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REPORT

ASSESSMENT OF POTENTIAL ALTERNATIVES TO SINGLE USE PLASTICS

29TH NOVEMBER 2019

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ZERO WASTE MALDIVES

MACCS

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1. INTRODUCTION

This report has been undertaken for Maldives Authentic Crafts Cooperative Society (MACCS) for the project Advocating Alternatives to Single-use Plastic Bags under which the Plastic Noon Gotheh movement (Practice No Plastic) was initiated. This project is implemented by UNDP and funded by The GEF Small Grants Program. Together with Zero Waste Maldives as the research partner, this report aims to identify problematic single use plastics that are currently being used in the country, and offer alternatives and recommendations on how to best combat it.

This study will mainly focus on single use plastic bags, bottles and takeaway containers made of Styrofoam. Different strategies to deal with these 3 single use plastic waste streams will be identified and discussed.

This report will try to identify other single use plastic waste streams that do not get much attention but still remain a persistent problem in the environment and offer suggestions on how to reduce and eliminate those waste streams as well.

2. AIMS AND OBJECTIVES

To assess potential alternatives that are available locally as well as internationally that could be introduced to replace single use plastics being used in the Maldives.

Identify single use plastics that are being used and discarded locally and their corresponding alternatives, focusing on bags, bottles and Styrofoam takeaway containers; taking into consideration their purpose, ease of use and cost.

Identify other potential problem single use plastics and offer recommendations to consider in the governments' plan to phaseout single use plastic by 2023, which is mentioned in the Strategic Action Plan 2019-2023.

SINGLE USE PLASTIC BAGS

3. SINGLE USE PLASTIC BAGS

3.1 Core Issues with single use plastic bags locally

3.1.1 Gaps in the Regulatory Framework

Currently there are 2 types of Single Use Plastic Bags being imported into the country. Plastic Bags and "Environmentally Friendly" Plastic Bags. As of today, the Maldives government imposes a 400% import duty on plastic bags that are imported and "Environmentally Friendly" Biodegradable Plastic Bags have a zero-duty rating.

This change came from a cabinet meeting held on the 31st of May 2011 where the decision was made to place a duty exemption for plastic bags that are imported to the Maldives labelled biodegradable or "environmentally friendly". This gave rise to the "Standards for Determining Bio Degradable Bags 2012" [1]

Though this change was made based on the best available information at the time in the hope that this would alleviate the single use plastic pollution problem, it only made it worse. Recent studies show that these "biodegradable" bags do not breakdown in some conditions and when they do breakdown, they disintegrate into microplastics that cannot be seen or removed.

Previously, there was an import duty of 200% on all plastic bags without exception. Due to the previously mentioned policy change, although conventional plastic bags' import duty was hiked to 400%, the biodegradable plastic bags had no duty, leading to a handful of local businesses making the importation of duty exempt bags their primary business. Almost all of the importers now import oxo-biodegradable bags which disintegrate into microplastics over time and are in fact more harmful to the environment than the regular plastic bags.

The fact that Environmental Protection Agency (EPA) conditioned that the bags had to have printed "Environmentally Friendly Bag" on the bag also leads to confusion among the public that the bag is environmentally friendly when in fact it is not. This is evident through MACCS' efforts to raise awareness on the dangers of the oxo-biodegradable bags. MACCS found that the almost all of the people they interacted with were under the assumption that due to the fact that these bags had the EPA logo and the words "Environmentally friendly bag" printed on the bag it was indeed better for the environment.

But almost all scientific studies show that oxo-biodegradable bags are not an environmentally friendly alternative. [2]

3.1.2 Unregulated Plastic Bag Importation and Local Production

There lacks a robust regulation to regulate the importation and production of plastic bags in the country, creating a legal loophole that can be exploited.
Importers can get the overseas manufacturers to manipulate the specification of the plastic bags being produced. The most important parameter they can alter is the thickness of the bags which results in less material being used and a thinner bag. So, the 400% duty may not be a deterrent or even a disincentive to opt for biodegradable bags as intended.

As the whole process is not locally regulated or monitored, no one can say exactly what materials or additives were used in the manufacturing process.
Thus, there is no way to verify that the material used is safe to be used to carry fish, or other food items.

This is a major concern as a lot of the migrant population's food is packed and delivered in plastic bags.

It is also important to note that there are 2 known facilities that are currently producing single use plastic bags in the Maldives. These facilities are neither regulated nor monitored.

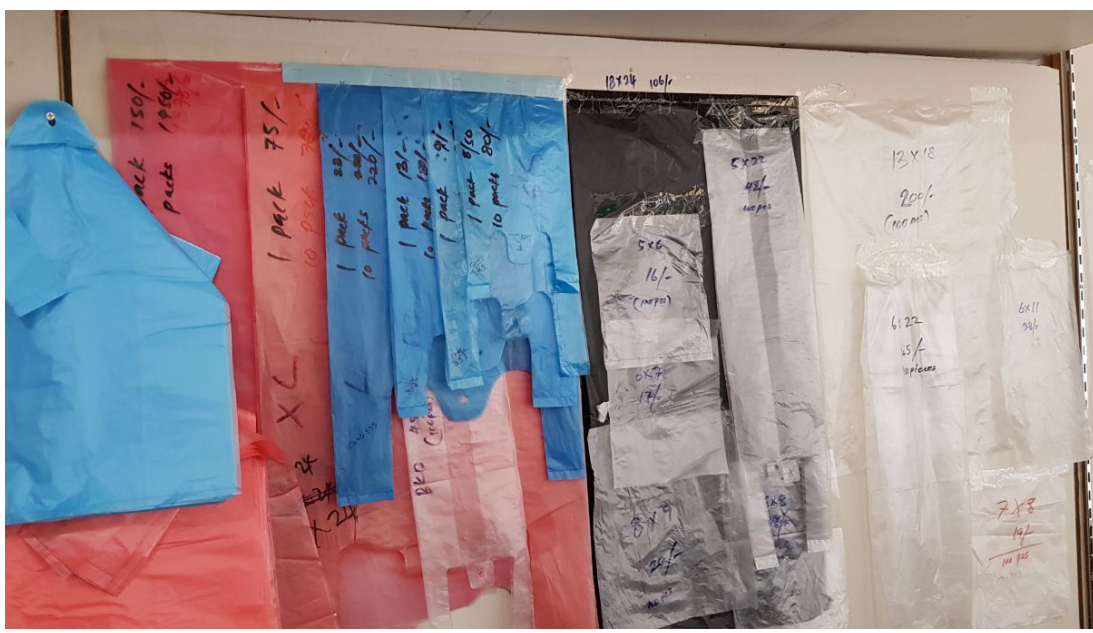


Figure 1 Some of the sizes of bags available locally

3.1.3 Lack of Size Restrictions on Plastic Bags and Biodegradable Plastic Bags

There is no standard to restrict the size of the bags or recommended sizes, which has led to a large fraction of the imports to be of a small size that has no viable end of life use. Usually the bigger bags which are initially provided from shops, as grocery carrier bags, are later used as bin liners as their end of life use. These smaller sized ones are often given out specifically at pharmacies as well as retail shops for smaller 1 or 2 item purchases.

It's also important to note that the thickness of the bags is not specified at all. This gives rise to the importers being able to tweak the strength of the bag. This is very visible in supermarkets when one buys certain items such as milk or juice cartons that maybe heavier and might puncture through the bag. Hence, they often double or triple bag the items in order for the bag to serve it's intended function.
It's important these restrictions are put in place as a standard to avoid further exploitation and also to reduce overall bag usage.

3.2 Policy Recommendation for Single Use Plastic Bags

Duty free status of Oxo-biodegradable bags and sale of bags with EPA logo should be stopped in the Maldives from Jan 2020. Regulation to ban all Single Use Plastic Bags should be in place by Jan 2020 and it should give a leeway of a year for importers, manufacturers and public to adjust. This will come into place with a Jan 2020 announcement of a ban on all single use plastic bags including importation, manufacture and use of bags that are less than 50 microns with enforcement starting Jan 2021.A total ban on all single use oxo bio degradable plastic bags to be implemented from Jan 2020 onwards.

Also, by Jan 2021 a levy on all single use bags should be implemented. Internationally it has been recorded that comparatively, levies result in a higher reduction in single use plastic bag use than bans. [3] [4] Maldivians require a behavioral change when it comes to using disposables and a levy would force the consumer to make a conscious decision on the single use bags. This would also nudge more people towards purchasing reusable bags. This has been proven in multiple studies done internationally on consumer behavior post ban or levy implementation. [5] [6]

When the announcement of the ban is made, the government should also put into place import quotas to be enforced from that date onwards. Importers of bags get a quota based on their past 3 year's supply trend with the maximum allowable import amount being set at 100,000,000 Bags total. This amount is an average of the import data of all single use plastic as well biodegradable bags since 2006. This is to avoid any sudden stockpiling by importers as well as to avoid having to compensate these businesses for potential lost revenue. A production quota should also be made based on data on local production. These quotas will need to be revised every 3 months and progressively reduced so that the total bags being used in the country decreases.

As there are some uncertainties concerning the compostable bags which would be the most suitable alternative to single use plastic bags. We recommend that a study be commissioned to see if compostable bags would be a viable alternative in the Maldivian context. The major concern being the bag's degradation in the marine environment and its effect on the marine eco system as well as it's composability in local composting facilities. A decision could be then made on the findings to decide if the Maldives government could introduce compostable bags as the alternative to single use plastic bags completely to meet the phaseout target of single use plastic bags by 2023. If they are introduced to the market, they should also carry the levy as a disincentive from disposables.

