, Estrada Sul S. Vicente.
Value recovery	ECOPET	Collection and recycling of PET bottles	Ecopet Cabo Verde Facebook page ecopet.cv@gmail.com
Collaborative economy	N/A	N/A	N/A

INDIAN OCEAN COMMISSION

National Circular Economy Framework & Guide for Entrepreneurs for Comoros

Country report

WORLD BANK GROUP

SWIOFISH 2

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Introduction

Circular Economy (CE) has experienced a worldwide take-off due to a growing concern about resource extraction rates and the pollution resulting from production processes within the framework of the linear economic model.

CE is "an industrial system that is restorative or regenerative by intention and design" (EMF 2013). It goes beyond recycling and waste reduction, aiming to value waste and keep materials in circulation as long as possible. It is about extracting higher value from fewer resources by increasing productivity and efficiency. It fosters moving from ownership to access to products, creating a sharing mindset allowing to reduce consumption through increased efficiency of asset use. For island states, CE is highly relevant due to their vulnerability to climate change and pollution but also due to the reliance of countries on imports for most consumer goods. The Indian Ocean Commission has therefore secured funding from the World Bank to support the SWIOFish regional project and increase efforts to set up a circular economic model for the supply and production chain to reduce downstream marine pollution. The CE Project's aim for each AIODIS country is to foster a circular economy and protect the environment and natural assets while aiming at economic growth.

The present report's objective is to showcase a national policy framework and guidelines for entrepreneurs. Thanks to collaboration with local experts and government officials, local agencies and international foundations, an understanding of the current situation has been attained in the review report. Possible approaches and actions have now been identified to move forward. These actions are gathered within the present document. Thanks to policy adaptations and various initiatives made throughout the past decade, Comoros have already laid down the the required bases to move on towards a CE. Involvement from the private sector, civil society and Non-Governmental Organisations (NGOs) has equally increased the understanding of the CE concept; cornerstones have been laid amidst society.

The document is divided into two parts. First, it presents a policy framework aiming to foster CE and suggests legislative implementations for Comoros. To facilitate the connection between authorities and policies and the private sector, it is important to guarantee a common understanding and an agreement on how to proceed, with the goal of a circular economy in mind. The second part of this document then presents CE guidelines for entrepreneurs. Implementing a CE goes beyond recycling and waste reduction. It aims to value waste and keep materials in circulation as long as possible. It encourages extracting higher value from fewer resources by increasing productivity and efficiency. Therefore, to move towards a circular economy it is crucial to involve local businesses and the private sector in order to facilitate collaboration, implementing respective practices along the path within production, distribution and treatment facilities. The guidelines for entrepreneurs are linked to the policy framework and legislative suggestions made during the first phase. Explanations on how to set up a business in Comoros with a circularity target, as well as the transition toward more sustainable business practices for established companies will be included and offer step-by-step advice along the way. This will allow to consider better the various informal sectors and to better involve the authorities and businesses in the common pursuit towards a circular economy.

1. Policy framework

The framework lays out possible ways forward to reach a CE based on the particularities of Comoros and updates from the local expert party to this work. Acting upon present conditions, legislation will be adopted to develop a circular economy while aiming further to identify additional opportunities to expand the economy and on the whole improved materials' efficiency.

1.1 Establish regulations for the country's Circular Economy

National Policy goal: The government needs to adopt a statement committing to a circular economy and fill the legal gaps. A certain number of legal texts exist in the country but they are not harmonised to address CE, comprehensively (see Annex 1).

Rationale: To date, there is no specifc CE legislation in Comoros. At present, there are only two pieces of law that are directly relevant to waste management and indirectly to CE: they are the framework law on environment and the law banning the use of plastics.

Comoros have neither a policy nor a specific strategy towards CE. This falls within the remit of the National Waste Management Agency (ANGD), incepted in 2020. The policies and sectorial strategies presently available only mention elements which could support efforts towards the CE sector. There is no real regulation across a sector still at an embryonic stage.

The interaction between the industry and the authorities, for a common action towards a CE, is very limited. This was exemplified by COMCO, a Coca-Cola franchised company located in Anjouan. After having taken the risk of losing its licence in 2010, it has been compelled to reexamine its environmental practices. For the authorities, reduction of waste and the reintroduction of glass bottles to replace plastic ones became a point of focalisation.

The government has publicised its objective in terms of circular economy through encouragement to private players and NGOs such as the Bandabisty association. The government has provided this charity with a plot of land for its waste upgrading activities. The Comorian government collaborates directly with the associations, supporting their initiatives (equally the case for 2Mains association) but gives no clear indication on its follow-up intention.

In Comoros, the polluter-pay principle (PPP) is not mentioned in the integrated waste management's defining project but it is applied at the Itsoundzou landfill site. There is no document as yet defining a waste management policy or national strategy. There is nevertheless a control and monitoring by ANGD and the waste management activities environmental directorate.

Despite the absence of a written acknowledgement of the PPP, the consumer, industry and the public sector are all responsible, through the Exo Tax, of the financial burden going along the cost of pollution. Comoros have enacted producer's extended responsibility (PER) across the whole supply chain to prevent extended pollution and reduce the PPP's impact, as was the case with Coca-Cola. Though existing, PPP and PER are not developed enough to provide a real base to CE and reduce the various forms of pollution, specially marine pollution. Another exemple is their absence from the legislation on waste management.

Specific Actions Required: To reach the above objectives, it is suggested that the country adopts a declaration or a framework legislation favouring players' integration and harmonising actions towards a CE. The commitment towards the CE could be embedded into the country's existing blue economy's strategic policies.

It is also suggested to adopt specific legislations, now not enacted, to favour the CE. These legislations include texts on recycling and a law on the PPP and PER, as well as one for a sustainable waste management in a CE and another one to curb squandering, making producers accountable and forcing them to collaborate with one another. Pieces of law to encourage conservation and repairing skills (auto mechanics, shoe repair , electronics, household appliances, furniture coating, junk shops, etc.) are welcome. As well as texts encouraging innovative entrepreneurship, favouring waste upgrading, notably production of compost and biological manure, based on foundation 4 (agriculture) of the Plan Comores Émergent. Texts to combat illegal waste dumping, texts compelling manufacturing industries to reutilise materials in the food and cosmetics sectors, as well as in printing, are considered useful.

1.2 Train through awareness and education campaigns

Mobilise players for CE: To achieve a CE in Comoros, it is essential to expand the knowledge about it at all levels, specially in the key sectors of the blue economy. The CE concept is still new at national level. The population and government departments are aware of the positive impacts the CE can afford the country, in terms of job creation and economic growth. However developing the sector raises difficulties for financial and technical issues.

Rationale: There are efforts from the gouvernment, civil society and private businesses to raise awareness among the population but they are limited in scope. Since 2019, a eco-circular national forum on the blue economy is organised each year by the Young Entrepreneurs Network, via the National Platform and the National Blue Economy Committee (www.facebook.com/ ecocomores/), in view of promoting the concept and sensitising enterprises, associations and cooperatives (agriculture and fisheries) to the circular economy and its relevance in their business plans and project documents.

Required Specific Actions: To reach the above objective, here are a few examples of required specific actions:

- Proceed with the existing awareness raising campaigns, involving therein society at large;
- Uphold initiatives introduced by organisations and institutions committed to the promotion of a circular economy (see annex 2);
- Consolidate the collaboration between business and authorities;
- Intensify and broaden the school campaigns to sensitise youngsters (initiative already launched by Association 2Mains with schools, early in 2020, on protecting the environment and promoting CE, alongside waste source separation);
- Increase the interaction with businesses to showcase circular economy models and highlight for them these models' necessity.

It is thus recommended to support existing initiatives and replicate them and other existing educational activities, at the level of government, businesses and population. In Comoros, awareness raising campaigns about the environment's sustainable protection have always existed, as well as actions towards a CE but it's only recently that the term circular economy gained mileage. The CE's promotion is carried out under various forms: training (university talks), events (public forums), coaching (by experts) or eventually through counseling (from the governement in favour of stakeholders, notably businesses). The campaigns can be seen in various sectors : tourism (with the promotion of clean beaches and towns), agriculture (inputs manufacture for animal feed) and services (training, advice, events organisation) (see Annex 2)

1.3 Improve material stock management

1.3.1 Collection and sorting system

Waste value optimisation: To improve existing waste management's processes, it is recommended to optimise present collection and sorting systems. This is also acknowledged in the report on marine plastics in the framework of the AIODIS project. Though the waste is collected, this collection is not carried out in a uniform way across the country. The waste sorting procedures are not proven and do not allow an effective waste-to-value recovery.

Rationale: Waste collection is carried out some four times a week (in a town like Moroni) by using containers, door-to-door collection but mainly from the curbside, on the ground or in a trash bin. Waste flows are not sorted in different types of materials such as metals, electronic components, paper and cardboard, organic waste, plastics, glass or even hazardous waste. The responsibility for collection and transportation of waste is the municipality's through private operators.

Some businesses equally carry out waste sorting. They are, for instance, mineral water bottlers such as Salsabil and Huriya. These companies produce considerable amounts of plastic waste. Further to an agreement with the sorting facility (2Mains / Environment's General Directorate), Salsabi sorts out at the source and sends its refuse for shredding to the sorting facility. Unfortunately, it produces without selling as there are no potential buyers as yet for the facility's products.

Specific Actions Required: Further to the above, it is thus useful to increase the number of collection points, to introduce and improve sorting procedures and to transform the existing site for sorting and waste-to-value recovery into a more sustainable facility, averting landfill disposal. Considering Comoros mountainous landscape, whichever site hosting a landfill may send waste into the sea upon a natural disaster (cyclone). None among the chosen sites has the capacity to centralise all the waste of the island. In Anjouan, the Didrihari site could barely handle the waste from Mutsamudu bay.

Efforts to set-up other waste sorting and waste-to-value recovery sub-units on the other islands could be a good start. It requires encouraging intercommunality. Another important step in this process consists in suporting existing business engaged in waste collection and sorting, replicating them at national level. A freshly created company, not fully operational, is in place, ready to benefit from governmental support (see Annex 3)

1.3.2 Waste treatment facility

Improve the efficiency of waste treatment facilities: tackling the processes applied in the waste treatment facilities represents a key step towards circularity. To that end, the country must upgrade its present facilities' efficiency and introduce more sustainable solutions such such as landfills with gas congestion, incineration with energy recovery, waste sorting and cleaning plants, recycling stations. Most of the present installations do not allow waste-to-value recovery and do not achieve their objectives in terms of waste reduction.

Nevertheless an informal partnership in Anjouan (Project Executors) specialised itself in the installation of biodigestors to provide cooking gas and electricity. Projects involving the three islands have already been implemented. Its activities revolve around sustainable agriculture, livestock and chicken farming as well as fisheries. The partners are solicited for lectures at Comoros University and also promote activities related to circular economy. They also achieve projects for their customers in the various sectors mentioned above. The partnership's objective is to contribute to food security (availability of financially affordable foodstuffs for all social categories) and nutrition (availability of a balanced nutrition, biological and preventing non communicable diseases such as diabetes and hypertension.

Rationale: The government has engaged discussions to improve the present landfills. Plans to revamp waste management's structures are presently being designed, with a focal point on medical and recyclable waste, notably plastics. At present, the authorities assess the possibilities of opening landfills equipped for anaerobic digestion or even recycling plants with waste-to-value recovery, over and above tne Waste Sorting and Value-Adding existing practices. Efforts to implement waste sorting began with an awareness raising campaign in early 2021. Besides, increasing the collection of waste and reducing uncontrolled waste disposal by 80% towards the end of 2021 are the targets of the Waste Management National Agency's general directorate, further to the recent purchase of three trucks, thanks to an Italian assistance to waste collection in Moroni.

Specific Actions Required: To achieve circularity, the existing solutions include the implementation of a high yield recycling plant and support to existing businesses which treat waste with circular motivations. At present, there is only one known formal company which delivers waste value-adding activities (see Annex 3)

1.3.3 Dumping and littering

Reducing pollution through a better waste management: For the country's blue and circular economies, the reduction of waste and related pollution is primordial at all levels and, notably, in the ocean. The level of industrial pollution is low at present but litter's accumulation is significant, coming from trash disposal in the towns and on the beaches. The more so, initial efforts are being defined to reduce and eventually avoid plastic waste in the sea.

Rationale: There aren't yet any declared anti-uncontrolled landfill and anti-refuse policies. The legislations and corresponding fines have been adopted but are not always enforced, lacking follow-up.

Specific actions required: It thus becomes obvious that the country will need to focus on upgrading its industrial waste surveillance and ensure fines are applied, working towards an understanding of materials' use in sectors such as tourism, fisheries or agriculture.

For Comoros the solution lies in supporting existing industrial waste surveillance programs and a subsequent sanction system. Further on, an improved cooperation between the respective regional and national players is recommended, to optimise collaboration and coordination in waste management. Removing legal barriers and encouraging businesses to develop sustainable practices are also recommended.

1.4 Restore and better manage the use of natural flows

Management of natural resources: To achieve sustainable use of natural resources within a CE, Comoros needs to further develop and support existing initiatives. These aim at regenerating natural flows, especially in the blue economy sectors such as fisheries, tourism or agriculture. Comoros has put in place various strategies related to biodiversity and the blue economy aimed at increasing environmental protection of marine and coastal ecosystems.

Rationale: There is a limited number of research centres entrusted with responsibilities towards the monitoring of natural resources such as fish stocks, forest abundance, wildlife preservation and water pollution. As a follow-up on existing monitoring efforts of natural resources, there are limited - but nevertheless existing - surveillance efforts from the National Fisheries Control and Surveillance Centre.

Specific actions required: Available solutions include increasing protection of EEZ through MPAs, reinforced monitoring of existing MPAs and areas-based management as well as increasing restoration activities. The continuation of efforts towards a Blue Economy and the support to initiatives in this domain are also part of the solution in Comoros.

As part of their conservation srategy, Comoros have implemented a strategy fostering the creation of a network of protected areas. Six priority zones of sustainable development are identified for the creation of protected areas. They are the Karthala Zone, the Coelacanth's Zone, the Mount Ntringui Zone, the Bimbini Zone, the Mohéli Park's Zone and the Mlédjélé Zone.

As regards the EEZ, there is a law (Loi n°82-005) defining the delimitation of maritime zones in the Islamic Federal Republic of the Comoros.

A key step for Comoros could be to improve existing monitoring practices and capabilities. Building better knowledge on the use of natural resources will provide evidence for future decision-making concerning resource extraction and oil drilling. To address regeneration of natural flows, a parallel step is to support and upscale existing activities such as mangrove restoration, locally managed marine areas and MPAs..

1.5 Incentivise businesses

Putting businesses at the centre of the CE: Increasing the involvement of businesses and entrepreneurs is a stepping stone towards achieving circular and blue economy activities. Businesses and entrepreneurs who are already involved in activities related to the CE are not properly supported. The present government's priority - waste management primarily in the capital (Moroni) - should be extended to the whole island and, if it turns out to be a success, to the other islands. Meanwhile the municipalities, associations and NGOs as well as some private players work each on their own, most of them to develop an unexploited sector. Some of them joined hands, like the intercommunality between Domoni and Bambao on Anjouan, certain associations being encouraged by the governement as is the case for Bandabisti on Grande Comore and 2Mains.

Rationale: The public sector is barely aware of the private sector's initiatives and efforts towards a circular economy and doesn't pay attention to circular business practices. The government has encouraged objectives linked to the green and circular economies in businesses it advised with regard to them. An example of that is Salsabil which, after being advised by the Environment Directorate and 2Mains association, has now accepted to send plastic waste for recycling to the sorting facility. The service is now free of charge but the enterprise has agreed to allocate financial resources to its sustainable refuse management if a solution were to be proposed.

In the absence of a government's control over business practices and understanding of circular efforts, companies do not cluster - according to equipment, use of materials and production practices - to institute a closed loop system or an industrial partnership.

Specific Actions Required: So as to promote the adoption of an ecological enterprise or the transition thereto, the government must provide a structural and financial support to businesses, notably through the following measures

- Set up a circular economy office within one or several of the government departments
- Create company groupings according to business activity, material use, equipment requirements and proximity to improve material use and infrastructural efficiency while reducing supply chain and waste treatment costs by sharing them among a group of firms
- Engage into a dialogue with industry to produce waste product valorisation
- Introduce tax relief schemes such as 3-5 years starting period completely tax-free or reduced
- Reduce the rate of Value Added Tax on repair and refurbish activities to encourage reuse.

- Embed into national policy the obligation to consider the Circular Economy concept and the 3R principle – Reduce, Recycle, Reutilise – for every entrepreneur, agricultural or fishing cooperatives, before the design of the business plan and project document, so as to promote investment in ecoresponsible machinery or products.

In Comoros, existing facilities such as government advice to businesses must be better promoted with enterprises so as to favour the efforts towards a circular economy.

2. Guide for entrepreneurs

To implement a circular economy model in businesses and between sectors, thanks to synergies, the public and private sectors' efforts are required to create the adequate environment. As the private sector players are capable of deciding and acting rapidly, private enterprise can be a local circular economy's powering engine. The enterprises are at present in a position from which they can lead change. By taking the lead and adopting the idea of transitioning towards circular economy practices, they can as well influence governement's decisions in that field.

So as to engage businesses in accepting the efforts to reach a circular economy, it is necessary to provide them with guidelines on the way to set up a circular production cycle and transition thereto. Thanks to consulation with local experts and government representatives, this document brings out the existing good practices as well as the opportunities for a circular economy. Achievable solutions and stakeholders liable to involve themselves in the process have been identified. Guidelines are proposed to kickstart a discussion between sectors to provoke synergies and disrupt the linear economic model. The identification and highlight of possible collaborations between enterprises and step by step guidelines for sustainability seeking businesses are starting points towards the final objective: protecting marine resources and reducing oceanic pollution.

The guidelines can help young companies as much as existing companies to establish entrepreneurial models which allow a more effective resource management while progressively removing waste creation, thus tackling maritime pollution at its source. The guidelines offer to future entrepreneurs administrative advice to create their enterprise and identify the main implementation modalities of a circular economy. For existing enterprises, the guidelines include step by step advice on the way to transition towards a sustainable production as well processes for systems associated to a circular economy. Upon concluding, the guidelines come with in-depth solutions present opportunities that businesse can pick-up and implement, in line with their ongoing quest for sustainable processes. Based on this document's content, companies will be in a position to progress in a way relevant to a better resource management, reduction of waste production and decrease of maritime pollution.

2.1 Creating a new CE business

2.1.1 Establish the mission, vision and objectives of the company

The company's mission must embody its essence and raison d'être. The vision comes as the way the company is envisioned in the mid-long term. Objectives of the company derive from the founders' goals (personal and professional motivations) and should allow to tackle environmental and social challenges and to satisfy customers' needs.

For a CE business, these three elements should refer to one of the CE principles: (1) preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows; (2)

optimise resource yields by circulating products, components, and materials at the highest utility at all times in both technical and biological cycles and (3) foster system effectiveness by revealing and designing out negative externalities.

In Comoros, tourism, fisheries, agriculture, breeding and manufacturing have been identified as key sectors. They offer impactful and far-reaching opportunities to reduce maritime and terrestrial pollution while introducing circularity in Comoros.

2.1.2 Identify key stakeholders and customer segments

This step involves identifying and prioritising those stakeholders that will play a significant role in achieving the objectives of the project. Stakeholders include the team (co-founders and employees), partners, beneficiaries (those who benefit from the value the project generates) and customers. The latter are at the core of the business model as they buy the services or products. The project's main impact in society has to be intrinsically linked to the local community and cover a local demand which needs to be met. Another task is to develop a sound understanding of the potential customer base (customer identification and profiling) and the existing market around it (market assessment).

To promote a CE in Comoros, it is essential at this stage to include stakeholders like the government, civil society organisations promoting CE, institutions like the Ellen MacArthur Foundation. To identify key stakeholders, entrepreneurs should target main suppliers, intermediaries, processing associates as well as customers and public partners. In the above identified sectors of fishery, agriculture and manufacturing, some key stakeholders are essential (Please refer to Annex 4).

In the fishing sector, concerned institutions haven't taken as yet direct circular economy initiatives. However, the fishing, breeding and agriculture sectors represent Foundation 4 in the Plan Comores Emergent, for food security. Clustered, these three sectors can collaborate towards an efficient circular economy, supporting the country's sustainable development.

Waste from the agricultural sector can serve as livestock feed and, mixed with cow dung, in the preparation of compost. Fish waste can be turned into flour, serving in the fabrication of livestock feed (experience carried out by the Société de pêche des Comores). Farmyard animals' droppings can be used in the production of biogas in the same way as cow dung (experience carried by some private individuals in Comoros.

As regards the breeding sector and the byproducts of livestock slaughter, only blood from the animals stomach and intestine is discarded; the rest is consumable by humans whereas the skin serves in the fabrication of musical instruments.

In addition to the above, the tourism and handicraft sectors lay together foundation 1 of Plan Comores Emergent (National framework plan). Comoros thus foresee, in one of its PCE flagship projects for tourism: seaside tourism, eco and agro-tourism, solidarity tourism… etc. In this way, at least three dimensions that go together in a circular way in these sectors are clustered, with respect to the environmental, economic and sociocultural dimensions.

2.1.3 Develop the value proposition

CE businesses create environmental value by tackling circularity and environmental challenges (which are key drivers for their existence) through their business solutions and operations. They create social value by empowering their stakeholders (including employees, suppliers, communities and future generations) and meeting the needs of their customers.

To achieve this, it is suggested to create strong across the board collaboration and involve customers and stakeholders in the process of designing and delivering the value proposition (through co-creation).

In Comoros, the issues of marine pollution, excess waste generation, failing waste responsibility, extensive resource extraction and failing responsibility towards waste represent key challenges which will constitute a good value proposal

2.1.4 Identify the modalities of implementation

2.1.4.1 Key activities and resources

Key activities outline what needs to be done in order to define and offer a value proposition to a specific customer segment. They include problem-solving (such as consulting or counselling), production (manufacturing, etc), platform/network/sale and supply chain management.

Activities within CE businesses should include those proposed in the different business models (in section 4 of these guidelines).

Key resources represent all the elements and aspects that are essential to the proper business operations. They include human resources, physical assets, intellectual, financial and natural resources. For the latter, a special focus should be placed on the use of recycled materials, sustainable or renewable resources as input materials.

Entrepreneurs also need to consider upcoming legislative changes in Comoros such as the laws on the PER and PPP. At this stage it can also be helpful to find out possible government support such as tax rebates, investment subsidies and sectorial specific funds.

2.1.4.2 Customer relationships and channels

Different types of relationships can be established with customers, such as personal assistance, self-service, automatic service, community or co-creation.

In order to correctly establish the different types of customer relationships, it can be useful to establish a customer journey map of the customer group in question. A customer journey map is an oriented graphic that describes the journey of a user by representing the different touch points that characterise his/her interaction with the service or product.

It is also necessary to distinguish between the way (channels) of attracting the customer's attention and the way of establishing and maintaining a close relationship with the customer. Channels include all means of communication and distribution to reach customers and deliver a value proposition.

For EC companies in Comoros, it is possible to explore existing initiatives for sharing economies, replicating take-back options for customers to return products and helping materials to stay with the company, while exploiting options to continue interacting with customers as already practiced with the Coca-Cola company in Anjouan. A new UNDP project in Comoros also aims to create a plastic bottle take-back centre. (See Annex 3)

2.1.4.3 Cost structure

It is important to carefully classify costs (fixed and variable) so that the business can analyse and improve its performance.

Within a CE, it is useful to explore potential costs linked to niche CE areas and identify cost savings arising from CE practices such as equipment sharing, recycled material purchases or supply and transport costs from abroad.

2.1.4.4 Revenue streams

The business must have an accurate idea of the importance of each revenue stream and which one best matches a particular customer segment and channel. Streams might include asset sale, usage fees, subscription fees, licensing etc.

2.1.5 Test the product or service

Before fully implementing the modalities above, the entrepreneur needs to test key variables:

Problems and needs identified should be tested by talking to experts in the field or by interviewing key stakeholders.

Participation of key stakeholders should be verified through various types of consultations and meetings on the business objectives where multiple stakeholders can provide a good measure of their willingness to engage.

Customer segments should be validated through focus groups, interviews, debate or conversations to check their needs, aspirations, gains and pains, etc. Focus groups, interviews, debates, and conversations could be used including on social media.

Value proposition needs to be tested by building a prototype at small-scale or semi functional versions of the services/products. Here, participants' reaction to the test might include satisfaction level, feedback, and curiosity/ demand for more.

Once hypotheses on the different variables have been tested and validated, the service/product has to be scaled up from prototype to the optimal market size where viability is attained.

To test the circular product or service, the company can mobilise existing platforms for entrepreneurs and green products, such as the Bureau du Réseau des Jeunes Entrepreneurs-Plateforme Nationale (located at the Maison de l'Emploi, Moroni, Grande Comore) (see Annex 4).

2.1.6 Mobilise tools for implementation

When the business model is validated, implementation of the modalities presented above can be facilitated by various tools. First is establishing a financial plan with income statements, balance sheets and cashflow projections, and a funding plan identifying traditional investors and banks as well as other funding mechanisms such as crowdfunding, financial cooperatives, microcredit, ethical banks. Second is having a legal management plan to choose the best-fitting legal form according to the needs and business model. Third is setting a roadmap to foresee the progress of the business from year 0 to the medium and long-term. Fourth is to have an operation and management plan which dictates how operations are performed and managed by staff and by assigning roles and responsibilities and setting a schedule. Tools used need to be adapted according to the CE business model adopted.

However, these appropriate tools are still at the design stage. Entrepreneurs could in the near future refer to existing governmental services such as the National Waste Management Agency, the Directorate of Environment and its annexes on the islands, the Commissariat Général au Plan (which is going to support a biodigester project) and the Regional Commissioners as soon as these tools are available (see Annex 4 for more details).

2.1.7 Measure impacts and improve

Effectively measuring environmental and social impacts is essential to CE businesses. In addition to measuring how the business is doing regarding the achievement of objectives and mission, environmental indicators are needed to assess environmental performance. Environmental indicators such as water consumption, material use, waste generated per service or product, or other CE related indicators are suggested to be used in order to assess current performances. Constantly improving the business is key to achieve the circular economic objectives as it is a process that requires ongoing efforts to improve efficiency. Common areas of improvement include levels of participation of stakeholders, communication and marketing to incentivize customers, improve environmental performance, ensure green procurement and increase environmental awareness amongst the public.

2.2 Transitioning to a CE business

2.2.1 Map your impact and set priorities

Learn how to bring together an internal "sustainability team" to set objectives, define targets, review your environmental impact and decide on priorities. In this process, you need to evaluate impacts regarding natural flow use and material stock management. In Comoros, the main environmental impacts of the economic sectors are marine pollution, waste generation and loss of biodiversity.

