An analysis of the effectiveness of plastic bag bans

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Contents

Introduction 3

Examples of successful plastic bag bans 4

California 4

Australian Capital Territory (ACT) 7

Sikkim 9

Examples of unsuccessful plastic bag bans 11

Delhi 11

Kenya 12

Michigan 15

General issues with existing bans with suggestions 17

1. Enforcement 17
2. Alternatives 19
3. Black market activity 22
4. Loop holes 23
5. Collection and disposal 24

Benefits of plastic bag bans 25

Conclusion of Considerations for Pune 26

Case studies 28

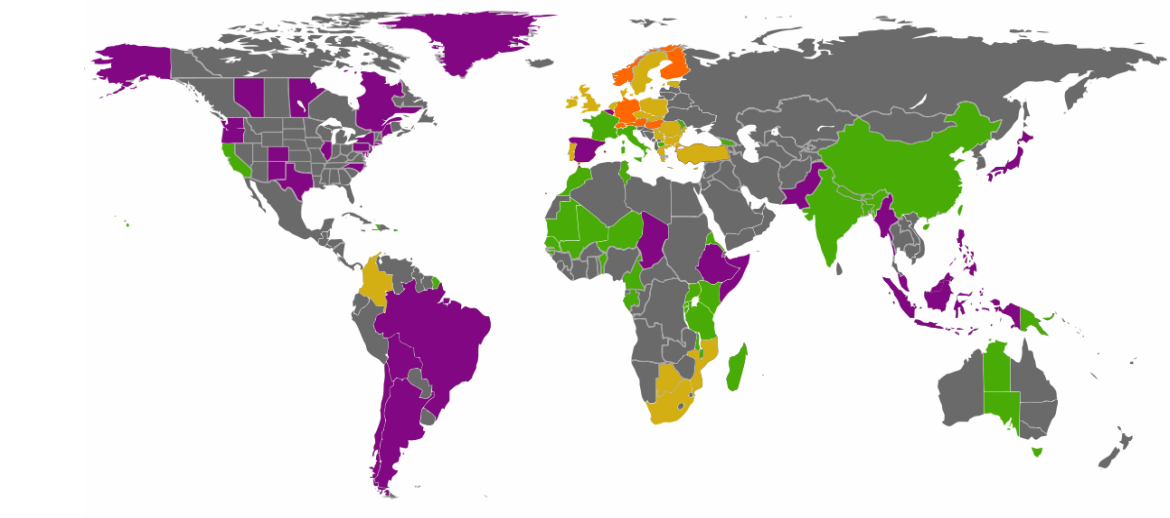
Case study 1 – Reusable bags and hygiene 28

Case study 2- Sagas Mitra Abihyan, Pune 31

Case Study 3: Umuganda, Rwanda 32

Introduction

Single use plastic bags are of growing concern worldwide. Many countries around the world have implemented total bans, partial bans or levies to reduce the use of single use plastic bags.



[] Plastic bags banned
[] A tax on some plastic bags
[] Voluntary tax agreement
[] Partial tax or ban (regional levels)

Figure 1: Map showing the phase out of lightweight plastic bags around the world[1]

In India the Ministry of Environment, Forests and Climate Change introduce a country wide ban on the manufacture and use of plastic carry bags less than 8 inches x 12 inches in size and 40 micron in width. State governments are also required to register all plastic manufacturing units, so that these can be regulated.

Many Indian states have independently placed further restrictions on plastic bags. For example the states and cities of Maharashtra, Punjab, Rajasthan, Himachal Pradesh, Delhi, Goa and West Bengal among others, have banned the use of plastic bags. The extent of these bans varies between regions from i) partial bans to ii) complete bans.

i. For example in Himachal Pradesh in 2003 bags with the following properties were banned:
   - A size less than 18x12 inches and a thickness of less than 70 microns
   - Composed of non biodegradable materials

ii. Alternatively in the union territory Chandigarh there has been complete ban on the use, storage, manufacture and sale of plastic bags since 2008.[2]

In most regions in India where bans are in place they have been ineffective, the biggest issues are; the lack of enforcement and unavailability of viable alternatives to plastic. These problems are not limited to India, they are shared globally. There are many countries worldwide who have implemented plastic bags bans, many of which have experienced challenges. This report will assess the effectiveness of a number of existing bans. Through analyzing these case studies eCoexist aims to identify the main issues bans encounter and provide solutions to tackle these.

[1] https://en.wikipedia.org/wiki/Phase-out_of_lightweight_plastic_bags
[2] http://toxicslink.org/docs/Full-Report-Plastic-and-the-Environment.pdf

Examples of successful plastic bag bans

California

In 2015 California became the first US state to ban single use plastic bags. Before this more than 150 municipalities in California passed local bag bans, including the cities of San Diego, Solana Beach, San Jose, Del Mar and Oceanside. As each municipality has different levels of recorded success we will focus on the results in the city of San Jose. Here the ban, known as the 'Bring Your Own Bag Ordinance' came into effect on the 01/01/2012.[3]