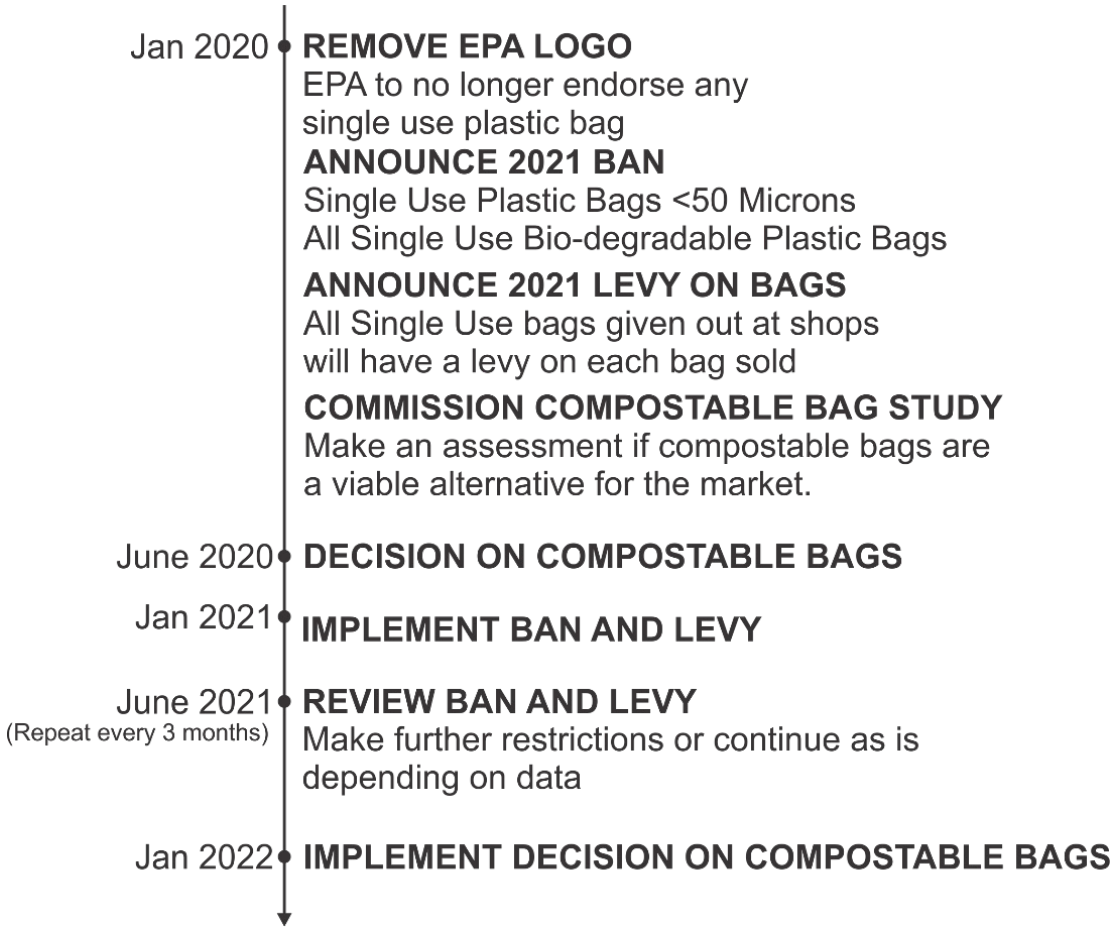


Figure 2 Timeline of Suggested Implementation of Policy Recommendations

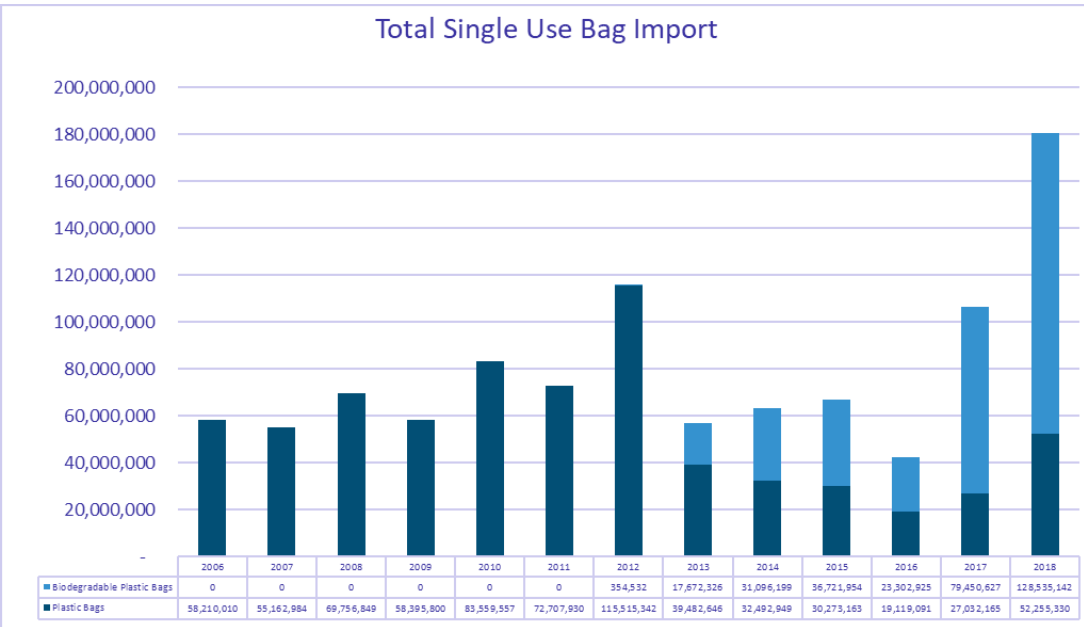
3.2.1 Ban Import and Production of Single Use Plastic Bags

The first key step in curbing Single Use Plastic Bags is to go for a total import ban on the bags. This should be a blanket ban on all the types of single use bags that are currently being imported, i.e., plastic bags as well as the biodegradable plastic bags.

The recommended way forward to start implementation would be to set a date for the ban. Announce 12 months prior to the date that an import ban will be imposed from that date onwards.

As visible from the graph above that shows the plastic bags and biodegradable bag imports in the country, the trend has shifted mainly to biodegradable plastic bags with the biodegradable bags now exceeding the total amount of plastic bags that were imported in 2012. It's also important to note that this data is the total import data only, as production data is not available from the local manufacturers.

There is an alarming rise in the total number of bags being imported and this probably is due to the fact that there is a lot of money to be made selling biodegradable bags which are duty exempt. Businesses have been setup with their primary function being to import and sell biodegradable bags.



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Biodegradable Plastic Bags	0	0	0	0	0	0	354,532	17,672,326	31,096,199	36,721,954	23,302,925	79,450,627	128,535,142
Plastic Bags	58,210,010	55,162,984	69,756,849	58,395,800	83,559,557	72,707,930	115,515,342	39,482,646	32,492,949	30,273,163	19,119,091	27,032,165	52,255,330

Figure 3 Yearly Total of Single Use Plastic Bags Imported

3.2.2 Bag Levy/Charge/Tax/ Mandatory Minimum Charge

The current practice that is followed in the Maldives is that all plastic bags are given out for free. People can request for their goods to be double or triple bagged and they are still given out for free.

Arguably the most effective way to deal with single use plastic bag use is to put in a levy on all plastic bags alongside the ban on single use plastic bags that are not of the specified thickness. This would stop all retailers from handing out bags for free and mandating that there be a charge imposed per bag given out. [5] [6]

This charge can be imposed at import level, where the importers have to pay a fixed fee of MVR 1 per bag that they import. This charge will then get passed down to wholesalers then to retailers and finally to the consumer. The customer has the option of refusing to buy a plastic bag and bring their own reusable bags, or pay a fee of MVR 1 for the plastic bag that they need.

This fee is added on top of the cost to procure the bags from the manufacture.

This has the potential to generate a revenue of MVR 100,000,000+ per year. As a Single Use Plastic Pollution Tax. This pollution tax can be used to improve composting and recycling. As well as spent towards introducing reusable alternatives.

3.2.3 Mandatory Reusable Bags Available for purchase at Supermarkets

Parallel to the bag ban and charge, the government must also mandate that the major supermarket outlets also have reusable bags on sale at checkout. So that customers have the option of buying a reusable bag instead of a single use disposable bag.

It is important that the cost of a reusable bag sold at supermarkets is made as affordable as possible so that the lower income households are not overburdened.

3.2.4 Color coded specialty bags for Waste Collection System

To ensure the success of the Government's Waste to Wealth waste management scheme, Waste collection/disposal system would have to transition to a minimum of a 2-stream waste collection system where customers are able to segregate wet waste and dry waste. The color-coded bag system would achieve 2 major goals. Basic segregation of waste and it will also ensure that there are no households that are not registered and paying into the waste management system. Currently WAMCO is planning for a color-coded bag system.

The proposed method would be to

provide bin bags to each household at a fixed rate of 30 bags per household. Any additional bags collected beyond the 30 bag per month limit would incur an additional charge and more bags can be procured from waste collector or major supermarkets. However, these bags sold at retail will have to have the collector's collection fee for the bag, as well as the product's cost factored into the retail cost.

Since these bags will be specifically manufactured for the waste, they will have distinct features that makes it identifiable as customer's household waste. So, any bags that are left on the roads other than these bags can be considered waste that is illegally dumped. It could also be assumed that the household that the waste originated from is not registered into the waste collection system and Collector can then approach those households and get them into the system to ensure 100% registration and collection.

3.2.5 Communication and Awareness Program

The one-year grace period should be used for a rigorous communication program that informs the public of the ban. In addition, awareness programs should be conducted on the costs and dangers of single use plastic pollution.

The bags themselves could be used as a medium for the communication program to also inform the public that a ban on single use plastic bags and a mandatory levy would be imposed on all single use plastic bags. This would reach the users of these bags in the most effective manner.

3.2.6 Monitoring and Enforcement Mechanisms

With the ban and levy in place government must plan and budget for an effective monitoring and enforcement program. It must ensure that the regulatory capacity is increased to match the needs that may arise due to the change.

The regulatory authority must be equipped to monitor and test the quality of bags being used in the country.

There must be Key Performance Indicators (KPI) to measure reduction in bag use by consumers as well as import and production of bags.

Baseline data for bag consumption, import and production must be in place before ban is in effect. Mechanisms to collect data from importers, producers and shops must be in place.

3.2.7 Business Opportunities

Producing and importing reusable bags is a business opportunity that needs to be encouraged as part of the plan to move to alternatives.

Waste collection bags such as planned by WAMCO, can be produced in the Maldives by existing plastic bag producing companies.