2.2.2 Choose indicators and understand data needs

The next step will consist in identifying indicators that are important for your business and learn about which data should be collected to help drive continuous improvement. To assess the circularity of your business, you can use CE related indicators such as: use of renewable energy; greenhouse gas intensity; energy intensity, intensity of your residuals; releases into the air and water.

2.2.3 Measure inputs used in production

Identify how materials and components used into your production processes influence environmental performance. Businesses can also measure CE related performance including: material consumption, resource extraction, renewable energy consumption, waste generation, import of inputs, non-renewable materials, restricted substances, recycled or reused materials. Businesses can check the availability of recyclable materials and monitor availability of waste materials/recycled materials as inputs into production process.

2.2.4 Assess the operations of your facility

It is essential to consider the impact and effectiveness of operations in the facility. Residual waste generation and excess material that can be phased out and managed more efficiently going forward (e.g. water consumption, energy intensity, greenhouse gas generation, emissions to air and water, waste generated). Efforts to improve production and material use efficiency toward circularity while reducing waste creation must be ongoing.

2.2.5 Evaluate your products

Identify factors such as energy consumption in use, recyclability and use of hazardous substances that help determine how sustainable your end product is. Businesses can use CE related indicators such as: recycled/reused content of your products, recyclability of your products, renewable materials used

in your products, non-renewable materials used in your products, restricted substances contained in your products, energy consumption in using your products, greenhouse gas emissions from the use of your products. You can also evaluate the possible incentives to recycle and engage customers to return products and possibly keep materials in cycle.

2.2.6 Understand your results

Learn to read and interpret your indicators and understand trends in your performance. Businesses can focus on CE related indicators that align with business models suggested.

Entrepreneurs and companies can refer to existing government services and companies that can provide assistance in this process, such as the Environment Directorate and the company «Comores multie-co-service-SARL», specialised in waste recovery in Moheli.

2.2.7 Take action to improve your performance

Choose opportunities to improve your performance and create action plans to implement them. CE businesses should focus on CE related indicators that align with business models suggested, and stay up to date with new arising sustainable opportunities and drive ongoing progress by pinpointing areas of improvement or non-circular practices.

2.3 Circular Business models for entrepreneurs

2.3.1 Circular design

This CE model relies on the following elements:

- **Circular product design:** use recyclable materials for goods and packaging that allow for a circular system and local supplies at a maximum
- **Product/service design and provision:** access over ownership and product service systems
- Local supplies and local demand for service/good
- **Economy of functionality** (rent resources rather than buy and own them).

There is only one formal enterprise that operates on a fully circular design (see Annex 5).

2.3.2 Optimal material and resource use

To adopt this model, the following activities can be undertaken:

- **Understand the value** of waste materials and engage in opportunities from materials
- **Buy recycled materials** and reduce input material costs
- **Target recyclable and sustainable materials** and pioneer in industrial waste valorisation
- **Introduce Industrial symbiosis**; internalise a maximum of production steps within the company on the same site to reduce transport costs. This also helps with waste creation as all accrues on the same site, making recycling or reusing easier since larger amounts hold more potential
- **Redefine retail**; skip retailers by directly interacting with consumers. Simplifies recycling practices, understanding of consumer behaviour and increases revenue

- **Inspect daily practices** to identify non-sustainable production practices such as use of single use plastics, equipment and garment
- **Adopt a closed-loop process**; use residual outputs and by-products as input for other production processes
- **Set up internal target rates** to increase recycling rates and encourage sorting to improve employee understanding of a circular economy and its benefits

In Comoros, a system for recycling machine parts for resale is already implemented. Electronic repair shops keep wrecked machines to be able to reuse the materials that are left in good condition.

However, Comoros do not really recycle materials, although some individuals export them, including batteries for recycling. This is linked to the fact that Comoros does not yet have an electronic manufacturing industry.

2.3.3 Value recovery

This CE model is grounded on the following elements:

- **Reuse and recycle:** Introduce ways to keep waste materials within the company and the production cycle; Increase material use efficiency
- **Repair and recondition:** produce goods and services to last (quality over quantity) and provide service to repair and refurbish products and services
- **Remanufacture** products that did not meet standards and were considered waste
- **Sensitize consumers:** inform them of recycling and repair opportunities to incentivize closed-loop material use while explaining competitive advantage of your service/product compared to non-circular business models.

There are very few companies that maximise the utility and value of some of their materials in their production cycle and achieve greater efficiency in the production process, thereby minimising waste generation (See Annex 5).

2.3.4 Collaborative economy

To adopt this model, the following activities can be undertaken:

- **Group businesses** that use similar materials to share transport supply costs and open channels to trade materials between firms
- **Foster cooperation:** exchange good practices and learning experiences between companies to accelerate transition toward circularity
- **Introduce a sharing economy:** collaborate with other businesses to build expensive infrastructure or purchase equipment to improve efficiency of usage (ex; cooling units, trucks, sorting site…)

There are no existing enterprises that operate on the basis of a collaborative economy and exploit all potential by-products and collateral uses that arise during their production. Furthermore, the sharing of equipment and materials through strong industrial networking to maximise resource use is not practised in Comoros.

3. Annexes

Annex 1: Types of policies and laws towards circular economy

Stock management	- National awareness policy on non-compostable waste - Framework law on the environment (1994 and 1995) - including waste management measures - Plan Comores Emergent 2030 for the promotion of the circular, blue and green economy (2019)
Renewable flows' management	- Law n ° 82-015 relating to the activity of foreign fishing vessels in Comorian maritime zones. (1982) - National strategy and action plan for the conservation of biological diversity (2000) - Co-management policy for fisheries resources (2013)

Annex 2: Existing awareness raising initiatives and campaigns towards CE

Initiative's name	Description of activity	CE aspect addressed	Link / Contact
Bureau of the Young Entrepreneurs Network-Platform and the National Blue Economy Committee	Forum that brought together green and blue employment actors for a mutual exchange and exhibition Forums on the blue economy and green «eco-circular» employment Workshops on the promotion and development of the circular economy and the blue economy adapted to the circular economy	All aspects of the CE have been taken into account	vwww.facebook.com/ecocomores/
2Mains (Two hands… but also sounding like « demain », Tomorrow)	A campaign to change users' behaviour regarding waste management and to encourage them to sort at source	All aspects of the CE have been taken into account	http://www.initiativesclimat.org/Toutes-les-initiatives/Mise-en-place-d-un-systeme-de-depot-volontaire
2Mains	Awareness campaign in schools	All aspects of the CE have been taken into account	https://www.facebook.com/Association2Mains/posts/2424515004474555/

Annex 3: Examples of companies doing CE related activities in waste management

CE aspect	Company's name	Description of activity
Collection, sorting, treatment, recycling and waste-to-value recovery	Company Comores-multie-co-service-SARL	the company carries out activities that go together in the EC : cleanliness and development of green places, management and waste-to-value processes the company intends to expand its activities in the manufacture of paper bags
Collection, sorting and recycling	Sorting Centre created by UNDP-Comoros	Project aiming to introduce a simple financial mechanism for the purchase of polyethylene terephthalate (PET) plastics and aluminium cans https://www.oceaninnovationchallenge.org/ocean-innovators#cbp=/ocean-innovations/establishment-pet-recovery-and-buy-back-center

Annex 4: Key sectors to foster CE and related stakeholders and supporting platforms

Key sector	Identified key stakeholders	Relevance of the stakeholder	Key sector
Fisheries	Fisheries Directorate	Co-management policy. Establishment of community management measures for a permanent marine reserve area, which involve the responsibility, collaboration and participation of stakeholders (fishermen among others through associations) https://www.banquemondiale.org/fr/news/feature/2016/06/14/fishing-communities-in-the-comoros-develop-fishing-management-projects?cid=EXT_WBSocialShare_EXT	Réseau des Jeunes Entrepreneurs - Comores Entreprendre https://www.facebook.com/ComoresEntreprendre/ Union des Chambres de Commerce des Comores (UCCIA, Union of Comorian Chambers of Commerce, Industry and Agriculture) https://www.facebook.com/www.uccia/
	SWIOFish-Comoros	The project supports the fisheries directorate in several areas including two important ones that can take into account the CE, namely improving the policy and regulatory framework and sustainable resource management. https://ewsdata.rightsindevelopment.org/files/documents/23/WB-P132123_HKKPaBG.pdf	
	Fishermen's Association	Innovate to improve good practices; Value fish co-products (especially viscera) for human consumption Increase the conservation of fish products (through drying, smoking etc.) Obtain powdered fish co-products for the manufacture of feed for livestock consumption.	
Tourism	Tourism Directorate	Integrated project on the Valorisation and Sustainable Development of the Comorian Eco-Tourism Potential indirectly taking into account the CE aspects in a joint public-private collaboration.	
	Tourism Office	Promotion of Comorian tourism, its products, its services and brings together several stakeholders (the valorisation of waste in handicrafts contributes to the protection of the environment)	
Waste	Salsabil Company	Transfer of plastic waste to the waste sorting and recovery centre	
	Hurya Company	Transfer of plastic waste to the waste sorting and recovery centre	

Annex 5: Key examples of companies operating under CE business models

Business model	Company	Activity	Website link or Contact
Circular design	Company Comores-multi-co-service-sarl	Collection, sorting and recycling of some waste	N/A
Optimal use of materials and resources	Coca-Cola-Anjouan Company	Recycling of glass bottles for reuse	N/A

INDIAN OCEAN COMMISSION

National Circular Economy Framework & Guide for Entrepreneurs for Guinea-Bissau

Country report

WORLD BANK GROUP

SWIOFISH 2

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Introduction

Circular Economy (CE) has experienced a worldwide take-off due to a growing concern about resource extraction rates and the pollution resulting from production processes within the framework of the linear economic model.

CE is "an industrial system that is restorative or regenerative by intention and design" (EMF 2013). It is about extracting higher value from fewer resources by increasing productivity and efficiency. It fosters moving from ownership to access to products, creating a sharing mindset allowing to reduce consumption through increased efficiency of asset use. For island states, a CE is highly relevant due to their vulnerability to climate change and pollution but also due to the reliance of countries on imports for most consumer products. The Indian Ocean Commission has therefore secured funding from the World Bank to support the SWIOFish regional project and increase efforts to set up a circular economic model for the supply and production chain to reduce downstream marine pollution. The CE Project's aim for each AIODIS country is to foster a circular economy and protect the environment and natural assets while aiming at economic growth.

The present report's objective is to showcase a national policy framework and guidelines for entrepreneurs. Thanks to collaboration with local experts and government officials, local agencies and international foundations, an understanding of the current situation has been attained in the review report. Possible approaches and actions have now been identified to move forward. These actions are gathered within the present document. Guinea-Bissau already has key elements to move towards CE, thanks to policy instruments such as environmental legislation and references to marine pollution and waste management in policies. There are also the various green incentives that have been introduced over the last decade. Meetings have also been held to identify stakeholders for a circular economy and the efforts to engage different players provide a valuable starting point. The involvement of civil society and the private sector has also helped to improve the understanding of the circular economy concept and to lay its foundations within society.

The document is divided into two parts. First, it presents a policy framework aiming to foster CE and suggests legislative implementations for Guinea-Bissau. To facilitate the connection between authorities and policies and the private sector, it is important to guarantee a common understanding and an agreement on how to proceed, with the goal of a circular economy in mind. The second part of this document then presents CE guidelines for entrepreneurs. Implementing a CE goes beyond recycling and waste reduction. It aims to value waste and keep materials in circulation as long as possible. It encourages extracting higher value from fewer resources by increasing productivity and efficiency. Therefore, to move towards a circular economy it is crucial to involve local businesses and the private sector in order to facilitate collaboration, implementing respective practices along the path within production, distribution and treatment facilities. The guidelines for entrepreneurs are linked to the policy framework and legislative suggestions made during the first phase. Explanations on how to set up a business in Guinea-Bissau with a circularity target, as well as the transition towards more sustainable business practices for established companies will be included and step-by-step advice is offered along the way. This will allow to consider better the various informal sectors and to better engage the authorities and businesses in the common pursuit towards a circular economy.

1. Policy framework

The framework lays out possible ways forward to reach a CE based on the particularities of Guinea-Bissau and on updates from the local expert party to this work. Acting upon present conditions, legislation will be adopted to develop a circular economy while aiming further to identify additional opportunities to expand the economy and on the whole improve materials' efficiency.

1.1 Establish regulations for the country's Circular Economy

National Strategic Objective: The government needs to adopt a declaration of commitment to the circular economy and close the legal gaps. A number of legal texts concerning the environment and waste management exist in the country but they are not harmonised to address CE (see Annex 1).

Rationale: There is already an interaction between industry and the authorities for joint action towards CE. The government has, through project documents in the field of CE submitted to its partners, notably UNDP-GEF, made its circular economy objective known and offers a clear indication on how to follow up. In Guinea-Bissau, the Polluter Pays Principle (PPP) is established in the National Strategic Plan for Environmental Management. There is a control and monitoring by the Ministry of Environment and Biodiversity. The public sector is responsible for the financial burden of pollution costs. Guinea-Bissau has not implemented Extended Producer Responsibility (EPR) throughout the supply chain to prevent widespread pollution and reduce the impact on the PPP. EPR and PPP are not generally recognised in waste management legislation. Despite the existence of PPP, it is not sufficiently developed to provide an CE basis for reducing various forms of pollution and in particular marine pollution. In Guinea-Bissau cyclical political instability also hinders the implementation of waste management policies and strategies, for example: the implementation of the Decree on the prohibition of the use of plastic bags is difficult at national level. Successive governments have, however, been concerned with integrating sustainable management of natural resources and the environment into their programmes and policies. In this context, a number of important documents have been elaborated and approved, such as the Basic Law on the Environment (Law nº01/2011).

Specific actions required: To achieve the above objective, it is suggested that the country adopts a declaration or framework legislation that promotes the integration of players and harmonisation actions towards a CE. The commitment to CE could be integrated into the country's development policies. There is also a need to adopt specific legislation that is currently not in place to favour of CE. These pieces of law include texts on recycling and a law on the PPP and the EPR.

1.2 Educate through awareness and education campaigns

Mobilising players for CE: To achieve it in Guinea-Bissau, it is essential to increase awareness of CE at all levels, especially in the key sectors of the blue economy. The concept of CE is still new at the national level, the population and government departments are not aware of what CE can bring.

Rationale: There are limited efforts by the government, civil society and private companies to raise awareness despite the fact that all are sensitive to the adverse effects of waste and pollution on the environment and on human life.

Specific actions Required: To achieve the above objective, some examples of specific actions required are :

- Strengthened collaboration between major industry partners and authorities.
- Continued existing awareness campaigns involving society as a whole.
- Reintroduction of school campaigns to raise awareness among young people.
- Increased interaction with businesses to introduce them to circular economy models and make them understand the need for them.

There is also a need to support and replicate existing initiatives and other educational activities in place at government, business and public levels.

In Guinea-Bissau, awareness campaigns on CE are very recent and can be seen in a limited way in the main sectors of the economy : agriculture, agro-industries, tourism and fisheries, natural resources management, energy and transport (see Annex 2).

1.3 Improve material stock management

1.3.1 Collection and sorting system

Optimising the value of waste: In order to improve the waste management processes currently in place, it is recommended that existing collection and sorting systems be upgraded. This is also recognised in the report on marine plastics in the AIODIS project. Although waste is collected, this is not done in a uniform manner throughout the country. Waste separation procedures are not effective and do not allow for efficient waste recovery.

Rationale : Waste is collected daily through containers, home collection and curbside collection, which is dependent on the municipality due to the lack of a national system. Waste collection and transport is the responsibility of the municipality but despite the different collection systems, no municipality undertakes efforts to sort the different materials.

Specific actions required : From the above, it is then necessary to increase collection points, improve sorting procedures and introduce a more sustainable treatment site than landfill.

An important step in this process is to support existing companies that collect and implement sorting on a national scale. There are currently no companies that collect and sort waste in a responsible manner (see Annex 3).

1.3.2 Waste treatment facility

Improve the efficiency of waste treatment facilities: tackling the processes applied in the waste treatment facilities represents a key step towards circularity. To that end, the country must upgrade its present facilities' efficiency and introduce more sustainable solutions such as landfills with gas congestion, incineration with energy recovery, waste sorting and cleaning plants, recycling stations. Most of the present installations do not allow waste-to-value recovery and do not achieve their objectives in terms of waste reduction.

Rationale: The government has initiated discussions to improve or replace existing landfills. The authorities are currently evaluating the possibilities of opening incineration plants, anaerobic landfills and recycling plants, but these discussions - which have been going on for several years - have not yet produced any results. There is a willingness at all levels (government, private sector, civil

society, NGOs, students, youth associations, community-based organisations, military/police, general population), but due to governmental political instability, the materialisation and continuation of efforts are difficult. Efforts to implement waste separation, increase waste collection, reduce littering and introduce recycling are undertaken but limited.

Specific actions required: To achieve circularity, existing solutions include the implementation of high efficiency recycling and the generation of biogas.

For Guinea-Bissau, options include the creation of new businesses and the support and development of existing businesses that process waste with circular motives. Existing enterprises with waste recovery processes exist and provide a basis for future efforts (see Annex 3).

1.3.3 Dumping and littering

Reducing pollution through a better waste management: For the country's blue and circular economies, the reduction of waste and related pollution is primordial at all levels and, notably, in the ocean. There is currently a significant level of industrial pollution and waste accumulation from litter in cities and on beaches.

Rationale: In Guinea-Bissau, the government has established an anti-sludge and anti-litter policy. However, the corresponding legislation and fines are not enforced. A control body is in place and managed by the public sector to monitor the waste streams of companies. Industrial dumpsters are not currently monitored by the municipality.

Specific actions required: It becomes clear that the country needs to better monitor industrial waste and establish fines and introduce an understanding of the use of materials in sectors such as tourism, fishing or agriculture.

For Guinea-Bissau, the solution is to support existing initiatives and create an industrial waste monitoring programme and subsequent penalty system.

1.4 Restore and better manage the use of natural capital

Natural resources management: To achieve sustainable use of natural resources within a CE, Guinea-Bissau needs to further develop and support existing initiatives. These aim to regenerate natural flows, particularly in blue economy sectors such as fisheries, tourism, oil and gas exploration and bioprospecting. Guinea-Bissau has set up various biodiversity and blue economy strategies aimed at increasing environmental marine and coastal ecosystems protection. While there is a wide range of environmental legislation, there are also high levels of biomass extraction through fishing for example.

Rationale: There are a limited number of agencies and research centres responsible for monitoring natural resource flows and stocks. Existing activities include wildlife preservation and water pollution control by the Ministry of Environment and Biodiversity. As an extension of existing natural resource monitoring efforts, there are limited control efforts, such as the implementation of resource use permits.

Specific needs required: Available solutions include increasing protection of EEZ through MPAs, reinforced monitoring of existing MPAs and areas-based management as well as increasing restoration activities.

A first step in Guinea-Bissau would be to improve existing monitoring practices and capacities. The acquisition of better knowledge on natural resource use will provide evidence for future decision-

making on resource extraction. To address the recovery of natural flows, a parallel step is to support and develop existing activities such as mangrove restoration or marine protected areas.

1.5 Incentivize businesses

Putting businesses at the centre of CE: Increasing the involvement of businesses and entrepreneurs is a stepping stone to achieving circular and blue economy activities. Businesses and entrepreneurs are not aware of the opportunity that CE represents. Those who are already involved in CE activities are not well supported.

Rationale: In Guinea-Bissau, the public sector has little awareness of private sector initiatives and efforts towards a circular economy and does not monitor circular business practices. The government has encouraged green and circular economy objectives within companies by supporting them financially through tax breaks, but more sustained efforts are limited due to lack of collaboration.

The lack of government control on business practices and understanding of circular efforts do not allow for the clustering of businesses based on equipment, material use and production practices, to establish the closed loop system or industry collaboration.

Specific actions required: In order to promote transition to a green business, the government should provide structural and financial support to businesses, including the following measures :

- Set up a circular economy office within one or more of the government departments.
- Create clusters of companies based on activity, material use, equipment needs and proximity to improve material use and infrastructure efficiency while reducing supply chain and waste treatment costs by sharing them among a group of companies.
- Engage with industry to create value from waste.
- Introduce a system of tax relief such as a 3 to 5-year start-up period that is completely tax free or reduced.
- Reduce value added tax for repair and refurbishment activities to encourage reuse businesses.

In Guinea-Bissau, existing initiatives such as tax rebates also need to be better promoted to businesses in order to facilitate access to support and encourage a transition to a circular economy

2. Guide for entrepreneurs

To implement a circular economy model within companies and across sectors through synergies, public and private sector efforts are needed to create the right environment. As private sector players are able to decide and act quickly, businesses can be the engine of a local circular economy. Businesses are currently in a position where they can lead the change. By taking the initiative and adopting the transition to circular economic practices, they can also influence government decisions in this area.

In order to engage businesses in efforts to achieve a circular economy, it is necessary to provide them with guidelines on how to implement and transition to a circular production cycle. Through consultation with local experts and government representatives, this document highlights existing good practices as well as barriers and opportunities for a circular economy. Feasible solutions and stakeholders who can be involved in the process are identified. Guidelines are proposed to create a discussion between sectors to form synergies and break the linear economic model. The identification and highlighting of

possible collaborations between companies as well as step-by-step guidelines for companies seeking sustainability are starting points towards the ultimate goal of protecting marine resources and reducing ocean pollution.

The guidelines can help start-ups as well as existing businesses to establish business models that allow for more efficient resource management while phasing out the creation of waste and thus combating maritime pollution at its source. The guidelines provide prospective entrepreneurs with administrative advice on how to set up their business and identify the main ways to implement a circular economy. For existing businesses, the guidelines include step-by-step advice on how to make the transition to sustainable production and system processes that are associated with a circular economy. The guidelines conclude with in-depth solution proposals and opportunities that companies can take up and implement in their ongoing quest for sustainable processes. Based on the content of this document, companies will be able to make relevant progress leading to better resource management, reduced waste generation and less marine pollution.

2.1 Creating a new CE business

2.1.1 Establish the mission, vision and objectives of the company

The mission of the company should embody its essence and purpose. The vision is the way in which the company is envisaged in the medium and long term. The company's objectives are derived from the founders' goals (personal and professional motivations) and should address environmental and social challenges and satisfy customer needs.

For a CE enterprise, these three elements must refer to one of the CE principles: (1) preserving and enhancing natural capital by controlling finite stocks and balancing renewable resource flows; (2) optimising resource efficiency by circulating products, components and materials to their maximum utility at all times through technical and biological cycles; and (3) promoting system efficiency by revealing and eliminating negative externalities

In Guinea-Bissau, the tourism, fisheries, agriculture and industry sectors have been identified as key sectors. They offer opportunities with high and deep impacts to reduce marine and land pollution and introduce circularity in Guinea-Bissau.

2.1.2 Identify key stakeholders and customer segments

This step involves identifying and prioritising the stakeholders that will play an important role in achieving the project's objectives. Stakeholders include the team (co-founders and employees), partners, beneficiaries (those who benefit from the value generated by the project) and customers. Customers are at the heart of the business model as they buy the services or products. The main impact of the project in society must be intrinsically linked to the local community and cover a local demand that must be met. Another task is to develop a good understanding of the potential customer base (customer identification and profiling) and the existing market around it (market assessment).

To promote CE in Guinea-Bissau, it is essential at this stage to include stakeholders such as governments, civil society organisations promoting CE, institutions such as the Ellen MacArthur Foundation. To identify key stakeholders, entrepreneurs should target key suppliers, intermediaries, processing partners as well as customers and public interest partners. In the tourism, fisheries, agriculture and industry sectors identified above, some key stakeholders are essential (see Annex 4).

2.1.3 Develop the value proposition

CE companies create environmental value by addressing the challenges of circularity and the environment (which is a key factor in their existence) through their business solutions and operations. They create social value by empowering their stakeholders (including employees, suppliers, communities and future generations) and meeting the needs of their customers.

To achieve this, it is suggested to create strong collaboration at all levels and to involve customers and stakeholders in the process of designing and delivering the value proposition (through co-creation).

In Guinea-Bissau, the problem(s) of marine pollution, lack of waste responsibility and extensive resource extraction are key challenges that will provide a good value proposition.

2.1.4 Identify the implementation modalities

2.1.4.1 Key activities and resources

Key activities outline what needs to be done to define and deliver a value proposition to a specific customer group. These activities may include problem solving (such as consultancy or advice), production (manufacturing, etc.), platform, network or sales and supply chain management.

Activities within CE enterprises should include those proposed in the different business models (in section 4 of this guide).

Key resources are all the elements and aspects that are essential for the proper functioning of the business. They include human resources, physical assets, intellectual resources, financial resources and natural resources. For the latter, particular attention should be paid to the use of recycled materials, sustainable or renewable resources as raw materials.

Entrepreneurs should also consider upcoming legislative changes in the country, such as EPR laws. At this stage, it may also be useful to find out about possible government support, such as tax breaks, investment grants or sector-specific funds.

2.1.4.2. Customer relationships and channels

Different types of relationships can be established with customers, such as personal assistance, self-service, automatic service, community or co-creation.

In order to correctly establish the different types of relationships with customers, it can be useful to draw up a customer journey map for the concerned customer group. A customer journey map is an oriented graphic that describes the journey of a user by representing the different contact points that characterise her/his interaction with the service or product.

It is also necessary to distinguish between the way (channels) to get the customer's attention and the way to establish and maintain a close relationship with her/him. Channels include all means of communication and distribution to reach customers and deliver a value proposition.

For CE companies in Guinea-Bissau, there is an opportunity to explore existing initiatives for sharing economies, introduce take-back options for customers to return products and help materials stay with the company, while exploiting options to continue interacting with customers.

2.1.4.3. Cost structure

It is important to carefully classify costs (fixed and variable) so that the company can analyse and improve its performance.

Within a CE, it is useful to explore potential costs related to CE niches and to identify savings from CE practices such as shared equipment, purchase of recycled materials or procurement and transport costs from abroad.

2.1.4.4. Revenue streams

The company needs to have a clear idea of the size of each revenue stream and which one best fits a particular customer segment and channel. These streams can include asset sales, user fees, subscription fees, licences, etc.

2.1.5 Test the product or service

Before fully implementing the above, the entrepreneur must test key variables:

- The problems and needs identified should be tested by talking to experts in the field or by interviewing key stakeholders.
- The involvement of key stakeholders should be verified through various types of consultations and meetings on business objectives where several stakeholders can provide a good measure of their willingness to engage.
- Customer segments need to be validated to ascertain their needs, aspirations, gains and pains, etc.
- Focus groups, interviews, debates and conversations could be used including on social media.
- The value proposition should be tested by building a small-scale prototype or semi-functional versions of the services/products. Here, the reaction of the test participants could include the level of satisfaction, feedback and curiosity/demand for more.

Once the assumptions on the different variables have been tested and validated, the service/product should be scaled up from the prototype to the optimal market size where viability is achieved.

To test the circular product or service, the company can mobilise existing platforms for green entrepreneurs and products, such as the National Laboratory for Fisheries Certification (see Annex 4 for more details).