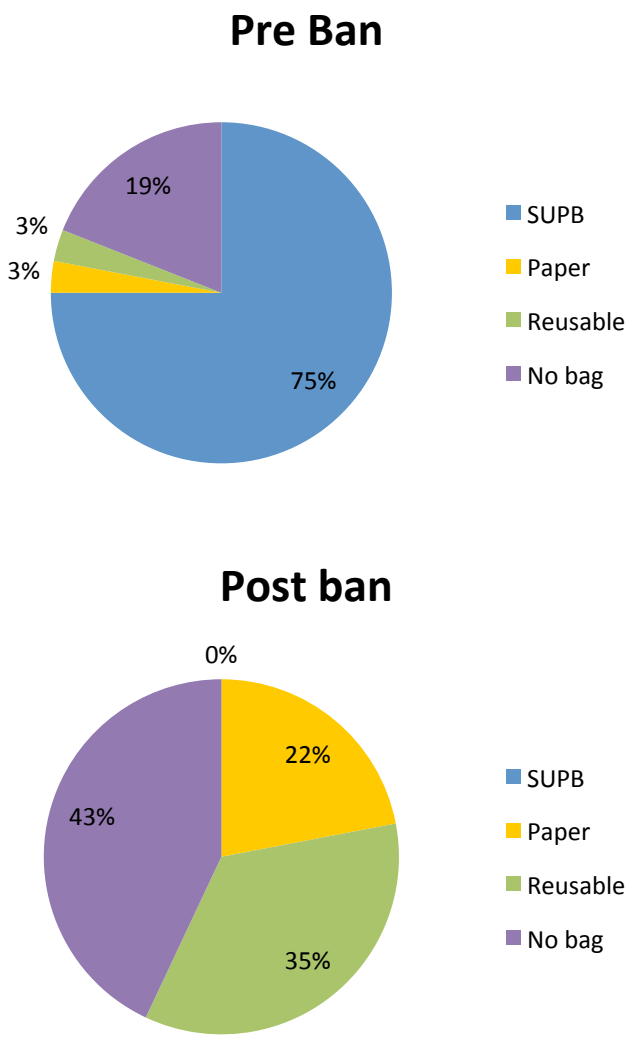
Start date of ban	July 2015
Plastic bags included in ban	1. Single use plastic bags (SUPBs) – "means a bag other than a Reusable Bag provided at the check stand, cash register, point of sale or other point of departure for the purpose of transporting food or merchandise out of the establishment. "Single-Use Carry-Out Bags" do not include bags without handles provided to the Customer: (1) to transport produce, prepared food, bulk food or meat from a produce, deli, bulk food or meat department within a store to the point of sale; (2) to hold prescription medication dispensed from a pharmacy; or (3) to segregate food or merchandise that could damage or contaminate other food or merchandise when placed together in a Reusable Bag or Recycled Paper Bag"
Plastic bags exempt from ban	1. Paper bags made from at least 40% recycled materials for a minimum charge of $0.10 2. 1/07/2015 - stores were allowed to give out compostable bags for a minimum charge of $0.10 3. 01/07/2015 - a store, may sell or distribute a reusable plastic bag to a customer if the reusable bag meets following requirements: i. Has a handle and is designed for at least 125 uses ii. Has a volume capacity of at least 15 liters. iii. Is machine washable or made from a material that can be cleaned and disinfected. iv. Has printed on the bag, or on a tag attached to the bag disclosing bag specifics and instructions for recycling v. Does not pose a threat to public health by containing contain lead, cadmium, or any other toxic material. vi. It must be recyclable in the state of California and accepted in the stores recycling program vii. As of January 1, 2016, bags should be made from a minimum of 20% postconsumer recycled material. Additionally as of January 1, 2020, the minimum will increase to 40%. 4. A reusable grocery bag that is from any other natural or synthetic fabric (not plastic film), must comply with all of the following (as well as the requirements mentioned above for reusable bags): i. It should be sewn.

[3] http://www.sanjoseca.gov/index.aspx?NID=1526

	ii. It should carry 22 pounds over a distance of 175 feet for a minimum of 125 uses. iii. It should have a fabric weight of at least 80 grams per square meter.
Extent of ban	1. As of July 1, 2015 stores that have a specified amount of sales in dollars or retail floor space will be prohibited from providing a single-use carryout bag to a customer 2. Additionally, after July 1, 2016 these prohibitions and requirements also apply to convenience food stores, food marts, and entities engaged in the sale of a limited line of goods, or goods intended to be consumed off premises, and that hold a specified license with regard to alcoholic beverages.
Preparation for ban	1. In 2006 California passed legislation requiring retail stores to adopt at-store recycling programs. Bags must be labeled with recycling instructions and stores must provide the facilities for them to be recycled so consumers can easily dispose of them. 2. The bill passed (for the state of California) made a loan of $2,000,000 available to the department to create and retain jobs and to manufacture and recycle reusable plastic bags in California. [4]
Alternatives to plastic bags	• Businesses can provide paper bags made from at least 40% recycled material, compostable bags and reusable bags (which meet the state requirements set out) for a minimum charge of $0.10. The charge is to discourage use of paper bags and encourage use of reusable bags.
Enforcement of ban	• Every Retail Establishment shall keep complete and a record of the purchase and sale of any Recycled Paper Bag for a minimum period of three (3) years from the date of purchase and sale. This should be shown upon inspection. • The law allows a fine of up to $1000 a day for violations. But no store has been fined under local ordinances.
Benefits of ban (San Jose)	1. Litter reduction i. At the end of 2016 the amount of plastic bags found in creeks and rivers had decreased by 76% ii. 69% reduction of plastic bags in storm drains 2. Consumer Behaviour changes i. A 43% increase in consumers using reusable bags since before the ban ii. A 30% increase in consumers carrying items without a bag since before the ban[5]
Drawbacks of ban	1. It does not cover all plastic bags 2. The use of reusable plastic bags has increased. If these are reused this is positive, however if they are bought then thrown away or stored and not reused these bags are more energy intensive to produce and the impact on the environment would therefore be negative. 3. Hygiene issues, see case study 1 at the bottom.

[4] https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140SB270
[5] http://www.sanjoseca.gov/index.aspx?NID=1526

Figure 2: San Jose, the change in Bag Use Profiles (as a Percentage) [6]



These charts show how the use of Single Use Plastic Bags has been completely eliminated post ban. It also highlights the corresponding increase in use of alternatives. It is positive to see that the use of reusable bags increased more than paper bags. However further information regarding the fate of these reusable bags is required. If they are being reused as intended the ban has been quite successful in changing consumer habits, if they are being used once and then thrown away then the problem would have been shifted. What is most notable is the increase by 24% of people opting to use no bag. This option has no additional impact on the environment, unlike reusable bags and paper bags which also have negative production costs.

[6] https://energycenter.org/sites/default/files/Plastic-Bag-Ban-Web-Version-10-22-13-CK.pdf

Australian Capital Territory (ACT)[7]

Start date of ban	November 2011
Plastic bags included in ban	1. Single use polyethylene bags less than 35 micron in thickness 2. Degradable plastic bags (less than 35 microns in thickness) are banned in the ACT. Degradable bags are made from plastic with an additive which encourages them to break apart more quickly than standard plastic bags causing similar environmental harm.
Plastic bags exempt from ban	1. Biodegradable bags that meet Australian Standards AS 4736 (these include plant starch materials or compostable materials) 2. Integrated packaging: A plastic bag that is part of the packaging that goods are sealed in before sale. 3. Barrier bags (tear-off-the-roll bags) 4. Boutique bags: heavier style reusable plastic bags 5. Reusable (woven) shopping bags: strong and durable bags designed for multiple uses, manufactured from materials such as nylon, polypropylene or PVC.
Extent of ban	Applies to all retailers including takeaway food and farmers markets (small enterprises)
Preparation for ban	1. Before the ban, between 01/07/2011 to 31/10/2011 the ORS inspected 1734 businesses to educate retailers on the new regulations coming into place and to assess whether they were preparing. 2. Before the ban was implemented the ACT government created the Plastic Bags Advisory Group (PBAG). This was made up of retailers, retail bodies and local associations. Their job was to provide a forum to identify and address potential issues. They also worked with retailers to raise awareness of the ban, and to help consumers adjust before the ban.
Alternatives to plastic bags	Thicker reusable plastic bags, biodegradable bags, woven shopping bags
Enforcement of ban	1. From 01/11/2011 – 31/10/2013 post ban the ORS undertook another 714 inspections. Only four breaches were detected. Two of these businesses received verbal warnings and the others received written warnings. No repeat offences have been recorded. 2. It is an offence for a retailer to provide a customer with a single use plastic bag. The current penalty payable is $140 for an individual and $700 for a corporation. 3. Access Canberra aims to achieve compliance with laws rather than through prosecution.
Benefits of ban	1. Environmental benefits i. Analysis shows in the six months prior to the ban an estimated 266