3.3 Alternatives to Single Use Plastic Bags

3.3.1 Reusable Bags (Reusable/ Zero Waste Options)

3.3.1.1 Fabric Bags

The most widely available option in terms of tote bags. Due to the amount and variety of material, size and color options available, this is the most ideal alternative to push for as an alternative single use plastic bag. Fabric bags could be hand made locally and customized to the requirements of anyone that wants to make a switch to a reusable bag.

Figure 4 Some Options of Fabric Bags

3.3.1.2 Cotton Bags

Cotton Bags are the subset that is the most common material for tote bags currently in the market. However, they may not be the most sustainable option if the production process and life cycle are considered.

3.3.1.3 Hemp Bags

A relatively new material that is fast becoming a more sustainable alternative to cotton, being stronger as well as being a crop that uses less water. Also, it grows much faster compared to cotton.

Figure 5 Some Options of Cotton and Hemp Bags and the Variations

3.3.1.4 Polyester Compact Bags

Though polyester is a plastic subset these specific types of bags as a reusable alternative provide much needed functionality for a large fraction of the population as it has a very compact formfactor and is very portable. The folded bag is small enough to fit into a person's palm and easily carried in a bag or on the persons transport. Not to mention it has a significant weight to strength ratio making it ideal for everyday carry. Even as a keychain.

MACCS' pilot project found that this bag was welcomed by people responsible for shopping in the household and they generally requested for these bags.

Figure 6 Polyester Compact Bags

3.3.1.5 Mesh Bags

Great alternative for grocery shopping or shopping for fruits and vegetables. These bags come in a variety of types where the mesh sizes become very fine or very coarse. A consumer may need different types to cater to their varying needs, but is a good alternative to have in the market as it will garner public interest towards the different type of reusable bag.

3.3.1.6 Canvas Bags

Also, a subset of plastic bags but because of the strength of bags and in some cases the waterproof quality makes it very useful and an alternative that would be needed in the market.

Figure 7 Some Examples of Mesh bags as well as Canvas Bags

3.3.1.7 Silicon Food Pouches

These are suggested in this report as an alternative that maybe a viable reusable option to carry fresh fish from the fish market. No extra packing would be required as these silicon pouches would get filled with the filleted fish depending on how much a household would usually require for a cooked fish dish. These are freezer safe and can be washed and reused and are also water tight.

Figure 8 Silicon Food Pouches and their potential uses

3.3.1.8 Reusable Bin Liners

Bin bags were the most common use for plastic bags that were identified during MACCS pilot project discussions. Bin liners can be reduced by not using bin liners for dry waste bins and emptying these bins into one large household bag meant for daily disposal.

The alternative product is a Reusable Bin Liner which could be a substitute for households that use bins around the house all with a plastic bin liner. So instead of disposable bin liners they can replace them with these reusable ones. Though probably not ideal for wet waste this maybe a viable option for dry waste around the house. Though this option is not very readily available in the market this is also an option to consider.

Figure 9 Reusable Bin Bag

3.3.2 Home Compostable Bags (Disposable Options)

3.3.2.1 Bin Bags

A direct substitution for the plastic bags and the bio degradable plastic bags currently in the market. These bags are usually made from cassava or some other starch-based material and generally are designed to be compostable. These bags would need to be available to facilitate a transition from the plastic bags as well as serve as an intermediary when a phaseout is put into place. However, for the Maldivian context only home compostable bags should be allowed into the country, as there are no local industrial composting facilities.

3.3.2.2 Barrier Bags

Barrier bags that are currently being used for fruits and vegetables in supermarkets can also be extended to include fish from the fish market. These also would be of the home compostable standard.

3.3.2.3 Paper Bags

Paper bags would a good alternative to be introduced in pharmacies where only transparent plastic bags are currently being offered.

Figure 10 Compostable Bags

3.4 Potential Issues to Consider

3.4.1 Compostable Bags do not degrade in the oceans

Some bags that have been tested to be compostable bags will not degrade in the oceans. The confusion comes from the marketing campaigns by some of the producers that their product will dissolve into water but most of the compostable bags only dissolve in water but at high temperatures 80˚C and above.

3.4.1.1 Public perception that compostable bags are going to be the perfect solution and will not pollute the oceans.

Due to the marketing campaigns by some of these producers of compostable bags some of the public already is under the impression that these bags when disposed of into the oceans will degrade and will not pose a threat to marine life.

The people that suggest this see compostable bags as a viable alternative for sea sickness bags so that they can be disposed of into the oceans.

This should not be the case and the bags should come with a warning that it should not be disposed of in the oceans.

There is also the misconception that plant-based bags will decompose. However even the end product of plant-based bags may not necessarily decompose.

3.4.2 Compostable Bags have different standards for composting

Compostable bags have 2 standards for composting. They can either be home composted in your normal home compost piles or they require an industrial composting facility to compost them. [7] It is important that only home compostable standard compostable bags are allowed to be imported, if not this may cause issues at the waste management level where the bags do not breakdown properly in the compost piles at island waste management centers.

There are various standards and grades of compostable bags and this would be quite a challenge to be tested and monitored locally. The amount of greenwashing of biodegradable and compostable bags in the recent years makes it very difficult for laymen to identify and make a distinction between the bags and their effects at the end of life. Therefore the decision on the standards and the products of those standards that are accepted into the country will need to be very thoroughly vetted before approvals.

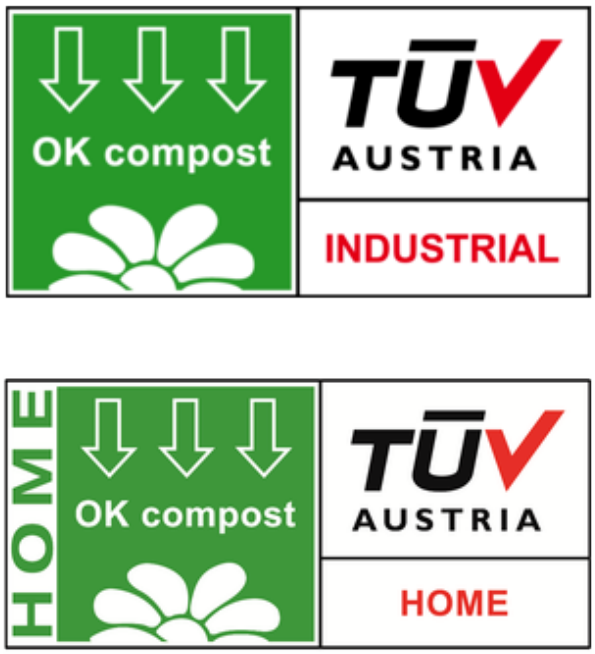


Figure 11 Home Compostable and Industrial Compostable Standard Markation

3.4.2.1 Bio Plastics or Plant based Plastics

Bio Plastics or Plastics that are derived from plants instead of fossil fuels are also often marketed as compostable but may not be the case in all instances. The labeling is often a marketing trick to confuse the consumer. The difference is that the source is considered renewable and comparatively cleaner compared to fossil fuel based plastic bags. Bio Plastics also can have the same chemical characteristics and cause similar environmental impacts as fossil fuel based plastic bags.

3.4.3 Expat Population food delivery disruption

It has been identified that a large part of the expatriate labor force that lives in the capital have their meals delivered to them and these meals are packed in single use plastic bags. With a ban and a levy in place there will be a considerable disruption to how food is provided to them.

There is potential for a business opportunity for the expatriate community as they could implement a reusable food container delivery service similar to what is implemented in India known as the Dabbawallas [8]

3.5 Cost of Alternatives and Where to Source

3.5.1 Compostable Bags

Avani Eco – Indonesia
https://www.avanieco.com

Nature Care Innovation Services - India
https://www.ncisinfo.com/

Plastic Pakaging (Pte.) Limited - Sri Lanka
http://www.pppsrilanka.com/naturplus/

Xy Bio Xingyuan Packaging Co., Ltd - China
http://xinyuanpak.com/index.html

Estimated wholesale price ranges from USD 0.02 to USD 0.05 per unit depending on volume of order. Shipping or import duties not considered.

Note: When considering compostable bag suppliers those with EN13432 Certification and Home Compostable Certification are recommended.

3.5.2 Fabric Bags

3.5.2.1 International Sources

Prestige Creations Co.,Ltd. - Thailand
https://handbag-asia.com/

Sandex Corp - India
https://www.sandexcorp.co.in/cotton-bags.html

Paramount Corporation - India
https://paramountcorporation.co.in/

Eastern Jutex Industries – India
http://www.easternjutex.com/

Xiamen Holy Luck Commercial Co., Ltd - China
https://www.holyluckbrand.com/

Estimated wholesale price ranges from USD 2.00 to USD 3.50 per unit depending on volume of order. Shipping or import duties not considered.

