



Federal Ministry  
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and Development



# Reducing the input of plastic litter into the ocean around Cozumel

Applicability and effects of selected instruments

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**List of abbreviations**

CAMAR	Centro de Acopio de Materiales Reciclables (Recyclable materials collection centre)
CDB	Caribbean Development Bank
CIM	Centre for International Migration and Development
EPR	Extended producer responsibility
GEPTE	Grupo Empresarial por el Turismo Europeo (Business Group for European Tourism)
GDP	Gross domestic product
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
NGO	Non-governmental organisation
PASA	Promotora Ambiental SAB de C.V.
PAYT	Pay as you throw
PET	Polyethylene terephthalate
SDG	Sustainable Development Goals
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
USD	United States dollar
XCD	East Caribbean dollar
Zofemat	Zona Federal Marítimo Terrestre (Federal Maritime Land Zone)

# Executive summary

## Background

Every year, many millions of tonnes of litter end up in the world's oceans, turning the sea into the world's biggest refuse dump and generating a host of environmental, economic, health and aesthetic problems. Land-based sources account for up to 80% of marine litter and include tourism, sewage outflows, poor waste management and illegal landfills as well as a lack of public awareness. International approaches like the Honolulu Strategy target the reduction of marine litter, the conservation of biodiversity and increased resource efficiency.

Plastic materials, especially plastic bottles and plastic bags, are among the most common items retrieved in marine litter monitoring programmes. Plastic is, after all, a very long-lasting material and is therefore a key pollutant. This project was launched by GIZ as part of its Concepts of Sustainable Waste Management sector project in order to contribute to reducing marine litter through the introduction of selected regulatory or economic instruments that promote the reduced use or reduced littering of relevant materials. Based on recent studies, as well as on discussions with partner countries, GIZ has decided to focus on reducing plastic bottle litter affecting the Caribbean islands of Cozumel (adjacent to and part of Mexico) and Grenada. This study focuses on the island of Cozumel.

## Baseline information on Cozumel

Cozumel, a flat island with a total area of 647 km<sup>2</sup>, belongs to the State of Mexico and has around 81,000 inhabitants. Some 4.5 million tourists visited Cozumel in 2012, mainly to explore its attractive nature: its landscapes, coasts and seas. 4 million tourists only visit the island during the day, while the remaining are stay-over tourists.

The mixed waste produced on the island is currently collected by a well organised collection service with a collection rate reaching nearly 100%. Separate waste collection is already carried out by a government owned company in some parts of the island. However, only few make use of this service. In addition, some private collection companies participate in the collection of recyclables, buying a high share of it from the informal sector established in Cozumel. Infrastructure for the collection and compaction of plastic bottles is already available. Currently around 15% of plastic bottles are collected separately whereas the rest of the bottles, together with the mixed waste, is disposed of in a state of the art landfill.

To cover the costs of waste collection, waste management fees have been introduced. They are relatively low for households (27 USD/year) and relatively high for commerce (between 200 USD/year and 5,300 USD/month). While the operating costs of Cozumel's waste management system are fully covered – indeed, it currently subsidises other government activities – it is failing to achieve the required levels of source separation, recycling and recovery

According to interviewees, littering is not an ongoing practice of local establishments; rather, it mostly results from the unmanaged litter that locals and tourists leave at the beach and that the beach cleaning programmes fail to pick up. It is estimated that up to 2% of plastic bottles remain unmanaged and that around 50% of these enter the sea every year.

## Selecting an economic instrument

Drawing on the baseline information, different possible policy instruments were evaluated in terms of their practicability for reducing the amount of plastic bottles that end up in the sea around Cozumel. Two of these instruments were subsequently pre-selected: (1) a deposit-refund system in tandem with a fee for importers and (2) a scheme for the separate collection of plastic bottles at source delivered along with incentives for local people.

Most stakeholders favoured the deposit-refund system. The legal establishment of a deposit-refund system was, however, seen as problematic given that Cozumel does not have the same revenue-raising powers as a federal state.

Therefore, it is proposed to introduce and promote a separate collection system via collection points, considering the currently established infrastructure. Collection companies would receive tax reductions and/or be paid by the local authority for the amount of bottles collected if they establish a certain number of collection points. The payments should be high enough to enable collection companies to forward a certain amount per bottle to people handing in empty bottles. As a consequence, people will be incentivized to return empty bottles to collection points. To make the system commercially viable, an increase of the waste management fee for households or the introduction of a recycling fee of the same height and/or a tourist environmental fee could be introduced by the local government. The income generated by the additional fees would be channelled into a special waste management fund managed by the local government. It is crucial to accompany the implementation of the instrument with awareness-raising campaigns that not only involve the tourism sector, but also seek to convince sector actors of the instrument's benefits.

It seems unlikely that the proposed instrument will be implemented within the next two years as the incumbent government will be seeking re-election in 2016. Therefore, short-term voluntary and administrative initiatives with the private sector are initially proposed, which would smoothe the way for subsequent mid-term activities. These initiatives comprise separation programmes with the commercial sector, awareness raising campaigns and the placement of well-designed and covered waste bins.

## Conclusion

The promotion of a separate collection system with deposit-refund elements and accompanied targeted awareness raising campaigns will contribute to reducing the amount of plastic bottle waste that ends up in the sea around Cozumel and, in so doing, would contribute to protecting the island's marine environment. It has been estimated that incomes will likely outweigh expenses, depending on the type of fees introduced. The expanded collection system with deposit-refund elements will create further economic and social advantages, such as new jobs and a cleaner environment for Cozumel.

In a long-term perspective, it should be evaluated whether a real deposit-refund scheme could be set up and how the introducers of plastic bottles could be made responsible for managing plastic bottle waste. As this kind of activity would be easier to conduct at the national level, a dialogue with the national and state governments should be initiated.



PET bottles collected in a trailer

# 1. Introduction

## 1.1 Background

Marine litter is a growing problem that poses an increasingly serious threat to the environment. Every year, many millions of tonnes of litter end up in the world's oceans, turning the sea into the world's biggest refuse dump and generating a host of environmental, economic, health and aesthetic problems. Marine litter consists of items that have been deliberately discarded, unintentionally lost or transported by winds and rivers into the sea and onto beaches. Land-based sources account for up to 80% of marine litter and include tourism, sewage outflows, poor waste management, a lack of public awareness as well as missing waste management infrastructure and illegal or poorly managed landfills. The main sea-based sources for marine litter are shipping and fishing.

Apart from things like cigarette butts, plastic items – especially bottle caps, plastic wrapping and packaging waste – are among the most common objects observed in the majority of marine-litter monitoring programmes that study the region's seas. The available data show that plastic bottles and bags are two of the main forms of plastic packaging recorded in marine litter studies. Plastic persists for several hundred years and is gradually broken down into smaller pieces. It therefore seems likely that the quantity of microplastics in the environment will continue to increase even if inputs of larger refuse items begin to decline (Galgani et al 2010). As such, these microplastics are and will be a key pollutant in our seas.

The individual behaviours and attitudes of local people or tourists in coastal areas or of those living near inland waterways – not only relating to disposal, but also to consumption – have often been identified as the factors that most influence the prevalence of littering. Inappropriate waste collection and treatment infrastructure or sewerage systems as well as administrative capacities are other important factors.

It is commonly coastal areas that are most affected by the burden of waste in the sea. Small islands are particularly affected because their limited land mass exacerbates complications related to waste quantities and poor waste management. In general, the vast majority of island dwellers live within 10 kilometres of the coastline. As these communities often do not produce sufficient waste

to attract the kind of investment needed to fund proper waste management facilities, their refuse is not properly handled and can end up in the ocean. Small islands depend very highly on tourism. Reducing the amount of litter in the surrounding environment will improve these islands' potential as tourist destinations and, as a result, will generate higher employment and incomes.

The Honolulu Strategy, launched by the United Nations Environment Programme (UNEP) in March 2011, aims to develop concrete solutions for the reduction of marine litter in order to decrease pollution, conserve biodiversity and increase resource efficiency. In light of the Honolulu Strategy, the recommendations of Rio+20, the work of the UNEP Global Partnership on Marine Litter, the proposed Sustainable Development Goal (SDG) target on marine pollution, and the activities proposed by the Caribbean Development Bank (CBD), the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH has committed to engage in tackling this pressing issue.

Under the aegis of its Concepts for Sustainable Waste Management sector project, GIZ aims to contribute to finding solutions through the analysis and development of:

- prevention strategies that limit the creation of marine litter through, for example, awareness-raising measures and national regulatory or economic instruments that promote the reduced use or reduced littering of relevant materials;
- improved integrated solid waste management at the local level.

Concepts for Sustainable Waste Management is focusing its efforts on analysing the applicability and effects of selected policy instruments that can contribute to reducing the input of litter into the oceans around selected partner countries.

A recent study carried out by the European Commission (de Vrees, Smith 2013) indicates that making general modifications to (a) recycling targets for waste or packaging waste and (b) landfill restrictions has a limited impact on the reduction of marine litter. Another study looking at the largest loopholes existing within the packaging

cycle (BiPRO 2012) targeted specific waste streams (namely plastic packaging waste) and produced specific solutions and preventative measures for reducing marine litter. Both these studies consider targeted prevention measures on plastic bottle and bag litter to be particularly relevant.

Based on these studies, on its discussions with partner countries about their key issues in dealing with marine litter and on assessments of the most problematic plastic waste fractions, GIZ has decided to focus on reducing plastic bottle litter affecting the Caribbean islands of Cozumel (adjacent to and part of Mexico) and Grenada. This study focuses on the island of Cozumel.

Cozumel is a tourism hotspot, especially for cruise ship tourism. The large numbers of visiting tourists generate large quantities of waste that present a major challenge for local waste management and put great pressure on the island's marine and terrestrial biodiversity. As such, policy instruments focusing on reducing the amount of plastic bottle waste that ends up in the sea must be tailored to the island's own particular circumstances.

Note that this study focuses on PET drinking bottles. Herein, these are mainly referred to as simply 'plastic bottles'.

## 1.2 Objectives

The purpose of this case study, which was developed in coordination with GIZ's Urban Industrial Environmental Management programme in Mexico, is to inform (primarily municipal) decision-makers in Cozumel about the benefits of instruments designed to prevent litter and especially plastic bottles from entering the sea. Accompanying the presentation of these potential instruments are proposals and guidance regarding their appropriate design.

When seeking to introduce appropriate instruments for reducing marine litter, particularly that of plastic bottles, it is essential to:

- identify suitable instruments for reducing plastic bottle littering that are tailored to the local context and respect local conditions and requirements;
- analyse the applicability and potential economic and environmental effects of the measures proposed for plastic bottles;
- provide recommendations outlining (a) the design and introduction of an instrument for reducing plastic bottle littering that is adapted to the local context and (b) how to discuss the recommendations with partners.

This study was carried out with the support of a national expert and the Department for Sustainable Development of the Cozumel Technical Secretariat.





## 2. Methodology

The study was divided into four stages:

1. Baseline study performed by a national consultant in Cozumel.
2. Desktop research carried out by an international consultant.
3. Field visit where the international expert visited Cozumel and consulted with relevant stakeholders.
4. Analysis of received information, and reporting.

For the baseline study, the national expert collected information from existing literature and held discussions with stakeholders on Cozumel's current situation in terms of waste management in general and of plastic bottle waste management in particular.

The desktop research carried out by the international expert identified potential policy instruments for reducing the plastic bottle waste liable to end up in the local sea. In addition, the information provided by the national expert on the situation of plastic bottle waste and its management on the island was used in the identification and evaluation of policy instruments (see Annex 2). Two instruments that were deemed suitable for deployment in Cozumel were subsequently selected and a set of preconditions for the successful introduction of these instruments on the island was developed.

During the field visit to Cozumel, relevant stakeholders were invited to meetings and interviews to discuss the policy instruments and preconditions and to select one of the two instruments for further development.

Based on the information received, the most suitable instrument was worked up into a recommendation for an approach to reduce the amount of plastic bottle waste entering the marine environment, which was then presented to decision-makers in Cozumel. The economic, environmental and social impacts of this recommendation were, as far as possible, also assessed.



A Cozumel shoreline

## 3. Overview of the current situation

This chapter provides an overview of the key aspects of current approaches to plastic bottle waste management in Cozumel. Detailed and relevant background information on waste management in general and plastic bottle waste management in particular in Mexico and Cozumel (a municipality of the Mexican Federal State of Quintana Roo) is presented in Annex 1.

### 3.1 Country profile

Cozumel, located 23 kilometres to the east of the Yucatán peninsula, is Mexico's largest island and Cancun, the peninsula's tourist hub, lies about 72 kilometres north of Cozumel. Most of Cozumel's population lives in the island's coastal capital city, San Miguel. Around 70% of the low-lying island is covered by low deciduous and medium sub-deciduous forest. There are no superficial water currents. The island has around 81,000 inhabitants (according to the 2011 census) with some 12,500 of these constituting its floating population<sup>1</sup> (according to average figures recorded in 2012).

Economic activity in Cozumel is based around tourism. Peak season begins in November and ends in April. Cozumel is one of the most visited tourist destinations in Mexico, with an estimated 4,545,939 visitors recorded in 2012. However, the great majority of these visitors are cruise ship and ferry passengers who come to the island for under a day (visits of approximately 10 to 12 hours) and do not stay overnight. The greatest pulls for tourists are the island's pleasant climate, interesting biodiversity and landscape, and high level of underwater visibility. Cozumel has 11,897 hectares of coral reef in its marine area of influence and 2,987 hectares of mangrove swamp. These two ecosystems are the island's most important natural resources, housing a great variety of endemic and commercial species. Cozumel is, however, highly vulnerable to weather events like hurricanes and powerful tropical storms that arise towards the end of summer.

### 3.2 The current status of Cozumel's waste management system

The coverage of municipal waste collection in Cozumel is officially stated to reach nearly 100%. The waste management system is based on national, state and municipal legislation (for more details, see Section 2.1 of Annex 1) and comprises a mixed collection system of mixed waste and recyclables. Waste management is carried out by different bodies: units of the local government, private companies, and the informal sector.

Servicios Públicos Municipales, the municipal refuse collection service, collects mixed waste from tourist areas and some residential areas and then transfers the collected waste to larger bins. A private company, PASA, is in charge of collecting waste in other areas and operating the overall waste transportation and disposal service. PASA has a 20-year contract in place with the local government and is paid according to the number of tonnes of refuse it collects. PASA also provides disposal services at its disposal site, which complies with national environmental regulations.

CAMAR, a company owned by the local government, is responsible for collecting recyclables. It has established daily collection routes that cover specific zones, including the tourist and commercial areas and some residential areas. Waste separation bins are not provided. Instead, households, businesses and tourism-based firms in the collection area stay informed about collection days and routes, separate their recyclables and place them outside their property for CAMAR to pick up. CAMAR then collects the recyclables, takes them to its collection centre, sorts them out and compacts them.

There is a local market for plastic bottles. Some private companies, mainly Baasha and El Cedro de la Península, buy up used plastic bottles from households, businesses and the informal sector and then sell them to recycling companies located mainly in Mérida on the mainland. The participation of private companies in the collection system has been further facilitated by the increasing emergence of the informal sector (*pepenadores* or waste pickers). The *pepenadores* collect PET bottles from public and commercial bins and sell them at around USD 0.26 per kilogram. Over 50% of the plastic bottles delivered to

<sup>1</sup> 'Floating population' refers to people who stay in Cozumel for limited time only (e.g. tourists).

private companies come from the informal sector, followed by around 30% from businesses and institutions, and roughly 20% from households. None of the companies provides a formal collection route system, and permits to establish collection points have not been granted. Unlike the private collection companies, CAMAR is not able to pay for recyclable materials. As new recycling companies have appeared over recent years (and thus a market for informal collection has emerged) CAMAR's collection rates have dropped sharply – so much so that the local authority now subsidises part of its operations. Currently CAMAR sells most of its recyclable materials to Baasha, a local private recycling company.