2.1.6 Mobilise tools for implementation

Once the business model is validated, the implementation of the above modalities can be facilitated by various tools. The **first** is the establishment of a financial plan with profit and loss accounts, balance sheets and cash flow projections, as well as a financing plan identifying traditional investors and banks as well as other financing mechanisms such as participatory financing, financial cooperatives, microcredit, ethical banks. **Second**, have a legal management plan to choose the legal form best suited to the needs and business model. **Thirdly**, a roadmap is needed to plan the progress of the business from year 0 to the medium and long term. The **fourth** is to have an operations and management plan that dictates how operations are carried out and managed by staff, assigning roles and responsibilities and setting a timetable. The tools used should be adapted to the CE business model adopted.

To find appropriate tools, contractors can refer to existing government services and companies that provide assistance to businesses such as the Tourism Secretariat, the Ministry of Fisheries or of Agriculture and Rural development (see Annex 4 for more details).

2.1.7 Measure impacts and improve

Effective measurement of environmental and social impacts is essential for CE companies. In addition to measuring the company's performance in achieving its objectives and mission, environmental indicators are needed to assess environmental performance. Environmental indicators such as water consumption, material use, waste generated per service or product or other CE-related indicators should be used. Continuous business improvement is essential to achieve the goals of the circular economy. Typical areas of improvement include levels of stakeholder involvement, communication and marketing to engage customers, improve environmental performance, ensure green procurement and increase environmental awareness among the public.

2.2 Transitioning to a CE business

2.2.1 Map your impact and set priorities

The first step is to bring together an internal «sustainability team» to set objectives, define targets, review environmental impact and determine priorities. In this process, it is necessary to assess the impacts on the use of natural flows and the management of material stocks. In Guinea-Bisssau, the main environmental impacts of the economic sectors are marine pollution and the loss of biodiversity.

2.2.2 Choose indicators and understand data needs

The next step is to identify the indicators that are important for the company and the data that should be collected to support continuous improvement. To assess the company's circularity, indicators related to the CE can be used, such as: use of renewable energy, greenhouse gas and energy intensity, waste intensity, releases into the air and water.

2.2.3 Measure inputs used in production

It is then necessary to identify how the materials and components used in the production processes influence environmental performance.Companies can also measure CE-related performance, including: material consumption, resource extraction, renewable energy consumption, waste generation, imported inputs, non-renewable materials, restricted substances, recycled or reused materials. Companies can check the availability of recyclable materials and monitor that of waste/recycled materials as inputs into the production process.

2.2.4 Assess the operations of your facility

It is essential to consider the impact and efficiency of operations in the facility. The generation of residual waste and surplus materials that can be phased out and managed more efficiently in the future (e.g. water consumption, energy intensity, greenhouse gas production, air and water emissions, waste generated). Efforts to improve the efficiency of production and use of materials towards circularity while reducing the creation of waste must be continuous.

2.2.5 Evaluate your products

Here it is essential to identify factors such as energy consumption during product use, recyclability and use of hazardous substances that help determine the sustainability of the final product. Companies can use CE-related indicators such as: recycled/reused content of products, recyclability of products, renewable materials used in products, non-renewable materials used in products, regulated substances

in products, energy consumption in use of products, greenhouse gas emissions resulting from use of products. It also aligns with CE to assess the possible incentives to recycle and encourage customers to return products to possibly keep materials in the cycle.

2.2.6 Understand your results

It is important to know how to read and interpret indicators and understand performance trends. Companies can focus on CE-related indicators that align with proposed business models.

Entrepreneurs and companies can refer to existing government services and companies that can provide assistance in this process, such as the Directorate General of Energy and Industry.

2.2.7 Take action to improve your performance

Finally, opportunities for performance improvement should be selected and action plans drawn up to implement them. CE companies should focus on CE-related indicators that align with the suggested business models. It is also useful to keep abreast of new sustainable opportunities as they arise. They should also make continuous progress in identifying areas of improvement or non-circular practices.

2.3 Circular Business models for entrepreneurs

At present, there are no companies operating on the basis of circular economy business models. The models outlined below present important opportunities for the country and entrepreneurs to develop the circular economy as well as key areas of the blue economy.

2.3.1 Circular design

This CE model relies on the following elements:

- Circular product design: use recyclable materials for goods and packaging that allow for a circular system and a maximum local supplies;
- Product/service design and provision: access over ownership and product service systems;
- Local supplies and local demand for service/good;
- Economy of functionality (rent resources rather than buy and own them)

There are few existing businesses that operate on the basis of a fully circular design.

2.3.2 Optimal material and resource use

The aim of this model is to optimise the use of resources by operating only with renewable and recycled materials as inputs. To adopt this model, the following activities can be undertaken:

- Understand the value of waste materials and engage in opportunities from materials
- Buy recycled materials and reduce input material costs
- Target recyclable and sustainable materials and pioneer in industrial waste valorisation
- Introduce industrial symbiosis; internalise a maximum of production steps within the company on the same site to reduce transport costs. This also helps with waste creation as all accrues on the same site, making recycling or reusing easier since larger amounts hold more potential

- Redefine retail; skip retailers by directly interacting with consumers. Simplifies recycling practices, understanding of consumer behaviour and increases revenue
- Inspect daily practices to identify non-sustainable production practices such as use of single use plastics, equipment and garment
- Adopt a closed-loop process; use residual outputs and by-products as input for other production processes
- Set up internal target rates to increase recycling rates and encourage sorting to improve employee understanding of a circular economy and its benefits

2.3.3 Value recovery

This CE model aims to maximise the usefulness and value of certain materials in their production cycle and to achieve greater efficiency in the production process, thereby minimising waste generation. It is based on the following elements:

- **Reuse and recycle:** Introduce ways to keep waste materials within the company and the production cycle; Increase material use efficiency
- **Repair and recondition:** produce goods and services to last (quality over quantity) and provide service to repair and refurbish products and services
- Remake products that did not meet standards and were considered waste
- **Consumer awareness:** inform customers of recycling and repair opportunities to incentivize closed-loop material use while explaining competitive advantage of your service/product compared to non-circular business models

2.3.4 Collaborative economy

This model is based on the exploitation of all potential secondary products and collateral uses that arise during their production. Sharing of equipment and materials is maximised through strong industrial networking. To adopt this model, the following activities can be undertaken:

To adopt this model, the following activities can be undertaken:

- **grouping** together companies that use similar materials in order to share transport supply costs and open up channels for the exchange of materials between companies
- **encourage** cooperation; exchange good practices and learning experiences between companies to accelerate the transition to circularity
- **introduce a sharing economy**: collaborate with other companies to build expensive infrastructure or buy equipment to improve efficiency of use (e.g. cooling units, trucks, sorting site ...)

1. Annexes

Annex 1: Type of policies and laws towards circular economy

Management of renewable flows	1. Law No. 1/2011 approving the Basic Legislation on Environment (2011) 2. Decree-Law No. 10/2011 approving the Basic Fishing Legislation (2011) 3. Decree-Law No. 5/2011 approving the New Forestry Law (2011) 4. Decree-Law No. 5-A/1992 establishing the Water Code (1992) 5. National Framework on Biotechnology and Biosafety of Guinea-Bissau (2008)
Management of stocks	1. Environmental Law N.1/2011 defining waste and good practices of waste management 2. Resolution N.22 of CMB/2010 for the management of Bissau municipal solid waste 3. Decree Law No. 2/2013 / Decree Law No. 16/2013-Prohibiting the manufacture, import, marketing and distribution of plastic bags

Annex 2: Existing awareness raising initiatives and campaigns towards CE

Initiative's name	Description of activity	CE aspect addressed	Link / Contact
TININGUENA	NGO whose mission is to «promote participatory and sustainable development, based on the conservation of natural and cultural resources and the exercise of citizenship	Regeneration of natural flows / production efficiency	http://www.tiniguena.org
Palmerinha	NGO working in the field of environmental education and communication in protected areas and in Bissau-Guinean society	Environmental protection (regeneration of natural flows/waste reduction/energy production/recovery efficiency)	http://www.palmeirinha.org
Government	Awareness campaign on the prohibition of the use of plastic bags	Environmental protection and pollution control	
Civil society, NGOs, Women's associations, People, Students, Military/Police	Awareness and sanitation campaigns	Environmental protection and pollution control	

Annex 3: Examples of companies doing CE related activities in waste management

CE aspect	Company's name	Description of activity
Collection	BLUFO	Private company for the collection and management of urban waste
Sorting	Initiative of the Chamber of Commerce, Industry, Agriculture and Services (CCIAS) with the municipality of Bissau	Equipment for the waste sorting centre
Treatment	Initiative of the Ministry of the Environment and Biodiversity	Creation of the Residue Centre
Recycling and disposal	Initiative of some private companies	Recycling and disposal of waste

Annex 4: Key sectors to foster CE and related stakeholders and supporting platforms

Key sector	Identified key stakeholders	Relevance of the stakeholder	Suportive platform
Agriculture	Ministry of Agriculture and Rural Development	Implementation of government policies and strategies for CE	http://www.gbissau.org
Fisheries	Authorities	Regulation of the sector	
	Fishermen	Stakeholders in the sector	
Tourism	State Secretariat for Tourism	Implementation of government policies for sustainable tourism	

INDIAN OCEAN COMMISSION

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SWIOFISH 2

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Introduction

The circular economy (CE) has gained momentum worldwide due to a growing concern about the rates of resource extraction and pollution arising from production processes under the linear economic model.

CE is «an industrial system that is restorative or regenerative by intent and design» (EMF 2013). It goes beyond recycling and waste reduction as it aims to add value to waste and keep materials in circulation for as long as possible. It is about extracting more value from fewer resources by increasing productivity and efficiency, and shifting from possession to access to products, creating a mindset of sharing to reduce consumption through increased efficiency in the use of goods. For island states, CE is very relevant because of their vulnerability to climate change and pollution, but also because of the countries' dependence on imports for most consumer products. The Indian Ocean Commission has therefore secured funding from the World Bank to support the regional SWIOFish project and increase efforts to implement a circular economic model for the supply and production chain to reduce downstream marine pollution. The objective of the CE project for each AIODIS country is to foster a circular economy and protect the environment and natural capital while targeting economic growth.

The aim of the report is to present a national policy framework and guidelines for entrepreneurs. Through collaboration with local experts and government representatives, local agencies and international foundations, an understanding of the current situation has been established in the state of play report. Possible approaches and actions were identified for moving forward. These actions are grouped together in this document. Despite the existence of various policy instruments and green initiatives put in place over the last decade, Madagascar does not yet have the necessary basis to move towards CE. However, the involvement of civil society and the private sector helps to improve the understanding of the different aspects related to the circular economy concept and to lay its cornerstones within society.

The document is divided into two parts. First, it presents a policy framework to encourage CE and suggests legislative implementations for Madagascar. To facilitate the connection between authorities and policy and the private sector, it is important to ensure a common understanding and agreement on how to proceed, with the goal of a circular economy in mind. The second part of this paper then presents CE guidelines for entrepreneurs. The implementation of CE goes beyond recycling and waste reduction. It encourages the extraction of more value from fewer resources by increasing productivity and efficiency. Therefore, to move towards a circular economy, it is crucial to involve and support local businesses and the private sector to facilitate collaboration, implementing the respective practices along the way within production, distribution and processing facilities. The guidelines for entrepreneurs are linked to the policy framework and legislative suggestions outlined in the first phase. Explanations on how to set up a business in Madagascar with circularity in mind, as well as the transition to more sustainable business practices for established businesses are included and offer step-by-step advice along the way. This will help to better consider the different informal sectors and better engage authorities and businesses in the common pursuit towards a circular economy.

1. Policy framework

The framework defines possible pathways to achieve a CE based on the particularities of Madagascar and on the information produced by the local expert involved in this work. Based on the existing situation, legislation will be promoted to further develop a circular economy while aiming to identify additional opportunities to expand the economy and improve overall material efficiency.

1.1 Establish regulations for the country's Circular Economy

National policy objective: the government should adopt a declaration of commitment to the circular economy and fill the legal gaps. A number of legal texts exist but they are not harmonised to address CE (see Annex 1).

Rationale: Interaction between industry and authorities for joint action is currently limited. The government has yet to communicate its circular economy objective and give a clear indication of how to implement it.

There is no interaction between industry and authorities for joint action towards the CE. The government does not communicate its circular economy objective and does not offer a clear indication on how to follow up on it. In Madagascar, the polluter pays principle (PPP) is not established in the National Sanitation Policy and Strategy (PSNA). There is control and monitoring by the environmental inspectorate. Industry is responsible for the financial burden of pollution costs. Madagascar has not implemented the full Extended Producer Responsibility (EPR) along the supply chain meant to prevent widespread pollution and reduce the impact on the PPP. EPR and PPP are not generally recognised in waste management legislation. The absence of EPR and PPP implementation texts results in the lack of a good basis for CE. It also hinders the fight against different forms of pollution and in particular marine pollution.

Specific actions required: To achieve the above objective, it is suggested that the country adopts a declaration or framework legislation that promotes the integration of actors and harmonisation actions towards CE. The commitment to CE could be integrated into the country's existing social, economic and other sectorial policies.

There is also a need for specific legislation that is not currently in place to support CE. These include legislation on recycling and legislation on PPP and EPR.

1.2 Train through awareness and education campaigns

Mobilising players for CE: To achieve it in Madagascar, it is essential to increase awareness of CE at all levels, especially in the key sectors of the blue economy. The concept of CE is still new at the national level; the population and government departments are not aware of what CE can bring.

Rationale: Government, civil society or private companies try to raise awareness through agencies, but the scope or geographical coverage is often limited.

Specific actions required: To achieve the above objective, some examples of specific actions required are:

- Awareness-raising campaigns involving society as a whole.
- Strengthened collaboration between major industries and authorities.
- Reintroduction of school campaigns to raise awareness among young people.
- Increased interaction with businesses to introduce them to circular economy models and make them understand their necessity.

It will also be key to support and replicate existing initiatives and other educational activities in place at government, business and public levels. In Madagascar, awareness campaigns on CE are very recent and can be seen in the tourism, agriculture, fisheries and service sectors. (see Annex 2).

1.3 Improve material stock management

1.3.1 Collection and sorting system

Optimising the value of waste: In order to improve the waste management processes currently in place, it is recommended to optimise the existing collection and sorting systems. This is also recognised in the report on marine plastic in the AIODIS project. Although waste is collected, this is not done in a uniform manner throughout the country. Waste sorting procedures are not efficient and do not allow for optimal waste recovery.

Rationale: Waste is collected once a week via curbside containers. Before and after collection, the waste streams are not sorted into different materials such as metal/electronics/paper and cardboard/organic waste/plastic/wood/glass/hazardous waste. Collection and transport of waste is the responsibility of the municipality.

Specific actions required: Based on the above, it is then necessary to increase collection points, improve sorting procedures and introduce a more sustainable treatment site than landfill.

An important step in this process is to support existing collection and sorting companies and replicate them on a national scale. There are currently no companies that collect and sort waste in a responsible way (see Annex 3).

1.3.2 Waste treatment facility

Improving the efficiency of waste treatment facilities: Addressing the processes related to waste treatment facilities is a key step towards achieving circularity. To do so, the country needs to increase the efficiency of current facilities and introduce more sustainable sites such as landfills with gas congestion, incineration with energy recovery, waste sorting and cleaning sites, recycling stations. Current facilities do not allow for waste recovery and do not meet their waste reduction targets.

Rationale: The government has initiated discussions to improve the current landfills. The authorities are currently assessing the possibilities of opening up facilities to standard. Efforts to implement waste separation/ increase waste collection/ reduce litter/ introduce recycling are not yet undertaken.

Specific actions needed: To achieve circularity, existing solutions include the implementation of high efficiency recycling and biogas generation.

For Madagascar, options include the creation of new enterprises and the support and development of existing enterprises that process waste with circular motives. There are very few current enterprises that have waste recovery processes. However, there are many examples of waste recovery in the informal sector that can be enhanced and better supported by government and the private sector (see Annex 3).

1.3.3 Dumping and littering

Reducing pollution through better waste management: For the country's blue and circular economy, reducing waste and associated pollution at all levels and especially in the ocean is paramount. There is currently a significant level of industrial pollution and waste accumulation from litter in cities and on beaches.

Rationale: In Madagascar, the industrial pollution management policy establishes anti-littering and anti-dumping policies, but the corresponding legislation and fines are not yet in place. There is no control body to monitor the waste flows of companies. Industrial dumpsters are not currently monitored by the municipality. Waste is carried to landfill sites.

Specific actions required: It becomes clear that the country needs to better monitor industrial waste and establish fines, introduce an understanding of the use of materials in sectors such as tourism, fishing or agriculture.

For Madagascar, the solution is to create an industrial waste monitoring programme and a subsequent penalty system.

1.4 Restore and better manage the use of natural capital

Natural resource management: To achieve sustainable use of natural resources within a CE, Madagascar needs to further develop and support existing initiatives. These aim to regenerate natural flows, particularly in blue economy sectors such as fisheries, tourism, oil and gas exploration and bioprospecting. Madagascar has put in place various biodiversity and blue economy strategies to increase environmental protection of marine and coastal ecosystems. While there is a wide range of environmental legislation, there is limited implementation and high levels of biomass extraction by fisheries for example.

Rationale: There are a number of agencies and research centres responsible for monitoring natural resources such as fish stocks, forest abundance, wildlife conservation and water pollution. As an extension of existing natural resource monitoring efforts, there are limited control efforts, such as the implementation of resource use permits.

Specific actions needed: Available solutions include increasing the protection of the EEZ through MPAs, strengthening the monitoring of existing MPAs and area-based management as well as increasing restoration activities.

A first step for Madagascar could be to improve existing monitoring practices and capacities. Gaining better knowledge of natural resource use will provide evidence for future decision-making on resource extraction. To address the recovery of natural flows, a parallel step is to support and develop existing activities such as fisheries closures, mangrove restoration, locally managed marine areas and MPAs.

1.5 Incentivize businesses

Putting business at the centre of CE: Increasing the involvement of businesses and entrepreneurs is a stepping stone to achieving circular and blue economy activities. Businesses and entrepreneurs are not aware of the opportunity that CE represents. Those who are already involved in CE-related activities are not well supported.

Rationale: The public sector has little awareness of private sector initiatives and efforts towards a circular economy and does not monitor circular business practices. The government has encouraged green and circular economy objectives within businesses by supporting them with business advice and facilitating business start-up procedures in general.

The lack of government control of business practices and understanding of circular efforts does not allow for the clustering of companies based on equipment, material use and production practices to establish the closed loop system or industry collaboration.

Specific actions required: Existing business advice initiatives need to be better promoted to businesses.

In order to promote the adoption of or transition to a green business, the government should also provide structural and financial support to businesses, including the following measures:

- The creation of a circular economy office within one or more of the government departments.
- The creation of clusters of companies based on activity, material use, equipment needs and proximity to improve material use and infrastructure efficiency while reducing supply chain and waste treatment costs by sharing them among a group of companies.
- Engage in a dialogue with industry to create value from waste.
- Introduce a system of tax relief such as a 3 to 5-year start-up period that is completely tax free or reduced.
- Reduce value added tax for repair and refurbishment activities to encourage reuse businesses.

2. Guide for entrepreneurs

To implement a circular economy model within companies and across sectors through synergies, public and private sector efforts are needed to create the right environment. As private sector players are able to decide and act quickly, businesses can be the driver of a local circular economy. Businesses are currently in a position where they can lead the change. By taking the initiative and adopting the transition to circular practices, they can also influence government decisions in this area.

In order to engage businesses in efforts to achieve a circular economy, it is necessary to provide them with guidelines on how to implement and transition to a circular production cycle. Through consultation with local experts and government representatives, this document highlights existing good practices as well as barriers and opportunities for a circular economy. Feasible solutions and stakeholders who can be involved in the process are identified. Guidelines are proposed to create a discussion between sectors to form synergies and break the linear economic model. The identification and highlighting of possible collaborations between companies as well as step-by-step guidelines for companies seeking sustainability are starting points towards the ultimate goal of protecting marine resources and reducing ocean pollution.

The guidelines can help start-ups as well as existing businesses to establish business models that allow for more efficient resource management while phasing out the creation of waste and thus combating maritime pollution at its source. The guidelines provide prospective entrepreneurs with administrative advice on how to set up their business and identify the main ways to implement a circular economy. For existing businesses, the guidelines include step-by-step advice on how to make the transition to sustainable production and system processes that are associated with a circular economy. The guidelines conclude with in-depth solution proposals and opportunities that companies can take up and implement in their ongoing quest for sustainable processes. Based on the content of this document, companies will be able to make relevant progress leading to better resource management, reduced waste generation and less marine pollution.

2.1 Creating a new CE business

2.1.1 Establish the mission, vision and objectives of the company

The mission of the company should embody its essence and purpose. The vision is the way in which the company is envisaged in the medium and long term. The company's objectives are derived from the founders' goals (personal and professional motivations) and should address environmental and social challenges and satisfy customer needs.

For a CE enterprise, these three elements must refer to one of the CE principles: (1) preserving and enhancing natural capital by controlling finite stocks and balancing renewable resource flows; (2) optimising resource efficiency by circulating products, components and materials to their maximum utility at all times through technical and biological cycles; and (3) promoting system efficiency by revealing and eliminating negative externalities

In Madagascar, the tourism, fisheries, agriculture and industry sectors have been identified as key sectors. They offer opportunities with high and deep impacts to reduce marine and land pollution and introduce circularity in Madagascar.

2.1.2 Identify key stakeholders and customer segments

This step involves identifying and prioritising the stakeholders that will play an important role in achieving the project's objectives. Stakeholders include the team (co-founders and employees), partners, beneficiaries (those who benefit from the value generated by the project) and customers. Customers are at the heart of the business model as they buy the services or products. The main impact of the project in society must be intrinsically linked to the local community and cover a local demand that must be met. Another task is to develop a good understanding of the potential customer base (customer identification and profiling) and the existing market around it (market assessment).

To promote CE in Madagascar, it is essential at this stage to include stakeholders such as governments, civil society organisations promoting CE, institutions such as the Ellen MacArthur Foundation. To identify key stakeholders, entrepreneurs should target key suppliers, intermediaries, processing partners as well as customers and public interest partners. In the tourism, fisheries, agriculture and industry sectors identified above, some key stakeholders are essential (see Annex 4).

2.1.3 Develop the value proposition

CE companies create environmental value by addressing the challenges of circularity and the environment (which is a key factor in their existence) through their business solutions and operations. They create social value by empowering their stakeholders (including employees, suppliers, communities and future generations) and meeting the needs of their customers.

To achieve this, it is suggested to create strong collaboration at all levels and to involve customers and stakeholders in the process of designing and delivering the value proposition (through co-creation).

In Madagascar, the problem(s) of marine pollution, excessive waste generation, lack of waste responsibility, extensive resource extraction, lack of locally available material inputs are key challenges that will form a good value proposition.

2.1.4 Identify the modalities of implementation

2.1.4.1 Key activities and resources

Key activities outline what needs to be done to define and deliver a value proposition to a specific customer group. These activities may include problem solving (such as consultancy or advice), production (manufacturing, etc.), platform/network/sales and supply chain management.

Activities within CE enterprises should include those proposed in the different business models (in section 4 of this guide).

Key resources are all the elements and aspects that are essential for the proper functioning of the business. They include human resources, physical assets, intellectual resources, financial resources and natural resources. For the latter, particular attention should be paid to the use of recycled materials, sustainable or renewable resources as raw materials.

Entrepreneurs should also consider upcoming legislative changes in the country, such as EPR and PPP laws or recycling. At this stage, it may also be useful to find out about possible government support, such as tax reductions on certain products and activities.

2.1.4.2. Customer relationships and channels

Different types of relationships can be established with customers, such as personal assistance, self-service, automatic service, community or co-creation.

In order to correctly establish the different types of relationships with customers, it can be useful to draw up a customer journey map for the concerned customer group. A customer journey map is an oriented graphic that describes the journey of a user by representing the different contact points that characterise her/his interaction with the service or product.

It is also necessary to distinguish between the way (channels) to get the customer's attention and the way to establish and maintain a close relationship with her/him. Channels include all means of communication and distribution to reach customers and deliver a value proposition.

For CE companies in Madagascar, there is an opportunity to explore existing initiatives for sharing economies, introduce take-back options for customers to return products and help materials stay with the company, while exploiting options to continue interacting with customers.

2.1.4.3 Cost structure

It is important to carefully classify costs (fixed and variable) so that the company can analyse and improve its performance.

Within a CE, it is useful to explore potential costs related to CE niches and to identify savings from CE practices such as shared equipment, purchase of recycled materials or procurement and transport costs from abroad.

2.1.4.4 Revenue streams

The company needs to have a clear idea of the size of each revenue stream and which one best fits a particular customer segment and channel. These streams can include asset sales, user fees, subscription fees, licences, etc.

2.1.5 Test the product or service

Before fully implementing the above, the entrepreneur must test key variables:

- The problems and needs identified should be tested by talking to experts in the field or by interviewing key stakeholders.
- The involvement of key stakeholders should be verified through various types of consultations and meetings on business objectives where several stakeholders can provide a good measure of their willingness to engage
- Customer segments need to be validated to ascertain their needs, aspirations, gains and pains, etc.
- Focus groups, interviews, debates and conversations could be used including on social media.
- The value proposition should be tested by building a small-scale prototype or semi-functional versions of the services/products. Here, the reaction of the test participants could include the level of satisfaction, feedback and curiosity/demand for more.

Once the assumptions on the different variables have been tested and validated, the service/product should be scaled up from the prototype to the optimal market size where viability is achieved.

To test the circular product or service, the company can mobilise existing platforms for green entrepreneurs and products, such as the EDBM (see Annex 4 for more details).

2.1.6 Mobilise tools for implementation

Once the business model is validated, the implementation of the above modalities can be facilitated by various tools. The **first** is the establishment of a financial plan with profit and loss accounts, balance sheets and cash flow projections, as well as a financing plan identifying traditional investors and banks as well as other financing mechanisms such as participatory financing, financial cooperatives, microcredit, ethical banks. **Second,** have a legal management plan to choose the legal form best suited to the needs and business model. **Thirdly**, a roadmap is needed to plan the progress of the business from year 0 to the medium and long term. The **fourth** is to have an operations and management plan that dictates how operations are carried out and managed by staff, assigning roles and responsibilities and setting a timetable. The tools used should be adapted to the CE business model adopted.

To find appropriate tools, contractors can refer to existing government services and companies that provide assistance to businesses such as the EDBM (see Annex 4 for more details).

2.1.7 Measure impacts and improve

Effective measurement of environmental and social impacts is essential for CE companies. In addition to measuring the company's performance in achieving its objectives and mission, environmental indicators are needed to assess environmental performance. Environmental indicators such as water consumption, material use, waste generated per service or product or other CE-related indicators should be used. Continuous business improvement is essential to achieve the goals of the circular economy. Typical areas of improvement include levels of stakeholder involvement, communication and marketing to engage customers, improve environmental performance, ensure green procurement and increase environmental awareness among the public.