3.5.2.2 Local Sources

Zero Waste Maldives
2 Types of Bags Totes and Mesh bags + Custom Orders
https://www.instagram.com/zerowastemv/
https://zerowastemaldives.com/

Island Bazaar
Multiple bag designs as well as sizes
https://www.instagram.com/islandbazaar/
https://island-bazaar.com/

Thakethi
Tote bags + Custom Orders
https://www.instagram.com/trade.thakethi/

Isle Kamana
Customized Hand Sewn Tote bags
https://www.instagram.com/isle_kamana/

Abyr.co
Multiple Size Grocery Bag Sets
https://www.instagram.com/abyr.co/

Olive and Tan – Plain Tote bags + Custom Orders
https://www.instagram.com/oliveandtan/

Tote.mv – Customized Hand Sewn Tote bags
https://www.instagram.com/tote.mv/

3.5.3 Silicon Food Pouches

Yuggen – UK
https://yuggen.org/

Stasher Bag - US
https://www.stasherbag.com/

3.6. Zero Waste Strategies to Introduce to Promote Refill Culture

3.6.1 Packaging Free Bulk Goods Store

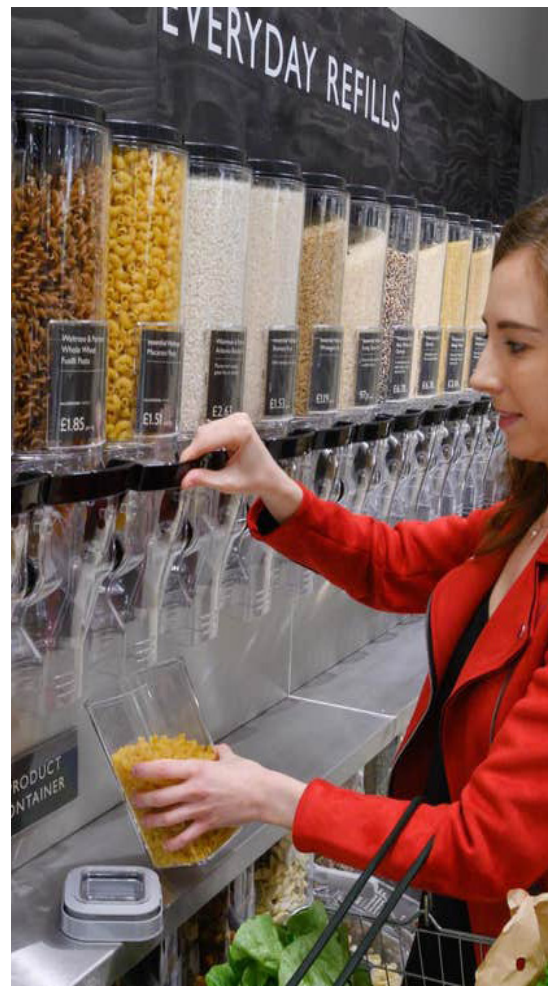
Bulk dry goods stores are slowly popping up as small SMEs in the Maldives. To facilitate this shift towards getting more people comfortable with the idea of bringing their own containers to do refills on dry goods and other amenities could be piloted and demonstrated via the state-owned enterprise, State Trading Organization STO.

A large portion of the population buy their groceries from STO and this would be a prime location to launch such an initiative.

Globally Packing Free Bulk Goods stores are operated by smaller SMEs since going plastic free or package free isn't something the bigger retailers are too keen on but if the government is interested to take this forward STO and other major supermarkets would be ideal to start with. They could offer bulk dry goods that are packaging free. In addition to this SMEs that are currently selling dry goods and might want to introduce a dry goods section in their corner shops could be incentivized through grants from green fund, bank loans through the SME Bank or tax exemptions.

STO as well as other supermarkets sell containers, so their customers can then use them to buy goods and bring with them on their refill runs.

The fact that the goods come in bulk and are package free and unbranded would allow these goods to be priced much lower than the conventionally packed dry goods.



3.6.2. Bring Your Own Initiatives

A big part of creating a refill culture is to ensure that a large demographic also actively participates and supports Bring Your Own (BYO) initiatives.
This would include making a conscious effort to bring your own coffee cups, containers, water bottles etc. when you are out to complete a particular task of the day.

More people doing so and supporting a refill culture would mean that more businesses would also adapt to the consumers so that they can capture that market.

Using reusable containers and refilling them would need to be trendy for most of the population to take notice and embrace that change. The tradition of making available dry goods in bulk at the store and measuring out requested quantities needs to be revived with a modern twist. Generation 50s and above are very familiar with dry goods being measured out into reused paper bags and sold. An awareness program that targets this kind of revival of old sustainable lifestyles with changes to suit current life styles can be conducted in partnership with CSOs, community leaders as well as social media influencers.

Local vegetable and fruit market vendors have scales that have a flat pan to weigh the produce which are put in small plastic bags. This practice promotes a culture where each kind of vegetable or fruit is put in separate plastic bags and then weighed. This results in as many small plastic bags as each type of vegetable or fruit bought being used per market visit.
Local markets should be mandated to have scales with a bowl so that the current practice of putting fruits or vegetable in bags and weighing can be stopped. Instead the pan can empty the fruits/vegetable into the customers reusable bags after measuring.

It is key that the battle against plastic pollution is waged on all fronts, manufacturing as well as end of life use at the consumer level.

Figure 12 An example of a bulk goods section located at a supermarket in Europe

SINGLE USE PLASTIC BOTTLES

4. SINGLE USE PLASTIC BOTTLES

4.1 Core Issues with single use plastic bottles locally

4.1.1 Public Perception of Municipally Supplied Tap Water

76% of households in Male' use bottled water. [9] The majority of the public is concerned about the safety of municipally supplied tap water. This stems from accounts of people sharing water that looks visibly contaminated and discolored, accounts of people sharing about the smell of the water as well as the taste of the water that is being supplied. The perception of unsafe tap water maybe the key factor for people to opt for bottled water at households.

Municipal water supply is regulated by EPA and they do have mandated regular testing that is carried out by the suppliers. These test results are shared publicly by EPA but this has not improved or increased public confidence in the municipally supplied tap water.

EPA does not have its own independent testing capabilities and relies heavily on the lab tests that are done by the suppliers themselves.

4.1.1.1 Conflict of Interest of SOE MWSC Producing Bottled Water and supplying tap water.

The issue of MWSC producing bottled water themselves creates a public perception that you should opt for their bottled water, specifically made for drinking, instead of their tap water.

4.1.2 Unregulated Production of Plastic Bottles

Though there are several bottled water manufacturers locally, the production of plastic bottles or the manufacturing processes is not regulated in anyway. Therefore, the producers have had free reign to do as they see fit in their production process as well as the amount that they produce. 3 major companies now fight for market capture and dominance.

State owned Maldives Water and Sewerage Company (MWSC)'s subsidiary Island Beverages Maldives. They produce "Taza" brand water. Happy Market Pvt Ltd. Owns International Beverage Company which produces "Life" brand water. Male' Aerated Water Company produces "Bonaqua" and "Aquarius" as their bottled water as well as several other soft drinks and flavored drinks that are packed in single use plastic bottles.

The companies choose which production method they would pursue, whether it be from plastic pellets being injection molded into preforms then blown into bottles or direct blow

molding from imported preforms. If it is a large volume manufacturer, they all have opted to import plastic pellets and manufacture preforms from this virgin plastic material.

Almost all these producers produce bottled water that come packed in 300ml 500ml, 1500ml and 5000ml bottles. The 300ml bottle is a new addition to their production line. It has been found in almost all beach cleanups that the majority of the litter that is found on the beach is less than 1000ml. Below is one instance where a Waste Audit of the Plastic Bottles collected during a coastal cleanup event was carried out. It was recorded that of the 1019 single use plastic water bottles collected about 75% of it was below 1000ml.

This is due to the fact that the larger bottles usually end up in the municipal waste stream other than on the beach as litter.

4.1.3 No testing for Microplastics in Bottled Water

Bottled water manufacturing is registered at and licensed by Maldives Food and Drug Authority (MFDA). However, though recent studies in other countries have shown that almost 93% of bottled water contains microplastics MFDA have still not tested the bottled water being produced in the Maldives for the presence [9] of microplastics.

The World Health Organization has stated that there is no evidence that microplastics in drinking water pose any human health risk it would be advisable to have at least a random test done so that extra precautions are taken on the part of the producers to ensure safety. [10]

4.1.4 Manufacturing Methodology of Plastic Bottles

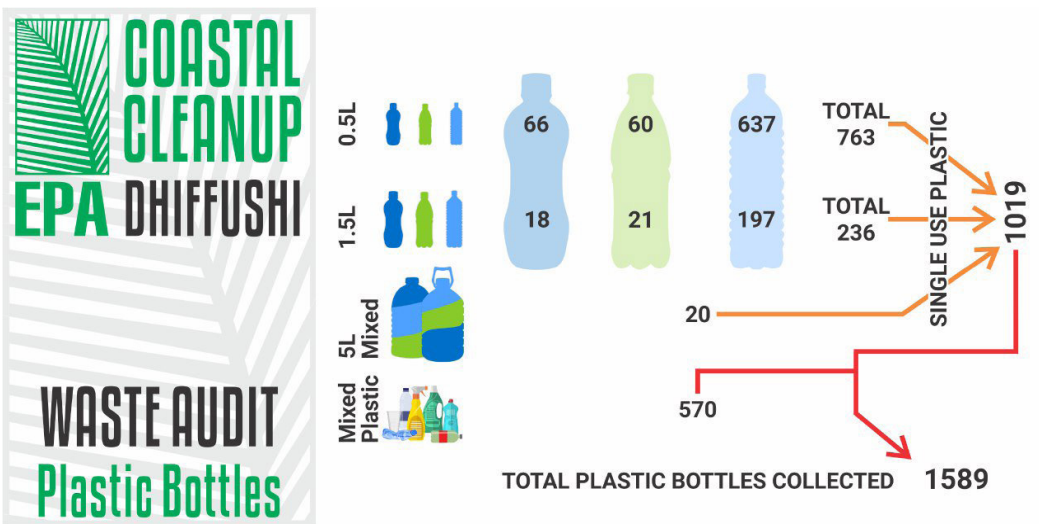


Figure 13 EPA's Waste Audit of Single Use Plastic Bottles at a Coastal Clean-up Event in 2018

Previously the bottle manufacturing process used to be carried out starting at preforms, which are bottle blanks that are injection molded and sent to the Maldives. These are then blow molded into the bottle shape.

Preforms were imported in bulk and transported and bottles were manufactured in this method. Now the producers cut costs further by doing the injection molding for the preforms locally as well. In order to carry out this process PET plastic pellets in their raw form are imported.

These PET plastic pellets are also called nurdles and are a significant contributor to the plastic pollution problem worldwide.

4.1.4.1 Nurdles

In a study that Zero Waste Maldives has been conducting, the presence of nurdles on the beach of Villimale' were discovered. Since plastic bottles are being manufactured in this way locally, it can only be said that these were of local origin and a cause for concern. Bottled water producers have claimed that there will not be any leakage into the environment but since nurdles have been found locally in the vicinity of production facilities, this places into doubt the assertions of the manufacturers.

Figure 14 Nurdles identified in one of the microplastic surveys conducted on K. Villingili

4.1.5 No Refill Stations for Bottled Water

Even though there is a small but crucial group of environmental advocates that carry a reusable bottle there are very little options for refilling empty water bottles. People that are on the move are often forced to buy a plastic water bottle. The lack of refill facilities available to the public is a major problem that can alleviate single use plastic bottle use drastically.