Federal and municipal programmes for beach cleaning are also in place that work in collaboration with PASA. Once the refuse is collected from the beaches, PASA steps in to dispose of the waste, which it officially does not separate. The plant and materials required for these programmes comprises collection trucks, bags and collection equipment.

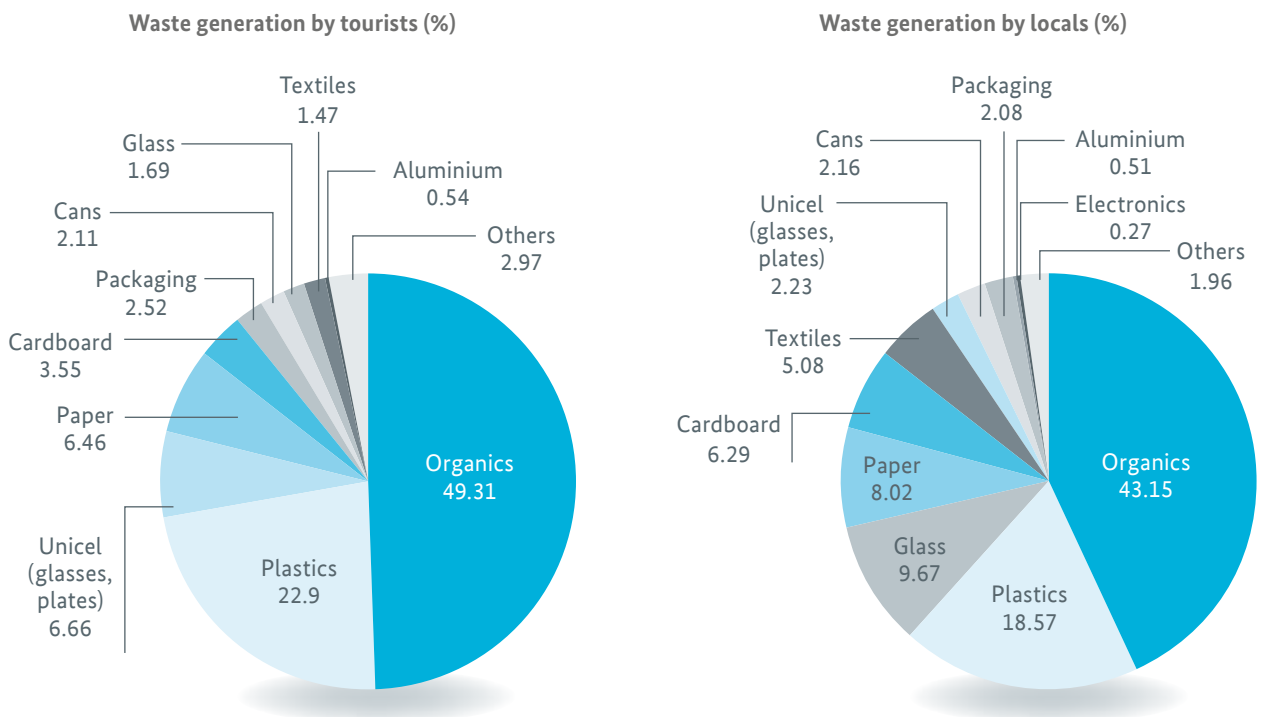
The informal sector has grown considerably over recent years. Some actors have asserted that this is due to the economic crisis, which caused many people to lose their jobs and thus resort to collecting recyclables to earn money. Local recycling companies state that the informal sector is, for them, an essential source of PET bottles.

Interviews also revealed that, for a while, informal sector waste collectors were persecuted by the local police and could be sent to jail or have their bicycle confiscated if they were caught separating and collecting recyclables. No information is available on how many people are involved in the informal recycling sector.

**Waste composition**

In total, the waste generated by locals and tourists in Cozumel in 2011 comprised the following:

Figure 1: Composition of waste generated by tourists and locals in Cozumel



Source: State Government of Quintana Roo and GIZ (2012), p. 17.

Plastics are the second largest waste stream in Cozumel. In 2011, 3,459.70 kg of PET bottles were collected each day. Of this, 372.08 kg were produced by the tourism sector and 3,087.62 kg by the local population, which represents 2.74% of the total amount of solid waste generated by the tourism sector and 3.65% of the total generated by the local population. An interview held with PASA's general manager revealed that the amount of solid waste generated in 2011 has changed little over the intervening years, so these figures can still be safely used to estimate the composition of waste in 2015.

### Main sources of marine litter in Cozumel

According to interviewees, ocean littering is not an ongoing practice of local establishments; rather, it mostly results from the unmanaged litter that locals and tourists leave at the beach and that the beach cleaning programmes fail to pick up. It is estimated that the amount of plastic bottles ending up in the ocean is small, compared to the amount in circulation. However, increases in the number of discarded plastic bottles correlate with the island's tourist seasons – i.e. when tourist numbers spike in the high season, public bins in tourist areas are found to contain many more plastic bottles than in the low season. It can therefore be deduced that the risk of plastic bottles ending up as marine litter is higher between November and April.

Furthermore, it is absolutely essential to inform the public about how to separate and manage their waste. While the operating costs of Cozumel's waste management system are fully covered – indeed, it currently subsidises other local government activities – it is failing to achieve the required levels of source separation, recycling and recovery. Additionally, marine litter is not considered to be an urgent political priority.

### 3.3 Lifecycle of plastic bottles

No plastic bottles are produced on Cozumel. The majority of plastic bottles are imported onto the island by the Coca-Cola Company. As no accurate data are available, the known amount of waste plastic bottles collected is estimated to equal the number of plastic bottles imported and sold. In total, it is estimated that 1,288 tonnes of

plastic bottles are placed on Cozumel's market each year. Cozumel does not export any waste plastic bottles internationally. Some 15% of all post-consumer plastic bottles are separately collected and transported to the Mexican mainland for recycling, 83% are disposed of at the landfill and 2% remain unmanaged. The latter group presents the risk of potentially ending up as marine litter.

### 3.4 Economic instruments in operation

The main economic instruments that have already been introduced in Cozumel are monthly and annual waste management fees. From 2014 to date, the following fees have been charged: individual households at USD 27 per year; businesses at USD 200–670 per year; and hotels and supermarkets at up to USD 5,300 per month. According to the accountability department, commercial tariffs are established according to the sector of the business in question. For example, supermarkets pay a higher tariff than coffee shops due to the nature of their commercial activities and the amount of waste they generate (pay-as-you-throw principle).

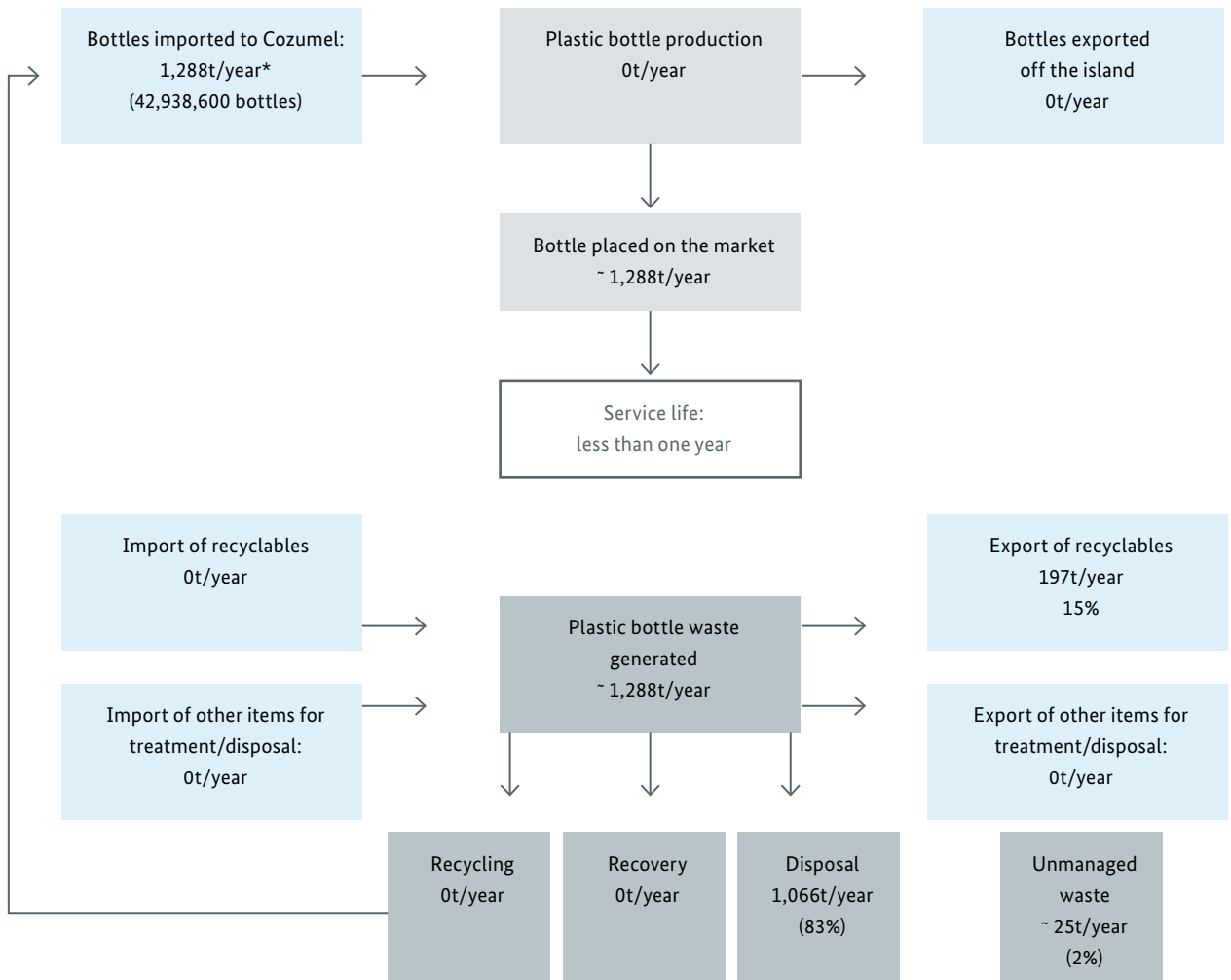
### 3.5 Actions undertaken to improve solid waste management

Four initiatives undertaken by different actors in Cozumel have sought to reduce marine litter and increase public awareness about proper waste management:

1. *Reciclando Basura por Alimentos* (recycling rubbish for food) is a successful state-government campaign based around a series of well-publicised local events to promote the collection and handing in of recyclables, including plastic bottles, in exchange for food.
2. In December 2013, a pilot awareness-raising campaign to promote waste separation was carried out, with CAMAR undertaking to collect the separated waste in pre-defined areas. The project was, however, cancelled because (a) the informal sector picked up the recyclables before CAMAR was able to do so and sold them and (b) people had more interest in holding on to their recyclables so they could exchange them in the above-mentioned Recycling Rubbish for Food programme.

3. The private recycling company Baasha worked with schools to install separation bins. The funds raised from the plastic bottles collected in the recycling bins was then used to fund small projects. However, the programme was discontinued due to a lack of awareness among school staff and a lack of knowledge about the importance of recycling.
4. Zero Tyres is a take-back programme for vehicle tyres where CAMAR, in cooperation with a company on the mainland, pays the costs of transporting used tyres off the island and is given ownership of them in return.

Figure 2: Life cycle of plastic bottles in Cozumel



Source: Tellez, 2015

\*t = tonne

## 4. Policy instruments

### 4.1 Pre-selection of instruments designed to reduce the amount of plastic bottle litter that ends up in the sea around Cozumel

Different policy instruments offer different waste management outcomes. To meet the aims of this project, a range of possible policy instruments and additional measures were considered for further evaluation. Some of the instruments aim to reduce plastic bottle waste generation and some to install proper treatment systems, while others directly aim to reduce the amount of plastic bottle waste entering the sea. That said, all of these approaches ultimately aim to reduce the amount of plastic bottle waste that ends up in the sea.

The evaluation of the policy instruments was carried out by assessing the information provided by the national expert on the island's current waste management situation (see Annex 1). An overview of the possible policy instruments and further measures as well as an evaluation of their feasibility in light of the current situation in Cozumel is provided in Annex 2.

The information collected by the national expert and provided by the stakeholders indicates that marine littering of plastic bottle waste is not the major problem in Cozumel. Although some waste ends up as litter, regular intensive clean-up activities are already being carried out, which further reduce the input of refuse into the sea. According to stakeholder information, most of the plastic bottle waste collected on beaches originates from other Caribbean nations like Costa Rica, Haiti and Jamaica (evidenced by the labelling and state of degradation of the bottles washed up). The proportion of unmanaged plastic bottle waste that is neither collected nor disposed of is estimated to be very low (less than 2%).

However, plastic bottle use is very high in Cozumel (for further information see Annex 1, Section 2.1), and the majority of plastic bottle waste generated is disposed of at the local landfill because bottles are not separated out at source prior to collection. As such, instruments for reducing marine littering are still considered relevant, as are instruments for diverting plastic bottle waste from the landfill, which offer the co-benefits of saving valuable landfill space and raising funds from the sale of secondary resources. Based on the evaluation of current waste

management practices, two main policy instruments for reducing plastic bottle litter and increasing separate collection were selected for further development:

a. Extended producer responsibility (EPR) schemes

An EPR involves introducing a deposit-refund system accompanied by advanced recycling fees. These fees will possibly be applied as a *derecho*, which is not a real tax but rather a fee for a specific service that needs to be justified (remember that Cozumel is a municipality and thus has fewer revenue-raising options than a federal state).

b. Separate collection accompanied by financial incentives

This involves providing bags for the collection of plastic bottles for a small fee while setting monetary incentives for the separate collection of plastic bottles in these bags. These incentives can be generated by adjusting the charging system for waste management services, which would require reforming the island's current property-tax-based charging system.

Both of these options could also include glass bottles and other drinks containers and could be extended if required. These options – especially option a. – could involve the informal sector for collection, where feasible.

Other possible policy instruments to consider are the levying of a tourist environmental tax, the installation of a larger number of waste bins for plastic bottles and the provision of drinking fountains.



## 4.2 Outcome of the stakeholder consultation

To inform discussions about which proposed option to take forward, stakeholder consultations were carried out during the field visit to Cozumel.

### 4.2.1 The stakeholders involved

The consultations involved the following stakeholders/ stakeholder groups:

- local authorities (technical secretariat, legal department, urban development function, ecology department, head of government);
- private and public collection and recycling companies;
- waste management companies;
- NGOs involved in clean-up activities;
- the national parks and museum authority in Cozumel;
- the Director of Chankanaab National Park;
- the manager of the Mérida waste sorting facility and landfill;
- the tourism sector, represented in part by Karola Tippman (CIM).

Coca-Cola, as the main importer of plastic bottles to Cozumel and thus a key stakeholder in the discussions, was invited but unfortunately declined to participate.

### 4.2.2 Main outcome

Most of the stakeholders confirmed that a substantial amount of plastic bottle waste is found on Cozumel's beaches, but that this mainly comes from other islands (as mentioned in Section 4.1).

The main problem in Cozumel is deemed to be a lack of awareness about and incentives for separating waste for collection. People generally dispose of their waste in rubbish bins, but do not separate items when they do so. Although the separate kerbside collection of recyclables

has already been introduced in Cozumel and is carried out by a collection company owned by the local authority, this system only collected around 8% of post-consumer plastic bottles in 2011. The government-owned collection company, CAMAR, carried out a pilot project a few years ago that involved installing bins at different locations around the island for the separate collection of recyclables. However, all manner of waste was discarded in these bins, to the point that the project ended up being discontinued. This is perhaps not surprising given that the same issue was already occurring with CAMAR's 120 existing separation bins installed in key tourist areas. As such, it is important to develop strategies for incentivising and raising public awareness about separate collection, and to divert waste from ending up in landfill sites and, instead, reuse it.

It was mentioned that plastic bottles only contribute to about 3.7% of the municipal waste stream and that glass bottles (9.7%) and plastic bags (9.3%) are actually of greater concern when it comes to littering and proper waste management. Littering of plastic bottle waste does occur to a lesser extent, mainly due to the insufficient number of waste bins provided in a number of tourist areas, on the main beaches and in residential areas. Many clean-up activities are already being carried out on a regular basis and are financed by the local authority and federal government.