[7] http://www.environment.act.gov.au/__data/assets/pdf_file/0017/602018/20140407-ESDD_BagBan_Report_2014_Final.pdf

	tones of plastic bags (including single-use plastic bags, reusable plastic bags, bin liners and a proportion of reusable woven bags) ended up in land fill. However, for the period 1 May 2013 to 31 October 2013 this appears to have decreased to an estimated 171 tones, a reduction of around 36%. ii. Analysis from KAB National Litter Index audits shows a reduction in plastic bag litter since the ban was introduced in 2011. In the 4 audits the number of plastic bags found had more than halved since pre ban. iii. There are less plastic bags being found in Gross Pollutant Traps (GTPs) which help prevent litter entering waterways. Before the ban it was common to find shopping bags in the GTPs however prior to the ban their occurrence is rare. 2. Consumer i. In February 2014 Piazza Research Pty Ltd conducted a survey interviewing primary shoppers about their support for the ban. Consumer support for the ban has increased by 7% up to 65% since it came into place. Those against the ban have also fallen by 9% to 26%. (9% remain unsure)
Drawbacks of ban	• Only includes polyethylene bags less than 35 microns • The ban saw purchases of the alternative bags (boutique and reusable) increase and these were eventually sent to landfill (however the total amount of plastic bags going into landfill was still reduced by over one third.) • After the introduction of the ban PBAG highlighted some initial issues with the ban. There was an increase in lost/stolen shopping trolleys and baskets, as some people did not bring reusable bags and refused to pay for these bags at the point of sale. More education/ awareness projects may have prevented this and encouraged people to be more willing to purchase and use reusable bags.

It should be noted that in both examples of 'successful' bans not all types of plastic bags were included in the bans. This could be attributed to their success and can be considered when implementing a ban in Pune.

Sikkim[8]

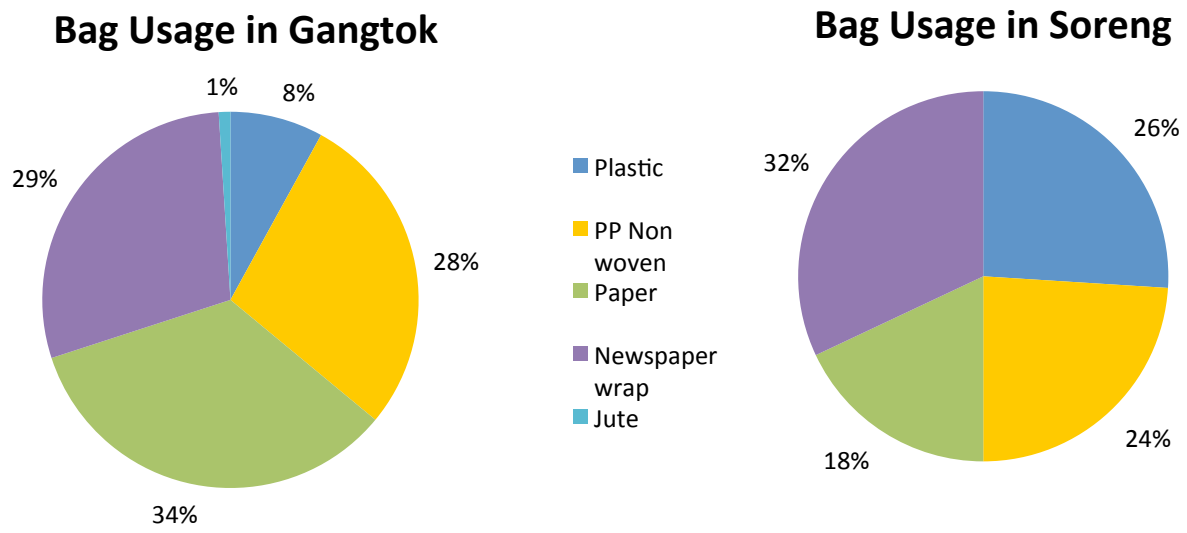
The effectiveness of the plastic bag ban in Sikkim differs between regions. Overall the ban has been quite successful in reducing plastic bag use but not eliminating it. A study by Toxic Link found 66% of shops around Sikkim use paper bags or newspaper and around 34% use plastic bags (which includes non woven). Although the use of plastic is still quite common significantly more people are using paper than in most Indian states. There is no evidence to say whether the paper bags are being reused to the extent required qualifying as more eco-friendly than single use plastics so using this as a measure of success is also questionable.

Start date of ban	4th June 1998
Plastic bags included in ban	The legislation states : 'That you shall not deliver any goods or materials purchased or otherwise to any person, firm, shop, company or any other agency or organization in plastic wrappers or plastic bags'[9]
Plastic bags exempt from ban	• Non woven
Extent of ban	Traders, shopkeepers, hawkers (customers are NOT liable)
Preparation for ban	• Very little emphasis on education, communication and sharing information with the public. • There was one poster designed to encourage the avoidance of plastic but it does not mention plastic is actually banned in Sikkim • Initially there was an article in the local papers announcing the ban and since there has not been an effort to send circulars to shops • Some regular notices can be seen in government offices
Alternatives to plastic bags	Newspaper, paper bags, non woven, banana leaf wraps, bamboo, jute
Enforcement of ban	• Initially, in big towns, continuous checks took place and strict fines were imposed on offenders – this created a level of fear, making the ban effective. • If caught in breach of law a traders business license can be suspended or cancelled and there will be a fine of up to Rs.20.000/- • In rural areas enforcement is lacking and the ban has been ineffective
Success of ban	• In urban areas awareness of the ban is high among shopkeepers and customers (+80%) – but not tourists (Around 40%) • Awareness is also high in rural areas at about 75% among shopkeepers and customers. • The ban has been quite effective in large towns like Gangtok, due to regular inspections and media access. Brown paper bags are used by vegetable vendors, grocers, chemists - however plastic bags are still covertly in use by some businesses.

[8] http://toxicslink.org/docs/Full-Report-Plastic-and-the-Environment.pdf
[9] https://www.sikkim.gov.in/stateportal/UsefulLinks/184-197.pdf

Drawbacks of ban	• Only 10% of waste is recycled, most goes to landfill. In rural areas 90% of people admit to burning their plastic bags. • The growing popularity of non woven bags is an issue – people assume these are ecofriendly and they are not regarded as plastic. • Many people are still using plastic covertly in big towns. • In smaller villages plastic bags are being used extensively for vegetables, meat and fish. (See pie charts below for comparison of big town and smaller village bag use) • In Soreng"most people were not in the habit of bringing their own bags they relied on shopkeepers to provide a bag. Alternatives to plastic bags if used for a single use are worse for the environment so this habit must be broken".