2.2 Transitioning to a CE business

2.2.1 Map your impact and set priorities

The first step is to bring together an internal «sustainability team» to set objectives, define targets, review environmental impact and determine priorities. In this process, it is necessary to assess the impacts on the use of natural flows and the management of material stocks. In Madagascar, the main environmental impacts of the economic sectors are marine pollution, waste production, the loss of biodiversity and the importation of end products.

2.2.2 Choose indicators and understand data needs

The next step is to identify the indicators that are important for the company and the data that should be collected to support continuous improvement. To assess the company's circularity, indicators related to the CE can be used, such as: use of renewable energy, greenhouse gas and energy intensity, waste intensity, releases into the air and water.

2.2.3 Measure inputs used in production

It is then necessary to identify how the materials and components used in the production processes influence environmental performance. Companies can also measure CE-related performance, including: material consumption, resource use, renewable energy consumption, waste generation, imported inputs, non-renewable materials, restricted substances, recycled or reused materials. Companies

can check the availability of recyclable materials and monitor that of waste and recycled materials as inputs into the production process.

2.2.4 Assess the operations of your facility

It is essential to measure the impact and efficiency of operations in the facility. The generation of residual waste and surplus materials that can be phased out and managed more efficiently in the future (e.g. water consumption, energy intensity, greenhouse gas production, air and water emissions, waste generated). Efforts to improve the efficiency of production and use of materials towards circularity while reducing the creation of waste must be continuous.

2.2.5 Evaluate your products

Here it is essential to identify factors such as energy consumption in product use, resource use, recyclability and use of hazardous substances that help determine the sustainability of the final product. Companies can use CE-related indicators such as: recycled/reused content of products, recyclability of products, renewable materials used in products, non-renewable materials used in products, regulated substances in products, energy consumption in use of products, greenhouse gas emissions resulting from use of products. It also aligns with the CE to assess the possible incentives to recycle and encourage customers to return products to possibly keep materials in the cycle.

2.2.6 Understand your results

It is important to know how to read and interpret indicators and understand performance trends. Companies can focus on CE-related indicators that align with proposed business models.

Entrepreneurs and companies can refer to existing government services and companies that can provide assistance in this process, such as the EDBM.

2.2.7 Take action to improve your performance

Finally, opportunities for performance improvement should be selected and action plans drawn up to implement them. CE companies should focus on CE-related indicators that align with the suggested business models. It is also useful to stay informed of new sustainable opportunities as they arise. They should also make continuous progress in identifying areas of improvement or non-circular practices.

2.3 Circular Business models for entrepreneurs

2.3.1 Circular design

This CE model relies on the following elements:

- Circular product design: use recyclable materials for goods and packaging that allow for a circular system and a maximum local supplies;
- Product/service design and provision: access over ownership and product service systems;
- Local supplies and local demand for service/good; 2.3.2. O
- Economy of functionality (rent resources rather than buy and own them)

There are no known existing companies that operate based on an entirely circular design (Annex 5).

2.3.2 Optimal material and resource use

To adopt this model, the following activities can be undertaken:

- Understand the value of waste materials and engage in opportunities from materials
- Buy recycled materials and reduce input material costs
- Target recyclable and sustainable materials and pioneer in industrial waste valorisation
- Introduce industrial symbiosis; internalise a maximum of production steps within the company on the same site to reduce transport costs. This also helps with waste creation as all accrues on the same site, making recycling or reusing easier since larger amounts hold more potential
- Redefine retail; skip retailers by directly interacting with consumers. Simplifies recycling practices, understanding of consumer behaviour and increases revenue
- Inspect daily practices to identify non-sustainable production practices such as use of single use plastics, equipment and garment
- Adopt a closed-loop process; use residual outputs and by-products as input for other production processes
- Set up internal target rates to increase recycling rates and encourage sorting to improve employee understanding of a circular economy and its benefits

There are very few companies that have optimised the use of resources by operating solely with renewable and recycled materials as inputs (see Annex 5 for key examples).

2.3.3 Value recovery

This CE model is based on the following elements:

- **Reuse and recycle:** Introduce ways to keep waste materials within the company and the production cycle; Increase material use efficiency
- **Repair and recondition:** produce goods and services to last (quality over quantity) and provide service to repair and refurbish products and services.

Remake products that did not meet standards and were considered waste

- **Consumer awareness:** inform customers of recycling and repair opportunities to incentivize closed-loop material use while explaining competitive advantage of your service/product compared to non-circular business models

There are very few companies that maximise the utility and value of some of their materials in their production cycle and achieve greater efficiency in the production process, thereby minimising waste generation (see Annex 5 for key examples).

2.3.4 Collaborative economy

To adopt this model, the following activities can be undertaken:

- **grouping** together companies that use similar materials in order to share transport supply costs and open up channels for the exchange of materials between companies
- **encourage** cooperation; exchange good practices and learning experiences between companies to accelerate the transition to circularity

- **introduce a sharing economy**: collaborate with other companies to build expensive infrastructure or buy equipment to improve efficiency of use (e.g. cooling units, trucks, sorting site ...)

There are very few existing businesses that operate on the basis of a collaborative economy and exploit all the potential by-products and collateral uses that arise during their production. In addition, the sharing of equipment and materials is maximised by strong industrial networking (see Annex 5 for key examples).

3. Annexes

Annex 1: Type of policies and laws towards circular economy

Management of renewable flows	Protection of the environ-ment/of bio-diversity	✓	Law n°2015-003 on the Malagasy Environment Charter
	Fisheries management	✓	Environmental programme for sustainable development (2016)
	Forestry management	✓	National strategy for forest landscape restoration and green infrastructure (2017)
	Protected Areas	✓	Law 2015-053 on the fishing and aquaculture code (2015)
	Water management	✓	Law 97-017 on the revision of forestry regulations (1997)
	Renewable Energy	X	Madagascar Forest Policy Towards Sustainable and Responsible Forest Management (2017)
Management of stocks	General waste management	✓	Law 2015-015 on the code of protected areas (2015)
	Solid waste management	✓	Law 98-029 on the water code (1999)
	Recycling	X	
	Ban/phase-out of plastic bags	✓	Law n°95-035 on urban sanitation fees (1995)

Annex 2: Existing awareness raising initiatives and campaigns towards CE

Initiative name	Description of activity	CE aspect addressed	Link / Contact
GreenNKool awareness raising	Raising awareness on recycling among young people	Recycling	https://green-n-kool.jimdofree.com/
World Cleanup Day Campaign	Cleaning of beaches to raise awareness about waste pollution	Waste reduction	https://da-dk.facebook.com/CetaMadaMG/posts/10158122279189678/
DHL Madagascar	Partnership with the Société Malgache de Production d'Articles Hygiénique (SPAH) for waste sorting	Waste reduction	http://www.midi-madagasikara.mg/societe/2016/05/31/dhl-recyclage-dechets-papier/
Ecovillage Madagascar	Raising awareness on permaculture and the use of sustainable materials for construction	Production efficiency	https://www.facebook.com/ecovillagemadagascar/
Madacompost - KOMPOSTECO	Promotion of the elaboration of natural compost made from the organic matter present in household waste	Waste recovery and recycling	http://madacompost.mg/komposteco/
Ecolodges	Use of local materials for construction and environmental protection	Regeneration of natural flows	https://travel2madagascar.com/inside-madagascars-incredible-eco-lodges/
Mahajanga Clean City	Raising awareness of children from a fishing village in local schools in the hope that the future generation will develop a culture of respect for the environment	Waste reduction	https://web.facebook.com/MahajangaVillePropre/?_rdc=1&_rdr

Annex 3: Examples of companies doing CE related activities in waste management

CE aspect	Company	Description of activity	Link / Contact
Collection	SMA (Société Municipale d'Assainissement)	Waste collection in the city of Antananarivo	
Sorting, Processing, Recycling, Export	Adonis Environnement Group	Collection, treatment and recovery of hydrocarbon waste and derivatives in Madagascar as well as medical waste	http://www.adonis-madagascar.com/
Processing, Recycling, Reuse	SMTP Antananarivo Company	Processing and recycling company for plastics and polymers	http://groupe-smtp.com/fr/les-metiers/industries/
Processing, Recycling and Disposal	Madacompost	Management and recovery of waste in Madagascar - Social and environmentally friendly company - Compost, Fuels, Services and expertise.	http://madacompost.mg/
Reuse	Very small informal shops on all national roads	Reuse of PET bottles and bottles for the sale of local food	

Annex 4: Key sectors to foster CE and related stakeholders and supporting platforms

Key sector	Identified key stakeholders	Relevance of the stakeholder	Platforme liable to support CE
Agriculture	Directorate General of Agriculture	Coordinates agriculture's management activities	EDBM - https://edbm.mg/
Industries	Ministry of Industry, Trade and Handicrafts (MICA)	Coordinates the activities of industry, commerce and crafts	
Fisheries	General Directorate of Fisheries and Aquaculture of the MAEP	Coordinates fisheries management activities	
	Fisheries surveillance centre	Surveillance of territorial waters	
Tourism	ONTM - Madagascar National Tourism Bureau	Promotion and protection of tourist sites	

Annex 5: Key examples of companies operating under CE business models

Business model	Company	Activity	Link / Contact
Circular design	SMTP	Processing and recycling of plastics	https://groupe-smtp.com/fr/les-metiers/industries/
Optimal use of materials and resources	Madacompost	Recycling of household waste into tiles and bricks	http://madacompost.mg/
Value recovery	Fakofia	Resale of metal and plastic components to local craft companies.	https://www.lerelais.mg/rubriques/collecte-et-valorisation-des-dechets

INDIAN OCEAN COMMISSION

National Circular Economy Framework & Guide for Entrepreneurs for the Maldives

Final report

WORLD BANK GROUP

SWIOFISH 2

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Introduction

Circular economy (CE) has been on the rise across the globe due to a growing concern about resource extraction rates and pollution arising from production processes under the linear economic model. The CE is "an industrial system that is restorative or regenerative by intention and design" (EMF 2013). The CE goes beyond recycling and waste reduction as it aims to value waste and keep materials in circulation for as long as possible. It is about extracting higher value from fewer resources by increasing productivity and efficiency, and moving from ownership to access of products, creating a sharing mindset allowing to reduce consumption thanks to increased efficiency of asset use. For island states, the CE is highly relevant due to their vulnerability to climate change and pollution but also due to the reliance of countries on import of most products consumed. The Indian Ocean Commission has therefore secured funding from the World Bank to support the SWIOFish regional project and increase efforts to set up a circular economic model for the supply and production chain to reduce downstream marine pollution. The CE Project's aim for each AIODIS country is to foster a circular economy and protect the environment and natural assets while aiming for economic growth.

The objective of the report is to present a national policy framework and guidelines for entrepreneurs. Through collaboration with local experts and government officials, local agencies and international foundations, an understanding of the current situation has been established in the review report. Possible approaches and actions have now been identified to move forward. These actions are gathered within the present document. Thanks to incentives and policy adaptations made throughout the past decade, in 2015 the Maldives implemented a national waste management policy with objectives including the introduction and application of the 3R concept and already created the fundamentals to proceed. The introduction of a new waste to energy incineration plant in Vandhoo in the northern region of the country in 2016 and the since 2019 ongoing discussions for a waste-to-energy process in the city of Addu city show efforts to follow up on and advance the progress. Involvement from the private sector as well as awareness campaigns have additionally increased the understanding of the concept of a circular economy and cornerstones have been laid within the society.

The document is divided into two parts. First, it presents a policy framework to foster CE and respective suggested legislative implementations for the Maldives. To facilitate the connection between authorities and policies and the private sector it is important to guarantee a common understanding and the comprehension on how to proceed, with the goal of a circular economy in mind. The second part of this document then presents CE guidelines for entrepreneurs. Implementing a CE goes beyond recycling and waste reduction as it aims to value waste and keep materials in circulation for as long as possible. It encourages extracting higher value from fewer resources by increasing productivity and efficiency. Therefore, to move towards a circular economy it is crucial to involve local businesses and the private sector in order to facilitate the collaboration, implementing respective practices along the path within production, distribution and treatment facilities. The guidelines for entrepreneurs are linked to the policy framework and legislative suggestions made during the first phase. Explanations on how to set up a business in the Maldives with a circularity target, as well as the transition toward more sustainable business practices for established companies will be included and offer step-by-step advice along the way. This will allow to close a gap of informality within different sectors and better involve authorities and businesses in the common quest toward a circular economy.

1. Policy framework

The framework to lay out possible paths moving forward based on the particularities of the Maldives and feedback from local experts participating on this work. Acting upon present circumstances in place legislation will be promoted to develop a circular economy further while aiming to identify additional opportunities to expand the economy and improve aggregate efficiency of materials.

1.1 Establish regulations for the country's Circular Economy

National Policy goal: The government need to Adopt a statement committing to a circular economy and fill the legal gaps. A number of legal texts exist in the country but they are not harmonised to address CE (See Annex 1).

Rationale: There is already an interaction between industry and authorities for common action. The government made its target for a circular economy known but did not offer a clear indication on how to follow through with it. In the 'waste as a resource' sector of the National Strategic Action Plan (2019-2023) there are four actions that are the first steps the Maldivian government is taking towards a circular economy. These include a legal framework to reduce import, use and manufacture of single use plastics, national policy framework on pollution prevention, a framework for extended producer responsibilities and other stewardship programmes and a national recycling strategy.

In the Maldives, the polluter pays principle (PPP) has been implemented within the national environmental policy, and is controlled and monitored by the Ministry of Environment. The ministry currently implements fines under the waste management regulation of 2012 for littering and dumping of waste in public areas, protected areas and vulnerable environments. However, the PPP is not yet entirely picked up throughout the industry and waste management system and the consumer and the industry are responsible for the financial burden of the pollution costs. The Maldives do not yet have in place the Extended Producer Responsibility (EPR) along the supply chain to prevent extensive pollution and reduce the impact on PPP, but the Ministry of Environment is pushing for its implementation. Moreover, both the EPR and PPP are included in the legislation about solid waste management. Despite their existence, they are not developed enough to provide a CE basis and reduce marine pollution. On the other hand, a plan to phase out all single-use plastics on the Maldives by 2023 has been put in place in February 2021 and aims at reducing waste generation and prevent marine littering.

To achieve the above goal, it is suggested that the country adopts a declaration or an umbrella legislation that promotes integration of actors and harmonisation actions towards a CE. Commitment to the CE could be integrated into existing or upcoming blue economy policy of the country.

Specific actions needed: There is a need to adopt specific legislations that are currently missing to foster a CE. A legislation to phase out single use plastic – focused on industry, awareness creation and implementation in different industries – and incentives to the fishery sector are in the works. At a later stage the possible implementation of fines would be helpful. Further a single use plastic and communication plan is passed to bring EPR under law. Further, a pertinent legislative framework to implement the marine spatial planning work is ongoing under the Noo Raajje Programme.

1.2 Educate through awareness and education campaigns

Mobilising actors for the CE: To achieve a CE in the Maldives, it is essential to increase literacy on CE at all levels, especially in key sectors of the blue economy. The concept of CE is still new at the national level as communities, industries and government entities are not fully aware of the benefits of a circular economic model.

Rationale: There are efforts from governmental, civil society and private companies including a recycling strategy and an EPR strategy that will be finalised by the end of 2021. In addition, the single use plastic phaseout plan for the Maldives has come into effect to sensitise population on single use plastic/waste management. Further, a recycling strategy and EPR strategy will be finalised by end of the year 2021.

To achieve the above goal, examples of specific actions needed include:

- Continued workshops in place engaging society at large.
- Build collaboration between large industrial partners and authorities.
- Reintroduce school campaigns to raise awareness within youth.
- Increase interaction with companies to introduce them to circular economic models and make them understand the necessity of it.

Specific actions needed: There is a need to support and replicate existing initiatives and other educational activities in place at the level of governments, businesses and the population. In the Maldives, awareness campaigns about the CE have started recently and can be seen in the sectors of Tourism and Fisheries (see Annex 2).

1.3 Improve material stock management

1.3.1 Collection and sorting system

Optimising Waste value: To improve the waste management processes currently in place, it is recommended to optimise existing collection and sorting systems. This is also acknowledged in the report on marine plastic pollution under the AIODIS project. While waste is collected, it is note done uniformly across the country. Waste sorting procedures are not efficient and do not allow for an elaborate subsequent incineration nor valorisation of waste.

Rationale: Waste is collected seven times a week through curb side collection or household collection depending on the island and municipality. Practices differ across the country because collection and transport of waste is within the responsibility of the municipality. After collection waste streams are sorted into different materials such as metal, paper & cardboard and bio waste. In some islands source segregation happens, however there are islands where no segregation at all is done. The waste is collected and segregated at island level and organic waste is managed at the island waste management centres. The remaining inorganic waste, including the recyclable and combustible waste, is transferred to the nearest regional waste management facility.

From the above it is then necessary to increase collection points, improve sorting procedures and introduce a treatment site that allows for waste valorisation and sustainable practices that go beyond incineration in the long term.

Specific actions needed: An important step in this process is to support existing companies doing collection and sorting and replicate nationally. Currently utility companies exist that responsibly collect and sort waste (see annex 3) and offer upscale opportunities going forward. Additionally, a clear waste management structure should be put in place to allocate the responsibilities along the treatment process.

1.3.2 Waste treatment facility

Improving efficiency of waste treatment sites: Addressing processes at waste treatment facilities represent a key step towards achieving circularity. To do so, the country needs to increase efficiency of current facilities and introduce more sustainable sites like landfill with gas congestion, incineration with energy recovery, waste sorting and cleaning sites and recycling stations. Existing facilities do not allow valorisation of waste and do not achieve their goals of reducing waste. Hence efforts to increase waste valorisation and efficient management at incineration sites need to be ongoing.

Rationale: The government has started discussion to improve current landfill sites. Options to upgrade incineration plants, sorting and recycling plants are being evaluated by the authorities but no consents have been found. At present there is one treatment facility at R. Vandhoo. In addition, Addu waste treatment facility will cover three civil atolls (Gn, GDh, GA, S) and works are ongoing and incinerator works are contracted out. Efforts to implement source segregation, increased waste collection, reduce littering and introduction recycling are being undertaken.

In northern facility region bio-degradable waste is source segregated at the island level and inorganic waste are taken to the facility for treatment, where combustible waste is incinerated.

To achieve circularity, existing solutions include implementing high efficiency recycling and biogas creation and improving sustainability on incineration plants on the two islands of H. Dh Kulhudhuffushi and in Fuvahmulah. Assessing energy recovery, sorting and waste valorisation practices within these plants is also deemed helpful.

Specific actions needed: For the Maldives options should surround supporting and upscaling existing companies treating waste with circular motives that have existing waste valorisation processes (see annex 3).

1.3.3 Dumping and littering

Reducing pollution through improved waste management: For the country's blue and circular economy, reducing waste and related pollution at all levels and especially in the ocean is paramount. There is currently an important level of industrial pollution and accumulation of waste from littering in cities and on beaches.

Rationale: In the Maldives, anti-dumping and littering legislation are in place but need to be enforced more thoroughly through existing fining systems that lack application. A body of control is in place and operated by the public sector and responsible for monitoring company waste streams but is facing similar issues than the fining systems regarding enforcement. Industrial dumpsters are supervised by the Department of Waste Management and pollution control as well as the Environmental Protection Agency.

It then becomes obvious that the country needs to better monitor industrial waste and establish fines, introduce material use understanding across sectors such as manufacturing, tourism, fisheries.

Specific actions needed: For the Maldives, the solution lies within supporting existing programs for industrial waste monitoring and a subsequent penalty system that is enforced on the entirety of the system to manage large industrial waste flows.

1.4 Restore and better manage the use of natural flow

Managing natural resources: To achieve sustainable use of natural resources within a CE, the Maldives need to upscale and further support existing initiatives. They should aim at regenerating natural flows especially in the blue economy sectors such as fisheries, tourism, oil and gas exploration and bioprospection. A project co-funded by the World Bank to build a sewerage system to avoid untreated sewage water running into the ocean are initiatives that show ongoing efforts in that regard.

There is currently a low level of environmental protection of natural resources with 557 square kilometres (less than one percent) of ecosystems of the overall 1 million square kilometres of their EEZ and coastal ecosystems being protected. Another 39 coastal ecosystems are being restricted through measures for harvesting water and natural resources are protected from detrimental fishing gears (E.g.: chemical, explosives, large scale nets). Despite existing environmental texts to protect ecosystems and biodiversity and growing conscience of the issue, high levels of biomass are extracted through, among others, fisheries.

Available solutions include increasing protection of EEZ through MPAs, reinforcing monitoring of existing MPAs and areas-based management, and increasing restoration activities while also introducing financial reprimands against offenders.

Rationale: There are agencies in place responsible for the monitoring of natural resources such as fish stocks, forest abundance, wildlife preservation and water pollution. As a follow up on existing monitoring efforts of natural resources, there are limited controlling efforts like implementation of resource use permits.

Specific actions needed in the Maldives: A first step could be to improve existing monitoring practices and capabilities while preventing ongoing harmful practices through fines. Building better knowledge on the use of natural resources will provide evidence for future resource extraction rate decision-making. To address regeneration of natural flows, a parallel step is to support and upscale existing activities such as fishery closures, mangrove restoration, locally-managed marine areas and MPAs.

In this regard, much work has already been conducted by the Ministry of Environment and the Ministry of Fisheries, Marine Resources and Agriculture, where areas of ecological and biological interest have been protected with one of the key goals being regeneration of stocks and stimulating the spill-over effect. Furthermore, the marine spatial planning work underway through the Noo Raajje Programme aims to protect a significant percentage of the Maldivian EEZ, thereby considerably expanding the existing MPA network.

1.5 Incentivise businesses

Putting businesses at the centre of the CE: Increasing the involvement of businesses and entrepreneurs is a stepping stone towards achieving circular and blue economic activities. Businesses and entrepreneurs are not aware of the opportunity the CE presents while those already involved in CE related activities are not well supported.

Rationale: The public sector is aware of private sector initiatives and efforts toward a circular economy but does not monitor circular business practices. Nevertheless, the government policy initiatives include circular economy within businesses by supporting them financially through tax reductions.

The existing governmental monitoring of business practices and the understanding of circular efforts allows there to be a certain degree of grouping of companies according to equipment and material use to encourage a closed loop or industrial collaboration called symbiosis.

These records are mainly maintained by Maldives Customs Services and approvals are given by Ministry of Environment.

To promote the adoption or transition to a CE business, the government needs to provide structural and financial support to businesses including through:

- The creation of a circular economy office within one or several of the government departments
- The creation of company grouping according to business activity, material use, equipment requirements and proximity to improve material use and infrastructural efficiency while reducing supply chain and waste treatment costs by sharing them among a group of firms
- Undertaking a dialogue with industry to create valorisation of waste materials
- Introducing tax relief system such as 3-5 year starting period complete tax free or reduced
- Cutting repair and refurbish value added tax to encourage reuse businesses

Specific actions needed: In the Maldives, there is a need for initiatives such as subsidies, aides, tax reductions and operative advice to incentivize businesses to adopt circular models.

2. Guide for entrepreneurs

To implement a circular economic model within businesses and across sectors through synergies both governmental and private sector efforts are required to create the right environment. Since private sector actors are able to decide and act quickly, companies can be the driving power toward a local circular economy. Businesses are currently in the position where they can drive the change by taking initiative and transition toward circular economic practices and influence governmental decisions on the matter to follow accordingly.

In order to engage businesses in efforts to achieve a circular economy it is necessary to provide them with guidelines on how to set up and transition toward a circular production cycle. Through consultation of local experts, consultants and governmental officials this document pinpoints to existing good practices as well as barriers and opportunities for a circular economy. Feasible solutions and possible stakeholders to become involved in the process have been identified and the guidelines are designed to create discussion across sectors to form synergies and break the linear economic model. Identifying and pointing out possible company collaborations as well as step-by-step guidelines for sustainability seeking businesses are starting points towards the final goal of protecting maritime resources and reducing ocean pollution.

The guidelines can help start-ups as well as existing companies to establish business models that allow for more efficient resource management while phasing out waste creation and thereby counteract maritime pollution at its source. The guidelines offer upcoming entrepreneurs administrative advice to set up their business and identify the main modalities of implementation for a circular economy. For existing businesses, the guidelines include step-by-step council on how to transition toward sustainable production and system processes that are associated with a circular economy. The guidelines conclude with in-depth solution proposals and opportunities for companies to pick up upon and implement in their ongoing quest for sustainable processes. Based on the content of this document companies will be able to make relevant progress leading to improved resource management, reduced waste generation and diminished maritime pollution for island states.

2.1 Creating a new CE business

2.1.1 Establish the mission, vision and objectives of the company

The company's mission must embody its essence and reason for being. The vision comes as the way the company is envisioned in the mid-long term. Objectives of the company derive from the founders' goals (personal and professional motivations) and should tackle environmental and social challenges and satisfy customer needs.

For a CE business, these three elements should refer to one of the CE principles: (1) preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows, (2) optimise resource yields by circulating products, components, and materials at the highest utility at all times in both technical and biological cycles, and (3) foster system effectiveness by revealing and designing out negative externalities (P3)

In the Maldives, the fishery, agriculture, manufacturing, construction and tourism sectors have been identified as key sectors. They offer the most impactful and far-reaching opportunities to **reduce maritime and land pollution and introduce circularity** within the economy on the islands of the Maldives.

2.1.2 Identify key stakeholders and customer segments

This step involves identifying and prioritising those stakeholders that will play a significant role in achieving the objectives of the project. Stakeholders include the team (co-founders and employees), partners, beneficiaries (beneficiaries are those who benefit from the value your project generates) and customers. Customers are at the core of the business model as they buy the services or products. As for the local community, the project's main impact in society has to be intrinsically linked to the local community and cover a local demand that is to be met. Another task is to develop a sound understanding of the potential customer base (customer identification and profiling) and the existing market around it (market assessment).

To promote a CE in the Maldives, it is essential at this stage to include stakeholders like governments, civil society organisations promoting CE and institutions like the Ellen MacArthur Foundation. To identify key stakeholders, entrepreneurs should target main suppliers, intermediaries, processing associates as well as customers and public partners of interest. In the above identified sectors of fishery, agriculture, manufacturing, construction and tourism some key stakeholders are essential (refer to Annex 4).

2.1.3 Develop the value proposition

CE businesses create environmental value by tackling circularity and environmental challenges (that key driver for their existence) through its business solutions and operations, and social value by empowering their stakeholders (including employees, suppliers, communities and future generations) and meeting the needs of their customers.

To achieve this, it is suggested to create strong collaboration across the board and involve customers and stakeholders in the process of designing and delivering the value proposition (co-creation).

In the Maldives, the issue(s) of marine pollution, excess waste generation and lack of locally accessible material inputs represent key challenges that will be a good potential value proposition.