Due to the economic crisis, a strong informal sector has developed that collects recyclables from public bins and other places and then sells it to collection companies that offer between two and four pesos per kilogram. The number of people operating in this sector is not known, but their informal activities increased the rate of post-consumer plastic bottle collection from around 8% in 2011 to around 15% in 2014. This shows that attaching a value to the bottle does increase the separate collection rate. However, to further increase separate collection rates, the bottle's value should be also be increased and more collection points set up to make it easier for people to return used bottles.

The existing infrastructure of collection companies, including the informal sector, should be maintained, as many families depend on the income generated by the current collection system.

Most stakeholders agreed that the bottles should have a value attached to them in order to incentivise people to return them and not throw them away. To this end, a **deposit-refund system** for plastic bottles was discussed. Collection companies stated that they were willing and able to install further collection points for the return of empty bottles but that the local authority did not permit them to do so. Representatives of Cozumel Municipality were not able to provide specific reasons why permission had been denied in these cases. The collection companies presumed that fears regarding the theft of copper and other valuable metals might be the main reason for this and, accordingly, proposed installing non-metallic-item collection points in urban and tourist areas.

The legal establishment of a deposit-refund system was, however, seen as problematic given that Cozumel does not have the same revenue-raising powers as a federal state. The other critical point is that the importation of plastic bottles is dominated by one company, Coca-Cola, which was unfortunately not present to discuss the proposed instruments. A study has already been carried out at the national level in Mexico on the potential for introducing a deposit-refund scheme in the country (INECC and GIZ, 2012a). The study's conclusions for Mexico were, among other things, to introduce a tax for plastic bottle producers and to carry out intensive awareness-raising campaigns to increase the separate collection of plastic bottle waste.

Further **incentives** for collection companies, such as **reduced taxes** or **subsidies** depending on the amount of bottles collected, would enable collection companies to increase payments to anyone handing in empty bottles (paid by weight or number of returned bottles).

The introduction of **fees for plastic bottle importers** and/or **tourists** was also discussed. The income from these fees would be used to fund the collection companies' installation of more collection points and to enable the payment of a pre-defined per-kilogram or per-bottle rate (higher than the present one) to anyone handing in empty bottles. Importer fees were not deemed to be a feasible option because the local authority is not allowed to charge fees that might create market barriers for specific companies (in this case mainly Coca-Cola, which

imports around 90% of the plastic bottles that come into Cozumel). The introduction of tourist environmental fees could, on the other hand, be workable, as the fee charged to tourists would not be very high. The local authority did, however, have some reservations about how to set up systems for collecting fees from cruise ships, airports and ferry ports. Another possibility would be **increasing household waste management fees**, which are currently very low or **introducing recycling fees that would constitute a certain percentage of the household waste management fee**. This was assessed to be the quickest and easiest way to secure revenue from waste, although the income would not be as high as that collected from tourists. Wherever the fees are collected from, it is essential to ensure that all fee revenue is ring-fenced for waste management purposes.

An additional proposal relating to the introduction of the tourist environmental fee was to divert a large part of the income from this fee towards a newly established **sustainability fund** that could also be used to finance other kinds of projects for delivering sustainability.

All the stakeholders mentioned the need to establish a **local regulation** on waste management for Cozumel. Waste legislation exists already at the state level for Quintana Roo, but there is still no legislation in place specific to Cozumel. This legislation should include specific regulations on waste management, policy instruments, incentives and fines. When drawing up this detailed regulation, it would be helpful for the municipality to be guided by an expert.

With regard to the introduction of bags for the separate collection of plastic bottles at source, it was proposed that the waste management fee should not be reduced when bottles are separately collected but, rather, increased when bottles are not separately collected. This would, however, be very difficult to implement and control. Also raised were the 2011 proposals, put forward by a GIZ expert, to promote the separate collection of recyclables at source by distributing differently coloured plastic bags for different recyclables. However, the system did not get taken forward because the local authority did not want to commit to procuring the range of plastic bags required.



In this context, it was noted that a GIZ project on the prevention and management of waste in Cozumel was carried out in 2011 and that none of its proposed actions to improve the local waste management system has so far been implemented.

It was also mentioned that the **number of public waste bins** installed in highly frequented areas should be increased. Currently, the local authority and federal government are not permitting the installation of new public bins because many tourist beaches are located in protected areas and it is feared that more bins could attract animals and thus alter the local biodiversity.

All stakeholders agreed that **long-term campaigns** as well as **education and training** would be necessary to raise local people's awareness about saving resources and about the role the separate collection of recyclables plays in protecting the environment.

The introduction of **drinking fountains** in national parks was also discussed. The park manager stated that they already have plans to install drinking fountains in Chankanaab National Park and will begin putting them in this year.

### 4.3 Selecting the preferred instrument

The proposal, based on the outcomes of the stakeholder meetings, is to 'increase the value of the bottle' and, at the same time, run awareness-raising campaigns that motivate consumers to return empty bottles to collection points. In so doing, they will reduce the amount of post-consumer plastic bottles that end up in either the sea or the landfill.

The difficulties involved in introducing a real deposit-refund system (as mentioned above) make it an unlikely option. Therefore, it is proposed to introduce and promote a **separate collection system with deposit-refund elements**. This means that people will receive per-kilogram or per-bottle payments when returning their empty bottles to waste collection points. The sums paid out should be higher than those currently paid by private collection companies. The introduction of a real deposit-refund system needs to be further discussed with

the federal and state governments and should be set as a long-term objective. It might be possible to engage the state government in piloting such a scheme in Cozumel.

The deposit system would work by providing **incentives to collection companies** (e.g. by reducing their taxes and/or paying them a per-kilogram or per-bottle refund) while, at the same time, requiring them to pay a certain share of this refund to anyone returning empty bottles. In a number of other islands, such as Barbados, the local authority pays collection companies to export plastic bottle waste and is therefore able to make payments to people who hand in empty bottles. If such an instrument were to be introduced, the current infrastructure (consisting of a government-owned collection company, two main private collection companies and the informal sector) could be maintained and, indeed, would need to be further expanded.

To be able to incentivise and pay the collection companies for the collection and recycling/transportation of returned plastic bottles, it is recommended to introduce **tourist environmental fees**. Another possibility would be to make an additional **increase to the waste management fees for households**, which are currently very low, or to introduce **recycling fees**. On the one hand, citizens would have to pay higher general waste/recycling fees but, on the other, they would have the option to earn refunds when they hand in empty bottles. In this way, participation in this policy instrument would be financially rewarded. In this model, inhabitants who use no or few plastic bottles would be at a disadvantage because they would have to pay the fee without having the option of getting the money back by returning the plastic bottles. However, as the fee for households is currently very low, increasing this fee or introducing the recycling fee can be justified. The potential negative outcome where consumers who usually opt for glass bottles or other beverage containers switch over to plastic bottles in order to receive refunds on empty bottles should also be evaluated.

To introduce and enforce these instruments, it is necessary to introduce a **local waste management regulation** that details how national and state legislation will be implemented locally. This regulation will, however, need political support and interest as well as the input of technical support.

The following table provides an overview of the proposed instruments including their advantages and considerations.

**Table 1: Advantages and considerations of the proposed policy instruments**

Instrument	Advantages	Considerations
<b>Separate collection system with deposit-refund elements for plastic bottles: incentivising or contracting collection companies to establish collection points for plastic bottles and paying them a certain amount of money on condition that they pass on a set amount to anyone handing in empty bottles</b>	<ul style="list-style-type: none"> <li>• Establishing a system to pay for recyclables is of benefit to both the community and the local environment.</li> <li>• Separation, collection and recycling rates will increase. This is a model without precedent in the region, so Cozumel could become an exemplar for sustainable waste management.</li> <li>• The island is seeking to encourage another type of tourism, which will require the implementation of concrete practices. This therefore presents a great opportunity to link this project up with other major sustainability projects.</li> <li>• A trust fund could be established, which would be overseen by civil society to ensure the funds are used for the intended purposes.</li> <li>• It is estimated that, by introducing this instrument for plastic bottles, the recycling rate for other recyclables will also increase if the collection points accept them.</li> </ul>	<ul style="list-style-type: none"> <li>• There is no precedent for such an instrument, so technical support will be needed for its implementation.</li> <li>• It could fall prey to corrupt practices.</li> <li>• The relationships and interactions between actors will need to be defined in detail. The financial administration and legal aspects of the instrument need to be fully worked up if the proposal is to be considered viable.</li> <li>• The government currently has limited capacity for operating the system.</li> <li>• It could create unfair competition practices (monopolies or oligopolies) if not regulated appropriately.</li> </ul>
Incentives such as tax reductions for private companies establishing collection points	<ul style="list-style-type: none"> <li>• This could build closer links and greater trust between private operators and the government.</li> <li>• It will provide local companies with support to establish a greater number of collection points and thus increase separation and collection rates.</li> <li>• Private operators with more experience in waste collection can provide and deliver solutions that lie beyond the capacity of the local authority.</li> </ul>	<ul style="list-style-type: none"> <li>• The local authority may be reluctant to offer private operators these incentives, as they may argue that these companies are already obtaining financial benefits under the current system.</li> </ul>
Environmental fees for tourists (derechos) and/or increments in household waste management fees or the introduction of separate recycling fees (suggested at 10% of existing waste management fee)	<ul style="list-style-type: none"> <li>• This would provide funds to cover the implementation and operating costs of the separate collection system with deposit-refund elements.</li> <li>• A small tariff levied on tourists will go almost unnoticed and, due to their high volume, may be an abundant source of financial resources.</li> <li>• If set up as a sustainability fund, the establishment of tourist waste fees could also cover other sustainability-related projects.</li> <li>• This could help the island not only to develop an improved waste management system that incentivises recycling, but also to carry out other projects that are in the pipeline.</li> </ul>	<ul style="list-style-type: none"> <li>• The imposition of a tourist environmental fee comes at great political cost. It will therefore not be easy to convince the municipal president and the cabinet to impose it.</li> <li>• There is no precedent for this kind of instrument. Technical support will be needed for its successful implementation.</li> <li>• Other priorities may be higher up the political agenda. Waste management systems may not be seen as an urgent matter.</li> </ul>



Compacted PET bottles

The provision of refuse sacks is not proposed as a first option here because local people's awareness about separate collection remains very low. Also, by setting incentives and paying for empty bottles at collection points, higher reductions in littering and better separate collection can be achieved using the infrastructure that already exists.

Once this system is established and local people's awareness is increased, the separate collection of inorganic refuse at source could also be introduced over the mid to long term, as already proposed in a 2012 study (H. Ayuntamiento de Cozumel, 2011).

To establish economic instruments, certain preconditions must be fulfilled. Therefore, the project team prepared preconditions for the two proposed instruments for discussion at the stakeholder meetings that were based on the information provided by the national expert. Since the separate collection system with deposit-refund elements (accompanied by the introduction of tourist fees and recycling fees for households) was selected as the preferred instrument, the preconditions for these instruments are evaluated as follows:

- *The instrument should not run contrary to existing laws or agreements.*

According to stakeholder feedback, the introduction of a separate collection system with deposit-refund elements would not run contrary to existing laws or agreements. What is needed is to develop a local-level regulation that is aligned with and grounded in the principles laid down in both national and state waste-management legislation.

- *The current legislation and current flow of revenues need to be examined.*

At the municipal level, a new regulation on waste management must be drawn up. According to stakeholder information, the income derived from waste management fees is higher than the service currently costs to implement. However, as the local authority has no spare financial capacity, additional income would be needed to finance the proposed instrument. Introducing tourist environmental fees and/or increasing waste management fees for households or introducing recycling fees could plug this gap in the funding.

- *The correct institutions for instituting the required legal instruments need to be defined and they must agree to issue the relevant legal provisions.*

**Local regulation on waste management:** The responsibility for developing and instituting this kind of regulation falls entirely to the local authority. This regulation does not need to be passed at the state government level, because only issues relating to the imposition of taxes, fees and other such charges must be approved at that level.

**Independent regulatory body and special fund:** The responsibility for establishing an independent regulatory body and/or fund to manage the tourist or waste management/recycling fees falls to the local authority, and both could be enacted by issuing a relevant regulation or decree. There is no need for state approval, but the regulation must reference the approved article of the Ley de Hacienda (public finance act) regarding any new fees that are imposed.

- *Which level (federal, state, local) has the power to issue legal provisions?*

The local authority can issue legal provisions and regulations, and only needs approval from the state government on issues relating to the imposition of fees, taxes or increments in existing fees.

- *Which body (parliament, ministry, regional/local council) is entitled to issue legal provisions?*

First of all, the municipal president must approve and be interested in the implementation of the instrument. Then, the local council must back up her or his plans and send a proposal for the imposition of tourist environmental fees and/or increments to the waste fees to the state congress.

- *Which level/body will have the final say over the financial instruments introduced in the legal provisions?*

The state government would have to approve the introduction of the financial instruments.

- *The government or authority responsible for enforcement and control should have enough capacity for ensuring correct implementation.*

According to the legal advisor, the responsibilities and attributes for the control and enforcement of the new waste management regulation would be handed to the Department of Ecology. This department's capacity is extremely limited as it has very few staff and does not contain a legal department, which is required if it is to handle issues related to enforcement and control. Currently, every section of the local authority is overburdened, so there is a high risk that the implementation and running of the system is insufficiently supervised.

- *The government or authority responsible for enforcement and control should have the capital required to make initial investments and to support awareness-raising campaigns.*

As the collection companies and infrastructure already exist to a certain extent, major capital is not needed for upfront investments. The local government is heavily in debt, so introducing an approved financing mechanism is important to provide the initial investments required to implement the instrument. The accompanying awareness-raising campaigns could also be paid for with income derived from the tourist environmental fee and/or increased waste management fees/recycling fees for households.

- *The government, private sector and the public should, in general, accept the system.*

All stakeholders expressed the need to improve the existing waste management system and the capture of recyclable waste destined for the landfill (including the separate collection of plastic bottle waste). As some collection points are already installed and used, it is expected that this system will, in general, achieve a high level of acceptance.

- *The public should be made aware about improved waste management through awareness-raising campaigns and educational programmes.*

When it comes to public awareness about improved waste management and the environmental harm caused by littering, there is still plenty of room for improvement. The introduction of a separate collection system with deposit-refund elements should therefore be accompanied by a long-term awareness-raising campaign. This could be funded by the additional income raised through tourist environmental fees and/or increased waste management fees for households. The availability of national or international funds could also be investigated.

- *The coordination of the different actors involved (e.g. retailers, refuse collection companies and local authority) needs to function well.*

Some of the stakeholders stated that there is already a certain level of coordination between refuse collection companies and that they have expressed their willingness to cooperate further with the stakeholders and authority involved.

- *A basic infrastructure must be available or made available for the separate collection system with deposit-refund elements, collection points and treatment facilities.*

Collection companies and the required infrastructure already exist to a certain extent. Collection companies are already willing to establish more collection points and have compactors available to operate these new points.



Separate collection bins

- *There needs to be a market for used plastic bottles.*

In Cozumel there is no market for used plastic bottles. Currently, plastic bottles are primarily transported to mainland Mexico (Mérida) and even to China for recycling. Incentives should be provided to recycling companies to support regional markets (e.g. by reducing these companies' taxes in order to promote the development of new markets).

Many of the preconditions for establishing a separate collection system with deposit-refund elements are already fulfilled or most likely can be fulfilled. The budget for supporting the system is a key issue and introducing a fee for tourists and/or households will be needed to cover the costs involved in setting up and running the separate collection system.

## 5. Proposal for the implementation of a separate collection system with deposit-refund elements

In Cozumel, operations for the separate collection of plastic bottles are already underway. Kerbside collections are carried out by a government-owned company and private refuse collection companies. Local people have not, however, engaged much with the voluntary kerbside collection scheme – it only collected around 8% of plastic bottles in 2011 and this percentage has dropped even further since then. This is due to the appearance on the scene of private companies that pay a set amount for the bottles they receive and to the simultaneous development of an informal sector that gathers and hands in empty bottles to these private collection companies. These developments have led to an increase in separate collection rates of around 15%.