Comparing bag usage in large towns (Gangtok) and Villages (Soreng)



The charts show that in Gangtok people using paper based bags is 62%, whereas in Soreng it is 50%. The use of the conventional plastic packaging is only 8% in Gangtok, compared to 26% in Soreng. So in this example plastic bag packaging is used 18% less in towns than villages – this can be attributed to the higher levels of inspection and therefore risk of getting caught.

In both Gangtok and Soreng PP non woven bags are popular, this is concerning because they are falsely advertised as eco-friendly when they too are made from plastic and damage the environment. People need to be made aware of these facts so they can make better informed decisions regarding their choice of bag. Additionally the government should recognize this and include non woven bags in the ban.

Examples of unsuccessful plastic bag bans

Delhi [10]

Start date of ban	January 2009 – the Delhi government ordered a complete ban on the use of all plastic bags in market areas October 2012 – the Delhi Government ordered a blanket ban on all types of plastic bag
Plastic bags included in ban	• All types of plastic bags • Including plastic sheets and films used to package books, magazines and cards. • Non woven
Plastic bags exempt from ban	• Plastic bags used or medical waste • Exceptions for export purposes
Extent of ban	Manufacturing, import, sale, storage, usage and transport of all kinds of plastic bags.
Preparation for ban	• No clear effort from government to aid the introduction of the ban • In previous years there had been other laws passed regarding plastic bags which may have eased the transition, however these efforts were only effective in reducing plastic bags in shopping malls and outlets. For example in 2008 the minimum thickness of bags was raised from 20 to 40 microns, then in 2009 there was a ban on all types of plastic bags in market areas.
Alternatives to plastic bags	• Paper, most popular alternative (66% of vendors choose) • Cloth • Jute
Enforcement of ban	• Municipal Corporation of Delhi (MCD) has the task of regulating the; use, collection, transportation and disposal of bags. • Delhi Pollution Control Committee (DPCC) has the task of regulating manufacturing and recycling of bags in Delhi. • The penalty for those found to be breaking the law could be a fined 100,000 rupees or imprisoned or up to 7 years. • Despite this the ban is very poorly enforced hence why this ban has been largely unsuccessful.
Drawbacks of ban	• Study by Toxics Link showed approximately 62% of vendors and 78% of consumers interviewed admitted to still using plastic bags. • The groups still most frequently using plastic bags were identified as follows: i. 99% of fruit and vegetable vendors still use plastic bags ii. 95% of meat and fish vendors still use plastic bags iii. 82% of temporary road side vendors • No emphasis on what the public should do with plastic bags already in their possession. In a survey it was revealed 18% of those questioned reused plastic bags and the other 82% used them once before throwing them.

[10] http://toxicslink.org/docs/Full-Report-Plastic-and-the-Environment.pdf

	• There are still manufacturing units open in Delhi despite the ban on manufacturing. These are concentrated in the areas of Mongolpuri, Narela and Bawana. • Delhi also receives bags from neighboring cities
Success of ban	• Despite the high incidence of smaller independent businesses using plastic bags, among larger corporations there has been successful. i. Multibrand shops have made a 100% to using alternatives to plastic. ii. Large food joints exhibita 90% shift to using alternatives to plastic. iii. Chemists show a 88% shift towards alternatives to plastics iv. Clothing and stationary shops also showed a 78% and 70% respectively.

Kenya

Kenya plastic bag ban comes into force after years of delays

In 2017 the National Environment Complaints Committee released a report stating 24 million plastic bags were being used in Kenya each month. In the capital Nairobi 20% of waste consisted of plastic waste. Kenya has tried multiple times in the past to ban plastic bags. All the previous attempts have failed. In 2005 and 2007 plastic bags with a thickness of 30 microns or less were banned. In 2011 this was extended to include bags of 60 microns or less. [11]

Reasons for failure;

i. Lack of enforcement of implementation plan
ii. Protests and threats from traders
iii. Failure to put a recycling system into place to deal with plastic waste
iv. Fear of job loss led to conflict with manufacturers and importers

Despite these failures Kenya continues its fight against plastic bags. To eliminate confusion they have extended their ban to include almost all plastic bags, this will make enforcement easier as those who are non-compliant will be easier to identify. The ban is recent so it is hard to quantify the success so far, but Kenyans are positive and have reported a cleaner environment. This is an interesting example as the current ban model has been designed to avoid the previous failures experienced in the country.

[11] https://www.nation.co.ke/lifestyle/DN2/Plastic-bag-ban-Have-the-cows-finally-come-home/957860-4099846-otxmvaz/index.html

Start date of ban	The ban came into effect on the 28/08/17 after a 6 month adjustment period.
Plastic bags included in ban	1. Plastic carrier bags used as secondary packaging 2. Flat bags used as secondary packaging
Plastic bags exempt from ban	1. Flat bags used as primary industrial packaging. Reason for exemption: i. Extended producer responsibility/take back schemes ii. Product labeling for ease of monitoring and traceability iii. Inventory record 2. Flat bags for i) hazardous waste and ii) rubbish. Rules for exception: i. Hazardous waste liners must be legibly labeled, color coded and incinerated with the waste. ii. Rubbish liners must be correctly labeled and will not be dumped with rubbish. Instead they will be cleaned and reused or recycled. 3. Duty free shop bags. Reason for exemption – ICAO and IATA international rules. However despite their exemption in duty free shops it is mandatory to dispose of these bags at the point of entry in Kenya.[12]
Extent of ban	Use, manufacture, sale and import of plastic bags
Preparation for ban	1. Step 1: Raising awareness i. Ministry and National Environment Management Authority conducted TV interviews and radio casts to inform public about the upcoming ban. ii. Ministry and National Environment Management Authority posted frequently asked questions and answers online to address national inquires. iii. Leaflets and articles printed in daily newspapers iv. Awareness meetings organized by Ministry and National Environment Management Authority for different groups i.e. religious, supermarkets, transport. These meetings clarified the ban rules and clarified expectation of co operation expected from stakeholders. 2. Step 2: Research alternatives i. The Ministry held an exhibition in Nairobi to showcasing alternative eco-friendly packaging materials to replace polythene bags. The National Media group raised awareness of this event through print and digital media. 3. Step 3: Partnerships i. Ministry and National Environment Management Authority asked other ministries and councils for their assistance in increasing awareness and help with enforcement after implementation. The Ministry received written commitments from various other ministries and semi-autonomous institutions confirming their commitment to the success of the ban.