Locating access to refill points in key areas such as schools, mosques, sporting arenas and other public areas would reduce our dependence on single use plastic bottles as the primary source of water when people are outdoors.

4.1.6 Islands Still lacking municipal water supply

87% of people in islands prefer drinking rain water over bottled water. However due to modernization some of the households in the islands no longer have rainwater storage for drinking and use plastic bottles as their primary source of drinking water. 43% of the population has access to desalinated network. [11]. In addition safety of collected rainwater is in question.

When phasing out single use plastic bottles the lack of municipally supplied tap water in some islands will become a major concern as there will be no way to get safe drinking water on islands in the dry season if the water lens is contaminated.

4.1.7 No Extended Producer Responsibility (EPR)

The lack of a robust Extended Producer Responsibility Framework in light of all the local plastic bottle production and the resulting plastic waste pollution the Maldives faces, is a key issue when it comes to reducing single use plastic bottle use in the country. If implemented early on this could have prevented a large portion of plastic bottles from entering into the ecosystem.

Since the start of production of plastic bottling in the country, plastic bottle producers have been allowed to keep on producing plastic without any EPRs in place. Nor have there been any pollution tax on these producers.

Extended Producer Responsibility is the most effective way to deal with plastic pollution as demonstrated by countries that have implemented and enforced this mechanism to combat waste pollution.

4.1.7.1 No Targets for Collection of Recyclables or recycling programs or use of recycled materials in production

None of the producers currently use any recycled materials in their plastic bottle production, it's all virgin plastic. They also do not have any recycling targets that are publicly available nor do they engage in recycling activities themselves.

The only plastic recycling program is conducted by the organization Parley which they carry out on their own. The municipal waste collection system is not setup for segregation of waste thus posing a considerable challenge in intercepting the plastic before it ends up in the oceans or landfills.

There is also the lack of a recycling system in the broader waste management strategy. Maldives is moving to incinerate all of the waste that is being produced as opposed to the global trend towards a circular economy model or zero waste model of resource management to a linear waste management model.

4.2 Policy Recommendation for Single Use Plastic Bottles

4.2.1 Communication Program on safety of municipal drinking water supply.

There needs to be a more comprehensive push to communicate that municipal water that is currently being supplied to households is safe as drinking water. A mechanism needs to be in place for water testing for households that have doubts or would like to have their water tested before they make the switch to tap water.

4.2.2 Ban Production of water and beverage bottles that are less than 1 liter.

From most of the beach cleanups the data shows that bottles that are less than 1 liter make up the majority of beach litter or ocean plastic that lands on the beaches. The larger volume bottles generally enter the waste collection system and are generally less common than the smaller bottles.

Putting in a production ban for bottles that are less than 1 liter would push the producers of plastic bottled beverages in the Maldives to change their production to larger volume bottles and will pave the way for a phaseout that leads to a complete ban by 2023.

4.2.3 Maximum Sale Price for Plastic Bottled Water

To curb plastic pollution and also to nudge restaurants and cafés to make a shift to water filtration systems the government could impose a maximum sale price for plastic bottled water at all eateries.

Currently the vast majority of eateries charge an average of MVR 6-10 for a 500ml bottled water served. This is marked up from water that they are able to procure for less than MVR 3 wholesale.

Since this is a high markup item bottled water is served regardless of the customer actually requesting for water or not. Thus, setting a maximum sale price that cannot be above a certain threshold for all outlets would decrease the monetary gains from selling plastic, pushing outlets to go for a water filtration system.

4.2.4 All new restaurants and cafés to be equipped with reusable water dispenser or water filtration systems

In order to get an operating license for a café or a restaurant they must fulfil certain criteria. A water filtration system or reusable dispenser could be made a requirement there for ensuring that these eateries would not have to have bottled water.

4.2.5 All eateries to act as refill stations

Eateries could be mandated to provide water for a small fee to any walk-in customer that requests water as well as refill reusable bottles for people. Since there a lot of eateries scattered around the Maldives on almost every inhabited island this could be the primary refill stations till the government is able to establish public water filters and dispensers. Government can subsidize the establishment of these facilities.

This is a mutually beneficial arrangement to the eatery/ establishment, which would have increased foot traffic and thus potential patrons in the future due to this change.

4.2.6 Import Duties for Imported Plastic Bottled Water

Current import duties on imported Mineral water is at 15% this could be increased on all bottled water that comes in plastic packaging. Predominantly Artisan water is imported for resort use however considering the climate impact of this, this should be discouraged.

An alternative would be to change to encourage the local bottled water manufactures to produce "Premium water" and have it sold bottled in glass bottles than should be returned and refilled.

4.2.7 Extended Producer Responsibility

Manufacturing of Single Use Plastic Bottles would need to be banned locally at some point. To facilitate the transition, there must be in place a robust Extended Producer Responsibility Regime that encompasses not only locally produced plastic bottles but also takes into consideration single use plastic bottles that are imported.

This is a perfect middle ground policy intervention as it allows for the producers to change their manufacturing methods and pivot themselves towards reusable methods of delivery of their goods rather than disrupt their business to a point that they will demand compensation from the government.

On top of this it buys time to ensure that municipally supplied water is made available to all inhabited islands prior to the phaseout targets set in the Strategic Action Plan 2018 - 2023. [12]

The Extended Producer Responsibility will not only help curb single use plastic pollution from leaking into the environment it will also facilitate the government's pledge to make sure waste is seen as a resource, as this would enable diversion of not only plastic but, glass and metal containers among other recyclables from the waste stream that is currently intended for incineration. [13]

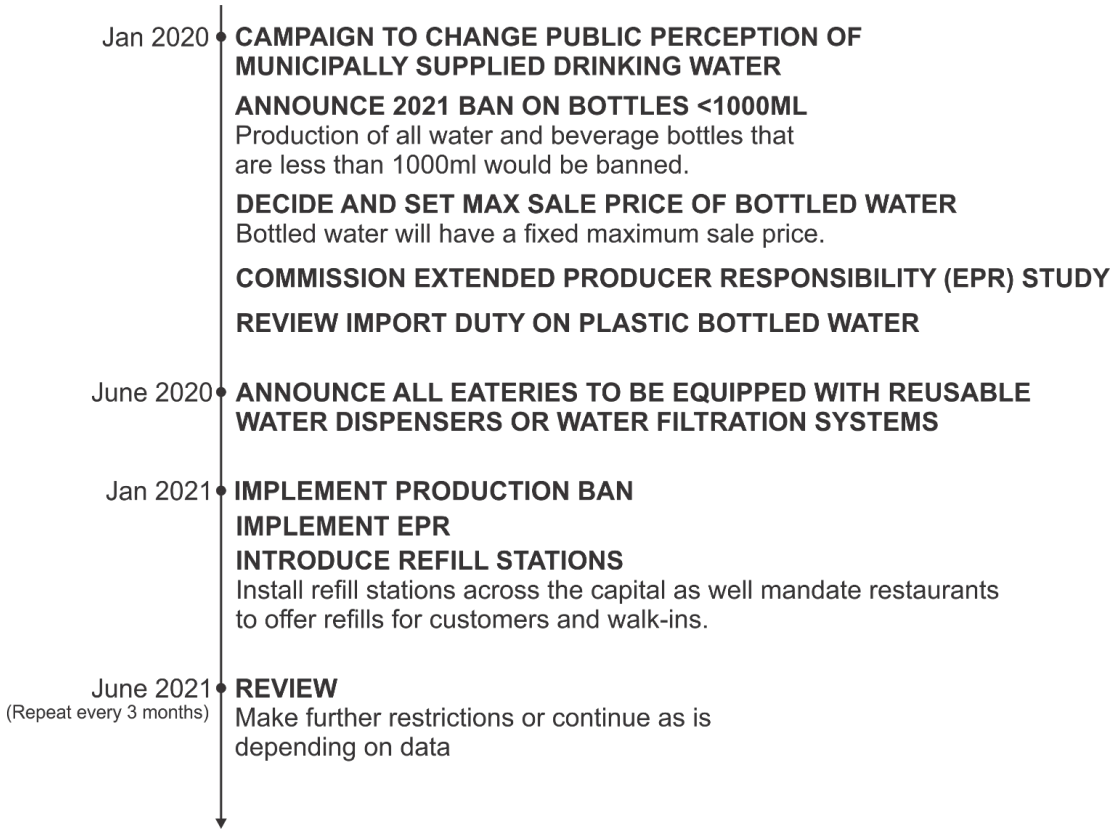


Figure 15 Timeline of suggested implementation of policy recommendations

4.3 Alternatives to Single Use Plastic Bottles

4.3.1 Household Water Filtration Systems

Due to the low consumer confidence of municipal tap water most households are reluctant to switch completely to municipally supplied water. An alternative is to go for household water filtration systems. Some of the potential issues to consider regarding water filtration systems are discussed in the next section.

4.3.2 19L Water Dispensers

19L water dispensers require minimal investment and as a system is portable as well. Perfect for renters who do not want to deal with the hassle of moving a water filtration system every time they move. These are ideal for outdoor events as most of the dispensers themselves do not require electrical power or a water connection to operate.

4.3.3 Bottled Water in Reusable Glass Containers

This would be an excellent alternative for restaurants and café's that do not want to, or actually lack the physical space to house a water filtration system on the premises. Bottled water suppliers could change out their inventory and start providing water packaged in this manner.

This is also an ideal way to supply water in island communities instead of sending single use plastic bottled water to every island from Male' or where the bottling plants are located.
Glass bottles would be returned to be refilled after use.

4.3.4 Refill Stations

Refill Stations for water are key to deal with single use plastic pollution as availability of refill stations would encourage more people to bring their own reusable bottles than buy a single use plastic bottle every time, they need to drink water. It is key that these are provided accessibly around an island.

4.4 Potential Issues to Consider

4.4.1 Household Water Filtration Systems

4.4.1.1 Misinformation from retailers

The retailers that sell the water filtration systems often use sales tactics that spread misinformation about the municipal tap water. This misleads the public so that they are more inclined to purchase a water filter that is more expensive or complex, when a filtration system with lesser number of filtration or the tap water supply enough.