In light of the above private sector developments, privately operated plastic bottle collection systems should be further supported, which will, in turn, incentivise people to hand in more bottles. This support should comprise the installation of more points for people to return used bottles in exchange for a per-bottle or per-kilogram fee.

### 5.1 Introduction of a separate collection system with deposit-refund elements

To increase the amount of plastic bottle waste that gets separately collected, collection companies need to be incentivised and supported to establish more collection points and to remunerate people more highly than at present for handing in plastic bottles. In practice, this can be undertaken to a certain extent through tax reductions or other subsidies or by paying companies a fixed sum for the number of post-consumer plastic bottles they amass, while requiring them to pass on a certain portion of this payment to those handing in empty bottles.

Cozumel Island could be divided into different waste management zones consisting of one or more neighbourhoods. According to the municipal planning department, it would be best to install collection points within or in the vicinity of urban parks, because they are public spaces located in or near residential neighbourhoods. Privately owned locations can be selected as long as they comply with established regulations – e.g. they should

not be located within a residential street because of the noise and movement associated with their operation, but instead should be installed at strategic points that avoid any conflicts with neighbours. For each zone, a contract can then be drawn up and signed between the local government and collection company. Contracts should be awarded by means of an open tendering process that considers existing structures and they should contain a number of contractual conditions on areas like:

- the required share of monies paid to the contractor that must be passed on to people handing in empty bottles;
- the minimum amount of collection points to be established (e.g. at least one for every two neighbourhoods);
- the conditions for establishing/acquiring/renting collection points;
- the frequency of used plastic bottles collections, especially in highly frequented areas, and the deployment of mobile collection points (such as a collection truck like that used by Grenada Breweries Limited to take back their used glass bottles);
- the provision of evidence that recyclable materials are treated in an environmentally sound way (money should only be paid out for the weight or number of bottles collected and received by a recycling company);
- obligatory annual training for collection point operators;
- specific additional environmental requirements.

It is important to ensure that neither existing nor new collection companies are disadvantaged by this process. Contracts could be time-limited and, following an evaluation of the collection system, collection companies and distribution of neighbourhoods in Cozumel, a new tendering process should then take place.

As mentioned above, on some other islands like Barbados collection companies are paid by the government on a per-kilogram basis for the post-consumer plastic bottles they export (author's own research, 2015).

In addition to or as an alternative to per-bottle or per-kilogram payments, collection companies could receive a tax reduction as a further incentive. This kind of tax reduction could also be provided to recycling companies as a way to promote the development of a market for recycling plastic bottles in Cozumel.

## 5.2 Financing and organisation

### 5.2.1 Financing options

There are a number of ways in which the separate collection system with deposit-refund elements can be promoted. Below, three such options are presented.

#### Option 1

The easiest option would simply be to **increase** the existing **waste management fees for households**, which are relatively low at present (about MXN 453 per year or EUR 24 per year) or to introduce an additional recycling fee to be paid on top of the current waste management fees for households. The local authority legal advisor suggested this increase could be set at around 10% and would require the amendment of local tax and fee legislation (the *Ley de Hacienda*<sup>2</sup>) and the approval of the state government for it to be put into effect (such amendments must be sent to the municipal council and state congress before the end of October of each year). However, the additional income raised would be relatively low. With a 10% increase in current household waste management fees, about MXN 900,000 or EUR 50,000 would be generated from Cozumel's estimated 20,000 households yearly, but if all those paying waste management fees were to have their rates similarly increased then MXN 2.8 million or EUR 160,000 could be generated. These funds could then be used to incentivise collection companies with tax

reductions, as proposed by a local authority representative, or to remunerate those collecting bottles for recycling on a per-bottle or per-kilogram basis, which would necessitate the installation of more new collection points. This kind of income would not, however, be enough to significantly increase the amount paid for the used plastic bottles that are returned. It is doubtful whether collection companies installing more collection points would be a sufficient incentive to get people who currently throw their used bottles in the mixed waste instead of separating them for recycling to then change their behaviour and return used plastic bottles to collection points. However, in combination with long-term awareness-raising campaigns, which could also be financed with the recycling fee income, it is estimated that the separate collection of plastic bottles and other recyclables could be further increased and plastic bottle littering decreased.

All additional income received through increased household waste management fees or the new recycling fee must be wholly ring-fenced for the purposes of incentivising collection companies and financing awareness-raising campaigns run by the local authority. It must not be diverted for other purposes.

#### Option 2

In addition to the recycling fees, another option would be to introduce **tourist environmental fees**. All income from both these fees could then be gathered in a special fund for tackling waste management issues. To impose a tourist fee and a recycling fee, the local government must amend the local tax and fee legislation (*Ley de Hacienda*) and, once this is approved by the state congress, must create a fund (*fideicomiso*) into which the fee monies are paid. The local authority (see Figure 5 1) or an independent body contracted by the local authority could create and manage this fund. The fee income is used to remunerate the collection companies at the agreed rate and from these remunerations the companies must, in turn, pay out a pre-defined per-bottle or per-kilogram sum to anyone handing in empty bottles. Given that around 4.5 million people visit Cozumel each year, the suggested fee of USD 0.5 per visit (MXN 8.4 or EUR 0.44) would generate around MXN 38.2 million (EUR 2 million) annually. Together with the recycling fee set at 10% of the current

<sup>2</sup> Income Law of the Municipality of Cozumel in the State of Quintana Roo, for the fiscal year 2015

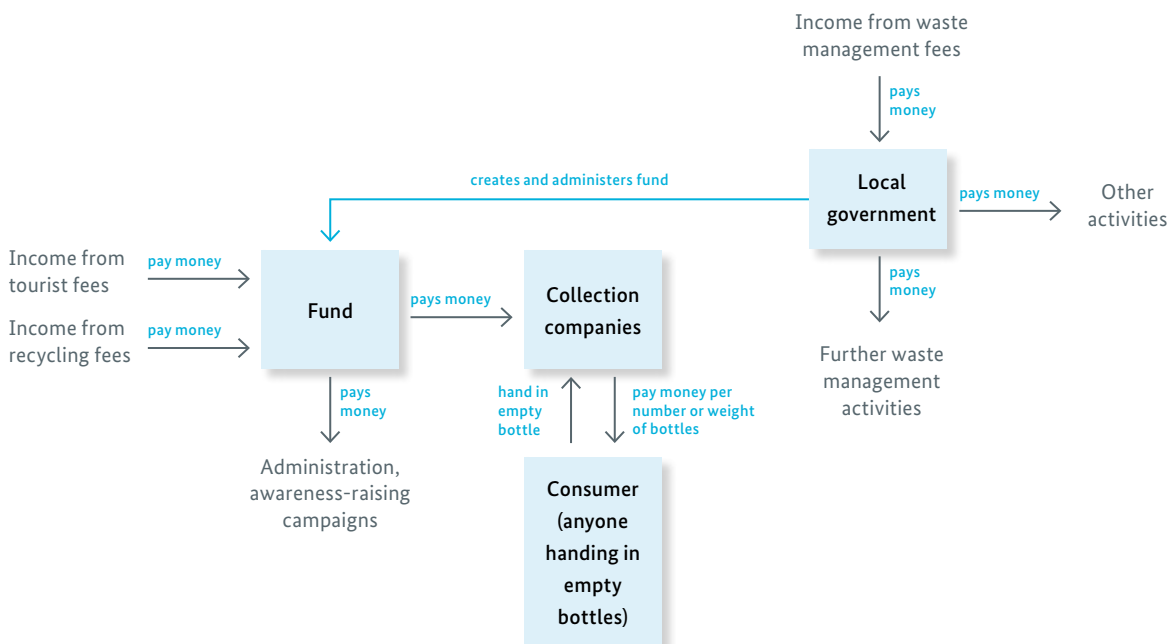
waste management fee for households (MXN 3 million), a total of around MXN 41.2 million (EUR 2.16 million) would be paid into the fund annually. This additional income would be sufficient to contract the collection companies and pay them according to their contractual conditions, to carry out awareness-raising campaigns, to cover additional administration costs, and to remunerate those returning used plastic bottles with a worthwhile per-kilogram or per-bottle payment (e.g. MXN 1 for five used bottles). If one local person uses one plastic bottle per day and a household consists of an average of four people, it is possible to estimate that a maximum of around MXN 292 (EUR 15.3) could be reimbursed in this way by year. This estimate could also be used to justify recycling fees of up to 50% of the current waste management fees, as this increase would correspond with and could be offset by the average reimbursement. Citizens would, on the one hand, have to pay higher overall waste fees but, on the other, would be able to get rebates by handing in their empty bottles. However, people who currently use no or few plastic bottles would be at a disadvantage. The proposed reimbursement is deemed attractive enough to incentivise people to return their used plastic bottles to collection points. A higher reimburse-

ment rate per plastic bottle is not, however, suggested as this would mean households would get more money back from returning plastic bottles than they pay out for waste management services. The awareness-raising campaigns run in tandem with the above-mentioned measures will also increase the rate of separate collection and decrease the littering of plastic bottles.

There is a certain risk that, by promoting a refund scheme for recyclable bottles, people will end up deliberately buying more products in plastic bottles. However, as the bottle itself also costs money, this is not overly likely. The awareness-raising campaigns must also focus on reducing the overall consumption of plastic bottles in order to reduce the number of bottles in circulation with the potential of ending up in the sea, to save natural resources and to cut waste management costs.

Another risk would be that bottles bought and consumed outside Cozumel end up being brought onto the island for the sole reason of securing refund payments from the collection points. However, shipping costs are relatively high, so this is scenario is far from likely.

Figure 3: Option 2: Financing the separate collection system with deposit-refund elements through income from tourist fees and recycling fees combined with a separate fund





**Option 3**

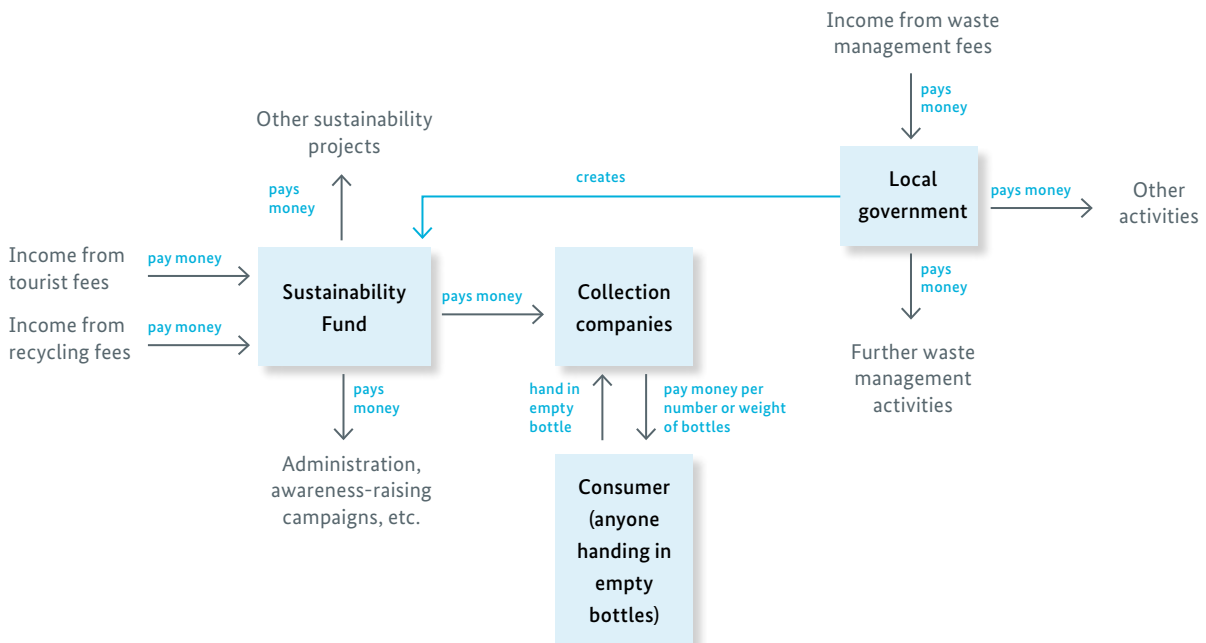
This is similar to Option 2. However, to make a stronger case for the introduction of tourist environmental fees, this option proposes channelling the income from tourist fees into a specially created local authority sustainability fund. The local authority still sees introduction of tourist fees as critical, because tourists are the main source of income in Cozumel. The sustainability fund could be used to pay for the administration and implementation of the separate collection system with deposit-refund elements and its associated awareness-raising campaigns, as well as to support other sustainability projects. As already shown in Option 2, a fee of USD 0.5 would still generate enough income to fund other projects. However, if the local authority fund is expanded to include sustainability projects, the environmental fee could be raised to USD 1 to bring in sufficient income. These sustainability projects

could include, for example, securing Blue Flag certification for the island’s beaches, which would, in turn, attract more tourists to Cozumel. The criteria for the awarding of Blue Flag certification include information and environmental education, water quality, management and environmental management, security, and services.<sup>3</sup>

A number of local authorities around the world that experience high levels of tourism (e.g. Sylt in Germany) have already introduced visitor fees to support the local infrastructure used by tourists. The tourist environmental fee could also be used for infrastructure projects that further promote tourism and develop the tourist centres in Cozumel.

The following figure describes how such a system might operate:

**Figure 4: Option 3: Financing the separate collection system with deposit-refund elements through tourist fees collected in a sustainability fund**



<sup>3</sup> For more information, visit <http://www.blueflagmexico.org/>

Further discussion is needed on the feasibility, acceptance and possible success of these different options, and the local authority will require the support of external experts when drawing up the local regulation and implementing the selected option.

It is assumed that, if collection companies get the support they need to establish collection points, they will not only accept plastic bottles but also other recyclables. People incentivised to bring their used plastic bottles will probably also return other recyclables, especially if the collection companies reimburse them in some way for what they bring. In this case, the amount of waste going into landfill or ending up as litter and thus possibly marine litter would be considerably reduced.

### 5.2.2 Considerations for the implementation of the financing system

The option of increasing of waste management fees requires the least amount of local authority effort, because the principle of waste management fees is already established. Nevertheless, amendments to the local tax and fee legislation (*Ley de Hacienda*) would need to gain the further approval of local elected members and the state congress prior to implementation.

The introduction of recycling fees is a more complicated option, because a new collection mechanism must be developed and the introduction of the fee must be justified to and approved by the state legislature. The justification would be that the additional income derived from this fee would be ring-fenced for funding the collection of recyclables/plastic bottles for recycling. The collection of the recycling fee would not be problematic as all householders already pay waste management fees along with their property tax.

The introduction of tourist environmental fees is the most complicated option because a new instrument and collection mechanism needs to be developed. There is no precedent for this kind of recycling fee system and the fees introduced must be justified to and approved by the state government.

**Developing a tourist fee scheme and collection mechanism**  
The Caribbean island of Grenada, for example, has already introduced environmental fees for tourists through the country's Environmental Levy Act.<sup>4</sup> This legislation requires each visitor (whether staying over or visiting from seagoing vessels) to pay USD 1.5 per visit. Visitors staying on the island pay the levy themselves, whereas the levy for those visiting from seagoing vessels is paid by their ship's agents. The authorities responsible for collecting the levy are, in the case of stay-over visitors, the airport authority and, in the case of visitors from seagoing vessels, the port authority (see Table 5 1).

Table 2: Extract from the Grenada Environmental Levy Act

Persons, goods and services liable to the levy	Persons liable to pay the levy	Amount or rate of levy	Public authority or person
Stay-over visitors	Visitors	XCD 4.05 (USD 1.50)	Grenada Airport Authority
Visitors from seagoing vessels	Ship's agent	XCD 4.05 (USD 1.50)	Grenada Ports Authority

<sup>4</sup> Environmental Levy Act No 5 of 1997, amended (Act No 12 of 2000 and Act 13 of 2007), available at <http://laws.gov.gd/> (accessed on 3 October 2015).