[12] http://www.kenyatoday.com/opinion/plastic-ban-alternatives-exemptions

	ii. The Kenya Airports Authority took action supplying bins to take polythene bags from visitors entering Kenya. 4. Step 4: Set an example to increase motivation i. A focus was made to rid forests and parks of plastic bags so that the public could envision their environment without plastic. You cannot enter these areas whilst in possession of plastic bags. 5. Adjustment period i. A six month warning was issued for businesses and manufacturers to adjust practices before ban was implemented.[13]
Alternatives to plastic bags	Old sacks, paper bags, envelopes, hands, fabric bags, non woven
Enforcement of ban	Fines of up to $38,000 or prison sentence up to four years [14]
Success of ban	1. Challenge Gift Bags a paper bag manufacturer has seen a 10% rise in business since ban[15] 2. Retain Trade Association of Kenya (Retrak) chief executive Wambui Mbarire said "women's groups in Naivasha and Nyandarua have already taken up making kiondos for Tuskys and Naivas supermarkets. This is empowering local women to make an income, these bags will be sold to public at a subsidized price." 3. The government is going to incentivize industries, women and youth groups to produce eco-friendly alternatives to plastic bags 4. Cleaner environment
Drawbacks of ban	1. Estimated to cost Kenya 60,000 to 70,000 jobs [16] 2. Many consumers are now using non woven bags which are in fact made from plastic 3. The ban only tackles half the issue. Waste management and recycling need heavy emphasis too.

[13] http://web.unep.org/ourplanet/december-2017/articles/free-plastic-bags
[14] http://www.loc.gov/law/foreign-news/article/kenya-notice-outlawing-plastic-bags-issued/
[15] https://www.theguardian.com/sustainable-business/gallery/2017/jun/08/kenya-plastic-bag-battle-ban-supermarkets-recycling-pictures
[16] https://www.nation.co.ke/lifestyle/DN2/Plastic-bag-ban-Have-the-cows-finally-come-home/957860-4099846-otxmvaz/index.html

Michigan

Why Michigan Banned Banning Plastic Bags

A new state law prevents cities and counties from restricting use of plastic bags or disposable cups and utensils

Start date of ban	March 28th 2017
Extent of ban	The act will preempt local ordinances regulating the: i. Use, disposition, or sale of auxiliary containers. ii. Prohibit or restricting auxiliary containers. iii. Imposing a fee, charge, or tax on auxiliary containers.
Included in the ban	'Auxiliary container' means a reusable or single-use bag, cup, bottle, or other packaging, that meets the following requirements: (i) Is made of cloth, paper, plastic, cardboard, corrugated material, aluminum, glass, postconsumer recycled material, or similar material (ii) Is designed for transporting, consuming, or protecting merchandise, food, or beverages from or at a food service or retail facility
Excluded from the ban	The act shall not restrict local ordinances from any of the following: (a) A curbside recycling program. (b) A designated residential or commercial recycling location. (c) A commercial recycling program.[17]
Reason for the ban on bans	The Michigan Restaurant Association pushed the bill to prevent local authorities from imposing any restrictions on the use of plastic containers including plastic bags. They argued that different systems of bag fees and bans across different municipalities in the state would make it difficult for chain restaurants and retailers to comply.[18]

[17] http://www.legislature.mi.gov/documents/2015-2016/publicact/pdf/2016-PA-0389.pdf

[18] https://www.smithsonianmag.com/smart-news/why-michigan-banned-banning-plastic-bags-180961630/

The rest of the United States

Looking at figure 3 it can be seen that the states of Missouri, Idaho, Iowa, Arizona, Wisconsin, Indiana and Florida are among others who have adopted the preemption measures pushed by plastic bag manufacturers and the plastic industry.