4.4.1.2 Unregulated Import and Sale of Water Filtration Systems

Currently no regulations exist to the specifications required of a home water filtration unit. Some sell 8 stage filtration systems and some sell 5 stage filtration systems. There are some water filters with just a carbon filter which people assume work similar to a counter top or under sink Reverse Osmosis system.
This is also due to the misinformation as well as the exploitation of the lack of regulation on what is considered a water filter. There needs to be a minimum standard of for what is considered a water filter and what specific filtration mechanisms it should have.

4.4.1.3 New suppliers with no after-sales services, spare parts or replacement filter cartridges.

Since this is a growing market there are a lot of new players that enter the market and often their business venture does not work out. Even during their time in the market, some of these suppliers are unable to service or replace faulty units or even provide replacement filter cartridges.

4.4.1.4 Potential for new unrecyclable Waste Stream

The lack of regulations also will have an effect on the replacement cartridges ending up in the waste stream and potentially becoming a problem in the future. Some filters require that the filters be changed in 3 to 6 months while others can last 12 to 24 months. There needs to be a minimum standard for these cartridges, in order to minimize the potential impact of end of life of filter cartridges.

4.4.1.5 Energy and water waste from filtration systems

Most of the reverse osmosis water filtration systems require electricity to operate and there is a considerable amount of water lost in the filtration process. Though this water could be collected and used for other purposes such as watering plants or even washing up dishes it is an issue to consider.

It is also important to point out that there are water filtration systems that do not require electricity to operate as well. However, these are seen and marketed as the lower end filtration system.

4.4.2 Extended Producer Responsibility (EPR) Enforced on all Producers of Single Use Plastic Bottles

EPR is the best middle ground policy intervention that can be implemented to curb single use plastic leakage into the environment. This has vast benefits in terms of policy as well environmental impact mitigation from plastic pollution.

As there are 3 main producers of single use plastic bottles in the country the majority of the pushback would come from these companies.

The government should facilitate the transition to a different model of water supply that includes reusable 19L water bottles as well as glass bottles for these companies so that pushback to the change could be mitigated.

The government could also promote or incentivize establishment of bottling plants under SOEs, Atoll Councils or as SMEs in different regions similar to the social enterprise Vitric that is currently in Baa Atoll.

4.4.3 Net Calorific Value of Municipal Solid Waste destined for Incineration

Maldives is currently set on a path to Incinerate the majority of the waste that is generated in the country. The feasibility study for the largest incineration facility that was awarded much before the announcement of the plastic ban for 2023. Therefore, it is most likely that this incineration facility that will be established in Thilafushi does not take into consideration any changes to the current waste stream from the single use plastic ban policy. This is a very crucial issue to be considered as it will directly impact the incineration project.

The current estimates put the plastic waste fraction to be at 7-10% of the waste stream. With a phaseout of single use plastic bottles and other single use plastics this may bring the fraction of plastic waste down to 3%. This would significantly impact the Net Calorific Value of the waste to be incinerated as the plastic faction contributes the most calorific value to the mix. 70% of the waste stream is already wet waste and green waste.

The countries main technology for waste management should not be centered on an incineration technology that is highly expensive to operate and requires more consumption. Options of composting, biogas production and recycling as well as zero waste strategies have to be an important component of waste management policy.

Reduction of upstream waste rather than end of pipe management of waste is always the recommended option.

Figure 16 Elkay Brand outdoor Refill Station http://www.elkay.com/outdoor

4.5 Zero Waste Strategies to Promote Refill Culture

4.5.1 Refill Stations

The ability to refill a reusable bottle will be the most effective way to reduce the amount of single use plastic bottles that are consumed daily while people are out and about.

It's important to consider the design of these refill stations to ensure that it is used by the majority of the population as well as a requires minimal upkeep and maintenance. As the image of a refill station would be key to ensure continued support and use by the public.

Our recommendation would be that refill stations have a separate tap for people that want to refill their bottles and for people that would like to have a drink from the tap in case they are found to be without a reusable bottle.

4.6 Cost of Alternatives and Where to Source

4.6.1 Household Water Filtration Systems

4.6.1.1 Aqua Reef
https://www.facebook.com/AquaReefMV/

4.6.1.2 H2A Showroom
https://www.facebook.com/h2ashowroom/

4.6.1.3 VaMCo
https://www.facebook.com/VAMCOMaldives/

4.6.1.4 Radiant Heat
https://www.facebook.com/rhmaldives/

Most of the suppliers listed above have multiple varieties of Reverse Osmosis Water Filtration Systems. The price ranges from about USD 175 to USD 500 for most models. The filter cartridges are a consumable that would incur a reoccurring cost based on the usage of the household. This should be considered carefully as recommended previously since different brands require a replacement at different frequencies.

4.6.2 19L Water Dispensers

4.6.2.1 Bon Aqua - Male' Aerated Water Company

4.6.2.2 Handy Water – Handy Enterprises

4.6.2.3 One Water – One Degree South Addu

4.6.2.4 Vitric – Soneva Water, B. Maalhos


STYROFOAM
TAKE-AWAY
CONTAINERS

5. STYROFOAM TAKE-AWAY CONTAINERS

5.1 Core Issues with Styrofoam Take-Away Containers

5.1.1 Toxic Substance not fit for food or drink storage and transport

Styrene which is the building block for Polystyrene has been linked to be carcinogenic for humans. The heat from the food starts a breakdown of styrene which creates toxins that can then be absorbed through the blood stream.

5.1.2 Unrecyclable and Zero Value

These containers are usually in contact with food and therefore contaminated to be collected for recycling. Even if a large volume of Expanded Polystyrene is collected within the Maldives it would still not be a viable option to recycle locally. This would only end up being openly burnt, incinerated or landfilled.

5.1.3 Breaks down into microplastics

Research confirms the presence of polystyrene in marine animals and the fact that polystyrene breaks down into microplastics allows it to enter the food chain easily and bio accumulate further along the food chain.

5.1.4 High volume to weight ratio – Problematic for the waste collection

There is a significant takeout culture in the Maldives and the majority of the food vendors pack their takeaway in Styrofoam containers which ends up in the waste stream. The fact that these are high volume low weight boxes makes it ideal for transport of food. However, in the waste stream they make it a considerable problem item as it fills up the collection bins slowing down the overall waste collection process.

5.1.5 Toxic to be burnt

Openly burning Styrofoam releases Carbon Monoxide and other styrene monomers into the environment and are hazardous to human health. [14]

5.2 Policy Recommendation for Take-Away Containers

5.2.1 Ban Styrofoam Take-Away Containers

Due to the risks to the environment, human health, and the issues it causes within waste collection and transport the recommended way forward would be to put in place a ban on Styrofoam food and drink containers as well as tableware.
Set a date and announce a date for the ban along with an import restriction till the date of ban to avoid stockpiling. 12 months is a long enough time for a ban to be enforced.

Import level ban as well as local manufacturing ban would be required.

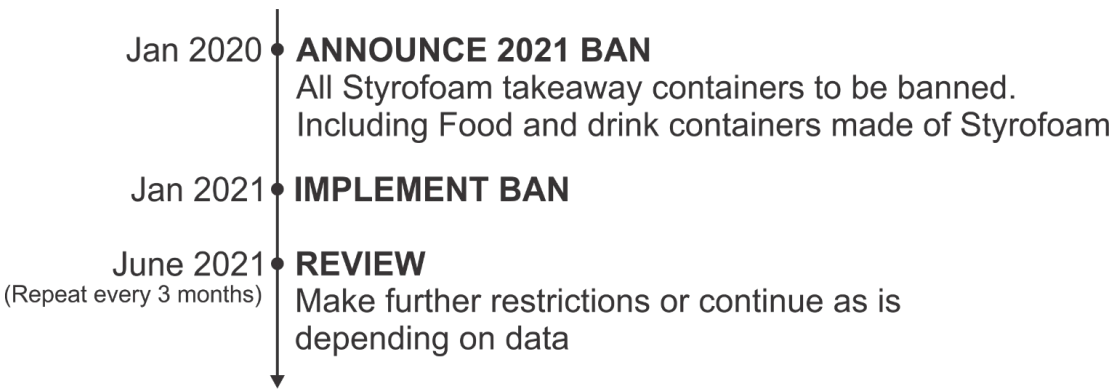


Figure 17 Timeline of suggested implementation of policy recommendation

5.3 Alternatives to Styrofoam Take-Away Containers

5.3.1 Paper Based Containers; Boxes, cups, trays etc.

Paper based alternatives are already very readily available overseas and there are some options being sold locally as well. Usually these come with either a plastic liner, PLA Liner or a wax coating to ensure that they are leak proof and do not absorb moisture from the food and cause a structural failure.

5.3.2 Sugarcane Pulp (Bagasse) Boxes

Bagasse is a leftover fibrous material from the sugarcane juice
extraction process. This is used as a more sustainable alternative to paper products as it uses much fewer raw materials to produce. On top of this containers manufactured with this material is able to withstand

temperatures ranging from -25˚C to 220˚C and is considered to be water repellent and grease-proof.