The levies collected in Grenada are transferred to the Grenada Solid Waste Management Authority and are used to cover the costs of waste management.

The way in which Grenada has drawn up these provisions serves as a replicable model for shaping Cozumel's new waste management regulation. Cozumel's airport authority considers the process of collecting fees from stay-over visitors to be fairly straightforward.

Ship agents may be less open to adding this kind of fee on to their existing ticket prices for fear that it will deter visitors. Therefore, before introducing the fee, care should be taken to properly inform ship agents and to convince them of the many advantages of introducing tourist environmental fees. Grenada recorded no reductions in visitor numbers as a result of introducing its environmental levy.

Federal and state port authorities already charge entry fees for the port of Cozumel. One of them – the Port Authority of Quintana Roo State, for example – could collect the environmental fee and pass it on to the in-

dependent body or fund set up to manage the fee in Cozumel. However, as the port authorities belong to the state and the country, the authorities at these levels will certainly have to approve this approach, and the feasibility of this option will need to be evaluated.

In general, it is expected that the introduction of this kind of tourist fee will be resisted by the tourism sector (hotels, restaurants, shops serving the tourism market, ships, etc.). As such, it is very important to inform tourism sector businesses about this idea and bring them on board, convincing them that the proper use of the funds will improve the island's offer and will thus increase rather than decrease the flow of tourists.

#### Justifying the fees

The island of Cozumel lacks any other industries and so depends mainly on tourism. It is one of the most visited tourist destinations in Mexico, with an estimated 4,545,939 people recorded as having visited the island in 2012.



PET bottles ready for compacting

Cozumel boasts a unique environment:

- The island's marine area of influence contains 11,897 hectares of coral reef and 2,987 hectares of mangrove swamp. These represent the island's two most important natural resources and house a great variety of endemic, conservation and commercial species.
- 70% of the island is covered by low deciduous and medium sub-deciduous forest.
- Cozumel is the only municipality in Mexico that has set up five natural protected areas: two are administered by the federal government and three by the state government.
- These natural protected areas cover an area equivalent to 70,000 football pitches.
- Anthropogenic areas like towns, scattered human settlements and farming areas cover only 53.57 km<sup>2</sup> of Cozumel, which represents 11% of the island's territory.

Cozumel has already applied for UNESCO biosphere reserve status. According to UNESCO, biosphere reserves are areas comprising terrestrial, marine and coastal ecosystems that promote solutions to reconcile the conservation of biodiversity with its sustainable use. The separate collection system of plastic bottles supported by income from environmental fees would demonstrate that Cozumel is already promoting the sustainable use of its biosphere reserve

Other improved waste management and sustainability projects that further strengthen Cozumel's case for being awarded biosphere reserve status could also be financed by the income generated through the tourist fee system.

Improving waste management will result in a cleaner landscape and introducing further sustainability measures will improve the infrastructure and image of the island. These positive outcomes are, in turn, likely to drive up the numbers of tourists visiting Cozumel.

With its separate collection system and improved waste management cofinanced by the tourist environmental fee, Cozumel could become a role model for other municipalities and islands.

Setting up the separate collection system with deposit-refund elements would create new jobs as new staff would be required to operate the collection points, administer the scheme, run the awareness-raising campaigns and deliver other sustainability projects.

Every year, more than four million people visit Cozumel and enjoy its natural beauty. At the same time, they also leave behind rubbish, including used plastic bottles, that needs to be managed. The environmental fee would therefore be used to protect the island's natural beauty and to manage the waste left behind by tourists.

Cozumel's marine areas contain 11,897 hectares of coral reef and the island also boasts five natural protected areas, all of which are a main attraction for tourists. Plans are already afoot to install drinking fountains in Chankanaab National Park to reduce people's dependence on plastic water bottles. As the separate collection scheme improves and more collection points get installed for people to return used plastic bottles, the potential for plastic bottles to end up as litter either on land or in the sea is reduced. In this way, the protection of the island's terrestrial and marine ecosystems is enhanced. This is vital if Cozumel wants to attract more tourists to visit the island and its marine environment.



Waste collection bin at a beach on the island's east side

### 5.3 Financial sustainability of the system

In this section, the income and expenses involved in delivering Option 2 are analysed to see whether it could be financed with the expected incomes.

The separate collection system with deposit-refund elements will generate income through the tourist environmental fee and/or increased waste management fees for households/recycling fees, and the sale of plastic bottles to recycling companies.

#### The income that the collection/waste management system can generate from tourists

Working on the assumption that around 4.4 million tourists visit Cozumel annually and the environmental tourist fee will amount to USD 0.5 per visit (MXN 8.4 or EUR 0.44), an additional income of around **MXN 38.2 million** (USD 2.3 million or EUR 2 million) could be generated by this tourist fee scheme each year.

#### The income that the collection/waste management system can generate from households

According to figures provided by the local authority, increasing the existing waste management fees or introducing recycling fees for households by around 10% would raise around MXN 900,000 of additional income. It is estimated that around 60% of used plastic bottles will

be returned, which means that around 40% or **MXN 1.8 million** (EUR 95,000) will remain in the fund and can be used to support the collection system or the accompanying awareness-raising campaigns.

#### The income that collection companies can generate by selling plastic bottles to recycling companies

According to Baasha, the recycling companies, which are mainly located in Mérida on the mainland, currently pay collection companies MXN 5.5 to MXN 6 per kilogram of used plastic bottles. Assuming that approximately 45% of the plastic bottles (567 tonnes) are collected in addition to current levels and earn MXN 6 per kilogram, this would generate additional income of around **MXN 3.4 million** (EUR 180,000).

It can therefore be estimated that the annual total income derived from the three above-mentioned income streams would be around MXN 43 million (EUR 2.3 million), which would be dedicated to running/supporting the separate collection system with deposit-refund elements (including its administration costs) and the accompanying awareness-raising campaigns.

**Table 3: Estimated incomes from the collection system with deposit-refund elements and accompanying fees**

Type of income	Annual income
Tourist environmental fee	MXN 38,200,000 (EUR 2,000,000)
Approximately 40% of the new recycling fee/increase in waste management fee for households	MXN 1,800,000 (EUR 90,000)
Sales of plastic bottle waste to recycling companies	MXN 3,400,000 (EUR 180,000)
<b>Total</b>	<b>MXN 43,400,000 (EUR 2,270,000)</b>

In addition, landfill costs and the costs of waste collection, street cleaning and clean-up operations would be reduced. Reduced landfill volumes will extend the life of the landfill site and make finding a new site less urgent. These effects will be minimal because plastic bottles make up only a small fraction of the total municipal solid waste. However, it is expected that the separate collection of

other recyclable waste fractions, such as glass, would also increase due to people's increased awareness about the need to separate recyclables. Furthermore, resources will ultimately be saved through the plastic bottle recycling process.

### Expenses

Alongside generating additional income, moves to expand the current recycling system will also involve a certain amount of spending. There will be major one-time investment costs for expanding the current infrastructure – mainly for installing the new collection points, investing in extra trucks to collect recyclables from collection points, and perhaps to procure more efficient compacting machines. Collection companies should be able to cover these costs if they are earning some form of income from the local authority (per bottle collected). A few compactors and collection centres are already in place.

Major annual expenses will be wages for the staff required to operate and maintain the collection points and machinery, to administer the fund and to deliver high-profile awareness-raising campaigns.

Baasha has stated that their current costs for managing plastic bottle waste stand at around MXN 1.5 per kilogram of bottles (MXN 0.5 for compacting, MXN 0.5 for transportation and MXN 0.5 for operating costs, including rent and insurance). However, these figures will change if considerably more bottles get collected and they are also different to those of other collection companies operating different equipment. More detailed information on the costs involved and on the number of collection points and, hence, number of staff required was not obtained during the project. However, it is assumed that the projected outgoings total much less than the projected income, which means that the high-profile awareness-raising campaigns, other sustainability projects and investments in further infrastructure should be possible.

## 5.4 Drawing up regulations for waste management in Cozumel

Waste legislation already exists at the national and state levels in Mexico (see Annex 1, Section 2.1). However, no legislation or regulations exist at the local level detailing how the principles laid down in the national and state legislation should be implemented locally. A regulation developed to this end should cover:

- the establishment and functioning of a fund (waste fund or sustainability fund, depending on the selected option);
- the introduction of environmental fees for tourists;
- the existing fees charged to households and businesses that could be integrated into this fund;
- the definition of relevant parties' waste management roles and responsibilities;
- the principle of the separate collection system with deposit-refund elements (detailed in the specific contracts entered into with the collection companies).

When developing this regulation, the local authority would benefit from the support of an external expert.



## 6. Economic, social and environmental impacts

In this section the economic, social and environmental impacts for Cozumel when implementing Option 2 are described and, as far as possible, quantified. The impacts depend on the option chosen.

### 6.1 Environmental impacts

An inordinate amount of plastic bottles are used on Cozumel (around 42 million bottles per year – see Annex 1, Section 2.3). People do tend to use public waste bins, but littering still occurs. A proportion of the litter is picked up in clean-up operations and by informal sector operatives who take the litter to the landfill or to private collection companies.

According to rough estimates put together by the Zofemat and Ecología organisations, around 146 tonnes of plastic bottles are collected annually in clean-up operations. However, the majority of these appear to come from other islands. It is estimated that around 20% of the bottles collected come from Cozumel, which amounts to 29 tonnes per year. The waste collected during the clean-up activities is mainly disposed of in the landfill site. The amount of plastic bottle litter collected by the informal sector is not known.

The estimate that only up to 2% of local post-consumer plastic bottles remain unmanaged in the environment and, thus, have the potential to end up polluting the marine environment represents around 840,000 unmanaged plastic bottles or 25.2 tonnes per year (if each bottle weighs 30 grams on average). However, this amount is very difficult to accurately estimate given the mitigating factors of the clean-up operations and the informal sector and is thus considered here as a maximal value.

Plastic materials, including plastic bottles, are highly durable products that harm the marine ecosystem in a number of ways, such as by:

- injuring and killing marine wildlife through entanglement and ingestion;
- devastating marine habitats such as coral reefs through alteration, degradation or destruction;

- transporting chemicals with implications for the food chain (UNEP 2011).

In order to minimise or put a stop to these negative impacts, it is therefore very important to decrease the amount of plastic (bottle) waste that enters the marine environment.

The estimate that separate collection could be increased by 45%, up to around 60%, implies a decrease of more than 10 tonnes of unmanaged plastic bottles annually (in the case that a deposit-refund system is introduced, this percentage will be lower because the incentive is also lower). The baseline report indicates that the littering of plastic bottles mainly occurs on beaches, in tourist zones, and in residential areas. However, the beaches already benefit from a large number of clean-up operations. It is estimated that around 50% of the unmanaged waste ends up in the sea, so the annual input of plastic bottles into the sea would therefore be reduced by about five tonnes. It is likely that the amount of unmanaged plastic bottles entering the sea will be even further reduced once the informal sector is incentivised to collect bottles from public bins, streets and beaches.

### 6.2 Economic impacts

Introducing the system would lead to different economic impacts on the stakeholders and sectors involved:

- **Bottle importers** would not be directly affected.
- Depending on the option chosen, the **local authority** would have an increased administrative burden. However, with the additional income, new positions could be created to administer the fund, to contract manage and monitor the collection companies and to carry out awareness-raising campaigns.
- In the **waste management sector**, the establishment of the separate collection system with deposit-refund elements would generate many new jobs, as new staff would be needed to operate the collection points. If incentives were put in place to encourage recycling companies to set up in Cozumel and recycle the bottles locally, even more companies and jobs might



Waste collection centre

be created. It is unlikely that any reductions in existing workloads (such as in waste collection, landfill and clean-up operations) would result in job losses because the scale of waste reduction is too small.

- An **informal sector** that collects and sells valuables already exists in Cozumel. A certain number of new informal jobs or additional incomes would probably be created for those incentivised to gather up bottles and hand them in to collection points.
- If the tourist environmental fee were introduced, a negative impact for **the tourism sector** would be expected in the early stages of the scheme. However, improved waste management means cleaner beaches, marine environments and landscapes, which, if promoted in public relations campaigns, would drive up visitor numbers and thus provide higher incomes over the mid to long term.
- If the recycling fee were to be introduced for all waste producers in Cozumel, **businesses** would have to pay out more for the management of their waste. However, as this increase would not be very high, no job losses are expected.

- Any increase in the waste management fee and/or the introduction of a recycling fee in Cozumel would mean **residents** having to pay out slightly more for the service.
- For **consumers** buying beverages in plastic bottles, there would be a slight positive economic impact because, by returning their empty bottles to waste collection points, they would be rewarded with a reimbursement.

### 6.3 Social impacts

As described above, the additional administration required to deliver the scheme would create new jobs, particularly in the waste management sector, which constitutes a positive outcome for the people of Cozumel.

The reduction of plastic bottle waste would lead to cleaner beaches, marine environments, road sides and scenic locations, which would further increase the quality of life in Cozumel and thus attract more visitors to the island.



## 7. Short-term solutions

All of the options proposed above involve amending the local tax and fee legislation (*Ley de Hacienda*). So, to develop and implement the proposed options, Cozumel's political context must be carefully considered. A number of key conditions need to be taken in account that would influence the possible time frame for implementing the required strategies and policies:

1. Local government terms of office are three years long. The incumbent administration will be seeking re-election in 2016 and, given that local people are resistant to the imposition of new charges, it is unlikely that the incumbents will be willing to impose a new fee or tax that might harm their election prospects. Added to this, the current government recently asked for a municipal credit, which increases Cozumel's debt. As such, imposing further taxes or fees has become a delicate political issue.
2. Local tax legislation reforms must be submitted and approved before the end of October of each year. So this year at least, there is not enough time to work through the legal process involved in imposing new fees or taxes.

These time-frame constraints mean that this instrument and its options should be considered as a medium-term strategy. In the meantime, it is useful to identify the objectives that can be achieved without the need for potentially protracted legal and political processes, and also the short-term strategies based on voluntary and administrative instruments that bring in the local community and that work with the existing market dynamics. These kinds of 'low-hanging fruit' are discussed in this section.

### 7.1 Proposed voluntary and administrative instruments

#### 1. Incorporate a waste separation programme and awareness-raising campaign for hotels, businesses and restaurants in GIZ's existing sustainable development programmes

From 2014 to 2017, a GIZ Centre for International Migration and Development (CIM) expert is delivering an economic development strategy project in Cozumel that is seeking to attract European tourists to the island. The strategy is focusing on 'bringing back the European market', which is considered to be more attractive because European visitors generally stay for longer periods, have a higher economic impact on the island, value cultural aspects and are open to sustainable concepts.

On the back of this project, the Grupo Empresarial por el Turismo Europeo (Business Group for European Tourism – GEPTTE) has been formed with the objective of creating a business alliance that can guide the sustainable development of the island. GEPTTE comprises representatives of city centre hotels, businesses and restaurants and is divided into working groups that each focus on one of the following themes:

- raising awareness about the characteristics of the European tourism sector;
- drawing up a joint promotional strategy with European operators;
- developing alternative products;
- promoting sustainability (with a focus on solid waste management and water management).

In the last quarter of 2015, the CIM expert is working with restaurants. It is proposed that the promotion and implementation of the separate collection of recyclable waste in general and plastic bottle waste in particular can be integrated into the 'sustainability' section of the alliance (Tippman, 2015).

The programme could use some of the existing material produced for the 2013 *Para de tirar y ponte a separar* (Stop throwing and get separating) campaign and could run workshops to raise people's awareness about separate waste collection and environmental responsibility. Also, a working group involving the private sector, CAMAR and other private collection companies could be tasked with developing a more formal separation and collection scheme.

By promoting an understanding of the potential economic benefits of sustainable practices and their appeal for European markets, hotels, businesses and restaurants can be incentivised to increase their current levels of separation (CAMAR already collects recyclables from these sectors).