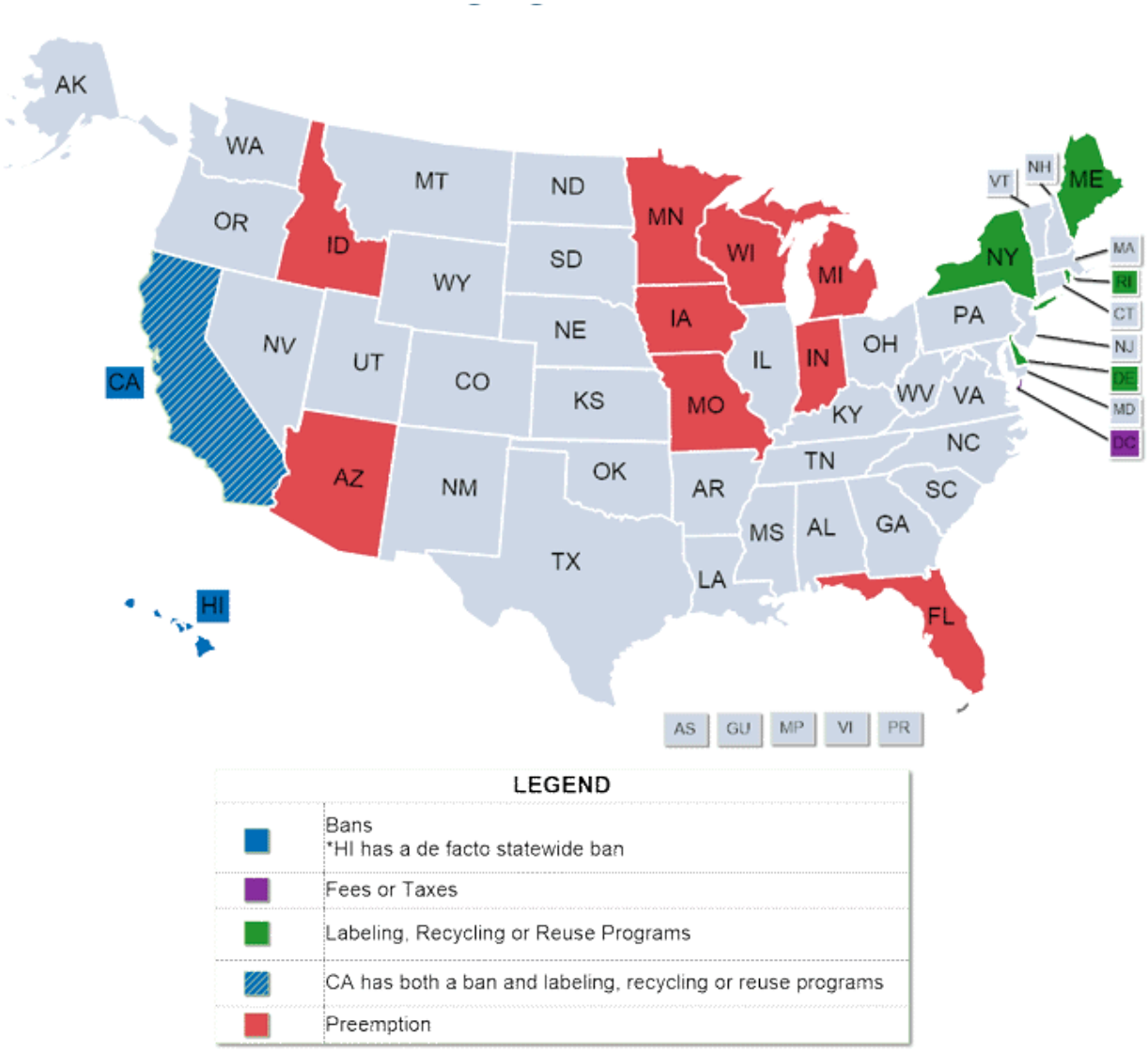


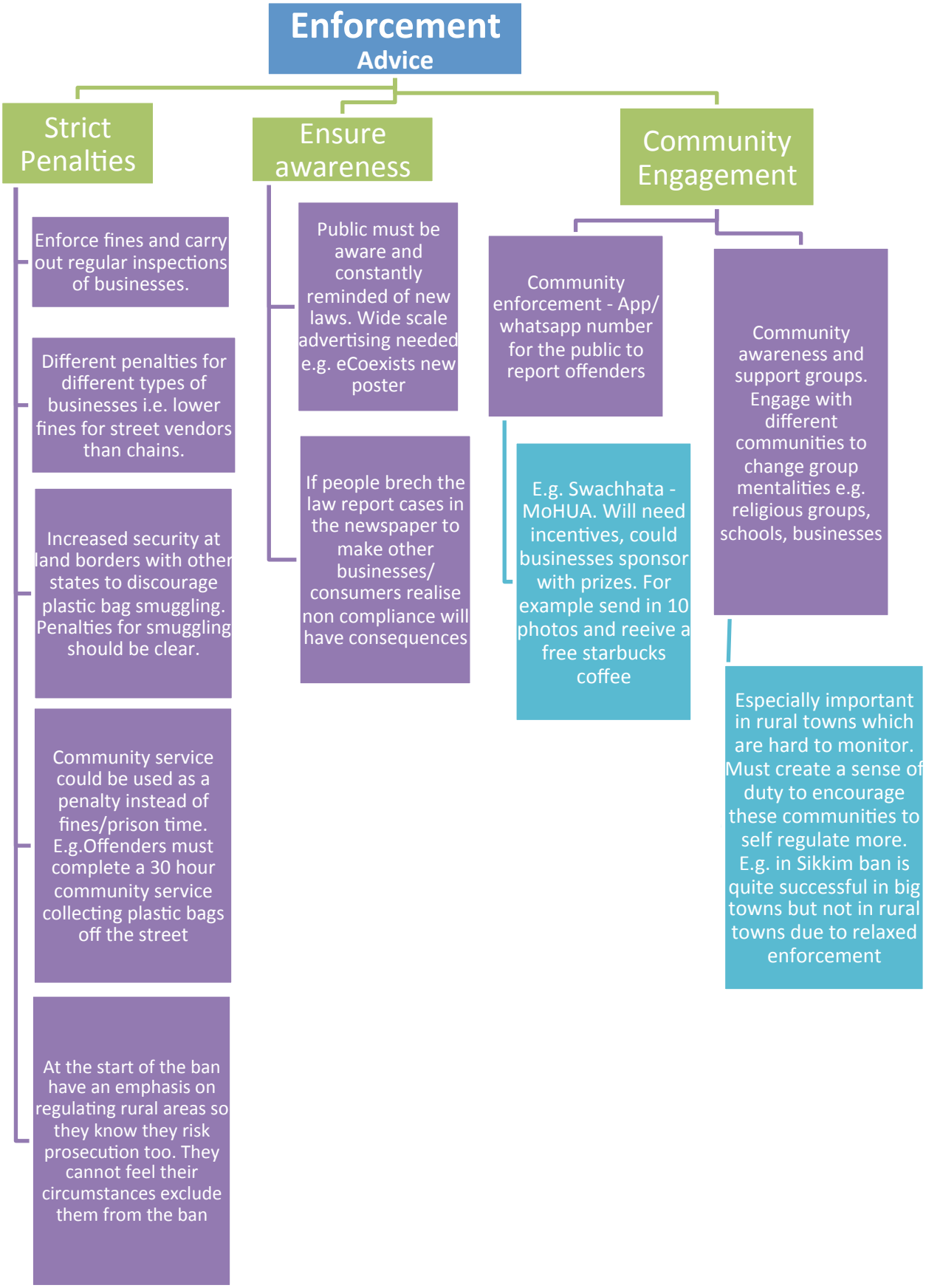
Figure 3: States with different enacted plastic bag legislations[19]

[19] http://www.ncsl.org/research/environment-and-natural-resources/plastic-bag-legislation.aspx

General issues with existing bans with suggestions

1. Enforcement

One of the biggest issues with most plastic bag bans globally is the lack of enforcement. If the laws are not enforced appropriately then compliance is reduced or eliminated. If businesses and consumers know there will be no consequence whether they abide by the law or not, they are likely to ignore new legislation that requires them to make changes to their habits.
Additionally, in countries such as India where there are huge numbers of small temporary independent vendors it is very challenging to monitor their plastic bag use. For example in Delhi the bag ban in plastic was largely successful with large retail outlets and food chains but failed to engage small vendors. Large businesses are much easier to monitor and punish for non compliance. Large corporations also have higher levels of corporate social responsibility; some may be global brands who have to maintain their brand image in a variety of markets.


Enforcement
Advice
Strict Penalties
Ensure awareness
Community Engagement
Enforce fines and carry out regular inspections of businesses.
Different penalties for different types of businesses i.e. lower fines for street vendors than chains.
Increased security at land borders with other states to discourage plastic bag smuggling. Penalties for smuggling should be clear.
Community service could be used as a penalty instead of fines/prison time. E.g.Offenders must complete a 30 hour community service collecting plastic bags off the street
At the start of the ban have an emphasis on regulating rural areas so they know they risk prosecution too. They cannot feel their circumstances exclude them from the ban
Public must be aware and constantly reminded of new laws. Wide scale advertising needed e.g. eCoexists new poster
If people brech the law report cases in the newspaper to make other businesses/ consumers realise non compliance will have consequences
Community enforcement - App/ whatsapp number for the public to report offenders
E.g. Swachhata - MoHUA. Will need incentives, could businesses sponsor with prizes. For example send in 10 photos and reeive a free starbucks coffee
Community awareness and support groups. Engage with different communities to change group mentalities e.g. religious groups, schools, businesses
Especially important in rural towns which are hard to monitor. Must create a sense of duty to encourage these communities to self regulate more. E.g. in Sikkim ban is quite successful in big towns but not in rural towns due to relaxed enforcement

2. Alternatives[20]

Another complication with banning plastic bags is what will replace them. Some of the popular alternatives such as paper bags also come with environmental consequences.