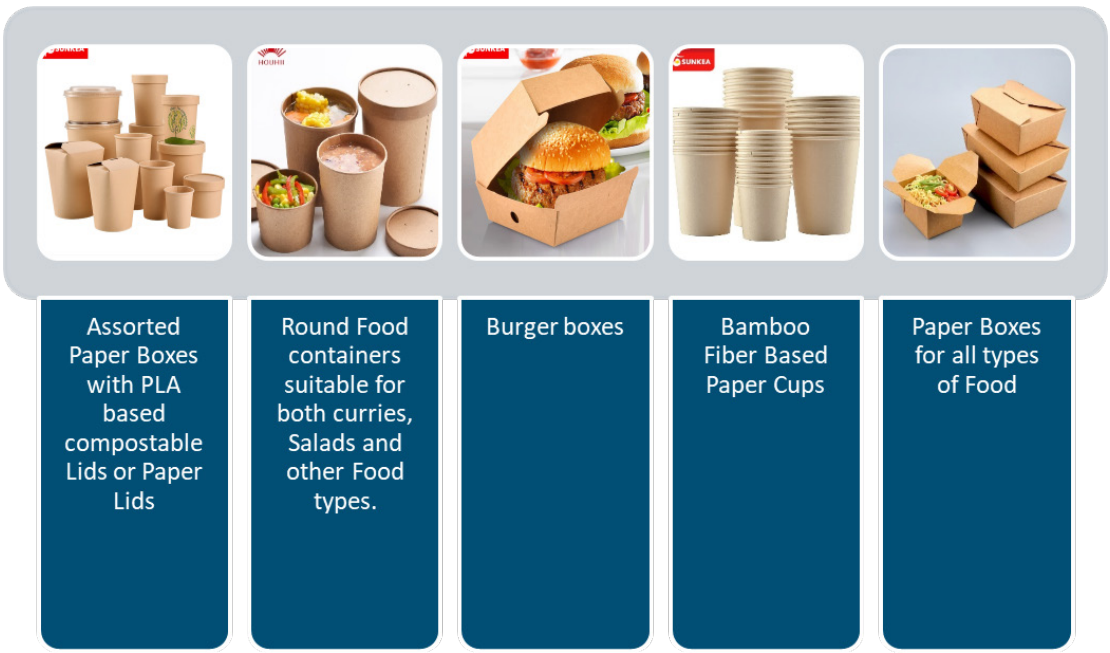


Figure 18 Paper Container Options and Uses

5.3.3 Reusable Containers

Reuseable alternatives should be readily available and optons abundant in the market for the consumers to purchase and use as well as for SMEs to procure so that they can shift their model to a container return model for food delivery. This could be implemented in food outlets that have regular customers.

It is important to reiterate the importance of avialability of options for consumers when it comes to pushing for alternatives as each consumer will have their own preference and the availability of options would ensure maximum uptake and acceptance of the alternatives.

Figure 19 Reusable Container Options

5.4 Potential Issues to Consider

5.4.1 Stockpiling of Styrofoam Products prior to ban

This is a relatively low risk as these boxes are high volume items so stockpiling would incur a warehousing cost that might not make it worthwhile to do so however this is still a potential risk that could delay the implementation of a ban as the market would take some time to completely consume the existing Styrofoam containers.

5.4.2 SME Pushback due to cost of alternatives and availability of alternatives in the market.

The majority of food restaurants, cafes and home food vendors rely on Styrofoam packaging as their primary means of food packaging for delivery. Some outlets that have tried to switch to paper options often have to fall back on the Styrofoam packaging since the current market is not consistent with the supply of alternatives.

This will definitely get cited by a lot of vendors when this ban is introduced. What can be done to circumvent this would be to make these alternatives available through the State Trading Organization STO, or SMEs could be incentivized to provide these alternatives to the market.

As far as the pricing is concerned depending on the volume of the import the price can become competitive and can match that of Styrofoam containers currently available in the market.

5.5 Cost of Alternatives and Where to Source

Currently in the market Styrofoam takeaway packaging is available for MVR 120 for 100 pieces. Putting the retail cost of the item at MVR 1.2 Per unit.

5.5.1 Paper Boxes or Sugarcane Fiber Boxes (Bagasse) for Food

Dongguan Lvbao Packaging Technology Co., Ltd. - China
http://www.greenpackaing.com

Avani Eco - Indonesia
https://www.avanieco.com/portfolio-item/bio-box/

Falcon Pack - Dubai
http://www.falconpack.com/

Eco Pack – South Africa
https://ecopack.co.za/

Gunjan International - India
http://www.pulptablewareproducts.com/

Critco Lanka (Pvt) Ltd – Sri Lanka
http://critco.net/bagasse-containers-suppliers-sri-lanka

Yash Compostables Limited - India
https://www.chuk.in/

GreenAware - Hindustan Paper Products - India
https://www.greenaware.in/

NaturDine – India
http://www.naturdine.com/

Shanghai SUNKEA Packaging Co., Ltd - China
https://www.sunkea.com/

Since there are several variation on size as well as design of the boxes for reference the standard clamshell design was considered. On average the cost to the wholesaler ranges from MVR 0.60 to MVR 1.85, another variable to the cost is the order ammount for large orders there is still room for the price to come down.

5.6 Zero Waste Strategies to Promote Refill Culture

For all sorts of food takeaway, a refill culture needs to be revived with a modern twist. Businesses that want to reduce their waste footprint often establish reusable takeaway options with return options. This can be put in place with either a refundable deposit being placed on the container or purchasing the container itself at the point of sale.

This same strategy has been seen employed at SMEs that offer Drinks or food, as takeaway.

For food a standardized reusable container could be used where an SME could become a middleman in charge of collecting, washing, sterilizing and redistributing the containers back to the partner outlets. This is a business opportunity that can come in with bans on single use plastics

For takeaway drinks which creates a lot of disposable waste in the form of plastic as well as paper cups, a mechanism where a patron with a reusable cup would get offered a discount as an incentive and a disposable cup would get charged for as a disincentive could be established. Parallel to this, regular customers of these outlets can also get access to a shared mug library where you borrow a mug for a small deposit which you can get refunded when you return the mug.

6. OTHER SINGLE USE AND PROBLEM PLASTICS

6.1 How to identify problem single use plastics

In the Maldives though cleanups are very common it's not common practice to gather data from cleanups. The only data that is usually available is the total weight of the waste that was collected and, in some cases, there is segregated collection of waste and you may receive weight data on the recyclables and non-recyclables that were collected.

Cleanups are a very valuable source of information when dealing with plastic pollution. However, no one has made a clear effort to ensure that there is standardized data that is collected from cleanups.

What is required are **waste audits** at the end of cleanups as well as the more **comprehensive brand audits** to be carried out so that the origins of the waste are identified. [15]

Alongside local waste audit and cleanup audits the government can rely on the work that has been and is being done internationally. Multiple countries are currently carrying out similar initatives and could serve as valuable lessons to the Maldives.

There are some easy wins that can be achieved which can have a very significant impact for the environment.

6.2 List of Potentially Problematic Single Use + Multiuse Plastic Identified

1. Diapers
2. Menstrual Pads and Tampons
3. Plastic Cutleries
4. Plastic Plates
5. Plastic Coffee/Drink Cups
6. Drink Stirrers
7. Takeaway boxes
8. Food Wraps
9. Industrial Wraps
10. Toothbrush
11. Toothpaste Tubes
12. Balloons
13. Cotton Buds
14. Condoms
15. Cigarette butts
16. Lighters
17. Pens and Other Stationeries
18. Toiletries
19. Dental Floss Pick
20. Kitchen Sponges
21. Kitchen Brushes
22. Brooms and other cleaning Brushes
23. Ropes of Plastic Material
24. Plastic Pellets used for Manufacturing (Nurdles)
25. AstroTurf and Turf Filler
26. Cheap Plastic Toys
27. Tea Bags
28. Sugar Packets with Plastic Liners
29. Tetra Packs + Straws
30. Wet Wipes
31. Slippers
32. Glitter
33. Microbeads
34. Packaging Litter (Supari, Jelly, etc)
35. Bread Bag Tie

6.3 Policy Recommendations on how to address

6.3.1 Capacity Building of Regulatory Authorities.

For the single plastic ban to be effective, the government has to commit additional resources to monitor and enforce the ban. The capacity building has to include human resources as well as institutional capacity to test alternatives.

In addition, the phase out regulations will have to be backed by significant communication and awareness programs. All regulations must give a minimum 12-month leeway for businesses and public to adjust to the regulation. This period must be used to incentivize businesses to make alternatives available and conduct the communication and awareness program.

6.3.2 NGO, Civil Society and private sector engagement

Currently several NGOs work on plastic pollution. Any regulation for plastic phase out will be strengthened by working together with all concerned NGOs. Making sure that there is engagement and feedback from these NGOs before a full single use plastic phaseout plan is finalized.

Keeping private sector and civil society informed and engaged is a crucial part of success of a major policy like the single use plastic phase out.

6.3.3 Deciding on what to phaseout/ban and introduce alternatives to

The easiest way forward is to look at countries that are putting into place different restrictions on certain items importation, manufacture and use within those countries and then leverage those research that they would have done in order to implement restrictions in those countries.

Some of the items identified in this report would have potentially no public backlash and for some items there are ample opportunities to develop local small-scale manufacturing and support SMEs that would like to make entry into this sector.

In order to keep up to date and on par with the alternatives that emerge into the market the easiest way to go about it would be to create a framework within the Environmental Protection Agency for any citizen to apply for a duty exemption for an item that they intend to import. The citizen can provide supporting documents and a sample of the product for EPA to verify and make the decision on whether the product is a suitable alternative or not. This would allow SMEs to potentially seek out and introduce more alternatives as it would incentivize them over other disposable products.

It is imperative that EPA is strengthened with the required technical staff as well as required equipment and training to be able to cope with the added mandate and workload.

The guiding principle should be that no alternative introduced should shift the problem from single use plastic to something else.

7. CONCLUSION

In order to tackle the single use plastic pollution that Maldives is facing the government of Maldives will need to remain steadfast in its pledge to phase out single use plastics by 2023.

Each type of single use plastic will require its own phaseout methodology and as discussed in this report some will require a hybrid approach where the single use plastic is swapped out for an alternative. Most problem single use plastics would however require a ban. An effective EPR program that collects plastic for recycling must be part of the mix. It is also imperative that the government puts into place measures such as waste audits and audits of regular beach cleanups so that the government has primary data to rely on to support data backed decision making when it comes to the impacts of single use plastic within the Maldives. It is also very encouraging that this new administration has put a lot of emphasis on waste audits and data collection as these are key action points to be followed through in the Strategic Action Plan 2019-2023.

It is important to reiterate the interlinkages that single use plastic has in the waste management system. Both as a solution that could potentially become the medium in which Maldives is finally able to establish waste segregation and to ensure 100% registration into the waste management system. As well as possibly causing major problems for the incineration projects that are currently being planned to be established.

However, the negative impacts of single use plastics on our environment, health and economy should not be disregarded. Where ever possible the government should promote refuse and reuse culture in order to reduce the amount of waste generated. Before promoting or introducing an alternative to the market, it is vital that the alternatives are assessed thoroughly so as the problem of single use plastic does not shift from one material to another, instead of solving the problem entirely.