Some form of sustainable business labelling system could also be developed to give prominence to the restaurants, supermarkets, hotels, etc. that separate waste and, in so doing, make them more attractive to tourists. Such a scheme would need to be discussed in more detail with the CIM expert.

Initiatives focusing on waste separation would not, in the first place, reduce littering, but they would raise awareness and prompt businesses to separate their waste, which should ultimately result in reduced waste and plastic bottle litter.

## **2. Gain local authority permission for private collection companies to install more collection points under their own initiative**

During the workshops the private collection companies expressed their willingness to install more collection points for recyclables with the local authority's permission. They have a natural market incentive as the recyclables (including PET bottles) they collect are sold on the mainland (e.g. in Mérida), so more volume means larger revenues.

As mentioned in Section 4.2.2, the private collection companies do not currently have local authority permission to establish more collection points. The reason for this is assumed to be a fear that valuable metals like copper will be stolen from the points. Yet, the private collection companies already stated during the field-visit workshops that they would agree to set up collection points for non-metal recyclables only. Local authorities and private companies must therefore sit down together to develop and agree on the conditions for installing extra collection points. Discussions should look at: the kinds of recyclables accepted; the environmental, hygiene and social conditions that need to be met; suitable and available locations; and collection point management.

As supermarkets are areas of high footfall, the private collection companies could enter into agreements with (independent) local supermarkets to install collection points in or near their premises. In the short term, this would result in the installation of a greater number of collection points, with companies obliged to pay 'market rates' for returned bottles. Although the sums involved are minimal (currently about MXN 2 to 4 per kilogram of PET bottles), the remunerations would still help to raise people's awareness and to increase separation rates to a certain extent.

Plastic bottle importers – in Cozumel's case, mainly Coca-Cola – could be asked to support the private collection companies, either by providing financial support or offering the use of their idle trucks to export empty plastic bottles for recycling.

The waste management authority can provide institutional support (where required) to facilitate contact between the private collection companies and the local supermarkets and plastic bottle importers by arranging workshops where the terms and conditions of collection point installation and other options for support are discussed.

Overall, this option would help to decrease plastic bottle litter, but not by a great deal because the incentive for people to come and hand in their used plastic bottles is low. The return rate is likely to be higher, however, for recyclables that offer higher reimbursements or that can be returned immediately after purchase.

### 3. Run awareness-raising campaigns to promote voluntary waste separation

To raise people's awareness about separation and recycling, GEPTE, the private collection companies and the local authority can hold a number of public events to share their experiences of voluntary separation schemes. The local community in Cozumel are heavy users of social media and many social initiatives and groups have become important channels of communication – e.g. Mercadito Orgánico Cozumel, My Verde Cozumel, Cozumel 4 You, Re-Cycling Cozumel, Que todo Cozumel se entere, among others. As such, a Facebook page could also be developed to promote the voluntary separation of waste.

The events and social media activities should:

- communicate the current rates of separation and recycling of plastic bottles in Cozumel (15%) and make comparisons with other higher-achieving countries (e.g. Bulgaria with a rate of 60–80%) so people understand what constitutes a low level of separation;
- share pictures of Cozumel's beaches polluted with plastic bottles and other recyclables and of animals (e.g. turtles) injured or killed by litter to raise awareness about the problem (Zofemat can provide good-quality, relevant images);
- talk about the social, environmental and economic impacts of plastic bottles in Cozumel (positive and negative), such as their:
  - current negative environmental impact on the island's flora and fauna and surrounding ocean,
  - current negative impact on natural resources in general,
  - positive impact on the informal sector and the wider public if they hand their recyclables in to a collection point,
  - negative impact on the economy – the higher costs of waste management services, the impact on the landfill's lifespan of dumping excessive and unnecessary waste, the reputation of litter-strewn beaches driving away tourists, the monetary value of bottles sent to landfill that could have gone to local families, etc.;

- publicise through public events and social media the voluntary alliance formed by private companies and the local authority in order to bring the issue into the public consciousness and to present it as an important matter for the government (the imposition of new command and control instruments will be better accepted when the general public is voluntarily involved and when they notice that the subject appears to be high up the political and social agenda);
- publicise the location of the newly installed collection points and promote their use.

Examples of local events where voluntary campaigns can be integrated:

- Scuba Fest
- Sea Walls: Murals for Oceans
- international sporting events such as the Ironman competitions, the GFNY Cozumel cycling event, etc.
- photographic exhibitions and art competitions
- school events and fairs
- organised town events.

The development of and follow up on voluntary awareness-raising campaigns can be included as a topic for discussion in the workshops that will bring together the local authority and private companies to explore the installation of new collection points.



**4. Apply to federal waste-management infrastructure programmes for funding to install more waste bins on the east side of the island (identify programmes that provide not only funding, but also custom-made waste bins designed to deter raiding by wildlife)**

Currently only a few bins are located on Cozumel's beaches, even though litter, including plastic bottles, has become a common feature. Federally funded and state-funded clean-up operations collect over 60 tonnes of waste from the island's beaches each month (of which about 75% is plastic waste). Although much of the collected waste is washed in from the sea, the scale of this refuse shows that beach littering is definitely a problem. Waste that is not picked up straight away in these clean-up operations may well end up in the sea, contributing to marine litter. As such, it would appear important to increase the quantity of litter bins on beaches. As Cozumel's beaches, especially those to the south, are mostly conservation areas, it is important to ensure that the bins are designed to prevent their contents from entering the environment as a result of animal raiding or wind action. Special bottle bins (or bins for other specific waste streams) should also be designed that deter the introduction of other types of waste.

The bin design could be enhanced with the incorporation of a symbol that is emblematic of Cozumel (e.g. a turtle or a Mayan symbol). An open competition for the design of the litter bins could be initiated, which would grow public interest and awareness.

Federal programmes funded the installation of Cozumel's existing waste bins, and it would be worth investigating whether similar funds can be drawn down again.

**7.2 Steps to be taken by the local authority**

To implement the proposed short-term solutions, the local authority should as a first step:

- discuss options with the local CIM expert for integrating private sector operations to separately collect recyclables (especially plastic bottles) into the current project;
- communicate with private collection companies and verify whether the permission to install further collection points will be possible under certain defined and agreed conditions;
- communicate with the private sector, NGOs and event holders about which, how and where campaigns could be carried out to increase the public's awareness of the effects of litter in general and of plastic bottle litter in particular;
- clarify whether federal funds would be available to cover the costs of installing better-designed litter bins;
- develop a plan to install more litter bins, especially in highly frequented areas and beaches, detailing the number, location and design of the litter bins;
- evaluate whether funds for awareness-raising campaigns are available at the federal or state levels.

## 8. Further recommendations to improve the waste management performance

As mentioned in Section 4.2.2, in 2011, GIZ carried out a project on the 'prevention and management of waste in Cozumel' that proposed a range of actions for improving the island's waste management system (H. Ayuntamiento de Cozumel, 2011). These were to:

- develop a regulation specifically on waste management on Cozumel;
- update existing standards and regulations;
- create a body responsible for waste management on the island;
- introduce economic incentives and a pay-as-you-throw scheme;
- introduce an approach for separate collection at source;
- inform the public;
- improve the waste management and collection system;
- improve the infrastructure for waste collection (routes and collection centres);
- introduce a system for the separate collection of organic waste;
- deliver awareness-raising programmes, training and pilot projects.

These proposed actions, which focus on municipal waste management in general, partially cover some of the activities described in this project. Importantly, they also remain relevant and, as such, should now be introduced to further improve waste management in Cozumel. However, to deliver on this list of actions requires money. For this reason, it is worth evaluating the role the additional income derived from the tourist environmental fee might play in making these actions financially feasible.

Baasha's new and efficient waste compactor



## 9. Conclusion and outlook



A compactor in the process of compacting paper

### Conclusion

The introduction and promotion of a separate collection system with deposit-refund elements for plastic bottles would contribute to reducing the amount of plastic bottle waste that ends up in the sea around Cozumel and, in so doing, would contribute to protecting the island's marine environment. The extent to which plastic bottle waste is prevented from entering the marine environment depends on the instrument chosen. It is expected that, by introducing the instrument for plastic bottles, the separate

collection of other recyclables will also increase. In this way, overall waste management improves and less waste gets sent to the landfill, which saves on valuable landfill space. The local authority, in concert with the national and state governments, should also assess whether the separate collection system with deposit-refund elements that is proposed could, in the long term, be converted into a straightforward deposit-refund scheme.

It is crucial to accompany the implementation of the instrument with awareness-raising campaigns that not only involve the tourism sector, but also seek to convince sector actors of the instrument's benefits. Campaigns should also target local people, encouraging them to use the new collection point system and explaining how to reduce household waste management costs by returning used plastic bottles. The awareness-raising campaigns will also help to promote the separate collection of other recyclables.

The proposed instrument would require financial support, which could be derived from the mooted recycling fees or tourist environmental fees. However, these new fees would need to be provided for in local legislation. It seems unlikely that the proposed instrument will be implemented within the next two years as the incumbent government will be seeking re-election in 2016. Therefore, short-term voluntary and administrative initiatives with the private sector are initially proposed, which would help to increase the separate collection of plastic bottles to a certain extent, and would raise local people's awareness about these measures, thus smoothing the way for subsequent mid-term activities.

In addition to the proposed instruments, it is important to look at how the producers of the durable plastic bottles causing the problem — i.e. those importing plastic bottles onto Cozumel — could be made more responsible for taking back or managing plastic bottle waste. As this kind of activity would be easier to conduct at the national level, a dialogue with the national and state governments should be initiated.

## Outlook

Although the proposed instruments will reduce the amount of recyclables, especially plastic bottles, that end up as litter or on the landfill, the majority of the island's refuse will still be disposed of in the landfill.

When collecting data for this project, plastic bags, which make up a large share of plastic waste, were also identified as particularly problematic. They are especially dangerous for marine ecosystems, as they can be swallowed by sea turtles that mistake them for jellyfish or get entangled with other sea life. As such, instruments to reduce plastic bag distribution, such as a bag tax or fee or the voluntary agreements of shops to reduce plastic bag use, should be introduced.

Given the value of recyclables and of landfill space, a mid-term objective should be set where all recyclables and organics, which currently make up 50% of municipal solid waste, must be separately collected for valorisation.

A study was recently carried out on how to reduce the costs of Cozumel's public lighting system.<sup>5</sup> One of the four actions for installing the improved lighting system is the establishment of a fermentation unit at the landfill to generate electricity, which could then be used to power the lighting system. For the waste fermentation, the study proposes collecting the waste in two fractions: organic waste for fermentation and inorganic waste for further separation and treatment at the landfill site. Although this project is proposing the introduction of a system for separate collection at source over the medium term, the introduction of a fermentation facility would be a very good way to further reduce the amount of waste going to the landfill and to make good use of these valuable resources. A composting facility is another approach for diverting waste from the landfill.

If, alongside the separate collection system with deposit-refund elements, the proposed short-term initiatives as well as some of the actions from the Prevention and Management of Waste in Cozumel project (see section 8) were to be implemented, this would be a huge step towards improving how the island manages its waste, protects its (marine) ecosystem and develops sustainably.

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5 Author interview with Ricardo Espinosa in July 2015, Cozumel.

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# 11. Annexes

## 11.1 Annex 1: Excerpts from Baseline Report, Cozumel (Tellez, 2015)

NB: The baseline data have been drawn from waste management studies carried out by GIZ in 2011. According to interviews held with PASA, this information can also be used as the baseline for 2014, as their monitoring in-

dicates that the quantities of waste generated would not have changed significantly from 2011 to 2014. The most significant changes recorded relate to the amount of PET bottles being recycled and thus not ending up as landfill, which is due to private companies entering the market in recent years.

Table 4: Overview table

Summary	
Most relevant actors identified	<ul style="list-style-type: none"> <li>Local government bodies involved in the waste management system: technical secretariat, financial office, municipal public services, and municipal department of ecology.</li> <li>PASA, a waste management company.</li> <li>Refuse collection actors: CAMAR, Baasha, El Cedro de la Península, other private companies, and informal refuse collectors.</li> <li>Beach cleaning programmes/initiatives of Zofemat, Ecología and FPM.</li> <li>Main importer of plastic bottles: the Coca-Cola Company.</li> <li>Main distributors:</li> </ul>
Main locations and sources of plastic bottle littering	Tourist zones, tourists who visit beaches, residential areas.
Weaknesses in the system	<ul style="list-style-type: none"> <li>No culture of at-source separation in place (a few bins are available for PET separation).</li> <li>Low level of awareness among locals and tourists about waste separation and recycling.</li> <li>No previous local authority experience of implementing economic instruments for SWM.</li> <li>The measures are not considered to be an urgent political priority.</li> </ul>
Statistics on plastic bottles	
Total amount of plastic bottles produced in Cozumel	0 tonnes
Total amount of plastic bottles imported onto the island each year in 2011 and 2014	1,288 tonnes per year (based on estimated annual imports of 42,900,000 bottles)
Total amount of plastic bottles exported off the island each year in 2011 and 2014	0 tonnes per year
Total amount of plastic bottles placed on the market each year in 2011 and 2014	1,288 tonnes per year (based on estimated annual imports of 42,900,000 bottles)
Total amount of plastic packaging products placed on the market (in tonnes)	n/a
Share of plastic bottles placed on the market (as a %)	n/a
Share of plastic bags placed on the market (as a %)	n/a

<b>Statistics on plastic bottles</b>	
Total amount of plastic packaging waste (PPW) generated each year in 2011 and 2014	5,991 tonnes per year (16,415.13 kg per day – 14.79% from tourists staying overnight and 85.21% from the rest of the population)
Share of plastic bottle waste generated each year in 2011 and 2014	21.08%
Total amount of plastic bottle waste generated (landfilled, recycled and unmanaged) each year in 2011 and 2014	1,288 tonnes per year (based on 3,530 kg per day)
Total amount of plastic bottle waste generated per capita	0.038 kg per day per capita (locals) 0.030 kg per day per capita (tourists staying overnight)
Separate collection rate for plastic bottle waste in 2011 and 2014	2011: 8% 2014: 15%
Recycling rates of plastic bottle waste in 2011 and 2014 (with recycling carried out off the island)	2011: 8% 2014: 15%
Recovery rates of plastic bottle waste including incineration with energy recovery	0%
Incineration rates of plastic bottle waste (incineration without energy recovery)	0%
Landfill rates of plastic bottle waste in 2011 and 2014	2011: 90% 2014: 83%
Share of plastic bottle waste that was unmanaged each year in 2011 and 2014	2%
Share of plastic bottle waste exported from the island for recycling in 2011 and 2014	2011: 8% 2014: 15% (collected PET is recycled off-island)
<b>Statistics on municipal solid waste</b>	
Total amount of municipal solid waste generated	35,847 kt
Total amount of municipal solid waste generated per capita	384 kg
Municipal solid waste recycling rate (as a %)	n/a
Municipal solid waste energy recovery rate	0%
Municipal solid waste incineration without energy recovery rate	0%
Municipal solid waste disposal rate (as a %)	n/a
Collection coverage for municipal solid waste	Nearly 100%

# NO SE COMPRA

- CABLE DE COBRE DE COMISION FEDERAL DE ELECTRICIDAD
- TUBERIA Y/O CABLE DE COBRE DE CAPA
- TAPAS DE ALCANTARILLA
- CABLE DE COBRE DE TELMEX