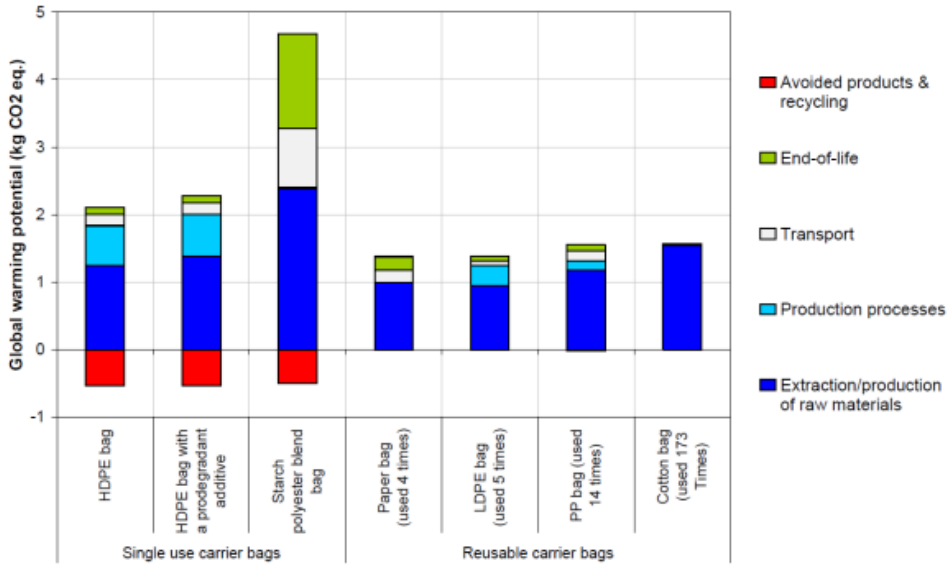


Figure 4: This graph shows the global warming potential of a range of single use and reusable bags assuming each bag type is reused by the amount required to outperform a HDPE single use carrier bag with no reuse

This graph shows that lower impacts can be attained by reusing alternative bags but can only be achieved in combination with consumer behavioral change. It is estimated paper bags must be used 4 times to compensate for larger carbon footprint, however paper bags are less durable than plastic so are harder to reuse. Similarly thicker plastic bags deemed as reusable must be used at least 5 times to compensate for the extra energy required during production. Cotton bags which are viewed by the media as the ultimate switch towards sustainability need to be used at least 173 times to compensate for the extra energy required to produce them. Cotton bags, if used correctly are superior to the other alternatives as the reuse value of paper and reusable thicker plastic is much less. If cotton bags are adopted and used correctly much fewer bags will end up in landfill as theoretically there would only be 1 cotton bag opposed to 173 plastic bags. Additionally, cotton bags should be capable of reuses more than 173 times; this is just the minimum requirement for them to be a viable alternative. For example if used 300 times this would forego 300 SUPBs going into landfill.

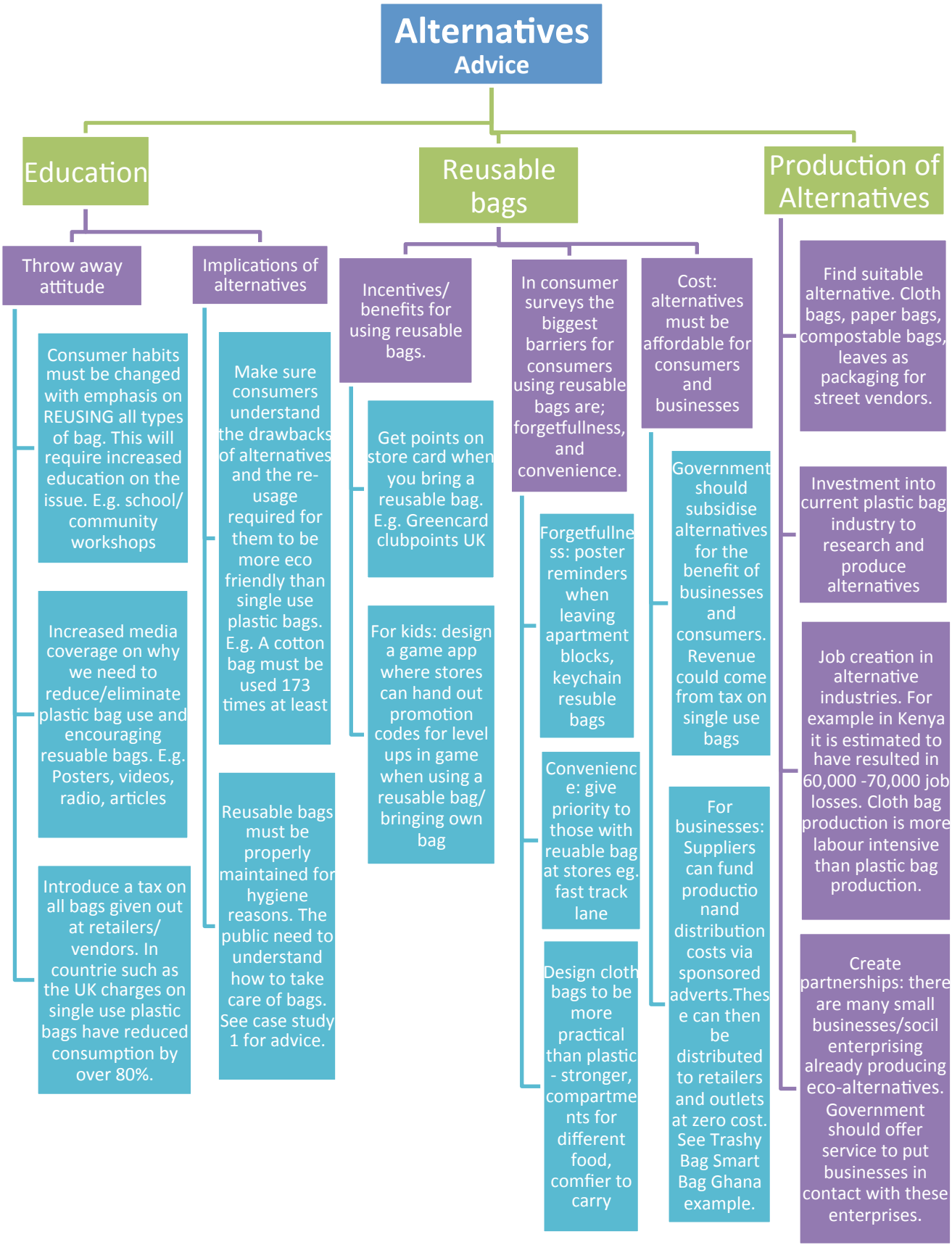
As well as providing alternatives, consumers must be provided with reasons to adopt these different bags types. This will

"You need a policy to get rid of plastic bags, but it must be wanted to be successful" – Dr Rose Mukankomje, Director of the Rwanda Environmental Authority

[20] http://www.environment.act.gov.au/__data/assets/pdf_file/0004/577057/12-26082_Plastic_bag_review_report.pdf