2.1.4 Identify the modalities of implementation

2.1.4.1 Key activities and resources

Key activities define what we must do in order to define and offer a value proposition to a specific customer segment. They include problem-solving (such as consulting or counselling), production (manufacturing etc), platform/network/sale, and supply chain management. Activities within CE businesses should include those proposed in the different business models (in section 4 of this guideline)

Key resources represent all the elements and aspects that are essential for making the business work properly. They include human resources, physical assets, intellectual resources, financial resources and natural resources. For the latter, a special focus should be on the use of recycled materials, sustainable or renewable resources as input materials.

Entrepreneurs also need to consider incoming legislative changes such as laws on waste management and the plan to phase out single use plastics. At this stage it can also be helpful to enquire for possible governmental support like tax reduction and investment subsidies as incentives for the use of recycled and sustainable materials as well as renewable resources as input materials.

2.1.4.2 Customer relationships and channels

Different types of relationships can be established with customers such as personal assistance, self-service, automatic service, community based or co-creation.

To properly establish the different types of relations with customers, doing a customer journey map of the particular segment of customers can be useful. A map is an oriented graph that describes a user's journey by representing the different touchpoints that characterise his/her interaction with the service or product.

You will also have to distinguish between the way (channels) to get the customer's attention and how to establish and maintain a close relationship with them. Channels include all means of communication and distribution to reach customers and deliver a value proposition to them.

For CE businesses, it is possible to explore existing initiatives towards sharing economies, introduce take-back options for customers to return products and help materials stay within the company while exploiting options to continue to interact with customers.

2.1.4.3 Cost structure

It is important to carefully classify costs (fixed and variable costs) so that the business can analyse and improve its performance.

Within a CE, it is useful to explore potential costs linked to niche CE areas and identify cost savings arising from CE practices such as equipment sharing, recycled material purchases or supply and transport costs from abroad.

2.1.4.4 Revenue streams

The business must have an accurate idea of the importance of each revenue stream and which one best matches a particular customer segment and channel. Streams might include asset sale, usage fees, subscription fees, licensing etc.

2.1.5 Test the product or service

Before fully implementing the modalities above, the entrepreneur needs to test key variables:

- Problems and needs identified should be tested by talking to experts in the field or by interviewing key stakeholders.
- Participation of key stakeholders should be verified through diverse types of consultations and meetings on the business objectives where multiple stakeholders can provide a good measure of their willingness to engage.
- Customer segments should be validated through focus groups, interviews, debate or conversations to check their needs, aspirations, gains and pains, etc. Focus groups, interviews, debates, and conversations could be used including on social media.
- Value proposition needs to be tested by building a prototype at small-scale or semi functional versions of the services/products. Here, participants' reaction to the test might include satisfaction level, feedback, and curiosity/ demand for more.

Once hypotheses on the different variables have been tested and validated, the service/product has to be scaled up from prototype to the optimal market size where viability is attained.

To test the circular product or service, there are currently no existing platforms for entrepreneurs and green products which can be mobilised to help with the process.

2.1.6 Mobilise tools for implementation

When the business model is validated, implementation of the modalities presented above can be facilitated by various tools. **First** is establishing a financial plan with income statements, balance sheets and cashflow projections, and a funding plan identifying traditional investors and banks as well as other funding mechanisms such as crowdfunding, financial cooperatives, micro-credits, ethical banks. **Second** is having a legal management plan to choose the best-fitting legal form according to the needs and business model. **Third** is setting a roadmap to foresee the progress of the business from year 0 to the medium and long-term. **Fourth** is to have an operation and management plan which dictates how operations are performed and managed by staff and by assigning roles and responsibilities and setting a schedule. Tools used need to be adapted according to the CE business model adopted.

To find the appropriate tools, entrepreneurs can refer to existing governmental departments and companies that provide assistance to businesses such as SME financing scheme by the Ministry of Economic Development and small-scale business loans offered to start-up companies by the Bank of Maldives. However, there are no such departments solely for circular or green products.

2.1.7 Measure impacts and improve

Effectively measuring environmental and social impacts is essential to CE businesses. In addition to measuring how the business is doing regarding the achievement of objectives and mission, environmental indicators are needed to assess environmental performance. Environmental indicators such as water consumption, material use, waste generated per service or product, or other CE related indicators are suggested to be used in order to assess current performances. Constantly improving the business is key to achieve the circular economic objectives as it is a process that requires ongoing efforts to improve efficiency. Common areas of improvement include levels of participation of stakeholders, communication and marketing to incentivize customers, improve environmental performance, ensure green procurement and increase environmental awareness amongst the public.

2.2 Transitioning to a CE business

2.2.1 Map your impact and set priorities

Learn how to bring together an internal "sustainability team" to set objectives, define targets, review your environmental impact and decide on priorities. In this process, you need to evaluate impacts regarding natural flow use and material stock management. Relevant fields and key aspects to take into consideration in the Maldives could be biodiversity protection, marine pollution, waste generation, waste collection and sorting.

2.2.2 Choose indicators and understand data needs

Identify indicators that are important for your business and learn about what data should be collected to help drive continuous improvement. To assess the circularity of your business, you can use CE related indicators such as: use of renewable energy; greenhouse gas intensity; energy intensity, intensity of your residuals; releases into the air and water.

2.2.3 Measure inputs used in production

Identify how materials and components used into your production processes influence environmental performance. Businesses can also measure CE related performance including: material consumption, resource extraction, renewable energy consumption, waste generation, import of inputs, non-renewable materials, restricted substances, recycled or reused materials. Businesses can check the availability of recyclable materials and monitor availability of waste materials/recycled materials as inputs into production process.

2.2.4 Assess the operations of your facility

Consider the impact and efficiency of the operations in your facility. Residual waste generation and excess material that can be phased out and managed more efficiently going forward (e.g. water consumption, energy intensity, greenhouse gas generation, emissions to air and water, waste generated). Efforts to improve production and material use efficiency toward circularity while reducing waste creation must be ongoing.

2.2.5 Evaluate your products

Identify factors such as energy consumption in use, recyclability and use of hazardous substances that help determine how sustainable your end product is. Businesses can use CE related indicators such as: recycled/reused content of your products, recyclability of your products, renewable materials used in your products, Non-renewable materials used in your products, restricted substances contained in your products, energy consumption in using your products, greenhouse gas emissions from the use of your products. You can also evaluate the possible incentives to recycle and engage customers to return products and possibly keep materials in cycle.

2.2.6 Understand your results

Learn to read and interpret your indicators and understand trends in your performance. Businesses can focus on CE related indicators that align with business models suggested.

Here businesses can make use of governmental offices and agencies or private sector companies that specialised in assisting businesses evaluate their performances. Examples in the Maldives include the NGO Parley that helps assess the ability and efforts to store plastic bottles.

2.2.7 Take action to improve your performance

Choose opportunities to improve your performance and create action plans to implement them. CE businesses should focus on CE related indicators that align with business models suggested, and stay up to date with new arising sustainable opportunities and drive ongoing progress by pinpointing areas of improvement or non-circular practices.

2.3 Circular Business models for entrepreneurs

2.3.1. Circular design

This CE model relies on the following elements:

- Circular **product design**: use recyclable materials for goods and packaging that allow for a circular system and **local supplies** at a maximum
- Product/service design and provision: **access over ownership** and product service systems
- **Local** supplies and local demand for service/good
- **Economy of functionality** (rent resources rather than buy and own them)

There are no known existing companies that operate based on an entirely circular design (Annex 5).

2.3.2. Optimal material and resource use

- **Understand value** of waste materials and engage in opportunities from materials
- **Buy recycled materials** and reduce input material costs
- **Target recyclable and sustainable materials** and pioneer in industrial waste valorisation
- **Introduce Industrial symbiosis**; internalise a maximum of production steps within the company on the same site to reduce transport costs. This also helps with waste creation as all accrues on the same site, making recycling or reusing easier since larger amounts hold more potential
- **Redefine retail**; skip retailers by directly interacting with consumers. Simplifies recycling practices, understanding of consumer behaviour and increases revenue
- **Inspect daily practices** to identify non-sustainable production practices such as use of single use plastics, equipment and garment
- **Adopt a closed-loop process**; use residual outputs and by-products as input for other production processes
- **Set up internal target rates** to increase recycling rates and encourage sorting to improve employee understanding of a circular economy and its benefits

There are no existing companies that optimised resource use by functioning solely with renewable and recycled materials as input (Annex 5).

2.3.3. Value recovery

- **Reuse and recycle**: Introduce ways to keep waste materials within the company and the production cycle; Increase material use efficiency
- **Repair and recondition**: produce goods and services to last (quality over quantity) and provide service to repair and refurbish products and services

- **Remake** products that did not meet standards and were considered waste
- **Consumer awareness:** inform customers of recycling and repair opportunities to incentivize closed-loop material use while explaining competitive advantage of your service/product compared to non-circular business models

Since there is no green certificate issued by the government there is no registry maintained on the businesses that carry out value recovery aspects. Therefore, the public sector is not aware of any existing companies that maximise the utility and value of some of their materials within their production cycle and reach higher production process efficiency leading to a minimized waste creation (Annex).

2.3.4 Collaborative economy

- **Group businesses** that use similar materials to share transport supply costs and open channels to trade materials between firms
- **Foster cooperation**; exchange good practices and learning experiences between companies to accelerate transition toward circularity
- **Introduce a sharing economy**: collaborate with other businesses to build expensive infrastructure or purchase equipment to improve efficiency of usage (ex; cooling units, trucks, sorting site, …)

The government has no knowledge of existing companies that operate on the basis of a collaborative economy and exploit any potential side products and collateral uses that accrue during their production. Additionally, equipment and material sharing are maximised through excessive industrial networking (Annex 5).

3. Annexes

Annex 1: Type of policies and laws towards circular economy

Renewable Flow Management	Environmental protection/ Biodiversity Conservation	✓	Law No. 4/93 on Environmental Protection and Preservation Act of Maldives (1993) Regulation on the Protection and Conservation of Environment in the Tourism Industry (2006)
	Fisheries management	✓	Law No. 4/93 on Fisheries Act of the Maldives The following legally recognised Fishery Management Plans have been published, which aim to sustainably manage the resources that fall under their purview: 1. Tuna Fishery Management Plan 2. Grouper Fishery Management Plan 3. Reef Fishery Management Plan 4. Billfish Fishery Management Plan 5. Marine Aquarium Fishery Management Plan 6. Sea cucumber Fishery Management Plan 7. Lobster Fishery Management Plan Diamondback Squid Fishery Management Plan
	Forestry management	X	
	Protected Areas	✓	Protected Areas Regulation (No. 2018/R-78) (2018)
	Water management	✓	National Water and Sewerage Policy (2017
	Renewable Energy	X	
Stock Management	General waste management	✓	Waste Management Regulation on Environmental Impact Assessment Report Completion Regulation in 2012 (2012/R-27) Regional Waste Management Strategy and Action Plan
	Material specific waste management	✓	A national waste management policy (2015) with objectives including the introduction and application of the 3R concept
	Recycling	✓	Malé 3R Declaration
	Plastic Bag Ban/ Phase out	✓	Single Use Plastic Phase-out policy for 2020-2023

Annex 2: Existing awareness raising initiatives and campaigns towards CE

Initiative name	Description of activity	CE aspect addressed	Link / Contact
Parley AIR	reduce plastic use, boost recycling, and support the creation of new materials and methods	Waste reduction, increase recycling and reduced pollution	https://www.maldives.parley.tv/

Annex 3: Examples of companies doing CE related activities in waste management

CE aspect	Company	Description of activity	Link / Contact
Collection	Promise Project	Collection and capture of plastic waste to avoid marine pollution	Maldives | PROMISE (projectpromise.eu)
Clean Environment Programme	Regional waste management system	https://www.govserv.org/XX/Unknown/381185578964060/Maldives-Clean-Environment-Project	
Sorting	N/A	N/A	N/A
Treatment	N/A	N/A	N/A
Recycling and disposal	Parley Maldives	Transforming plastic bottles into shoes and clothes through Parley recycling plants	https://www.parley.tv/updates/parleymaldives

Annex 4: Key sectors to foster CE and related stakeholders and supporting platforms

Key sector	Identified key stakeholders	Relevance of the stakeholder
Fisheries	Large scale fish processing companies such as MIFCO, Ensis, Horizon Fisheries, Big Fish, Cyprea Marine…etc	Relevant due to potential for using fish parts which are otherwise thrown out as waste, to be used to produce fish meal and other such byproducts
Tourism	N/A	N/A
Manufacturing	N/A	N/A
Construction	N/A	N/A
Agriculture	N/A	N/A

Annex 5: Key examples of companies operating under CE business models

Business model	Company	Activity	Website link or Contact
Circular design	N/A	N/A	N/A
Optimal material and resource use	Kangyang seawater desalination	Desalinates seawater offering fresh water for domestic consumption	Maldives desalination plant project 100 m3 per day - Kangyang seawater desalination equipment Co.,ltd (kysearo.com)
Value recovery	Parley Maldives	Transforming plastic bottles into shoes and clothes through Parley recycling plants	https://www.parley.tv/updates/parleymaldives
Collaborative economy	N/A	N/A	N/A

INDIAN OCEAN COMMISSION

National Circular Economy Framework & Guide for Entrepreneurs for Mauritius

Final report

WORLD BANK GROUP

SWIOFISH 2

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Introduction

Circular economy (CE) has been on the rise across the globe due to a growing concern about resource extraction rates and pollution arising from production processes under the linear economic model. The CE is "an industrial system that is restorative or regenerative by intention and design" (EMF 2013). The CE goes beyond recycling and waste reduction as it aims to value waste and keep materials in circulation for as long as possible. It is about extracting higher value from fewer resources by increasing productivity and efficiency, and moving from ownership to access of products, creating a sharing mindset allowing to reduce consumption thanks to increased efficiency of asset use. For island states, the CE is highly relevant due to their vulnerability to climate change and pollution but also due to the reliance of countries on import of most products consumed. The Indian Ocean Commission has therefore secured funding from the World Bank to support the SWIOFish regional project and increase efforts to set up a circular economic model for the supply and production chain to reduce downstream marine pollution. The CE Project's aim for each AIODIS country is to foster a circular economy and protect the environment and natural assets while aiming for economic growth.

The objective of the report is to present a national policy framework and guidelines for entrepreneurs. Through collaboration with local experts and government officials, local agencies and international foundations, an understanding of the current situation has been established in the review report. Possible approaches and actions have now been identified to move forward. These actions are gathered within the present document. Thanks to incentives and policy adaptations made throughout the past decade, Mauritius implemented the *'strategy and action plan for a new solid waste management and resource recovery system in Mauritius'* and already created the fundamentals to proceed. Involvement from the private sector as well as awareness campaigns have additionally initiated the understanding of the concept of a circular economy and cornerstones have been laid within the society as a special focus has been put on recycling practices.

The document is divided into two parts. First, it presents a policy framework to foster CE and respective suggested legislative implementations for Mauritius. To facilitate the connection between authorities and policies and the private sector it is important to guarantee a common understanding and the comprehension on how to proceed, with the goal of a circular economy in mind. The second part of this document then presents CE guidelines for entrepreneurs. Implementing a CE goes beyond recycling and waste reduction as it aims to value waste and keep materials in circulation for as long as possible. It encourages extracting higher value from fewer resources by increasing productivity and efficiency. Therefore, to move towards a circular economy it is crucial to involve local businesses and the private sector in order to facilitate the collaboration, implementing respective practices along the path within production, distribution and treatment facilities. The guidelines for entrepreneurs are linked to the policy framework and legislative suggestions made during the first phase. Explanations on how to set up a business in Mauritius with a circularity target, as well as the transition toward more sustainable business practices for established companies will be included and offer step-by-step advice along the way. This will allow to close a gap of informality within different sectors and better involve authorities and businesses in the common quest toward a circular economy.

1. Policy framework

The framework to lay out possible paths moving forward based on the particularities of Mauritius and feedback from local experts participating on this work. Acting upon present circumstances in place legislation will be promoted to develop a circular economy further while aiming to identify additional opportunities to expand the economy and improve aggregate efficiency of materials.

1.1 Establish regulations for the country's Circular Economy

National Policy goal: The government needs to adopt a statement committing to a circular economy and fill the legal gaps. A number of legal tests exist in the country but they are not yet harmonised to address CE. (See Annex 1)

Rationale: The concept of CE is relatively new and not widely understood in Mauritius. There is limited interaction between industry and authorities for common action and for a strategic plan. The government did not make its target for a circular economy known and did not offer a clear indication on how to follow through with it.

In Mauritius, the polluter pays principle (PPP)[1] is implemented within the national environmental policy, and is controlled and monitored by the Ministry of Finance, Economic Planning and Development through the Mauritius Revenue Authority and National Audit Office. However, the PPP is not yet entirely picked up throughout the industry and waste management system and the consumer is responsible for the financial burden of the pollution costs. Mauritius does not yet have in place the Extended Producer Responsibility (EPR)[2] along the supply chain to prevent extensive pollution and reduce the impact on PPP, but the Ministry of Environment, Solid Waste Management and Climate Change is pushing for its implementation for Business Mauritius and international buyers through programs such as Sedex Members Ethical Trade Audits, HIGG Index or brands own standards. While PPP exists in legislation for PET bottlers and in terms of Green tax, EPR is not yet included in the legislation about waste. Despite their existence, they are not developed enough to provide a CE basis and reduce marine pollution.

To achieve the above goal, it is suggested that the country adopts a declaration or an umbrella legislation that promotes integration of actors and harmonisation actions towards a CE. Commitment to the CE could be integrated into existing or upcoming blue economy policy of Mauritius.

Specific actions needed: There is a need to adopt developed specific legislations that are currently missing to foster a CE. These legislations include: a text on banning single use plastic, a law on EPR, water management, waste generation and waste control. The government could also commit to some targets towards circular objectives such as rate of recycling. A re-evaluation of the Green tax is needed to address circular objectives and promote circular strategies such as recycling. Enforcement policies need to be stronger by providing severe penalties to all pollutants including private sector actors as well as the public sector.

[1] The Polluter-Pays Principle means that the polluter has to bear the cost of steps that he is legally bound to take to protect the environment, such as measures to reduce the pollutant emissions at source and measures to avoid pollution by collective treatment of effluent from a polluting installation and other sources of pollution (OECD 1992).

[2] The Extended Producer Responsibility is a policy approach under which producers are given a significant responsibility – financial and/or physical – for the treatment or disposal of post-consumer products (OECD 2001).

1.2 Educate through awareness and education campaigns

Mobilising actors for the CE: To achieve a CE in Mauritius, it is essential to increase literacy on CE at all levels, especially in key sectors of the blue economy and the manufacturing sector. The concept of CE is still new at the national level, populations and governments are not aware of what benefits the CE can provide.

Rationale: There are limited efforts from governmental, civil society and private companies to sensitise population through agencies. There are insufficient skills and knowledge on circular economy at all levels including at local authorities' level. While the concept is mentioned in various public discourses, there is little implementation in practice. A limited environmental culture is also present amongst the population that can prevent the adoption of circular practices regarding, for example, waste.

To achieve the above goal, examples of specific actions needed include:

- Continued workshops in place engaging society at large.
- Build collaboration between large industrial partners and authorities.
- Reintroduce school campaigns to raise awareness within youth.
- Increase interaction with companies to introduce them to circular economic models and make them understand the necessity of it.
- Raise awareness about the cost implication underlying products used and discarded by buyers and consumers.
- Campaigns through the media promoting products with circular purposes such as local products and projects with circular purposes.

Specific actions needed: There is a need to support and replicate existing initiatives and other educational activities in place at the level of governments, businesses and the population. In Mauritius, awareness campaigns about the CE have started recently and can be seen in several sectors including service, manufacturing, printing and waste management. (see Annex 2)

1.3 Improve material stock management

1.3.1 Collection and sorting system

Optimising Waste value: To improve the waste management processes currently in place, it is recommended to optimise existing collection and sorting systems. This is also acknowledged in the report on Marine plastic under the AIODIS project. While waste is collected, it is not done uniformly across the country and waste sorting procedures are not in place, hence do not allow sufficient valorisation of waste.

Rationale: Waste is collected once or twice a week through household collection but neither sorting not segregation are practiced. Collection and transport of waste is within the responsibility of the municipality and district council and also outsourced to the private sector. However, several NGO initiatives sponsored by private sector CSR offer bins and starting 2020, the Ministry of Environment will install 400 eco-bins throughout the island, to collect PET and plastic bottles and cans for recycling. Paper and carton boxes are collected by the private sector. There are also adhoc collection of bulky wastes at household level, mainly before festive periods. Additionally, deposit areas for bulky waste has recently been announced but this is still at its initial phase of implementation. Collection costs are also considered high by actors involved.

Based on the above it is then necessary to increase collection points, introduce sorting procedures, implement deposit refund scheme for recyclables and introduce a treatment site that is more sustainable than landfill.

Specific actions needed: An important step in this process is to support existing organisations doing collection and sorting and replicate it nationally. Additionally, a clear waste management structure should be put in place to allocate the responsibilities along the treatment process. Current companies that responsibly collect and sort waste already exist. (see annex 3)

1.3.2 Waste treatment facility

Improving efficiency of waste treatment sites: Addressing processes at waste treatment facilities represent a key step towards achieving circularity. To do so, the country needs to increase efficiency of current facilities and introduce more sustainable sites like landfill with gas congestion, incineration with energy recovery, waste sorting and cleaning sites and recycling stations. Existing facilities do not allow valorisation of waste and do not achieve the goal of reducing waste.

Rationale: The government has started discussion to improve current landfill sites. Options to open recycling plants and setting up of Civic Amenities Centres have just started. As for discussions about existing landfill sites discussions have just started and cannot be evaluated at this initial phase. Efforts to implement waste sorting, waste segregation at the source, increase waste collection, reduce littering and facilitate recycling are not yet undertaken.

To achieve circularity, existing solutions include implementing high efficiency recycling and biogas creation and bringing the Mare Chicose landfill site under control. There is also a need to identify the different barriers to recycling and composting at the national level.

Specific actions needed: For Mauritius, options include creating new companies at the transfer station and replacing sanitary landfill sites to reduce transport costs and facilitate recycling to treat waste with circular motives. Current companies that have existing waste valorisation processes exist (see annex 3). The government has committed to set up one transfer station in each district but these stations are not easily accessible being located far away from towns and villages. To promote a recycling mentality in the population, community recycling centres must be set up close to where people live to make it convenient for them to deposit their recyclables. The Government should seriously consider sorting of waste at source, at the individual household level. This is the only option which will reduce substantially the amount of recyclable waste going to a landfill. The cost implications, incentives and tax implications need to be worked out. The most expensive part of recycling is in the collection and sending it to the vendor who will process the recyclable waste. Promoting and funding of sorting at source and the utilization of the recyclables in the circular economy is an imperative. So far, the allocation of resources for collection of recyclables by local authorities on a systematic method just like for organic waste is practically non-existent.

1.3.3 Dumping and littering

Reducing pollution through improved waste management: For the country's blue and circular economy, reducing waste and related pollution at all levels and especially in the ocean is paramount. There is currently an important level of industrial pollution and accumulation of waste from littering, in towns, villages and on beaches.

Rationale: In Mauritius, anti-dumping and littering legislation are in place and need to be enforced more thoroughly since fines already exist. A body of control is not in place and industrial dumpsters are currently not supervised by the local authorities but there is the 'Police de l'Environnement' and

sanctions under the form of fines are existent. Additionally, industries need to pay annual trade fees to local authorities and waste carriers need to have their permits to be allowed to operate.

It then becomes obvious that the country needs to better monitor industrial waste and establish fines, introduce material use understanding across sectors such as manufacturing, tourism and fisheries.

Specific actions needed: For Mauritius, the solution lies within creating a program for industrial waste monitoring and a subsequent penalty system that is enforced on the entirety of the system. Local authorities can then issue trade licences and request payment of fees per quantity of waste generated.

1.4 Restore and better manage the use of natural flow

Managing natural resources: To achieve a sustainable use of natural resources within a CE, Mauritius needs to upscale and further support existing initiatives. They should aim at regenerating natural flows especially in the blue economy sectors such as fisheries, tourism, oil and gas exploration and bioprospection. There is currently a low level of environmental protection of natural resources with 11.9 percent of their total EEZ and coastal ecosystems being protected. Despite existing environmental texts to protect ecosystems and biodiversity and growing conscience of the issue high levels of biomass are extracted through, among others, fisheries.

Rationale: There are agencies in place responsible for the monitoring of natural resources such as fish stocks, forest abundance, wildlife preservation and water pollution but there is no verification of the effectiveness. As a follow up on existing monitoring efforts of natural resources, there are limited controlling efforts like implementation of resource use permits. However, the implementation of existing regulations is limited.

Available solutions include increasing protection of EEZ through MPAs, reinforcing monitoring of existing MPAs and areas-based management, and increasing restoration activities while also introducing financial reprimands against offenders.

Specific actions needed: A first step could be to improve existing monitoring practices and capabilities while preventing ongoing harmful practices through fines. Building better knowledge on the use of natural resources will provide evidence for future resource extraction decision-making. To address regeneration of natural flows, a parallel step is to support and upscale existing activities such as fishery closures, mangrove restoration, locally-managed marine areas/MPAs, noting that fishery closures exists at this moment for the lagoon only.

1.5 Incentivise businesses

Putting businesses at the centre of the CE: Increasing the involvement of businesses and entrepreneurs is a stepping stone towards achieving circular and blue economic activities. Businesses and entrepreneurs are not aware of the opportunity the CE presents. Further, those already involved in CE related activities are not supported well enough.

Rationale: The public sector is aware of private sector initiatives and efforts toward a circular economy but does not monitor circular business practices in depth. The government has not provided incentives for a circular economy within businesses by supporting them financially in the form of subsidies, aides, tax reductions or operative advice. There is therefore insufficient funding for entrepreneurs to invest in research, testing or new technology.

The lack of governmental monitoring of business practices and the understanding of circular efforts does not allow there to be grouping of companies according to equipment, material use and production practices leading to a closed loop or industrial collaboration called symbiosis. There have been various studies undertaken but no tangible benefits have been felt by entrepreneurs.

To promote the adoption or transition to a CE business, the government needs to provide structural and financial support to businesses through:

- The creation of a circular economy office within one or several of the government departments
- The creation of company grouping according to business activity, material use, equipment requirements and proximity to improve material use and infrastructural efficiency while reducing supply chain and waste treatment costs by sharing them among a group of firms
- Undertaking a dialogue with the industry to create valorisation of waste materials
- Introducing tax relief system such as 3-5 year starting periods with complete tax free or reduced tax help
- Cutting repair and refurbish value added tax to encourage reuse businesses
- Encouraging individuals and entrepreneurs to enter circular economy businesses such as recycling through workshops and training.

Specific actions needed: In Mauritius, existing initiatives of subsidies and aides need to be reviewed and require better promotion amongst recyclers. There is also a need for additional initiatives such as subsidies, aides, tax reductions and operative advice to incentivize businesses to adopt circular models. These could take the form of subsidies for business investment into on-site recycling efforts or production efficiency improvements, aides for infrastructural improvements, tax reductions on the purchase of recycled input materials or lower corporate taxes within the first 5 years of circular transitioning. Countries like China, Sweden or Cabo Verde have put in place such incentives to promote more circular practices within businesses.