**EVITENOS LA PENA DE DAR AVISO A LAS AUTORIDADES CORRESPONDIENTES**

Sign showing waste types that are not accepted

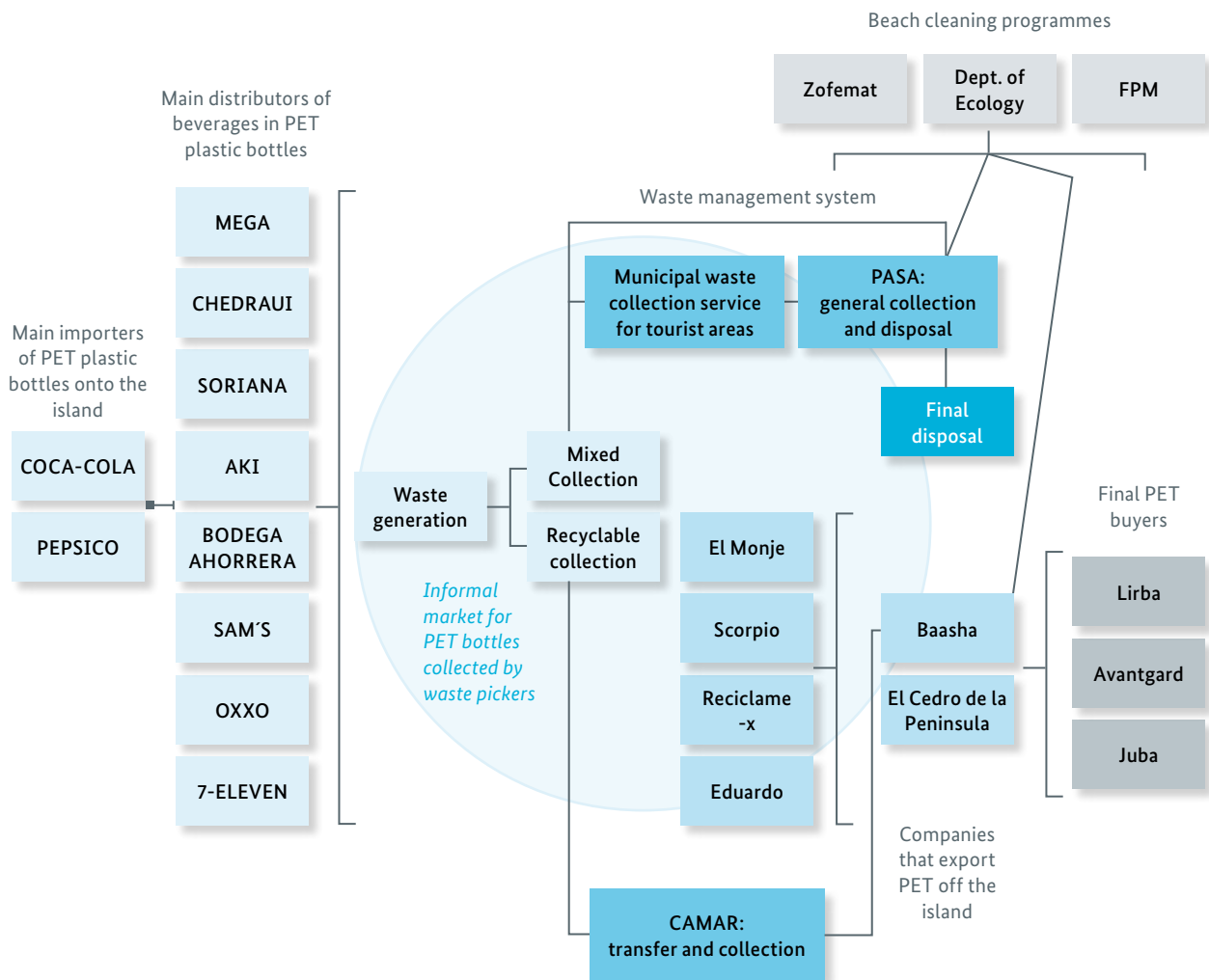
## Features of the national plastic-packaging waste management system, focusing on plastic bottles

<p>Relevant legislation (for waste management in general and plastic packaging waste in particular)</p>	<p><b>National</b></p> <ul style="list-style-type: none"> <li>• General Law on Solid Waste Prevention and Integrated Management</li> </ul> <p><b>State</b></p> <ul style="list-style-type: none"> <li>• State General Law on Solid Waste Prevention and Integrated Management</li> <li>• State Programme for Waste Prevention and Integrated Management (which highlights the implementation of the extended producer responsibility principle)</li> <li>• Sub-programme on Integrated Waste Management for Quintana Roo's Islands</li> </ul> <p><b>Municipal</b></p> <ul style="list-style-type: none"> <li>• Municipal Programme for the Prevention and Integrated Management of Urban Solid Waste and for the Special Management of Cozumel Island</li> <li>• Regulation on the Ecological Balance and Protection of the Environment of Cozumel Island</li> <li>• Public Finance Act (Ley de Hacienda) for Cozumel Municipality, State of Quintana Roo</li> </ul>
<p>State of enforcement</p>	<ul style="list-style-type: none"> <li>• The local authority's Department of Ecology department asks companies seeking to obtain a permit for their operations to present a waste management plan.</li> <li>• Extended user responsibilities are not reinforced, but are established in the waste management state law and mentioned in the <i>Reglamento de Equilibrio Ecológico y Protección al Medio Ambiente del Municipio de Cozumel</i> (Cozumel's ecology and environmental protection regulation).</li> <li>• There is no regulation currently in place covering solid waste management.</li> </ul>
<p>Economic instruments already introduced</p>	<ul style="list-style-type: none"> <li>• Monthly and annual waste management user charges for: individual households (USD 27 per year), businesses (USD 200–670 per year) and hotels and supermarkets (up to USD 5,300 per month). According to the accountability department, tariffs are established according to the commercial sector — e.g. supermarkets pay a higher tariff than coffee shops given the nature of their commercial activities and the amount of waste they generate (pay-as-you-throw principle).</li> <li>• The PET market currently operates in the same way as a deposit-refund system. The reason for this is that Coca-Cola and recycling companies buy PET from local collection and transportation companies, which has resulted in the establishment of local companies that buy waste valuables, including PET. The informal sector (<i>pepenadores</i>) constitutes a fairly important part of the separation and collection system, collecting more than 50% of the recyclables received.</li> </ul>

**Relevant key aspects of the national waste management situation, focusing on (plastic) packaging waste and especially plastic bottles**

The stakeholder map below describes the administrative structures as well as additional factors such as tourism, awareness-raising activities, the informal sector, and relevant actors involved in generating and managing plastic bottle waste.

Figure 5: Stakeholder map



Source: Tellez (2015); State Government of Quintana Roo and GIZ (2011).

PASA operates the waste management system (collection and disposal) and the local government pays monthly recovery costs to PASA that vary according to the number of tonnes collected. The government collects monthly and annual user charges that vary according to the type of contributor (individual household, business, hotel or supermarket). For businesses, the tariff varies according to the sector or type of business (e.g. supermarkets pay a higher tariff than restaurants). In effect, this constitutes a form of pay-as-you-throw scheme.

Interviews revealed that, at present, the operating costs of the waste management system are fully covered and that, in fact, the waste management system currently subsidises other government activities.

The informal sector plays quite an important role in the local recycling system. The collection of recyclables, including PET plastic bottles, has become the main or sole income stream for many families. People collect recyclables directly from bins and then take them to the collection companies on the island. Baasha and El Cedro de la Península are preferred because they buy bottles at higher prices (MXN 4 per kilogram).

In all, seven companies collect solid waste recyclables, which they buy from the informal sector. Baasha and El Cedro de la Península are the only companies that export used bottles to buyers on the mainland, with Baasha exporting the highest quantities of PET. The latter also recently procured equipment for compressing bottles three times more than can be achieved by other equipment on the island. Cutting down on the bulk of recyclables shipments reduces transportation costs, which enables Baasha to pay higher prices for the bottles they receive. Stable and high PET prices in Cozumel have helped to incentivise the local waste separation and collection market.

The interviews revealed that the number of waste plastic bottles disposed of in bins correlates with the numbers of tourists visiting the island – e.g. in high season there is a spike in the number of plastic bottles found in public bins located in tourist areas.

All the main actors mentioned the public's lack of awareness about waste separation.

Most of the PET bottles recovered from the beach cleaning operations go directly to landfill. That said, interviews revealed that sometimes those working as part of the clean-up operations sell recyclable bottles to collection companies, but this is not done as a formal practice.

### **Facts and figures about plastic bottles, their use and management in Cozumel (quantities of waste, plastic packaging waste, share of plastic bottles)**

In 2011, GIZ carried out a solid waste analysis to determine the material composition of waste derived from two main sources: the tourist population (considered to include only those staying overnight – e.g. waste generated by hotels) and the local population. The total amount of waste generated each day on the island was estimated at 98,213.15, which is equal to 1.1 kg per person – note that this figure does not include unmanaged solid waste.

Plastic packaging waste (PPW) represents 16.71% of the total waste generated. The total amount of PET collected was **3,459.70 kg per day (372.08 kg from the tourism sector and 3,087.62 kg from the local population)**. As such, PET makes up 3.52% of the total amount of solid waste generated. Interviews held with the general manager of PASA revealed that the amount of solid waste generated in 2015 is still roughly equivalent to that generated in 2011, so these 2011 figures are still relevant and useful for estimating the waste composition situation in 2015.

From 2011 to 2015, however, the island's recycling and waste management sector underwent considerable change. In 2011, for example, the total amount of PET collected by CAMAR was 108.43 tonnes. This quantity was double-checked in the interviews held with CAMAR's general manager and through quantitative data collection.

In 2011, CAMAR was the only organisation collecting recyclables and it did not remunerate those handing in PET bottles. An estimated total of 1288.15 tonnes of PET bottles circulated on the island that year (i.e. were sent to landfill, got recycled or ended up unmanaged). In 2014, because private recycling companies began paying for PET bottles and other recyclables, the separate collection rate increased to 15%.

Between 2011 and 2015, the informal recycling sector increased considerably and local companies, especially Baasha, drove up collection levels by buying PET and other recyclable materials. CAMAR's general director also confirmed this, stating that the amount of PET CAMAR currently collects is substantially less than in 2011 because they are not able to remunerate those handing it in. For this reason, informal sector actors prefer to take the recyclables they collect to other companies that can and do pay for them. CAMAR cannot pay informal collectors because they lack the infrastructure required to export the PET to the mainland recycling companies (i.e. an efficient compactor and a trailer).

According to the quantitative data obtained from the interviews with Baasha and El Cedro de la Península (the two companies that buy PET from the informal sector and other collection companies to export to mainland recycling companies), all the PET they collect is exported to the mainland for sale. In 2014, the amount of PET collected and transported off the island stood at 197.78 tonnes, which represents a separate collection rate of 15%.

The main importer of bottles onto the island, the Coca-Cola Company, declined to provide information on the amount of plastic bottles it releases onto the market in Cozumel. So, to get an idea of the numbers involved, a rough estimate of the total was calculated to be:

*the amount of bottles sent to landfill + the amount recycled + the amount remaining unmanaged*

This adds up to approximately 1,288.15 tonnes or, taking the average weight of a bottle to be 0.3 g, a total of 42,939,600 bottles in 2014. As no bottles are produced in Cozumel, it is estimated that the amount of used bottles sent to landfill, recycled and left unmanaged equals the amount of plastic bottles imported.

### **Description/analysis of the material flow**

On Cozumel no PET bottles (or any type of plastic) are produced and no centres equipped to recycle the material exist. The two main importers of PET plastic bottles onto the island are Bepensa S.A. de C.V. (the Coca-Cola Company) and Bebidas Purificadas del Sureste S. de R.L. de C.V. (PepsiCo). These distributors operate the main sales points for Coca-Cola Company and PepsiCo beverages.

There are several distribution pathways of used plastic PET bottles in Cozumel. Some of the main waste management and recycling actors indicated that the majority of plastic bottles are collected from the main tourist areas of Cozumel, where the hotels, restaurants, businesses and supermarkets are located.

Other areas affected by bottle litter are the main tourist beaches on the eastern side of the island. Interviews and site observations revealed that there are not enough waste bins in these areas. Zofemat operatives stated that this was due to the local and federal governments prohibiting the installation of extra bins in order to avoid attracting animals, which might possibly alter the biodiversity of the site (the section of coast in question is a natural protected area). They also assert that many people, lacking awareness, leave their plastic bottles on the beach or on the road running behind the beach and that this can easily end up as marine litter (although the regular clean-up operations help to prevent much of this unmanaged waste from entering the sea). There was a general consensus among key actors that not enough bins are installed around the town.

Plastic bottles are most commonly thrown directly into mixed waste bins in residential areas because the required separation and collection systems are lacking. However, the informal sector also collects plastic waste in these areas.

The total amount of PET bottle waste has been determined using GIZ's 2011 solid waste analysis. This analysis estimated that 3,459.5 kg of PET bottles were thrown away each day, equivalent to 1,262 tonnes per year, which becomes 1,288 tonnes per year with the inclusion of unmanaged bottles (2% of the total number of used bottles).



Collected and sorted  
PET bottles

When it comes to recycling on Cozumel in 2015, there are several PET collection initiatives in place:

- a. Private businesses offering a predetermined per-kilogram payment for PET have incentivised the informal sector, encouraging informal PET collectors to deposit at their centres.
- b. The state programme Recycling Waste for Food operates on an ongoing basis on the island to collect valuables including PET (at the moment, the PET collected through this programme is not factored into the figures for recycled PET due to a lack of data).
- c. CAMAR has established collection routes that mainly serve hotels and businesses but also cover number of neighbourhoods. The PET collected by CAMAR is factored into Baasha's PET export figures because CAMAR sells the PET to either Baasha or El Cedro de la Península.

The PET recovered by Baasha, CAMAR, El Cedro de la Península or any other recycling company is exported off the island and sold to recycling companies on the mainland that are mainly located in Mérida.

Zofemat, Ecología and the Fundación de Parques y Museos (Parks and Museums Foundation – FPM) carry out scheduled beach cleaning operations. The main actors operating in waste management estimated that plastic makes up more than 70% of all the waste they collect and that PET represents 25% of these plastics. They also mentioned that a great quantity of PET plastic bottles are carried by sea currents from other places and are washed up on Cozumel's beaches. The evidence for this assertion is the level to which the bottles are degraded and the fact that the brands are not Mexican. The degraded state of PET waste collected from beaches means that it is not suitable for sale. As such, it is not separated but is, instead, taken away for final disposal.

Although most littered PET is collected through these clean-up operations, an estimated 2% remains unmanaged and thus presents a high risk of ending up in the ocean.

**(1) Separation**

Several waste separation practices are partially operational in Cozumel, for example:

- a. 120 separation bins (organic/inorganic) are placed in the main tourist areas.
- b. Collection routes established by CAMAR cover the main tourist areas and a number of neighbourhoods. Households, businesses and hotels located in these areas do not have proper separation bins. Instead, they sort their valuables using plastic bags and hand them to CAMAR operators on the appropriate collection day.
- c. The informal sector plays a key role in the separation system, and collecting recyclables has become a source of income for many families. Interview findings indicate that the informal sector is responsible for collecting more than 50% of the total amount of valuables that are exported to the mainland. The remaining 50% is collected directly from hotels, businesses and households as mixed waste, with separation being carried out by the intermediary.

Together these initiatives have resulted in the estimated collection of 15% of PET bottles in 2014.

- (2) In Cozumel, the only post-separation treatment process that plastic bottles undergo is compacting, which is carried out at the collection points operated by CAMAR, Baasha, El Cedro de la Península or others.
- (3) After compacting, the bottles are exported to the mainland for recycling. Based on GIZ's 2011 solid waste analysis and on the collection rates for 2011 (8%) and 2014 (15%), it is estimated that, in 2014, 83% of the island's plastic bottles ended up as landfill and an estimated 2% remained unmanaged.

**Main sources and locations of plastic bottle littering**

1. Tourist areas such as the Malecón (the main waterfront promenade in San Miguel), hotels, cruise ship docks, and restaurants.
2. The main beaches on the island's east coast.
3. Residential areas.

**Weaknesses and possible loopholes**

Listed below are the key weaknesses or loopholes affecting waste management and recycling in Cozumel.

**(1) Waste generation and use**

- 1.1 Low levels of awareness about how to prevent consumption.
- 1.2 Hotels, restaurants and tourist sites profit from selling beverages contained in plastic bottles.
- 1.3 Tourists and foreigners do not trust non-bottled drinking water.
- 1.4 The culture of drinking beverages from plastic bottles is embedded in the local culture.
- 1.5 There are no incentives or penalties in place for promoting waste reduction.