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APPENDIX I : Plastic Noon Gotheh Case Study on Single Use Plastic Bag use

MACCS Case Study: Consumer feedback when having to switch to an alternative to Single Use Plastic (SUP) Bags.

A component of the GEF SGP project, "Piloting Alternatives to Single Use Plastic Bags in Male'" is to work with households and corner shops to introduce alternatives to single use plastic bags. MACCS provided alternatives to Single Use Plastic (SUP) Bags such as pocket-sized polyester bags, cotton, canvas bags, and mesh grocery bags with zippers. The perspective and the challenges to avoiding or refusing single use plastics were then discussed with the consumers at a household level (Shoppers) as well as consumers who would provide bags at the retail level (Business Operators) after a period.

Major Issues Identified at the Household Level

Single Use Plastic bags are seen as the norm to carry goods and food from place to place. It is most convenient for the users and given away free.

Single use plastic bags given away free from shops are used as bin liners. It is also used to dispose of soiled Diapers. Each diaper is disposed of in a separate bag. Therefore, customers actively seek to increase number of plastic bags.

Staples such as flour, sugar and rice now are available only pre weighed and prepacked in SUP bags. There are no options to weigh out exactly the weight that is required. If the shop only has the staple food packed in 1Kg bags then if a consumer requires more than 1kg the consumer has to accept more single use plastic bags of 1Kg of the staple food.

Single Use Plastic is also used as a barrier when fresh fish is stored in the freezer and is provided at no cost to the consumer. It is also used as a barrier when storing fruits and vegetables.

The main end of life use of single use plastic bags is as trash bags. The Waste Management Corporation (WAMCO) will not collect household waste unless it is in a bag.

The average household would not volunteer or spend on alternatives as long as single use plastic bags are provided for free at shops. The convenience of free single use bags and Cost of alternatives is a hinderance to finding alternatives and using them even if a household is conscious about the effects of single use Majority of the shops and households consulted see the only way to reduce the single use plastic bags used in the country is to Ban the use of single use plastic bags.

Major Issues Identified at the Retail Level

Public perception towards the shop becomes slightly negative as they can be perceived and labelled as stingy if they try to reduce the amount of single use plastic bags given out. There is also the fear that that they could potentially loose customers.

Customers repeatedly forgot to bring reusable bags provided by the project. The reusable bags were given away free, after speaking with selected customers.

The shops surveyed also noticed a trend that school children requested to avoid SUP bags but parents that made purchases took SUP bags to carry their snacks.

Some customers also request for a plastic bag for the smallest items that could fit inside a pocket and some even get hostile when they aren't provided a bag.

Use of free single use plastic bags have become a matter of high expectation. One shop keeper narrated an incidence where, a customer buying finger foods and snacks that are generally consumed during evening tea, requests, that for each child in her household, an individual bag is filled with the different varieties of the finger food. The norm for this take-away food is to bag the savoury and sweet snacks separately and then put those together into another larger bag.

To try and reduce this MACCS experimented by providing an outlet with reusable containers, but the outlet reported that it was unsuccessful as the customers forgot to bring the container back on their next visit.

Some of these outlets also tried to reduce single use bags by utilising used newspapers as a barrier and found that some customers do not mind the paper wrapping specially foreigners had no issue with this method.

Most customers in the selected shops do not mind paper bags or paper wrappings instead of single use plastic bags.

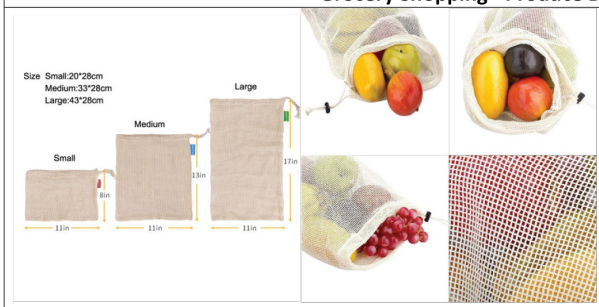
Name of Shop	Size of Single Use Plastic bags						
	X Small	Small	Medium	Large	X Large	XX Large	Black Bag
Vega Point (Galolhu)	300	300	300	300	100	100	-
Daka Traders (Galolhu)	-	100	100	50	14	-	-
Violet Store (Galolhu)	-	200	200	33	33	-	20
Food Fair 1 (Henveiru)	-	100	50	50	20	20	14
Favourite (Henveiru)	-	500	300	500	100	50	-

Table 1 Single Use Plastic Usage Per Day in Selected Shops

Popular Reusable Shopping Bags – Alternatives to Single Use Plastic Shopping Bags

Bag/Use	Details	Remarks
	Approximate sizes.	
Regular Every day or on the go Grocery Shopping		
 https://www.amazon.com/Reusable-Foldable-Attached-Polyester-Lightweight/dp/B07TS5M1L5/ref=cm_cr_srp_d_product_top?ie=UTF8&th=1	Polyester Light Weight Foldable Bags W x H = 16" x 16" Handle Depth = 5"	Reusable Grocery Bags Set, Grocery Tote Foldable into Attached Pouch, Washable Durable and Lightweight Can be folded to a compact size. Very easy to carry in hand or in hand bag or under Bike seats.
  https://totebagfactory.com/products/economical-100-cotton-tote-bag-tob293?variant=728431129	Tote Bags - Hemp/Cotton/-Canvas Small W x H = 12" x 14" Handle = 9" Medium W x H = 15" x 16' Handle = 21"	To carry around. Small shopping errands. Different Sizes, Designs, material are available.
  https://thecleverbaggers.co.uk/cotton-goody-bag-21x26cm-flat	Cotton Goody/-Carrier Bags with short handles W x H = 8" x 10" W x H = 10" x 12" W x H = 11" x 14 " Handle Depth 4.5" – 5.5"	for regular grocery shopping at corner shops or for taking to market for vegetable and fruits. Easier to hold with hand instead of shoulder bag. Can be stored in a larger bag.

Planned Weekly Shopping. Local Market/Super Market /delivery Bags.		
 https://www.amazon.com/Turtlecreek-Cotton-Canvas-Reusable-Grocery/dp/B077DRGBSZ/ref=pd_rhf_cr_p_img_3?_encoding=UTF8&psc=1&refRID=QN708GV1H4W0RDZ0BYFB	W x H = 12" x 16" Handles: 4.5" to 6" Depth = 7 "	Cotton/Canvas Good for weekly grocery shopping trips. Strong.
 https://sewspire.com/2018/06/how-to-sew-the-ultimate-reusable-grocery-shopping-tote-bag-by-sewspire/	8" deep 14" tall 14" across the base 11" handle drop	Grocery bags with compartments for separate storage.

Grocery Shopping - Produce Bags - groceries		
 https://www.aliexpress.com/item/32965457878.html	Available in many sizes and materials.	Separte types of Groceries can be put in bag and weighed. Soft easily foldable material maybe good to start. Can be stored inside larger bag
 https://www.amazon.com/GoGreenBags-12-Pack-Reusable-Bags/dp/B07GTSJL4T		

APPENDIX II: IMAGE SOURCES

Figure 1 Some of the sizes of bags available locally

Figure 2 Yearly Total of Single Use Plastic Bags Imported

Figure 3 Some Options of Fabric Bags

Figure 4 Some Options of Cotton and Hemp Bags and the Variations

Figure 5 Polyester Compact Bags

https://www.amazon.com/LIHI-Reusable-Foldable-Attached-

Polyester/dp/B078WMRPZV
https://www.businessinsider.sg/best-reusable-shopping-tote-bag/

Figure 6 Some Examples of Mesh bags as well as Canvas Bags

https://www.amazon.com/Reusable-Produce-Bags-Biodegradable-Drawstrings/dp/B07SVFXNWZ

https://www.amazon.com/Portable-Reusable-Washable-Organizer-Shopping/dp/B07HQHCWDV/ref=pd_sbs_79_img_0/130-1250870-5464760?_encoding=UTF8&pd_rd_i=B07HQHCWDV&pd_rd_r=54bacb44-e17c-4872-b7fa-0c2c0a4b1e7a&pd_rd_w=nK9hM&pd_rd_wg=8Q2wU&pf_rd_p=5cfcfe89-300f-47d2-b1ad-a4e27203a02a&pf_rd_

https://www.amazon.in/ReBagMe-Reusable-Grocery-Reinforced-Handles/dp/B00Y17OIL0

Figure 7 Silicon Food Pouches and their potential uses

https://www.amazon.com/Reusable-Silicone-Food-Storage-Bags/dp/B078VY9QDC

Figure 8 Reusable Bin Bag

https://www.planetwiseinc.com/planet-wise-reusable-trash-bag.html

rd_i=B07GXBV55K&pd_rd_r=51883b1f10df4316a71649ff7704ccf1&pd_rd_w=9loFe&pd_rd_wg=eYzUl&pf_rd_p=24d053a830a14822a2ff4d1ab2b984fc&pf_rd_r=E4QZ12B0K8PS6ZP1DYKB&psc=1&qid=1573933018

https://www.architecturaldigest.com/gallery/plastic-free-food-storage-containers

https://www.self.com/gallery/cute-lunch-boxes

Figure 17 Timeline of suggested implementation of policy recommendation

Figure 18 Paper Container Options and Uses

https://sc01.alicdn.com/kf/HLB1Z7CFUq6qK1RjSZFmq6x0PFXa5.jpg

https://sc01.alicdn.com/kf/HTB1v1KxbkY2gK0jSZFgq6A5OFXam.jpg

Figure 19 Reusable Container Options

http://imshopping.rediff.com/imgshop/8001280/shopping/pixs/4995/3/32lunchbox1._3container-thermos-insulated-hot-lunch-tiffin-dabba-box-home-picnic-32.jpg

https://cdn11.bigcommerce.com/s9geauonp44/images/stencil/1024x1024/products/139/430

https://cdn11.bigcommerce.com/s9geauonp44/images/stencil/1024x1024/products/139/429/

https://images-na.ssl-images-amazon.com/images/I/71MB2-gdL3L._AC_SL1000_.jpg

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