The government shall also provide funds to assess existing production processes and to replace existing production processes by CE friendly processes. Subsidies that avoid that the cost of implementing CE does not lead to an increase in cost and selling price to be paid by the consumer should also be considered.

Measures shall be applied without any discrimination, that is, considering not excluding PET bottles in the banning of singly use plastic, should the government be able to put in place a glass bottle recycling or reuse system to cover for the PET bottles. Government shall, through the Mauritius Standard Bureau, establish a standard to assess and certify against CE.

Furthermore, authorities shall, through the National Productivity and Competitiveness Council, establish a programme to assist enterprises to implement CE.

2. Guide for entrepreneurs

To implement a circular economic model within businesses and across sectors through synergies both governmental and private sector efforts are required to create the right environment. Since private sector actors are able to decide and act quickly, companies can be the driving power toward a local circular economy. Businesses are currently in the position where they can drive the change by taking initiative and transition toward circular economic practices and influence governmental decisions on the matter to follow accordingly.

In order to engage businesses in efforts to achieve a circular economy it is necessary to provide them with guidelines on how to set up and transition toward a circular production cycle[3]. Through consultation of local experts, consultants and governmental officials this document pinpoints to existing good practices as well as barriers and opportunities for a circular economy. Feasible solutions and possible stakeholders to become involved in the process have been identified and the guidelines are designed to create discussion across sectors to form synergies and break the linear economic model. Identifying and pointing out possible company collaborations as well as step-by-step guidelines for sustainability seeking businesses are starting points towards the final goal of protecting maritime resources and reducing ocean pollution.

The guidelines can help start-ups as well as existing companies to establish business models that allow for more efficient resource management while phasing out waste creation and thereby counteract maritime pollution at its source. The guidelines offer upcoming entrepreneurs administrative advice to set up their business and identify the main modalities of implementation for a circular economy. For existing businesses, the guidelines include step-by-step council on how to transition toward sustainable production and system processes that are associated with a circular economy. The guidelines conclude with in-depth solution proposals and opportunities for companies to pick up upon and implement in their ongoing quest for sustainable processes. Based on the content of this document companies will be able to make relevant progress leading to improved resource management, reduced waste generation and diminished maritime pollution for island states.

2.1 Creating a new CE business

2.1.1 Establish the mission, vision and objectives of the company

The company's mission must embody its essence and reason for being. The vision comes as the way the company is envisioned in the mid-long term. Objectives of the company: derive from the founders' goals (personal and professional motivations) and tackle environmental and social challenges and satisfy customer needs.

For a CE business, these three elements should refer to one of the CE principles: (1) preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows, (2) optimise resource yields by circulating products, components, and materials at the highest utility at all times in both technical and biological cycles, and (3) foster system effectiveness by revealing and designing out negative externalities (P3)

[3] The guidelines are based on a literature review of international best practices of green, environmental and circular businesses that are most up to date. These include:
- Circular Economy Guidelines for businesses
- Créer une entreprise sociale et solidaire: le guide - une autre économie existe
- Circular Economy Business Strategies Conceptual Framework to Guide the Development of Sustainable Business Models
- OECD Sustainable Manufacturing Toolkit - Seven Steps to Environmental Excellence

Thanks to the input of local experts and collaborators, the food industry and the sectors of service, chemicals and manufacturing have been identified as key sectors in Mauritius. They offer the most impactful and far-reaching opportunities to reduce maritime and land pollution and introduce circularity in Mauritius.

2.1.2 Identify key stakeholders and customer segments

This step involves identifying and prioritising those stakeholders that will play a significant role in achieving the objectives of the project. Stakeholders include the team (co-founders and employees), partners, beneficiaries (those who benefit from the value your project generates) and customers (customers are at the core of the business model as they buy the services or products). The project's main impact in society has to be intrinsically linked to the local community and cover a local demand that is to be met. Another task is to develop a sound understanding of our potential customer base (customer identification and profiling) and the existing market around it (market assessment).

To promote a CE in Mauritius, it is essential at this stage to collaborate and consult with stakeholders like governments, civil society organisations promoting CE and institutions like the Ellen MacArthur Foundation. To identify key stakeholders, entrepreneurs should target main suppliers, intermediaries, processing associates as well as customers and public partners of interest. In the above identified sectors of the food industry and the sectors of service, chemicals and manufacturing some key stakeholders have been identified and are essential for a development aiming at circular practices. (Annex 4)

2.1.3 Develop the value proposition

CE businesses create environmental value by tackling circularity and environmental challenges (that key driver for their existence) through its business solutions and operations, and social value by empowering their stakeholders (including employees, suppliers, communities and future generations) and meeting the needs of their customers.

To achieve this, it is suggested to create strong collaboration across the board and involve customers and stakeholders in the process of designing and delivering the value proposition (co-creation)

In Mauritius, the issues of marine pollution, excess waste generation and the lack of locally accessible material inputs due to a missing environmental consciousness represent key challenges that will be a good value proposition.

2.1.4 Identify the modalities of implementation

2.1.4.1 Key activities and resources

Key activities define what we must do in order to define and offer a value proposition to a specific customer segment. They include problem-solving (such as consulting or counselling), production (manufacturing etc), platform/network/sale, and supply chain management.

Activities within CE businesses should include those proposed in the different business models (in section 4 of this guideline).

Key resources represent all the elements and aspects that are essential for making the business work properly. They include human resources, physical assets, intellectual resources, financial resources and natural resources. For the latter, a special focus should be on the use of recycled materials, sustainable or renewable resources as input materials.

Entrepreneurs also need to consider incoming legislative changes such as laws on PPP or laws on EPR. At this stage it can also be helpful to enquire about possible governmental support like tax reduction, grants for sustainable practices or investment subsidies.

2.1.4.2 Customer relationships and channels

Different types of relationships can be established with customers such as personal assistance, self-service, automatic service, community based or co-creation.

To properly establish the different types of relations with customers, doing a customer journey map of the particular segment of customers can be useful. A map is an oriented graph that describes a user's journey by representing the different touchpoints that characterise his/her interaction with the service or product.

You will also have to distinguish between the way (channels) to get the customer's attention and how to establish and maintain a close relationship with them. Channels include all means of communication and distribution to reach customers and deliver a value proposition to them.

For CE businesses, it is possible to explore existing initiatives towards sharing economies, re-introduce take-back options that used to exist for customers to return products and help materials stay within a company while exploiting options to continue to interact with customers.

2.1.4.3 Cost structure

It is important to carefully classify costs (fixed and variable costs) so that the business can analyse and improve its performance.

Within a CE, it is useful to explore potential costs linked to niche CE areas and identify cost savings arising from CE practices such as equipment sharing, recycled material purchases or supply and transport costs from abroad.

2.1.4.4 Revenue streams

The business must have an accurate idea of the importance of each revenue stream and which one best matches a particular customer segment and channel. Streams might include asset sale, usage fees, subscription fees, licensing etc.

2.1.5 Test the product or service

Before fully implementing the modalities above, the entrepreneur needs to test key variables:

- Problems and needs identified should be tested by talking to experts in the field or by interviewing key stakeholders.
- Participation of key stakeholders should be verified through diverse types of consultations and meetings on the business objectives where multiple stakeholders can provide a good measure of their willingness to engage.
- Customer segments should be validated through focus groups, interviews, debate or conversations to check their needs, aspirations, gains and pains, etc. Focus groups, interviews, debates, and conversations could be used, possibly on social media.
- Value proposition needs to be tested by building a prototype at small-scale or semi functional versions of the services/products. Here, participants' reactions to the test might include satisfaction level, feedback, and curiosity/demand for more.

Once hypotheses on the different variables have been tested and validated, the service/product has to be scaled up from prototype to the optimal market size where viability is attained.

To test the circular product or service, the business can mobilise existing platforms for entrepreneurs and green products like Business Mauritius. (see Annex 4).

2.1.6 Mobilise tools for implementation

When the business model is validated, implementation of the modalities presented above can be facilitated by various tools. **First** is establishing a financial plan with income statements, balance sheets and cashflow projections, and a funding plan identifying traditional investors and banks as well as other funding mechanisms such as crowdfunding, financial cooperatives, micro-credits, ethical banks. **Second** is having a legal management plan to choose the best-fitting legal form according to the needs and business model. **Third** is setting a roadmap to foresee the progress of the business from year 0 to the medium and long-term. **Fourth** is to have an operation and management plan which dictates how operations are performed and managed by staff and by assigning roles and responsibilities and setting a schedule. Tools used need to be adapted according to the CE business model adopted.

To find the appropriate tools, entrepreneurs can refer to existing governmental departments and companies that provide assistance to businesses such as SME Mauritius. It is however necessary to also invest into such departments and companies to make sure they possess the required competencies to assist entrepreneurs. (see Annex 4)

2.1.7 Measure impacts and improve

Effectively measuring environmental and social impacts is essential to CE businesses. In addition to measuring how the business is doing regarding the achievement of objectives and mission, environmental indicators are needed to assess environmental performance. Environmental indicators such as water consumption, material use, waste generated per service or product, or other CE related indicators are suggested to be used in order to assess current performances. Constantly improving the business is key to achieve the circular economic objectives as it is a process that requires ongoing efforts to improve efficiency. Common areas of improvement include levels of participation of stakeholders, communication and marketing to incentivize customers, improve environmental performance, ensure green procurement and increase environmental awareness amongst the public.

2.2 Transitioning to a CE business

2.2.1 Map your impact and set priorities

Learn how to bring together an internal "sustainability team" to set objectives, define targets, review your environmental impact and decide on priorities. In this process, you need to evaluate impacts regarding natural flow use and material stock management. Relevant fields and key aspects to take into consideration in Mauritius could be, among others, biodiversity protection, marine pollution and waste generation.

2.2.2 Choose indicators and understand data needs

Identify indicators that are important for the business and learn about what data should be collected to help drive continuous improvement. To assess the circularity of the business, one can use CE related indicators such as: use of renewable energy; greenhouse gas intensity; and energy intensity, intensity of your residuals; releases into the air and water.

2.2.3 Measure inputs used in production

Identify how materials and components used into the production processes influence environmental performance. Businesses can also measure CE related performance including: material consumption, resource extraction, renewable energy consumption, waste generation, import of inputs, non-renewable materials, restricted substances, recycled or reused materials. Businesses can check the availability of recyclable materials and monitor availability of waste materials/recycled materials as inputs into the production process.

2.2.4 Assess the operations of the facility

Consider the impact and efficiency of the operations in the facility. Residual waste generation and excess material that can be phased out and managed more efficiently going forward (e.g. water consumption, energy intensity, greenhouse gas generation, emissions to air and water, waste generated). Efforts to improve production and material use efficiency toward circularity while reducing waste creation must be ongoing.

2.2.5 Evaluate your products

Identify factors such as energy consumption in use, recyclability and use of hazardous substances that help determine how sustainable the end product is. Businesses can use CE related indicators such as: recycled/reused content of the products, recyclability of the products, renewable materials used in the products, non-renewable materials used in the products, restricted substances contained in the products, energy consumption in using the products, greenhouse gas emissions from the use of the products. One can also evaluate the possible incentives to recycle and engage customers to return products and possibly keep materials in cycle.

2.2.6 Understand the results

Learn to read and interpret the indicators and understand trends in performance. Businesses can focus on CE related indicators that align with business models suggested. At the current time, there is no organisation to evaluate performance against CE.

2.2.7 Take action to improve the performance

Choose opportunities to improve the performance and create action plans to implement them. CE businesses should focus on CE related indicators that align with business models suggested, and stay up to date with new arising sustainable opportunities and drive ongoing progress by pinpointing areas of improvement or non-circular practices.

2.3 Circular Business models for entrepreneurs

2.3.1 Circular design

- circular **product design**: use recyclable materials for goods and packaging that allow for a circular system and **local supplies** at a maximum
- product/service design and provision: **access over ownership** and product service systems
- local supplies and local demand for service/good
- **economy of functionality** (rent resources rather than buy and own them)

There are organisations that operate based on an entirely circular design. (see Annex 5)

2.3.2 Optimal material and resource use

- **Understand value** of waste materials and engage in opportunities from materials
- **Buy recycled materials** and reduce input material costs
- **Target recyclable and sustainable materials** and pioneer in industrial waste valorisation
- **Introduce Industrial symbiosis**; internalise a maximum of production steps within the company on the same site to reduce transport costs. This also helps with waste creation as all accrues on the same site, making recycling or reusing easier since larger amounts hold more potential
- **Redefine retail**; skip retailers by directly interacting with consumers. Simplifies recycling practices, understanding of consumer behaviour and increases revenue
- **Inspect daily practices** to identify non-sustainable production practices such as use of single use plastics, equipment and garment
- **Adopt a closed-loop process**; use residual outputs and by-products as input for other production processes
- **Set up internal target rates** to increase recycling rates and encourage sorting to improve employee understanding of a circular economy and its benefits

There are very few organisations that optimise resource use by functioning solely with renewable and recycled materials as input (see Annex 5).

2.3.3 Value recovery

- **Reuse and recycle:** Introduce ways to keep waste materials within the company and the production cycle; Increase material use efficiency
- **Repair and recondition:** produce goods and services to last (quality over quantity) and provide service to repair and refurbish products and services
- **Remake** products that did not meet standards and were considered waste
- **Consumer awareness:** inform customers of recycling and repair opportunities to incentivize closed-loop material use while explaining competitive advantage of your service/product compared to non-circular business models

There are existing companies that maximise the utility and value of all their materials within their production cycle and reach higher production process efficiency leading to a minimized waste creation (see Annex 5).

2.3.4 Collaborative economy

- **Group businesses** that use similar materials to share transport supply costs and open channels to trade materials between firms
- **Foster cooperation;** exchange good practices and learning experiences between companies to accelerate transition toward circularity
- **Introduce a sharing economy:** collaborate with other businesses to build expensive infrastructure or purchase equipment to improve efficiency of usage (ex; cooling units, trucks, sorting site, …)

There are no existing companies that operate on the basis of a collaborative economy and exploit potential side products and collateral uses that accrue during their production. Equipment and material sharing practices that are maximised through excessive industrial networking (see Annex 5). Collaborative economy has been developed in other countries in sectors like sale, services or transport[4]. The Seychelles also presents a model of collaborative economy in terms of waste management.

[4] See examples here: http://sharingandcaring.eu/sites/default/files/files/CountriesReport2018.pdf

3. Annexes

Annex 1: Type of policies and laws towards circular economy in Mauritius

Renewable Flow Management	Environmental protection/ Biodiversity Conservation	✓	Environment Protection Act 2002 (No. 19 of 2002)
	Fisheries management	✓	Fisheries and Marine Resources Act 2007 (Act No. 27 of 2007)
	Forestry management	X	Forests and Reserves Act 1983 (Act No. 41) National Native Terrestrial Biodiversity and National Parks Act 2015 (No. 14 of 2015)
	Protected Areas	✓	Biodiversity Strategy and Action Plan 2017 – 2025 (2017)
	Water management	✓	National Water Policy of 2014 Waste Water Management Authority Act. (2004)
	Renewable Energy	X	
Stock Management	General waste management	✓	National Environment Policy – including waste management (2007) Environment Protection (Collection, Storage, Treatment, Use and Waste Oil) Regulations (2006) Local Government Act (Registration of Scavenging Contractors) Regulations (2004) Local Government Act (Dumping and Waste Carriers) Regulations (2003)
	Material specific waste management	✓	Environment Protection Regulation on sound management of PET bottles (2001)
	Recycling	✓	Registration of Recycler and Exporter Regulations (2013)
	Plastic Bag Ban/ Phase out	✓	Environment Protection (Banning of Plastic Bags) Regulations 2020 GN 197 of 2020 Environment Protection Regulation on the Banning of Plastic Bags (2015)

Annex 2: Existing awareness raising initiatives and campaigns towards CE in Mauritius

Initiative name	Description of activity	CE aspect addressed	Link / Contact
Signenatir	Brochure in Circular Economy; Has set up a Waste Management within the Sustainable Development and Inclusive Growth Commission, Committee that promotes circular economy in the Mauritian private sector	The brochures promote all aspects of CE	signenatir.mu https://www.businessmauritius.org/

Annex 3: Examples of actors doing CE related activities in waste management

CE aspect	Company	Description of activity	Link / Contact
Collection	• Polypet Recyclers Ltd • We-Recycle • Greencycle Ltd	Collection and export of PET bottles Collection of PET bottles, cans and other plastics (PETE, HDPE, LDPE, PP) for recycling Collection of cartons for recycling	NA https://www.facebook.com/WeRecycleMU NA
Sorting	• WECycle	Collection, destruction, baling for export to mills in Asia	https://www.wecycle.mu/
Treatment	• Compagnie Mauricienne de Commerce Ltee	Tyre retreating	https://www.facebook.com/Compagnie-Mauricienne-de-Commerce-Limit%C3%A9e-1953344981377540/
Recycling and disposal	• Plankton Reccyling • BEM Recycling • RVE Ltd • Mission verte • Ministry of Environment, Solid Waste Management and Climate Change	Collection and recycling of glass bottles Recycling of electronic waste Collection and recycling of electronic waste Collection and recycling of various waste streams Permits to recycle waste Promote awareness to potential entrepreneurs on the importance of CE	• https://www.facebook.com/plankton.recycling • http://bemrecycling.com/en • https://www.facebook.com/Mauritius.Island.mu/ • http://missionverte.org • https://environment.govmu.org

Annex 4: Key sectors and actors to foster CE and related stakeholders and supporting platforms

Key sector	Identified key stakeholders	Relevance of the stakeholder	Examples of circular practices linked to marine pollution
Fisheries	Ministry of Blue Economy, Marine Resources, Fisheries and Shipping	Issuing of fishing permits	Global Ghost Gear Initiative
Tourism	Tourism Authority - Sustainable Mauritius	Issue of permit Support	Intercepting plastic from Resorts – Parley Maldives
Manufacturing	National Productivity and Competitiveness Council	Promotes productivity including waste reduction in enterprises	MARPLASTICS for businesses
	Association of Mauritian Manufacturers	AMM regroups manufacturing companies and provide the Made in Moris label	
Industrial assistance	Ministry of Commerce and Consumer Protection	Control of importation of raw materials	OECD key areas against ocean pollution
	Ministry of Industrial Development SME'S and Coorperatives through SME Mauritius SME Division	Support in setting up and promotion of businesses	
	Economic Development Board	Promoting, facilitating and assisting in the development of industries and services	
	Business Mauritius	Business Mauritius is an organisation which regroups the main private economic operators and has initiated activities in Circular Economy	
Research	University of Mauritius	The University of Mauritius conducts research, sometimes in collaboration with the private sector. Is also represented at different committees	EMF Resources
	Mauritius Research and Innovation Council	Funding of research project	

Annex 5: Key examples of actors in Mauritius operating under CE business models

Business model	Company	Activity	Website link or Contact
Circular design	Double Life	Double Life promotes Sustainable Fashion by taking on consignment branded female used clothing from individual users and selling these during events. Unsold ones are taken back by the users or donated to the Good Shop.	https://doublelife.shop
Optimal material and resource use	Plastic Industries Mauritius	Plastic Industries Mauritius manufactures plastics containers and utilities using imported and has started using plastic waste as well. It has also started with recycling.	https://www.facebook.com/PlasticIndustryMtiusLtd
Value recovery	The good Shop	The Good Shop, on a permanent basis, accepts used items as donations for repairs and sale and in return make donations to the NGOS and Prison	https://www.facebook.com/thegoodshopmu The Good Shop - Give, Shop, Change Lives (eshops.mu)

INDIAN OCEAN COMMISSION

National Circular Economy Framework & Guide for Entrepreneurs for São Tomé and Príncipe

Country report

WORLD BANK GROUP

SWIOFISH 2

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Introduction

Circular economy (CE) has been on the rise across the globe due to a growing concern about resource extraction rates and pollution arising from production processes under the linear economic model. The CE is "an industrial system that is restorative or regenerative by intention and design" (EMF 2013). The CE goes beyond recycling and waste reduction as it aims to value waste and keep materials in circulation for as long as possible. It is about extracting higher value from fewer resources by increasing productivity and efficiency, and moving from ownership to access of products, creating a sharing mindset allowing to reduce consumption thanks to increased efficiency of asset use. For island states, the CE is highly relevant due to their vulnerability to climate change and pollution but also due to the reliance of countries on import of most products consumed. The Indian Ocean Commission has therefore secured funding from the World Bank to support the SWIOFish regional project and increase efforts to set up a circular economic model for the supply and production chain to reduce downstream marine pollution. The CE Project's aim for each AIODIS country is to foster a circular economy and protect the environment and natural assets while aiming for economic growth.

The objective of the report is to present a national policy framework and guidelines for entrepreneurs. Through collaboration with local experts and government officials, local agencies and international foundations, an understanding of the current situation has been established in the review report. Possible approaches and actions have now been identified to move forward. These actions are gathered within the present document. Thanks to incentives and policy adaptations made throughout the past decade, São Tomé and Príncipe already created the fundamentals to proceed within specific sectors such as agriculture and fishery. Additionally, in collaboration with the Food and Agriculture Organization of the United Nations, efforts toward a sustainable blue economy are being undertaken. Involvement from the private sector as well as awareness campaigns have additionally increased the understanding of the concept of a circular economy and cornerstones have been laid within the society.

The document is divided into two parts. First, it presents a policy framework to foster CE and respective suggested legislative implementations for São Tomé and Príncipe. To facilitate the connection between authorities and policies and the private sector it is important to guarantee a common understanding and the comprehension on how to proceed, with the goal of a circular economy in mind. The second part of this document then presents CE guidelines for entrepreneurs. Implementing a CE goes beyond recycling and waste reduction as it aims to value waste and keep materials in circulation for as long as possible. It encourages extracting higher value from fewer resources by increasing productivity and efficiency. Therefore, to move towards a circular economy it is crucial to involve local businesses and the private sector in order to facilitate the collaboration, implementing respective practices along the path within production, distribution and treatment facilities. The guidelines for entrepreneurs are linked to the policy framework and legislative suggestions made during the first phase. Explanations on how to set up a business in São Tomé and Príncipe with a circularity target, as well as the transition toward more sustainable business practices for established companies will be included and offer step-by-step advice along the way. This will allow to close a gap of informality within different sectors and better involve authorities and businesses in the common quest toward a circular economy.

1. Policy framework

The framework to lay out possible paths moving forward based on the particularities of São Tomé and Príncipe and feedback from local experts participating on this work. Acting upon present circumstances in place legislation will be promoted to develop a circular economy further while aiming to identify additional opportunities to expand the economy and improve aggregate efficiency of materials.

1.1 Establish regulations for the country's Circular Economy

National Policy goal: The government need to adopt a statement committing to a circular economy and fill the legal gaps. A number of legal texts exist in the country but they are not harmonised nor far reaching enough to address CE (See Annex 1).

Rationale: There is no interaction between industry and authorities for common action. The government did not make its target for a circular economy known and also did not offer a clear indication on how to follow through with it.

In São Tomé and Príncipe, the polluter pays principle (PPP) has not been implemented within the national environmental policy, and is yet to be decided to be controlled and monitored by the Commission for monitoring and evaluation of the application of the environmental impact tax (CMEAET) which was created to ensure the monitoring and enforcement of the tax, and is the responsibility of the Ministry of Decentralization. The PPP is not yet picked up throughout the industry, often the driving force behind circular economic progress in the country. The public sector is responsible for the waste collection and financial burden of the pollution costs, but the waste management system in place is little developed and only offers limited ground for future waste management upgrades. São Tomé and Príncipe recognizes the Extended Producer Responsibility (EPR) in the Decree-Law No. 64/2013 creating the Environmental Impact Tax but its implementation has been lacking follow-through. The Ministry of Infrastructure and Natural Resources is pushing for its implementation under the country's new country strategic plan (2019-2024). Since neither EPR nor PPP are developed enough in São Tomé and Príncipe, they do not to provide a CE basis to reduce marine and plastic pollution.

To achieve the above goal, it is suggested that the country adopts a declaration or an umbrella legislation that promotes integration of actors and harmonisation actions towards a CE. Commitment to the CE could be integrated into existing or upcoming blue economy policy of the country.

Specific actions needed: There is a need to adopt specific legislation that is currently lacking to promote a CE. These legislations need to be able to harmonize with existing laws, namely Law 10/99 which is the basic law of the environment that defines the bases of environmental policy for the sustainable development of the Democratic Republic of São Tomé and Príncipe and establishes the principles that guide it. Within the framework of the Political Constitution and the Rio Declaration on Environment and Development, Law 8/2020 Measures to reduce the use of plastic in STP and aims to ban the import commercialization and distribution of non-biodegradable plastic bags in São Tomé and Príncipe. Law 7/2018 ensures all water resources management, to create a mechanism that makes the aforementioned laws viable and that is able to make it easy from the ban the use of plastic, the management of waste and water resources that makes it easy to create an ERP or PPP.

1.2 Educate through awareness and education campaigns

Mobilising actors for the CE: To achieve a CE in São Tomé and Príncipe, it is essential to increase literacy on CE at all levels, especially in key sectors of the blue economy. The Concept of CE is still new at the national level; both population and governments are not aware of the benefits of a circular economy.

Rationale: There are currently limited efforts from the civil society to sensitise population through agencies.

To achieve the above goal, examples of specific actions needed include:

- Continued workshops in place engaging society at large.
- Build collaboration between large industrial partners and authorities.
- Reintroduce school campaigns to raise awareness within youth.
- Increase interaction with companies to introduce them to circular economic models and make them understand the necessity of it.

Specific actions needed: There is a need to support and replicate existing initiatives and other educational activities in place at the level of governments, businesses and the population. In São Tomé and Príncipe, awareness campaigns about the CE and blue economy have started recently and can be seen in the sectors of fisheries and agriculture. (see Annex 2)

1.3 Improve material stock management

1.3.1 Collection and sorting system

Optimising Waste value: To improve the waste management processes currently in place, it is recommended to optimise existing collection systems and introduce sorting systems. Currently, collection and transportation is done with worn-out transportation, and there are insufficient collection means and a lack of planning, leading to a collection coverage of only about 38 percent. This need for an optimised system is also acknowledged in the report on marine plastic under the AIODIS project.

Regarding waste treatment, no treatment is currently given to undifferentiated waste. There are small unique initiatives for the treatment of the organic fraction, but efforts are limited due to missing public backing or funding. As for recycling and reuse, there is a waste processing plant but the quantities recycled are still insignificant to generate an impact on the system.

Rationale: Waste is collected daily through collection of waste from containers. The collection is still made in an undifferentiated way, where no waste material separation or sorting is practiced and collection and transport of waste is within the responsibility of the municipality, leading to missing national common ground that could simplify future systemic improvements.