**(2) Distribution by the consumer (due to purchase, use and consumer behaviour including littering)**

- 2.1 The island has a large floating population that spends time in tourist and natural areas and usually carries plastic bottles. This increases the risk of marine and/or land littering.
- 2.2 Cozumel is extremely hot, so locals and tourists are much more likely to buy bottled beverages and to do so more frequently.



- 2.3 Distributors, businesses and consumers do not have defined responsibilities when it comes to the marketing, sale or consumption of goods in plastic bottles.
- 2.4 There are no restrictions in place to limit the amount of plastic bottles being imported onto the island.
- 2.5 No monitoring system/organisation is able to provide information on the amount of bottles being imported onto Cozumel.

#### (3) Collection and clean-up operations

- 3.1 The local authority restricts the number of operating licenses awarded to collection companies and has refused permission for the installation of more collection points in town.
- 3.2 There are no collection points where the public can separate their waste.
- 3.2 The waste management service only operates a mixed waste collection service.
- 3.3 PASA does not have the infrastructure required to handle separate waste collection.
- 3.5 The collection infrastructure is not sufficient (e.g. there are not enough refuse trucks).
- 3.6 Only CAMAR is permitted to collect recyclables from households.
- 3.7 The informal sector is not formally permitted to collect recyclables.
- 3.8 The recyclables that are collected from beaches are not separated, but go directly to the landfill.
- 3.9 The costs involved in exporting recyclables off the island is high.

#### (4) Separation

- 4.1 Separation at source is not being implemented in Cozumel.
- 4.2 Separated-waste collection routes cover tourist and commercial areas and a number of neighbourhoods and they are only operated by CAMAR.
- 4.3 There are no separation bins for valuables (just bins to separate organic and inorganic materials).
- 4.4 Public awareness about the need for separation is low.

#### (4) Treatment

- 5.1 The recycling of materials can, so far, only be carried out in other off-island locations.
- 5.2 Only one company (Baasha) owns an efficient compactor and its use reduces transportation costs.

Table 5: Analysis of selected weaknesses

Specific weakness/ loophole identified	Description	Reasons
There are too few bins in local areas or on the beaches.	All actors mentioned that there were not enough bins installed on the island and that, when trialling recycling bins, people tended to throw any kind of waste into them.	The local authority can draw down federal funds to pay for more bins (this has been done in the past), but separation bins do not tend to work because, due to a lack of awareness, people do not separate their waste.
A waste separation culture has yet to be developed on the island and there are insufficient collection points for depositing separated waste.	It is difficult to separate waste at source as there are no special bins for collecting recyclables. There are also a few alternative collection points for recyclables around the island, so people sometimes do not bother to separate their waste and go to these alternatives instead.	The government continues to deny permission to companies seeking to establish more collection points.
Previous experience of implementing economic instruments for waste management is lacking.	The local authority has yet to grasp the importance of implementing economic instruments that can help improve the waste management system.	<ul style="list-style-type: none"> <li>• Other priorities are higher up the political agenda.</li> <li>• There is a lack of awareness about the importance of solid waste prevention and management.</li> </ul>
Local legislation does not offer a clear legal pathway for developing and implementing an economic instrument.	Although there is a clear legal framework at the national and state levels that considers extended producer responsibility (EPR) principles, the legal framework required to implement this at the local level still needs to be refined and analysed.	It is not clear whether the local authority has the powers needed to implement instruments like a deposit-refund system, tourist fees or fees for plastic bottle importers (EPR).

## 11.2 Annex 2: Possible instruments and an evaluation of their suitability for Cozumel

Table 6: Evaluation of possible instruments for Cozumel

Instruments to improve waste management	Type of instrument	Description	Objective	Discussion	Focus on reducing plastic bottle waste (that ends up in sea)	Evaluation
Extended producer responsibility (EPR) for plastic bottles/ packaging	Economic	Producers/importers are made responsible for the entire lifecycle of their product. Strong options are to: <ul style="list-style-type: none"> <li>establish a fully private entity that is jointly owned, operated and supported by the producers/importers in question;</li> <li>require producers to fully fund the collection and recycling scheme;</li> <li>set high targets.</li> </ul>	To reduce the amount of plastic bottle waste or enhance the performance of collection operations by placing the responsibility for managing this waste on the producers/importers.	EPR is seen as a very flexible instrument in terms of its design and of the levels of involvement required of the relevant authorities and industry.	Direct/indirect	According to information provided by the national expert, the legal basis for EPR already exists in the legislation.  This instrument is very flexible and must therefore be further tailored to the objectives, conditions and needs of Cozumel. A idea for an instrument that may be relevant for Cozumel is a deposit-refund system accompanied by an advanced recycling fee (which is described further down this table).
Deposit-refund system for plastic bottles	Economic	Consumers pay a deposit when buying a bottled product and are refunded the deposit when they return the bottle.	To reduce the amount of plastic litter by creating an incentive for consumers to return used bottles.	The system can be introduced by the state or importers. Different scheme options exist. A clear system and infrastructure for bottle returns is needed that involves retailers/dealers.	Direct	Deposit-refund systems are known to be very successful instruments for reducing the amount of plastic bottle waste that ends up as litter or landfill. The infrastructure required for collecting returned bottles is already in place in some areas in Cozumel.  As Cozumel is a municipality and not a federal state, the legal basis for this kind of scheme needs to be clarified. Any scheme developed must also ensure that it offers no or very low incentives for bringing bottles from the mainland to the collection points on the island ('deposit fraud').  To manage the money, the local authority would need to set up a fund to hold the income from deposit charges, so it can be repaid later. The system could also be financed or further supported with advanced recycling fees for importers (see the next option) and by earnings made on the sale of plastic bottle waste.  Campaigns to raise consumer awareness about the existence of the scheme, the deposit charge and the thinking behind the deposit-refund system are essential to promote the scheme.

Green: pre-selected for Cozumel. Yellow: would also be suitable. Red: not selected for Cozumel. Blue: accompanying measures.

Instruments to improve waste management	Type of instrument	Description	Objective	Discussion	Focus on reducing plastic bottle waste (that ends up in sea)	Evaluation
Advanced recycling fee: fee scheme for plastic bottle importers	Economic	Producers/importers are obliged to pay a small fee for waste treatment.	This approach aims to internalise the costs of disposal in the product itself, which incentivises the greater use of recyclable materials or reduces the amounts of waste produced.	There are different ways to implement this kind of scheme. Exemptions could be allowed for those importers that take back their waste.	Indirect	According to information provided by the national expert, the legal basis for EPR is already built into current legislation. However, as Cozumel is not a federal state, clarification is needed to understand whether Cozumel Municipality is entitled to institute this kind of instrument.  This instrument could help to make the deposit-refund system self-financing, so that it requires no or low government subsidies.
Imposing waste service charges by providing bags for waste collection (plastic waste collection)	Economic	In this approach, waste producers are charged for the waste management services they benefit from. To incentivise waste reduction, the charge should correspond to the amount of waste produced by the fee payer.	To improve waste management and reduce plastic bottle waste.	Polluters must pay for the quantities of waste they produce ('pay as you throw'). This measure will raise revenues, especially if bags are also used for other purposes. This kind of scheme does not tackle plastic bottle waste directly. A collection and billing system will need to be established.	Indirect	In some parts of the island, the required collection infrastructure already exists, as do collection companies and informal-sector plastic bottle collectors. However, most bottles disposed of domestically end up in the landfill.  A system could be introduced in which locals and/or businesses/hotels are required to buy refuse sacks from the authority (which may, for example, be sold in supermarkets) for the separation and collection of plastic bottle waste.  This kind of system can be highly effective but it needs to be very well prepared (calculation of fees, system design, billing, collection, etc.).  By monetarily incentivising the collection of plastic bottles (instead of setting fees for high residual waste), the illegal dumping that often results from pay-as-you-throw schemes may be prevented. In this way, the drawback that bags need to be paid for is offset by the fact that waste fees can end up being reduced.  This system could be extended to include glass bottles and, if this works well, to other recyclables too.

Instruments to improve waste management	Type of instrument	Description	Objective	Discussion	Focus on reducing plastic bottle waste (that ends up in sea)	Evaluation
Installation of drinking fountains that provide free potable water	Infra-structural	In high-footfall locations, drinking fountains could be installed to provide free potable water.	To reduce the amount of plastic bottle waste.	The successful implementation of this kind of scheme can drastically reduce plastic bottle waste.  The scheme depends on the availability of potable water in the island and on tourists trusting the water supply from a public fountain. There may be resistance from the packaged water industry.	Direct	In some areas on Cozumel, a similar system is already in place that enables locals to refill their water containers.  It is understood that tourists distrust the island's tap water supply, so to make this instrument work, an intensive awareness-raising campaign would be required, along with tight controls on the water quality and functional capability of drinking fountains.  The packaged water and plastic bottle industries are likely to vehemently oppose this measure.  Plans are already in place to gradually install drinking fountains in Cozumel's national parks, such as Chankanaab National Park.
Introduce incentives, subsidies, funds and exemptions for recycling facilities	Economic	Successful initiatives and general recycling efforts are rewarded with small amounts of funding or exemptions from certain duties.	To improve recycling and thus reduce the amount of plastic bottle waste.	This scheme is costly and generates no revenues. However, once the recycling industry takes off, less waste collection and disposal is needed. This scheme is also relevant for all other types of recyclables.	Indirect	Recycling facilities are rare, despite the market for used plastic bottles on the mainland (e.g. in Mérida). Collection companies for recyclables are already established in Cozumel and would be interested in expanding their operations. However, to be more profitable, they could receive a small government payment for collecting and exporting the waste off the island. In the best case scenario, a recycling market would be created on the island.

Instruments to improve waste management	Type of instrument	Description	Objective	Discussion	Focus on reducing plastic bottle waste (that ends up in sea)	Evaluation
Tourist waste tax (that could, for example, be included in hotel costs, car parking fees, ferry fees)	Economic	Tourists are required to pay a charge for visiting the island. The income derived is then earmarked for action to improve waste management.	To improve waste management and, in so doing, reduce plastic bottle waste and littering.	This is a good measure if tourists are the main source of litter. However, it does not raise people's awareness significantly or specifically target plastic bottles, and it is difficult to implement as many tourists are daytime-only visitors, so the charge cannot be added on to room rates. Adding the charge to ferry ticket prices is a strong idea, especially as locals are exempted, but, again, controls are necessary.	Indirect	The funds raised from the tourist charges could be used to improve the separate waste collection system. However, this is somewhat difficult to implement in Cozumel, as the island is not a federal state. If the advanced recycling fees proposed (see above) are claimed as a fee (derecho) and not as a tax, a tourist waste tax may also then be feasible. The fee could be collected at the airport and immigration points through which all cruise liner passengers must pass.
Voluntary agreement with the business sector to introduce separate waste collection	Economic	By adopting separate waste collection, the businesses (hotels, for instance) can improve their image and also, possibly, receive some form of accreditation or label.	To increase separate collection and, in so doing, reduce the number of plastic bottles going to landfill.	A strong incentive is needed if hotels are to participate. Staff will need to be trained and tourists targeted with awareness-raising campaigns.	Indirect	Only a few hotels have introduced separate waste collection so far, handing over their recyclables to collection companies. The federal government programme Destino Turístico Limpio (Clean tourist destination) is a relevant voluntary certification scheme for the sector but, although some hotels began participating, the programme currently appears to be on hold.

Instruments to improve waste management	Type of instrument	Description	Objective	Discussion	Focus on reducing plastic bottle waste (that ends up in sea)	Evaluation
Product ban on disposable plastic bottles	Legal	Plastic bottles are banned outright by the local authority.	To reduce the amount of plastic bottle waste through prohibition.	Not or hardly feasible, given the inevitable resistance of industry. Bottles could be bought on the mainland or products sold in other containers that do not effect any change in waste behaviour	Direct	This instrument is not deemed to be feasible for implementation in Cozumel. High levels of resistance can be expected from the plastic bottle industry, and producers and consumers might simply shift to other products that present similar or new problems.
Improve waste collection by increasing collection	Administrative	To increase the capacity of staff collecting plastic bottle waste, focusing particularly on the beaches.	To reduce the amount of plastic waste that ends up the marine environment.	This scheme is costly and, while it may improve the problem of littering, it does not tackle the on-the-ground causes of littering.	Direct	Many initiatives and an informal sector are already in place collecting plastic bottles. Littering was not identified as the main problem. The main problems are the high levels of plastic bottles being bought, the lack of separation of these bottles, and the low levels of awareness about waste management issues. This approach would not ultimately solve these problems.
Vessel berthing fees	Economic	Ships are required to pay a fee for using the port. Ships and cruise liners could be subject to an individual passenger service charge	To charge ship owners and passengers (tourists) in order to improve waste management on the island.	This scheme is reasonable, especially if ships are shown to be the major source of marine littering.	Indirect	According to stakeholder information, PET bottles are already mainly banned from cruise ships. As such, bottle waste from cruise ships could be reduced from the current rate of 10% of recyclables generated on board to 1% of recyclables over time.
Port reception fees	Economic	Cruise ships are required to pay to offload their waste. This could, however, be an incentive for marine littering. As such, it is better to charge an environmental fee for using the port and then channel the income raised towards operating the waste reception facilities.	To charge ship owners and tourists in order to improve waste management on the island.	This approach is reasonable if ships are the major source of marine littering in the area and waste offloading is allowed.	Indirect	According to stakeholder information, PET bottles are already mainly banned from cruise ships. As such, bottle waste from cruise ships could be reduced from the current rate of 10% of recyclables generated on board to 1% of recyclables. Ships are not allowed to dispose of their waste in the island's port.

Instruments to improve waste management	Type of instrument	Description	Objective	Discussion	Focus on reducing plastic bottle waste (that ends up in sea)	Evaluation
Increase the number and density of closed public waste bins and collection points (for plastic waste/plastic bottle waste)	Infrastructural	More closed public waste bins and waste collection points are installed by companies or authorities, especially in areas highly frequented by tourists.	To reduce the littering of used plastic bottles.	This is not a policy instrument per se, but is more of an infrastructural measure. It is a valid approach for raising awareness but is not viable as a standalone measure. Initial installation and ongoing maintenance would prove costly, so the approach must be introduced in combination with other revenue-raising instruments and also awareness-raising initiatives to modify the behaviours of locals and tourists.	Direct/indirect	In certain areas of the island, like the east-coast beaches and in the towns, the density of waste bins could be improved (often litter is deposited next to bins as too few bins are provided in the high seasons). The local authority is also cautious about installing bins in what are protected conservation areas. For this reason, the bins would have to be designed so that they do not attract animals. In addition, the public lacks awareness about separate waste collection. If different waste bins for different types of waste were installed, it is feared that people would not separate their rubbish but, instead, throw whatever waste they have in whatever bin. A possible solution could be to introduce bins for specific waste types (bottles) with holes shaped to admit certain types of litter (small round holes for bottles) along with awareness-raising campaigns and controls.
Awareness-raising campaign	Informative	Different campaigns and training are delivered to increase local people's and tourists' awareness of the issue and its effects on the environment.	To reduce the amount of plastic bottle litter that people generate.	While this is not a policy instrument and would be costly at the outset, this scheme would back up other policy instruments and help to ensure they achieve more successful outcomes.	Direct	Almost all stakeholders assert that raising the awareness of locals and tourists is essential. These kinds of campaigns can be used to support any of these instruments. In our case, the campaign would focus on separate waste collection.



Instruments to improve waste management	Type of instrument	Description	Objective	Discussion	Focus on reducing plastic bottle waste (that ends up in sea)	Evaluation
Vessel berthing fees	Fines for littering	Economic	The introduction of fines for people caught littering.	Fines cannot be introduced specifically for plastic bottles but for waste in general. Such a scheme only works if controls are properly carried out.	Direct	According to stakeholder information, littering is not such a big problem on the island. As such, the impact of this measure would be fairly low. The strongest effect would be achieved by systematically by handing out fines on and around the beaches. Littering fines could be used as a supporting measure, conducted in tandem with other selected instruments.





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