From the above it is then necessary to increase collection points, collection transport and equipment, improve sorting procedures and introduce a treatment site that allows for waste valorisation and sustainable practices that go beyond incineration. Especially hospital and medical waste that is currently dumped and burned in the open air is identified as an area in need of change.

Specific actions needed: An important step in this process is to encourage the creation of companies that can collect in a sustainable way and allow for waste valorisation. Additionally, the state should aim to create conditions for the sector to become attractive and foster waste material sorting and replicate it nationally. Currently companies that responsibly collect and sort waste do not exist and will need to be established first in order to address the matter effectively. A clear waste management structure should then be put in place to allocate the responsibilities along the collection and treatment process. (see annex 3)

1.3.2 Waste treatment facility

Improving efficiency of waste treatment sites: Addressing processes at waste treatment facilities represents a key step towards achieving circularity. To do so, the country should target to increase efficiency of current facilities and introduce more sustainable sites like landfill with gas congestion, incineration with energy recovery, waste sorting and cleaning sites and ultimately recycling stations. Existing facilities do not allow valorisation of waste and do not achieve their goals of reducing waste hence efforts to increase waste valorisation and efficient management at incineration sites need to be ongoing.

Rationale: A first step would be to assess existing waste treatment facilities but the government has not yet started discussions to upgrade or replace current landfill sites. Options to upgrade recycling plants, like the one currently already practicing glass recycling, are being evaluated by the authorities but no consents have been found yet. Efforts to increase waste collection, reduce littering and introduce recycling are being developed in a very timid way and without accountable results.

To achieve circularity, existing solutions include implementing waste valorization systems that allow to explore the part of energy valorization through biogas and also the production of organic compost with the main applicability in agriculture is deemed helpful.

Specific actions needed: For São Tomé and Príncipe options include creating new companies treating waste with circular motives under a common framework and on a common structural system. Companies that have waste valorisation processes currently do not exist and will need to be set up to take a step toward a more sustainable waste management system. (see annex 3)

1.3.3 Dumping and littering

Reducing pollution through improved waste management: For the country's blue and circular economy, reducing waste and related pollution at all levels and especially in the ocean is paramount. There is currently an important level of industrial pollution and accumulation of waste from littering in cities and on beaches.

Rationale: In São Tomé and Príncipe, anti-dumping and littering legislation need to be enforced more thoroughly and existing fines need to be harmonized and applicable. A body of control is in place and operated by the public sector. Responsible for monitoring company waste streams is the general environmental direction but in practice the system is not functional and industrial dumpsters are not currently supervised by the General environmental direction.

It then becomes obvious that the country needs to better monitor industrial waste and establish fines, introduce material use understanding across sectors such as manufacturing, tourism and fisheries.

Specific actions needed: For São Tomé and Príncipe, the solution lies within creating a program for industrial waste monitoring and a subsequent penalty system that is enforced on the entirety of the industry to manage large industrial waste flows.

1.4 Restore and better manage the use of natural flow

Managing natural resources: To achieve a sustainable use of natural resources within a CE, there is a need to upscale and further support existing initiatives. They should aim at regenerating natural flows especially in the blue economy sectors such as fisheries, tourism, oil and gas exploration and bioprospection. There is currently a low level of environmental protection of natural resources with less than 1 percent of the EEZ and coastal ecosystems being protected. The deal with ERHC Energy

Inc., giving the company the rights to manage parts of the national EEZ, is of particular interest as it offers future opportunities for sustainable energy production. Despite existing environmental texts to protect ecosystems and biodiversity and growing conscience of the issue, high levels of biomass are extracted through, among others, fisheries.

Rationale: A research centre and directions of state for the monitoring of natural resources such as fish stocks, forest abundance, wildlife preservation and water pollution is established. As a follow up on existing monitoring efforts of natural resources, there are limited controlling efforts like implementation of resource use permits.

Available solutions include increasing protection of EEZ through MPAs, reinforcing monitoring of existing MPAs and area-based management and increasing restoration activities while also introducing financial reprimands against offenders.

Specific actions needed: A first step could be to improve existing monitoring practices and capabilities while preventing ongoing harmful practices through fines. A close collaboration with ERHC Energy Inc. should be sought to increase control and sustainable use of the EEZ while assessing renewable energy options. Building better knowledge on the use of natural resources will provide evidence for future resource extraction rate decision-making. To address regeneration of natural flows, a parallel step is to support and upscale existing activities such as fishery closures, mangrove restoration and locally-managed marine areas/MPAs.

1.5 Incentivise businesses

Putting businesses at the centre of the CE: Increasing the involvement of businesses and entrepreneurs is a stepping stone towards achieving circular and blue economy activities. Businesses and entrepreneurs are not aware of the opportunity the CE presents while those already involved in CE related activities are not well supported by the officials.

Rationale: The public sector is not aware of private sector initiatives and efforts toward a circular economy and does not monitor circular business practices. The government does not encourage businesses by providing incentives for a circular economy within businesses or supporting them financially through subsidies, aides, tax reductions or operative advice.

The lack of governmental monitoring of business practices and the understanding of circular efforts does not allow there to be grouping of companies according to equipment, material use and production practices to encourage a closed loop or industrial collaboration called symbiosis.

To promote the adoption or transition to a CE business, the government needs to provide structural and financial support to businesses including through:

- The creation of a circular economy office within one or several of the government departments
- The creation of company grouping according to business activity, material use, equipment requirements and proximity to improve material use and infrastructural efficiency while reducing supply chain and waste treatment costs by sharing them among a group of firms
- Undertaking a dialogue with industry to create valorisation of waste materials
- Introducing tax relief system such as 3-5 year starting period of complete tax exemption or reduction
- Cutting repair and refurbish value added tax to encourage reuse businesses

Specific actions needed: In São Tomé and Príncipe most efforts are done by international NGOs or the private sector, while governmental support and initiatives are limited. Existing official programs providing subsidies, aides, tax reductions or operative advice need better promotion amongst businesses. There is also a need for more governmental initiatives to incentivize businesses to adopt circular models and a need for increased efforts to support current efforts.

2. Guide for entrepreneurs

To implement a circular economic model within businesses and across sectors through synergies both governmental and private sector efforts are required to create the right environment. Since private sector actors are able to decide and act quickly, companies can be the driving power toward a local circular economy. Businesses are currently in the position where they can drive the change by taking initiative and transition toward circular economic practices and influence governmental decisions on the matter to follow accordingly.

In order to engage businesses in efforts to achieve a circular economy it is necessary to provide them with guidelines on how to set up and transition toward a circular production cycle. Through consultation of local experts, consultants and governmental officials this document pinpoints to existing good practices as well as barriers and opportunities for a circular economy. Feasible solutions and possible stakeholders to become involved in the process have been identified and the guidelines are designed to create discussion across sectors to form synergies and break the linear economic model. Identifying and pointing out possible company collaborations as well as step-by-step guidelines for sustainability seeking businesses are starting points towards the final goal of protecting maritime resources and reducing ocean pollution.

The guidelines can help start-ups as well as existing companies to establish business models that allow for more efficient resource management while phasing out waste creation and thereby counteract maritime pollution at its source. The guidelines offer upcoming entrepreneurs administrative advice to set up their business and identify the main modalities of implementation for a circular economy. For existing businesses, the guidelines include step-by-step council on how to transition toward sustainable production and system processes that are associated with a circular economy. The guidelines conclude with in-depth solution proposals and opportunities for companies to pick up upon and implement in their ongoing quest for sustainable processes. Based on the content of this document companies will be able to make relevant progress leading to improved resource management, reduced waste generation and diminished maritime pollution for island states.

2.1 Creating a new CE business

2.1.1 Establish the mission, vision and objectives of the company

The company's mission must embody its essence and reason for being. The vision comes as the way the company is envisioned in the mid-long term. Objectives of the company should be derived from the founders' goals (personal and professional motivations) and should tackle environmental and social challenges, and satisfy customer needs.

For a CE business, these three elements should refer to one of the CE principles: (1) preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows, (2) optimise resource yields by circulating products, components, and materials at the highest utility at all times in both technical and biological cycles, and (3) foster system effectiveness by revealing and designing out negative externalities (P3).

In São Tomé and Príncipe, the fishery, agriculture, tourism, services and manufacturing sectors have been identified as key sectors to drive circular economy. They offer the most impactful and far-reaching opportunities to reduce maritime and land pollution and introduce circularity on the islands of São Tomé and Príncipe.

2.1.2 Identify key stakeholders and customer segments

This step involves identifying and prioritising those stakeholders that will play a significant role in achieving the objectives of the project. Stakeholders include the team (co-founders and employees), partners, beneficiaries (beneficiaries are those who benefit from the value your project generates) and customers. Customers are at the core of the business model as they buy the services or products. The project's main impact in society has to be intrinsically linked to the local community and cover a local demand that is to be met. Another task is to develop a sound understanding of the potential customer base (customer identification and profiling) and the existing market around it (market assessment).

To promote a CE in São Tomé and Príncipe, it is at this stage essential to include stakeholders like governments, civil society organisations promoting CE and institutions like the Ellen MacArthur Foundation. To identify key stakeholders, entrepreneurs should target main suppliers, intermediaries, processing associates as well as customers and public partners of interest. In the above identified sectors of fishery, tourism, agriculture, service and manufacturing identifying and collaborating with some key stakeholders is essential (refer to Annex 4).

2.1.3 Develop the value proposition

CE businesses create environmental value by tackling circularity and environmental challenges (that key driver for their existence) through its business solutions and operations, and social value by empowering their stakeholders (including employees, suppliers, communities and future generations) and meeting the needs of their customers.

To achieve this, it is suggested to create strong collaboration across the board and involve customers and stakeholders in the process of designing and delivering the value proposition (co-creation)

In São Tomé and Príncipe, the issues of marine pollution, excess waste generation, missing waste responsibility, extensive resource extraction, a lack of locally accessible material inputs and the awareness of the population and the state about the need for a better management of resources represent key challenges that will be a good potential value proposition.

2.1.4 Identify the modalities of implementation

2.1.4.1 Key activities and resources

Key activities define what we must do in order to define and offer a value proposition to a specific customer segment. They include problem-solving (such as consulting or counselling), production (manufacturing etc), platform/network/sale, and supply chain management.

Activities within CE businesses should include those proposed in the different business models (in section 4 of this guideline)

Key resources represent all the elements and aspects that are essential for making the business work properly. They include human resources, physical assets, intellectual resources, financial resources and natural resources. For the latter, a special focus should be on the use of recycled materials and sustainable or renewable resources as input materials.

Entrepreneurs also need to consider incoming legislative changes such as laws on PPP, laws on EPR, phasing out of single use plastics. At this stage it can also be helpful to enquire for possible governmental support like tax reduction or investment subsidies.

2.1.4.2 Customer relationships and channels

Different types of relationships can be established with customers such as personal assistance, self-service, automatic service, community based or co-creation.

To properly establish the different types of relations with customers, doing a customer journey map of the particular segment of customers can be useful. A map is an oriented graph that describes a user's journey by representing the different touchpoints that characterise his/her interaction with the service or product.

You will also have to distinguish between the way (channels) to get the customer's attention and how to establish and maintain a close relationship with them. Channels include all means of communication and distribution to reach customers and deliver a value proposition to them.

For CE businesses, it is possible to explore existing initiatives towards sharing economies, introduce and replicate take-back options for customers to return products and help materials stay within the company while exploiting options to continue to interact with customers.

2.1.4.3 Cost structure

It is important to carefully classify costs (fixed and variable costs) so that the business can analyse and improve its performance.

Within a CE, it is useful to explore potential costs linked to niche CE areas and identify cost savings arising from CE practices such as equipment sharing, recycled material purchases or supply and transport costs from abroad.

2.1.4.4 Revenue streams

The business must have an accurate idea of the importance of each revenue stream and which one best matches a particular customer segment and channel. Streams might include asset sale, usage fees, subscription fees, licensing etc.

2.1.5 Test the product or service

Before fully implementing the modalities above, the entrepreneur needs to test key variables:

- Problems and needs identified should be tested by talking to experts in the field or by interviewing key stakeholders.
- Participation of key stakeholders should be verified through diverse types of consultations and meetings on the business objectives where multiple stakeholders can provide a good measure of their willingness to engage.
- Customer segments should be validated through focus groups, interviews, debate or conversations to check their needs, aspirations, gains and pains, etc. Focus groups, interviews, debates, and conversations could be used including on social media.
- Value proposition needs to be tested by building a prototype at small-scale or semi functional versions of the services/products. Here, participants' reaction to the test might include satisfaction level, feedback, and curiosity/ demand for more.

Once hypotheses on the different variables have been tested and validated, the service/product has to be scaled up from prototype to the optimal market size where viability is attained.

To test the circular product or service, a platform where businesses and entrepreneurs can try their green products is considered to be a helpful step for firms to assess feasibility and market conditions for their operations. As no such platform exists yet, a coordinated effort between industry and authorities could allow to put it into existence.

2.1.6 Mobilise tools for implementation

When the business model is validated, implementation of the modalities presented above can be facilitated by various tools. **First** is establishing a financial plan with income statements, balance sheets and cashflow projections, and a funding plan identifying traditional investors and banks as well as other funding mechanisms such as crowdfunding, financial cooperatives, micro-credits, ethical banks. **Second** is having a legal management plan to choose the best-fitting legal form according to the needs and business model. **Third** is setting a roadmap to foresee the progress of the business from year 0 to the medium and long-term. **Fourth** is to have an operation and management plan which dictates how operations are performed and managed by staff and by assigning roles and responsibilities and setting a schedule. Tools used need to be adapted according to the CE business model adopted.

To find the appropriate tools, entrepreneurs can refer to existing governmental departments that provide assistance to businesses such as Investment Promotion Agency (APCI) (refer to Annex 4).

2.1.7 Measure impacts and improve

Effectively measuring environmental and social impacts is essential to CE businesses. In addition to measuring how the business is doing regarding the achievement of objectives and mission, environmental indicators are needed to assess environmental performance. Environmental indicators such as water consumption, material use, waste generated per service or product, or other CE related indicators are suggested to be used in order to assess current performances. Constantly improving the business is key to achieve the circular economic objectives as it is a process that requires ongoing efforts to improve efficiency. Common areas of improvement include levels of participation of stakeholders, communication and marketing to incentivize customers, improve environmental performance, ensure green procurement and increase environmental awareness amongst the public.

2.2 Transitioning to a CE business

2.2.1 Map your impact and set priorities

Learn how to bring together an internal "sustainability team" to set objectives, define targets, review your environmental impact and decide on priorities. In this process, you need to evaluate impacts regarding natural flow use and material stock management. Relevant fields and key aspects to take into consideration in São Tomé and Príncipe could be maritime resource conservation, biodiversity protection, marine pollution, waste generation and waste collection and sorting.

2.2.2 Choose indicators and understand data needs

Identify indicators that are important for your business and learn about what data should be collected to help drive continuous improvement. To assess the circularity of your business, you can use CE related indicators such as: use of renewable energy, greenhouse gas intensity, energy intensity, intensity of your residuals, releases into the air and water.

2.2.3 Measure inputs used in production

Identify how materials and components used into your production processes influence environmental performance. Businesses can also measure CE related performance including: material consumption, resource extraction, renewable energy consumption, waste generation, import of inputs, non-renewable materials, restricted substances, recycled or reused materials. Businesses can check the availability of recyclable materials and monitor availability of waste materials/recycled materials as inputs into production process.

2.2.4 Assess the operations of your facility

Consider the impact and efficiency of the operations in your facility. Residual waste generation and excess material that can be phased out and managed more efficiently going forward (e.g. water consumption, energy intensity, greenhouse gas generation, emissions to air and water, waste generated). Efforts to improve production and material use efficiency toward circularity while reducing waste creation must be ongoing.

2.2.5 Evaluate your products

Identify factors such as energy consumption in use, recyclability and use of hazardous substances that help determine how sustainable your end product is. Businesses can use CE related indicators such as: recycled/reused content of your products, recyclability of your products, renewable materials used in your products, Non-renewable materials used in your products, restricted substances contained in your products, energy consumption in using your products, greenhouse gas emissions from the use of your products. You can also evaluate the possible incentives to recycle and engage customers to return products and possibly keep materials in cycle.

2.2.6 Understand your results

Learn to read and interpret your indicators and understand trends in your performance. Businesses can focus on CE related indicators that align with business models suggested.

Here businesses can make use of governmental offices and agencies or private sector companies that specialised in assisting businesses evaluate their performances. Examples in São Tomé and Príncipe include the 'Investment Promotion Agency' (APCI) is a governmental agency that provides such help.

2.2.7 Take action to improve your performance

Choose opportunities to improve your performance and create action plans to implement them. CE businesses should focus on CE related indicators that align with business models suggested, and stay up to date with new arising sustainable opportunities and drive ongoing progress by pinpointing areas of improvement or non-circular practices.

2.3 Circular Business models for entrepreneurs

2.3.1 Circular design

This CE model relies on the following elements:

- Circular **product design**: use recyclable materials for goods and packaging that allow for a circular system and **local supplies** at a maximum

- Product/service design and provision: **access over ownership** and product service systems
- **Local** supplies and local demand for service/good
- **Economy of functionality** (rent resources rather than buy and own them)

There are existing companies that operate based on an entirely circular design (see Annex 5).

2.3.2 Optimal material and resource use

- **Understand value** of waste materials and engage in opportunities from materials
- **Buy recycled materials** and reduce input material costs
- **Target recyclable and sustainable materials** and pioneer in industrial waste valorisation
- **Introduce Industrial symbiosis**; internalise a maximum of production steps within the company on the same site to reduce transport costs. This also helps with waste creation as all accrues on the same site, making recycling or reusing easier since larger amounts hold more potential
- **Redefine retail**; skip retailers by directly interacting with consumers. Simplifies recycling practices, understanding of consumer behaviour and increases revenue
- **Inspect daily practices** to identify non-sustainable production practices such as use of single use plastics, equipment and garment
- **Adopt a closed-loop process**; use residual outputs and by-products as input for other production processes
- **Set up internal target rates** to increase recycling rates and encourage sorting to improve employee understanding of a circular economy and its benefits

There are no existing companies that optimised resource use by functioning solely with renewable and recycled materials as input yet.

2.3.3. Value recovery

- **Reuse and recycle**: Introduce ways to keep waste materials within the company and the production cycle; Increase material use efficiency
- **Repair and recondition**: produce goods and services to last (quality over quantity) and provide service to repair and refurbish products and services
- **Remake** products that did not meet standards and were considered waste
- **Consumer awareness:** inform customers of recycling and repair opportunities to incentivize closed-loop material use while explaining competitive advantage of your service/product compared to non-circular business models

There are existing companies that maximise the utility and value of some of their materials within their production cycle and reach higher production process efficiency leading to a minimized waste creation (see Annex 5).

2.3.4. Collaborative economy

- **Group businesses** that use similar materials to share transport supply costs and open channels to trade materials between firms
- **Foster cooperation**; exchange good practices and learning experiences between companies to accelerate transition toward circularity

- **Introduce a sharing economy**: collaborate with other businesses to build expensive infrastructure or purchase equipment to improve efficiency of usage (ex; cooling units, trucks, sorting site, …)

There are very few existing companies that operate on the basis of a collaborative economy and exploit all potential side products and collateral uses that accrue during their production. Additionally, equipment and material sharing are maximised through excessive industrial networking (See Annex 5).

3. Annexes

Annex 1: Type of policies and laws towards circular economy

Renewable Flow Management	Environmental protection/ Biodiversity Conservation	✓	Environmental Law No. 10/99 (1999)
	Fisheries management	✓	Fisheries Law No. 9/2001 (2001)
	Forestry management	✓	Forestry Law No. 5/2001 (2001)
	Protected Areas	✓	Law No. 11/99 on Flora and Fauna conservation and protected areas (1999) National Biodiversity Strategy and Action Plan 2015-2020 (2015) Laws Nº 6 and 7/2006 of August 2nd: Obô Park Law of São Tomé and Obô Park Law of Príncipe
	Water management	✓	Water Resources Framework Law No. 07/2018 (2018) Order No. 12/2012 approving the Participatory Strategy for Water and Sanitation of Sao Tomé e Príncipe until 2030
	Renewable Energy	X	
Stock Management	General waste management	✓	National Plan for the Integrated Management of Urban Solid Waste to the period 2018-2023 Decree No. 36/99 regulating solid waste disposal (1999)
	Recycling	✓	Decree-Law No. 64/2013 creating the Environmental Impact Tax (TIA) (2003 then 2013)
	Plastic Bag Ban/ Phase out	✓	Law No. 8/2020 Approving Measures to Reduce the Use of Plastic Bags in São Tomé and Príncipe

Annex 2: Existing awareness raising initiatives and campaigns towards CE

Initiative name	Description of activity	CE aspect addressed	Link / Contact
TESE - Associação para o desenvolvimento	Promotional videos for kids and the public	Waste reduction	https://www.facebook.com/tese.ongd/videos/316298845957680/
OQUIMAMB	promotes cleaning action in the framework of the Clean World	Waste reduction & Green chemistry promotion	https://m.facebook.com/Lets-Do-It-S%C3%A3o-Tom%C3%A9-e-Pr%C3%ADncipe-989950781186143

Annex 3: Examples of companies doing CE related activities in waste management

CE aspect	Company	Description of activity	Link / Contact
Collection	Public service	Depends on municipality	N/A
Sorting	N/A	N/A	N/A
Treatment	N/A	N/A	N/A
Recycling and disposal	CPR São Tomé e Príncipe	Collection and recycling glass into construction material	https://fr-ca.facebook.com/cprsaotome

Annex 4: Key sectors to foster CE and related stakeholders and supporting platforms

Key sector	Identified key stakeholders	Relevance of the stakeholder
Fisheries	MARAPA	NGO with a lot of experience in the protection of marine and coastal habitats and ecosystems, co-management of fishery resources and support to the actors in the fishing industry
Sustainability	OIKOS	is an NGO that bases its area of work on three pillars Humanitarian Action, Sustainable Life, and Global Citizenship.

Annex 5: Key examples of companies operating under CE business models

Business model	Company	Activity	Website link or Contact
Circular design	ROSEMA	Production of beer	N/A
Optimal material and resource use	ECOGESTUS Lda	Production of compost from organic waste	https://www.ecogestus.com/pt/en/projects/
Collaborative economy	Agripalma	industrial oil palm	https://www.socfin.com/en/locations/agripalma

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Introduction

Circular economy (CE) has been on the rise across the globe due to a growing concern about resource extraction rates and pollution arising from production processes under the linear economic model. The CE is "an industrial system that is restorative or regenerative by intention and design" (EMF 2013). The CE goes beyond recycling and waste reduction as it aims to value waste and keep materials in circulation for as long as possible. It is about extracting higher value from fewer resources by increasing productivity and efficiency, and moving from ownership to access of products, creating a sharing mindset allowing to reduce consumption thanks to increased efficiency of asset use. For island states, the CE is highly relevant due to their vulnerability to climate change and pollution but also due to the reliance of countries on import of most products consumed. The Indian Ocean Commission has therefore secured funding from the World Bank to support the SWIOFish regional project and increase efforts to set up a circular economic model for the supply and production chain to reduce downstream marine pollution. The CE Project's aim for each AIODIS country is to foster a circular economy and protect the environment and natural assets while aiming for economic growth.

The objective of the report is to present a national policy framework and guidelines for entrepreneurs. Through collaboration with local experts and government officials, local agencies and international foundations, an understanding of the current situation has been established in the review report. Possible approaches and actions have now been identified to move forward. These actions are gathered within the present document. Thanks to policy adaptations and various initiatives made throughout the past decade, the Seychelles already created the fundamentals to proceed. Involvement from the private sector, civil society and Non-Governmental Organizations (NGOs) has additionally increased the understanding of the concept of a circular economy and cornerstones have been laid within the society.

The document is divided into two parts. First, it presents a policy framework to foster CE and respective suggested legislative implementations for the Seychelles. To facilitate the connection between authorities and policies and the private sector it is important to guarantee a common understanding and the comprehension on how to proceed, with the goal of a circular economy in mind. The second part of this document then presents CE guidelines for entrepreneurs. Implementing a CE goes beyond recycling and waste reduction as it aims to value waste and keep materials in circulation for as long as possible. It encourages extracting higher value from fewer resources by increasing productivity and efficiency. Therefore, to move towards a circular economy it is crucial to involve local businesses and the private sector in order to facilitate the collaboration, implementing respective practices along the path within production, distribution and treatment facilities. The guidelines for entrepreneurs are linked to the policy framework and legislative suggestions made during the first phase. Explanations on how to set up a business in the Seychelles with a circularity target, as well as the transition toward more sustainable business practices for established companies will be included and offer step-by-step advice along the way. This will allow to close a gap of informality within different sectors and better involve authorities and businesses in the common quest toward a circular economy.

1 Policy framework

The framework to lay out possible paths moving forward based on the particularities of the Seychelles and feedback from the local expert participating in this work. Acting upon present circumstances in place legislation will be promoted to develop a circular economy further while aiming to identify additional opportunities to expand the economy and improve aggregate efficiency of materials.

1.1 Establish regulations for the country's Circular Economy

National Policy goal: The government needs to adopt a statement committing to a circular economy and fill the legal gaps. A number of legal texts exist in the country but they are not harmonised to address CE, comprehensively (See Annex 1).

Rationale: There is currently limited interaction between industry and authorities for common action. The government is yet to make its target for a circular economy known and offer a clear indication on how to follow through with it.

In the Seychelles, the polluter pays principle (PPP)[1] is established in the National Waste Policy with limited implementation. It is controlled and monitored by the department of environment in collaboration with the Landscape and Waste Management Agency (LWMA) and the Seychelles Maritime Security Agency (SMSA). The public sector is responsible for the financial burden of the pollution costs, and this is why the government has imposed environment levies on selected products, businesses and sectors. The Seychelles has not put in place the Extended Producer Responsibility (EPR)[2] along the supply chain in all sectors to prevent extensive pollution and reduce the impact on PPP. EPR and PPP are generally recognised in the legislation about waste management. Despite the existence of the PPP and due to the lack of EPR, there is no Circular Economy Policy or no strong CE basis yet that can reduce different forms of pollution and in particular marine pollution.

Specific actions needed: To achieve the above goal, it is suggested that the country adopts a declaration or an umbrella legislation that promotes integration of actors and harmonisation actions towards a CE. Commitment to the CE could be integrated into existing social, economic and other sector policies of the country.

There is a need to adopt specific legislations that are currently missing to foster a CE. These legislations include texts on EPR. Implementing policies relating to the Blue Economy Roadmap also represent key opportunities to integrate circular economy principles.

1.2 Educate through awareness and education campaigns

Mobilising actors for the CE: To achieve a CE in the Seychelles, it is essential to increase literacy on CE at all levels, especially in key sectors such as the blue economy. The Concept of CE is still new at the national level, the population and governmental departments have not fully explored the potential and benefits of this sector. However, there are small and scattered CE related projects initiated by the private, civil society and the NGOs. They are mainly addressing nature conservation rather than commercial practices.

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[1] The Polluter-Pays Principle means that the polluter has to bear the cost of steps that he is legally bound to take to protect the environment, such as measures to reduce the pollutant emissions at source and measures to avoid pollution by collective treatment of effluent from a polluting installation and other sources of pollution (OECD 1992).

[2] The Extended Producer Responsibility is a policy approach under which producers are given a significant responsibility – financial and/or physical – for the treatment or disposal of post-consumer products (OECD 2001).

Rationale: There are efforts from the government, civil society or private companies to sensitise population through agencies but the outreach or geographical coverage have often been limited.

Specific actions needed: To achieve the above goal, there is a need to support and replicate existing initiatives and other educational activities in place at the level of government, businesses and the local community. In the Seychelles, more vigorous awareness campaigns about the CE that have started are very recent and can be seen in the sectors of tourism, agriculture and fisheries, which are the main pillars of the economy. These sectors are also the principal waste generators and polluters. (see Annex 2).

Key examples of specific actions needed include:

- Continued workshops in place engaging society at large.
- Build stronger collaboration between large industrial partners and authorities.
- Reintroduce school campaigns or incorporate it in the curriculum to raise awareness within youth.
- Increase interaction with companies to introduce them to circular economic models and make them understand the necessity of it.
- Develop a raising awareness policy or guide on CE
- Facilitate access to credit for CE projects and programmes

1.3 Improve material stock management

1.3.1 Collection and sorting system

Optimising Waste value: To improve waste management processes currently in place, it is recommended to optimise existing collection and sorting systems. This is also acknowledged in the report on Marine plastic under the AIODIS project. While waste is collected, it is not done uniformly across the country. Waste sorting procedures are not efficient and do not allow an efficient valorisation of waste.

Rationale: Waste is collected six times a week through containers, kerbside collection and household collection. After collection, waste streams are not always sorted into different materials such as metal, electronics, paper & cardboard bio waste, plastic etc. Collection and transport of waste are the responsibility of the government in all public places (include household wastes deposit in roadside bins). The collection and disposal activities are outsourced to the private sector organisations. However, industries and businesses are required to have provisions in place to collect and dispose of waste at their premises and areas of their operations at their own costs. This is usually part of their licensing conditions.

Specific actions needed: From the above and due to increasing waste production, it is then necessary to increase collection points and collection capacity, improve sorting procedures and introduce a treatment site that is more sustainable than landfill. The landfill in its current form is exposed to create more toxic pollution and prone to fire outbursts. An important step in this process is to support existing companies doing collection and sorting and replicate nationally. Current companies exist that responsibly collect and sort waste (See annex 3).

1.3.2 Waste treatment facility

Improving efficiency of waste treatment sites: Addressing processes at waste treatment facilities represent a key step towards achieving circularity. To do so, the country needs to increase efficiency of current facilities and introduce more sustainable sites like landfill with gas congestion, incineration with energy recovery, waste sorting and cleaning sites, recycling stations. Existing facilities do not allow valorisation of waste and do not achieve their goals of reducing waste.

Rationale: The government has started discussion to replace current landfill sites. Options to open incineration plants or landfill with anaerobic congestion as well as recycling plants are being evaluated by the authorities. Efforts to implement waste sorting, to increase waste collection, to reduce littering and to introduce recycling are undertaken. This was given a boost following a comprehensive study to sort out waste by a German Team from University of Darmstadt in 2016.

Specific actions needed: To achieve circularity, existing solutions include implementing high efficiency recycling and biogas creation.

For the Seychelles, options include creating new companies as well as supporting and upscaling existing companies treating waste with circular motives. Current companies that have existing waste valorisation processes are limited in facilities, technology and in what they can re-use and recycle for economic value. (See annex 3).

1.3.3 Dumping and littering

Reducing pollution through improved waste management: For the country's blue and circular economy, reducing waste and related pollution at all levels and especially in the ocean and along the coast is paramount. There is currently an important level of industrial pollution and accumulation of waste from littering in the districts, on different islands and on beaches.

Rationale: In the Seychelles, the National Waste Policy establishes anti-dumping and littering. Related legislations and fines are in place. A body of control is in place and operated by the public sector and responsible for monitoring company waste streams. Industrial dumpsters are supervised by the department of environment, and SMSA is mandated to regulated ocean and sea waste pollution.

Specific actions needed: It then becomes obvious that the country needs to better monitor industrial waste and reinforce the implementation of fines, introduce material use understanding across sectors such as tourism, fisheries or agriculture.

For the Seychelles, the solution lies within supporting existing program for industrial waste monitoring and a subsequent, enforcing the implementation of the penalty system.

1.4 Restore and better manage the use of natural flows

Managing natural resources: To achieve a sustainable use of natural resources within a CE, the Seychelles needs to upscale and further support existing initiatives. They aim at regenerating natural flows especially in the blue economy sectors such as fisheries, tourism, oil and gas exploration and bioprospection. The Seychelles has committed to protect 30% of its EEZ which will increase environmental protection of marine and coastal ecosystems. While there is a wide range of environmental texts, there are also high levels of biomass extraction through fisheries for example.

Rationale: There are agencies but limited research centres in place responsible for the monitoring of natural resources such as fish stocks, forest abundance, wildlife preservation and water pollution. As a follow-up on existing monitoring efforts of natural resources, there are limited controlling efforts like implementation of resource use permits.

Specific actions needed: Available solutions include increasing protection of EEZ through MPAs, reinforcing monitoring of existing MPAs and areas-based management, and increasing restoration activities.

The next step for the Seychelles could be to improve existing monitoring practices and capabilities. Building better knowledge on the use of natural resources will provide evidence for future resource extraction decision-making. To address regeneration of natural flows, a parallel step is to support and upscale existing activities such as fishery management plan such as restriction on license period or capping annual catch of vulnerable species, mangrove restoration, locally managed marine areas and MPAs.

1.5 Incentivise businesses

Putting businesses at the centre of the CE: Increasing the involvement of businesses and entrepreneurs is a stepping stone towards achieving circular and blue economy activities. Businesses and entrepreneurs are not aware of the opportunity the CE presents. Those already involved in CE related activities are not well supported.

Rationale: The public sector is not fully aware of private sector initiatives and efforts toward a circular economy and does not effectively monitor circular business practices. The government has provided limited incentives for a circular economy within businesses by supporting them financially through aids, tax incentives and operative advice.

The current existing governmental monitoring of business practices and the understanding of circular efforts allows there to be limited grouping of companies according to equipment, material use and production practices to allow for a closed loop or industrial collaboration.

Specific actions needed: In the Seychelles, existing initiatives of aids, tax incentives and operative advice need to be more attractive and better promoted amongst businesses.

To promote the adoption or transition to a CE business, the government also needs to provide structural and financial support to businesses including through:

- The creation of a circular economy office within one or several of the government departments
- The creation of company grouping according to business activity, material use, equipment requirements and proximity to improve material use and infrastructural efficiency while reducing supply chain and waste treatment costs by sharing them among a group of firms
- Undertaking a dialogue with industry to create valorisation of waste materials
- Introducing tax relief schemes such as 3-5 years starting period complete tax-free or reduced
- Cutting repair and refurbish value-added tax to encourage reuse businesses

2 Guide for entrepreneurs

To implement a circular economic model within businesses and across sectors through synergies both governmental and private sector efforts are required to create the right environment. Since private sector actors are able to decide and act quickly, companies can be the driving power toward a local circular economy. Businesses are currently in the position where they can drive the change by taking initiative and transition toward circular economic practices and influence governmental decisions on the matter to follow accordingly.

In order to engage businesses in efforts to achieve a circular economy, it is necessary to provide them with guidelines on how to set up and transition toward a circular production cycle. Through consultation of local experts and governmental officials this document pinpoints to existing good practices as well as barriers and opportunities for a circular economy. Feasible solutions and possible stakeholders to become involved in the process have been identified and the guidelines are designed to create discussion across sectors to form synergies and break the linear economic model. Identifying and pointing out possible company collaborations as well as step-by-step guidelines for sustainability seeking businesses are starting points towards the final goal of protecting maritime resources and reducing ocean pollution.

The guidelines can help start-ups as well as existing companies to establish business models that allow for more efficient resource management while phasing out waste creation and thereby counteract maritime pollution at its source. The guidelines offer upcoming entrepreneurs administrative advice to set up their business and identify the main modalities of implementation for a circular economy. For existing businesses, the guidelines include step-by-step council on how to transition toward sustainable production and system processes that are associated with a circular economy. The guidelines conclude with in-depth solution proposals and opportunities for companies to pick up upon and implement in their ongoing quest for sustainable processes. Based on the content of this document companies will be able to make relevant progress leading to improved resource management, reduced waste generation and diminished maritime pollution.

2.1 Creating a new CE business

2.1.1 Establish the mission, vision and objectives of the company

The company's mission must embody its essence and reason for being. The vision comes as the way the company is envisioned in the mid-long term. Objectives of the company derive from the founders' goals (personal and professional motivations) and should tackle environmental and social challenges, and to satisfy customer needs.

For a CE business, these three elements should refer to one of the CE principles: (1) preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows, (2) optimise resource yields by circulating products, components, and materials at the highest utility at all times in both technical and biological cycles, and (3) foster system effectiveness by revealing and designing out negative externalities.

In the Seychelles, the fishery, agriculture, services, manufacturing and the construction sectors have been identified as key sectors. They offer the most impactful and far-reaching opportunities to reduce maritime and land pollution and introduce circularity in the Seychelles.

2.1.2 Identify key stakeholders and customer segments

This step involves identifying and prioritising those stakeholders that will play a significant role in achieving the objectives of the project. Stakeholders include the team (co-founders and employees), partners, beneficiaries and customers (beneficiaries are those who benefit from the value the project generates). Customers are at the core of the business model as they buy the services or products. The project's main impact in society has to be intrinsically linked to the local community and cover a local demand that is to be met. Another task is to develop a sound understanding of our potential customer base (customer identification and profiling) and the existing market around it (market assessment).

To promote a CE in the Seychelles, it is essential at this stage to include stakeholders like governments, civil society organisations promoting CE, institutions like the Ellen MacArthur Foundation. To identify key stakeholders, entrepreneurs should target main suppliers, intermediaries, processing associates as well as customers and public partners of interest. In the above identified sectors of fishery, agriculture and manufacturing, some key stakeholders are essential (Please refer to Annex 4).

2.1.3 Develop the value proposition

CE businesses create environmental value by tackling circularity and environmental challenges (that is a key driver for their existence) through their business solutions and operations. They create social value by empowering their stakeholders (including employees, suppliers, communities and future generations) and meeting the needs of their customers.

To achieve this, it is suggested to create strong collaboration across the board and involve customers and stakeholders in the process of designing and delivering the value proposition (through co-creation).

In the Seychelles, the issue(s) of marine pollution, excess waste generation, missing waste responsibility, extensive resource extraction and the lack of locally accessible material inputs. represent key challenges that will be a good value proposition.

2.1.4 Identify the modalities of implementation

2.1.4.1 Key activities and resources

Key activities define what we must do in order to define and offer a value proposition to a specific customer segment. They include problem-solving (such as consulting or counselling), production (manufacturing etc), platform/network/sale, and supply chain management.

Activities within CE businesses should include those proposed in the different business models (in section 4 of these guidelines).

Key resources represent all the elements and aspects that are essential for making the business work properly. They include human resources, physical assets, intellectual resources, financial resources and natural resources. For the latter, a special focus should be on the use of recycled materials, sustainable or renewable resources as input materials.

Entrepreneurs also need to consider required legislative changes in the Seychelles such as laws on EPR. At this stage it can also be helpful to enquire for possible governmental support like tax incentive schemes, access to credits, access to land infrastructure and investment subsidies.

2.1.4.2 Customer relationships and channels

Different types of relationships can be established with customers such as personal assistance, self-service, automatic service, community based or co-creation.

To properly establish the different types of relations with customers, doing a customer journey map of the particular segment of customers can be useful. A map is an oriented graph that describes a user's journey by representing the different touchpoints that characterise his/her interaction with the service or product.

You will also have to distinguish between the way (channels) to get the customer's attention and how to establish and maintain a close relationship with them. Channels include all means of communication and distribution to reach customers and deliver a value proposition to them.

For CE businesses in the Seychelles, it is possible to explore existing initiatives towards sharing economies, introduce take-back options for customers to return products and help materials stay within company while exploiting options to continue to interact with customers.

2.1.4.3 Cost structure

It is important to carefully classify costs (fixed and variable costs) so that the business can analyse and improve its performance.

Within a CE, it is useful to explore potential costs linked to niche CE areas and identify cost savings arising from CE practices such as equipment sharing, recycled material purchases or supply and transport costs from abroad.

2.1.4.4 Revenue streams

The business must have an accurate idea of the importance of each revenue stream and which one best matches a particular customer segment and channel. Streams might include asset sale, usage fees, subscription fees, licensing, etc.

2.1.5 Test the product or service

Before fully implementing the modalities above, the entrepreneur needs to test key variables:

- Problems and needs identified should be tested by talking to experts in the field or by interviewing key stakeholders.
- Participation of key stakeholders should be verified through diverse types of consultations and meetings on the business objectives where multiple stakeholders can provide a good measure of their willingness to engage.
- Customer segments should be validated through focus groups, interviews, debate or conversations to check their needs, aspirations, gains and pains, etc. Focus groups, interviews, debates, and conversations could be used including on social media.
- Value proposition needs to be tested by building a prototype at small-scale or semi-functional versions of the services/products. Here, participants' reaction to the test might include satisfaction level, feedback, and curiosity/ demand for more.

Once hypotheses on the different variables have been tested and validated, the service/product has to be scaled up from prototype to the optimal market size where viability is attained. To test the circular product or service, the business can mobilise existing platforms for entrepreneurs and green products such as FBOA[3] , SHTA[4] and SCCI (please refer to Annex 6 for more details).

2.1.6 Mobilise tools for implementation

When the business model is validated, implementation of the modalities presented above can be facilitated by various tools. **First** is establishing a financial plan with income statements, balance sheets and cashflow projections, and a funding plan identifying traditional investors and banks as well as other funding mechanisms such as crowdfunding, financial cooperatives, micro-credits, ethical banks. **Second** is having a legal management plan to choose the best-fitting legal form according to the needs and business model. **Third** is setting a roadmap to foresee the progress of the business from year 0 to the medium and long-term. **Fourth** is to have an operation and management plan which dictates how operations are performed and managed by staff and by assigning roles and responsibilities and setting a schedule. Tools used need to be adapted according to the CE business model adopted.

To find the appropriate tools, entrepreneurs can refer to existing governmental departments and companies that provide assistance to businesses such as the Seychelles Fishing Authority, the Department of Tourism, the ESA and the SNPA. (Please refer to Annex 4 for more details).

2.1.7 Measure impacts and improve

Effectively measuring environmental and social impacts is essential to CE businesses. In addition to measuring how the business is doing regarding the achievement of objectives and mission, environmental indicators are needed to assess environmental performance. Environmental indicators should be used such as water consumption, material use, waste generated per service or product, or other CE related indicators. Constantly improving the business is key to achieve the circular economic objectives. Common areas of improvement include levels of participation of stakeholders, communication and marketing to incentivize customers, improve environmental performance, ensure green procurement and increase environmental awareness amongst the public.

2.2 Transitioning to a CE business

2.2.1 Map your impact and set priorities

Learn how to bring together an internal "sustainability team" to set objectives, define targets, review your environmental impact and decide on priorities. In this process, you need to evaluate impacts regarding natural flow use and material stock management. In the Seychelles, key environmental impacts of the economic sectors include marine pollution, waste generation, loss of biodiversity including animal species loss.

[3] Fishing Boat Owners Association (a legal entity but not all boat owners are members of this association)
[4] Seychelles Hospitality and Tourism Association (regroups the tourism sector service providers)

2.2.2 Choose indicators and understand data needs

Identify indicators that are important for your business and learn about what data should be collected to help drive continuous improvement. To assess the circularity of your business, you can use CE related indicators such as: use of renewable energy, greenhouse gas intensity and energy intensity, intensity of your residuals, releases into the air and water.

2.2.3 Measure inputs used in production

Identify how materials and components used into your production processes influence environmental performance. Businesses can also measure CE related performance including: material consumption, resource extraction, renewable energy consumption, waste generation, import of inputs, non-renewable materials, restricted substances, recycled or reused materials. Businesses can check the availability of recyclable materials and monitor availability of waste materials/recycled materials as inputs into production process.

2.2.4 Assess the operations of your facility

Consider the impact and efficiency of the operations in your facility. Residual waste generation and excess material that can be phased out and managed more efficiently going forward (e.g. water consumption, energy intensity, greenhouse gas generation, emissions to air and water, waste generated). Efforts to improve production and material use efficiency toward circularity while reducing waste creation must be ongoing.

2.2.5 Evaluate your products

Identify factors such as energy consumption in use, recyclability and use of hazardous substances that help determine how sustainable your end product is. Businesses can use CE related indicators such as: recycled/reused content of your products, recyclability of your products, renewable materials used in your products, Non-renewable materials used in your products, restricted substances contained in your products, energy consumption in using your products, greenhouse gas emissions from the use of your products. You can also evaluate the possible incentives to recycle and engage customers to return products to possibly keep materials in cycle.

2.2.6 Understand your results

Learn to read and interpret your indicators and understand trends in your performance. Businesses can focus on CE related indicators that align with business models suggested.

Entrepreneurs and businesses can refer to existing governmental departments and companies that can provide assistance in this process such as the Public Utilities Corporation (PUC), the Seychelles Energy Commission, the Seychelles Climate Change Agency, the LWMA (Landscape and Waste Management Agency), the SBS (Seychelles Bureau of Standards), the SNPA (Seychelles National Parks Authority), the SFA (Seychelles Fishing Authority) and the Department of Environment.

2.2.7 Take action to improve your performance

Choose opportunities to improve your performance and create action plans to implement them. CE businesses should focus on CE related indicators that align with business models suggested, and stay up to date with new arising sustainable opportunities and drive ongoing progress by pinpointing areas of improvement or non-circular practices.

2.3 Circular Business models for entrepreneurs

2.3.1 Circular design

This CE model relies on the following elements:

- Circular **product design**: use recyclable materials for goods and packaging that allow for a circular system and **local supplies** at a maximum
- Product/service design and provision: **access over ownership** and product service systems
- Local supplies and local demand for service/good
- **Economy of functionality** (rent resources rather than buy and own them)

There are companies that operate based on some form of circular design though their operations are not formally classified as CE. A number of them are illustrated in Annex 5.

2.3.2 Optimal material and resource use

To adopt this model, the following activities can be undertaken:

- **Understand value** of waste materials and engage in opportunities from materials
- **Buy recycled materials** and reduce input material costs
- **Target recyclable and sustainable materials** and pioneer in industrial waste valorisation
- **Introduce industrial symbiosis**; internalise a maximum of production steps within the company on the same site to reduce transport costs. This also helps with waste creation as all accrues on the same site, making recycling or reusing easier since larger amounts hold more potential
- **Redefine retail**; skip retailers by directly interacting with consumers. Simplifies recycling practices, understanding of consumer behaviour and increases revenue
- **Inspect daily practices** to identify non-sustainable production practices such as use of single use plastics, equipment and garment
- **Adopt a closed-loop process**; use residual outputs and by-products as input for other production processes
- **Set up internal target rates** to increase recycling rates and encourage sorting to improve employee understanding of a circular economy and its benefits

There are very few companies that optimised resource use by functioning solely with renewable and recycled materials as input. They are illustrated in annex 5.

2.3.3 Value recovery

This CE model relies on the following elements:

- **Reuse and recycle:** Introduce ways to keep waste materials within the company and the production cycle; Increase material use efficiency
- **Repair and recondition:** produce goods and services to last (quality over quantity) and provide service to repair and refurbish products and services

- **Remake** products that did not meet standards and were considered waste
- **Consumer awareness:** inform customers of recycling and repair opportunities to incentivize closed-loop material use while explaining competitive advantage of your service/product compared to non-circular business models

There are very few companies that maximise the utility and value of some of their materials within their production cycle and reach higher production process efficiency leading to a minimized waste creation, as illustrated in annex 5.

2.3.4 Collaborative economy

To adopt this model, the following activities can be undertaken:

- **Group businesses** that use similar materials to share transport supply costs and open channels to trade materials between firms
- **Foster cooperation;** exchange good practices and learning experiences between companies to accelerate transition toward circularity
- **Introduce a sharing economy:** collaborate with other businesses to build expensive infrastructure or purchase equipment to improve efficiency of usage (ex; cooling units, trucks, sorting site, …)

There are very few companies that operate on the basis of a collaborative economy and exploit all potential side products and collateral uses that accrue during their production. Additionally, equipment and material sharing are maximised through excessive industrial networking (Please refer to Annex 5 for key examples).

3 Annexes

Annex 1: Types of laws and policies in Seychelles relating to CE

Renewable Flow Management	Environmental protection/ Biodiversity Conservation	✓	Environment Protection Act 2016 (No. 18 of 2016) (2016) Petroleum Mining (Pollution Control) Act (1976 then 2012) Wild Animals (Whales Shark) Protection Regulation (2003) Seychelles' National Biodiversity Strategy and Action Plan 2015-2020. (2015) 2012–2020 Seychelles Sustainable Development Strategy The Blue Economy Strategic Policy (Road Map) 2018-2030
	Fisheries management	✓	Fisheries Act (No. 20 of 2014). (2014) Fisheries Sector Policy and Strategy 2019 (2019)
	Forestry management	✓	Forest Reserve Act (1976)
	Protected Areas	✓	National Parks and Nature Conservancy Act (1986) Seychelles' Protected Areas Policy (2013)
	Water management	✓	Seychelles Water Supply Development Plan 2008-2030
	Renewable Energy	✓	Energy Act, 2012 (Act 11 of 2012) Proposal for Energy Policy of the Republic of Seychelles, 2010 – 2030
Stock Management	General waste management	✓	Seychelles National Waste Policy 2018-2023)
	Solid waste management	✓	Solid Waste Masterplan for Seychelles (2020-2035)
	Recycling	✓	Seychelles National Waste Policy 2018-2023
	Plastic Bag Ban/ Phase out	✓	Environmental Protection Act 2016 prohibiting the import, manufacture, distribute, or sell of Plastic bags, plastic utensils, and polystyrene boxes

Annex 2: Existing awareness raising initiatives and campaigns towards CE

Initiative name	Description of activity	CE aspect addressed	Contact
LWMA Clean-up campaign	Periodical clean-up campaign involving the public	Waste reduction	Landscape & Waste Management Agency Address: PO Box 1153, English River, Mahe Phone number: +248 432 43 34 Fax: +248 461 06 46

Annex 3: Examples of companies doing CE related activities in waste management

CE aspect	Company	Description of activity	Link or Contact
Collection	WASTEA	Collection of different types of waste	http://www.wastea.sc/waste-management-services-seychelles/
Sorting	• METALUCO • SAMLO	Collection, processing and exporting of scrap metals, plastic and car batteries	• METALUCO PTY LTD, Avenue D'Arhoa, Providence Industrial Estate Address: P.O. Box 247, Mahe, Seychelles, Email: metaluco@seychelles.sc • Samlo & Sons, Provdence Industrial Estate Email: samlogroup@intnet.mu. Phone number: +248 51 69 18
Treatment	LWMA	Crushing and disposing	Landscape & Waste Management Agency Address: PO Box 1153, English River, Mahe Phone number: +248 432 43 34 Fax: +248 461 06 46
Recycling and disposal	• SoScience • METALUCO • SAMLO	Conversion of plastic into oil Exporting scrap metal and car batteries	• https://www.soscience.org • metaluco@seychelles.sc • samlogroup@intnet.mu.

Annex 4: Sectors to foster CE and related key stakeholders

Key sector	Identified key stakeholders	Relevance of the stakeholder
Fisheries	SFA	Monitors the fish stocks and issues licenses
	FBOA	Coordinates local fishers
	Department of Blue economy	Coordinates sustainable use of marine resources across sectors
Tourism	Seychelles National Parks Authority (SNPA)	Regulates and maintains the marine parks
	Department of Environment	Responsible for policy issues, plans and strategies for the environment
	Department of Tourism	Responsible for policy issues, plans and strategies for tourism
	Seychelles Hotel and Tourism Association (SHTA)	Coordinates and represents local hoteliers and other service providers in tourism
Manufacture	Seychelles Licensing Authority (SLA)	Delivers licences and ensures operational compliance
	Seychelles Chamber of Commerce and Industry (SCCI)	Coordinates and be central representative of the local business communities
	Seychelles Bureau of Standards (SBS)	Sets and safeguards quality and standards
	Enterprise Seychelles Agency (ESA)	Coordinates and supports the development of micro and small enterprises/businesses
Agriculture	Seychelles Agriculture Agency (SAA)	Enhances the national food and nutrition security and to provide goods and services to the food producing entrepreneurs.
	Seychelles Farmers Association (SEYFA)	Self-empowerment for a more profitable and sustainable agriculture, and strengthening the place of farmers in the food chain. To organise, promote and develop farming at all levels in Seychelles

Annex 5: Key examples of companies in the Seychelles operating under CE business models

Business model	Company	Activity	Website link or Contact
Circular design	Seychelles Breweries	Implementing a returnable glass bottle scheme to be recycled and reused	https://www.diageo.com/en/our-business/where-we-operate/africa/seychelles-breweries/sustainable-development/
Optimal material and resource use	Indian Ocean Tuna	Implementing a tuna fish processing that uses the whole fish including oil extraction from heads and animal feed from wastage	www.thaiunion.com/en/about/company/subsidiary/350/indian-ocean-tuna-limited
Value recovery	Ocean Basket and JHL Group (Pty) Ltd in collaboration with purse seiners and other local fishermen	Processing by-catch from tuna vessel into fillet, steak, salted	https://www.facebook.com/Ocean-Basket-pty-ltd https://www.facebook.com/Amirante-Fisheries
Collaborative economy	SAMLO and in collaboration with LWMA and other waste generating commercial sectors	working with local and foreign partners to export waste like scrap metals and car batteries	Contact SAMLO: samlogroup@intnet.mu. Phone number :+248 251 69 18

Annex 6: Platforms or entities that can support CE-related activities

Name of entity	Website
Enterprise Seychelles Agency	http://www.esa.gov.sc/
Seychelles Bureau of Standards	https://sbs.sc
Seychelles Chamber of Commerce and Industry	www.scci.sc
Seychelles Hospitality and Tourism Association	www.shta.sc
Seychelles Licensing Authority	http://www.sla.gov.sc/
Seychelles National Parks Authority	www.snpa.gov.sc
Sustainability for Seychelles	http://www.s4seychelles.com/
The Fishing Boat Owners Association	www.seychelles-hookandline-fishermen.org
Yes consulting	https://bit.ly/3x9a3HN

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Blue Tower, 3rd floor, Rue de l'Institut,
Ebène, Mauritius
Tel: (+230) 402 61 00
www.commisionoceanindien.org