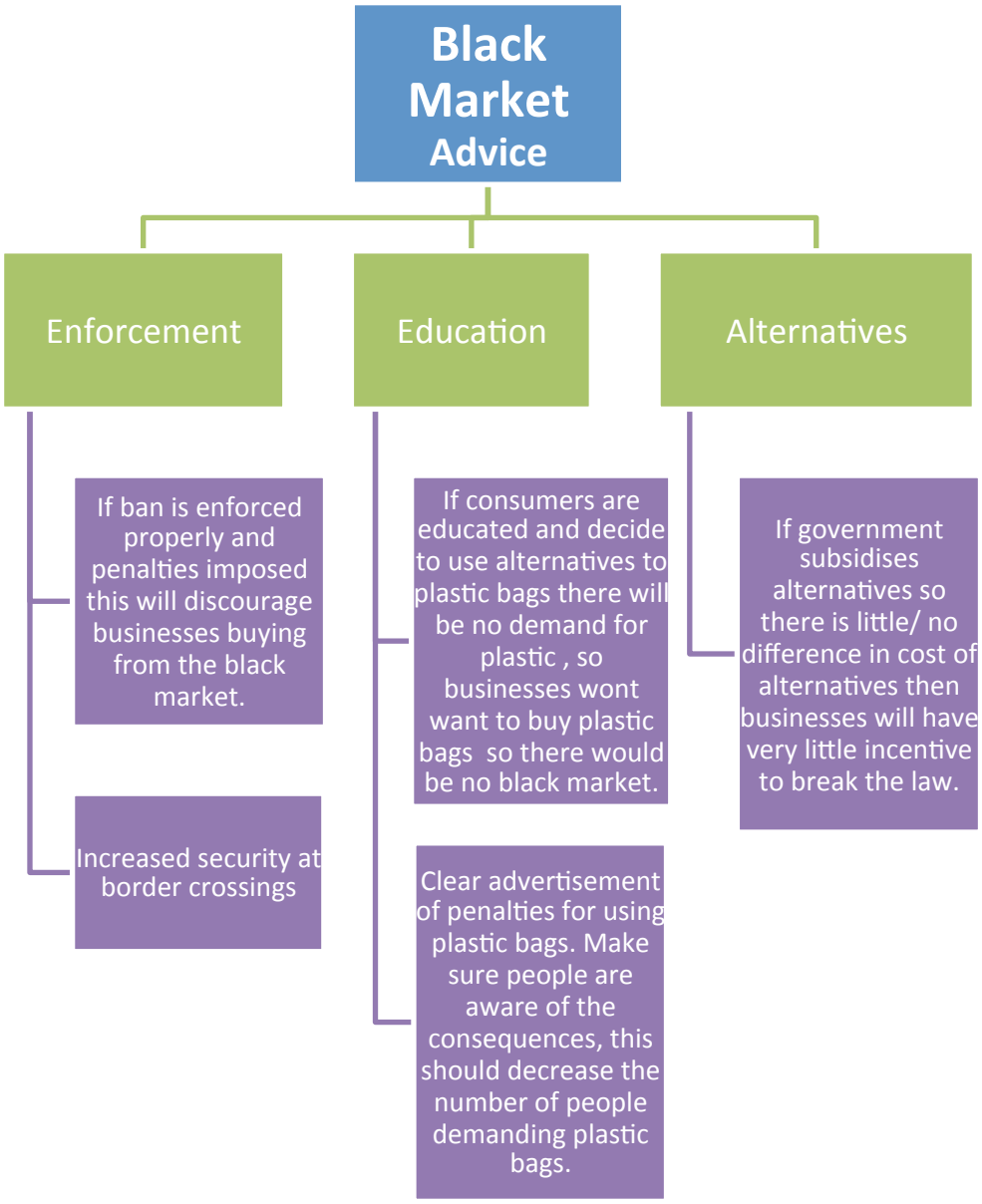
require increased education surrounding the issue and for alternatives to be convenient. [21]

[21] https://idjournal.co.uk/2017/04/24/reflecting-rwandas-plastic-bags-ban/


Alternatives
Advice
Education
Throw away attitude
Consumer habits must be changed with emphasis on REUSING all types of bag. This will require increased education on the issue. E.g. school/ community workshops
Increased media coverage on why we need to reduce/eliminate plastic bag use and encouraging resuable bags. E.g. Posters, videos, radio, articles
Introduce a tax on all bags given out at retailers/ vendors. In countrie such as the UK charges on single use plastic bags have reduced consumption by over 80%.
Implications of alternatives
Make sure consumers understand the drawbacks of alternatives and the re-usage required for them to be more eco friendly than single use plastic bags. E.g. A cotton bag must be used 173 times at least
Reusable bags must be properly maintained for hygiene reasons. The public need to understand how to take care of bags. See case study 1 for advice.
Reusable bags
Incentives/ benefits for using reusable bags.
Get points on store card when you bring a reusable bag. E.g. Greencard clubpoints UK
For kids: design a game app where stores can hand out promotion codes for level ups in game when using a reusable bag/ bringing own bag
In consumer surveys the biggest barriers for consumers using reusable bags are; forgetfullness, and convenience.
Forgetfullness: poster reminders when leaving apartment blocks, keychain resuble bags
Convenience: give priority to those with reuable bag at stores eg. fast track lane
Design cloth bags to be more practical than plastic - stronger, compartments for different food, comfier to carry
Cost: alternatives must be affordable for consumers and businesses
Government should subsidise alternatives for the benefit of businesses and consumers. Revenue could come from tax on single use bags
For businesses: Suppliers can fund productionand distribution costs via sponsored adverts.These can then be distributed to retailers and outlets at zero cost. See Trashy Bag Smart Bag Ghana example.
Production of Alternatives
Find suitable alternative. Cloth bags, paper bags, compostable bags, leaves as packaging for street vendors.
Investment into current plastic bag industry to research and produce alternatives
Job creation in alternative industries. For example in Kenya it is estimated to have resulted in 60,000 -70,000 job losses. Cloth bag production is more labour intensive than plastic bag production.
Create partnerships: there are many small businesses/socil enterprising already producing eco-alternatives. Government should offer service to put businesses in contact with these enterprises.

3. Black market activity

In many cases where plastic bags have been banned in a certain state or country a black market can emerge, where plastic bags are smuggled in from neighboring states/countries. For example, Rwanda has implemented a very successful plastic bag ban however faces the issue of a growing black market for bags in their country. Neighboring countries such as Burundi, Tanzania and Uganda do not have similar bans in place so plastic bags flow relatively easily across borders, despite the government of Rwanda conducting searches at border crossings.[22] In Delhi some manufacturers have ignored the ban on manufacturing due to lack of enforcement and other businesses continue to obtain plastic bags from neighboring states.

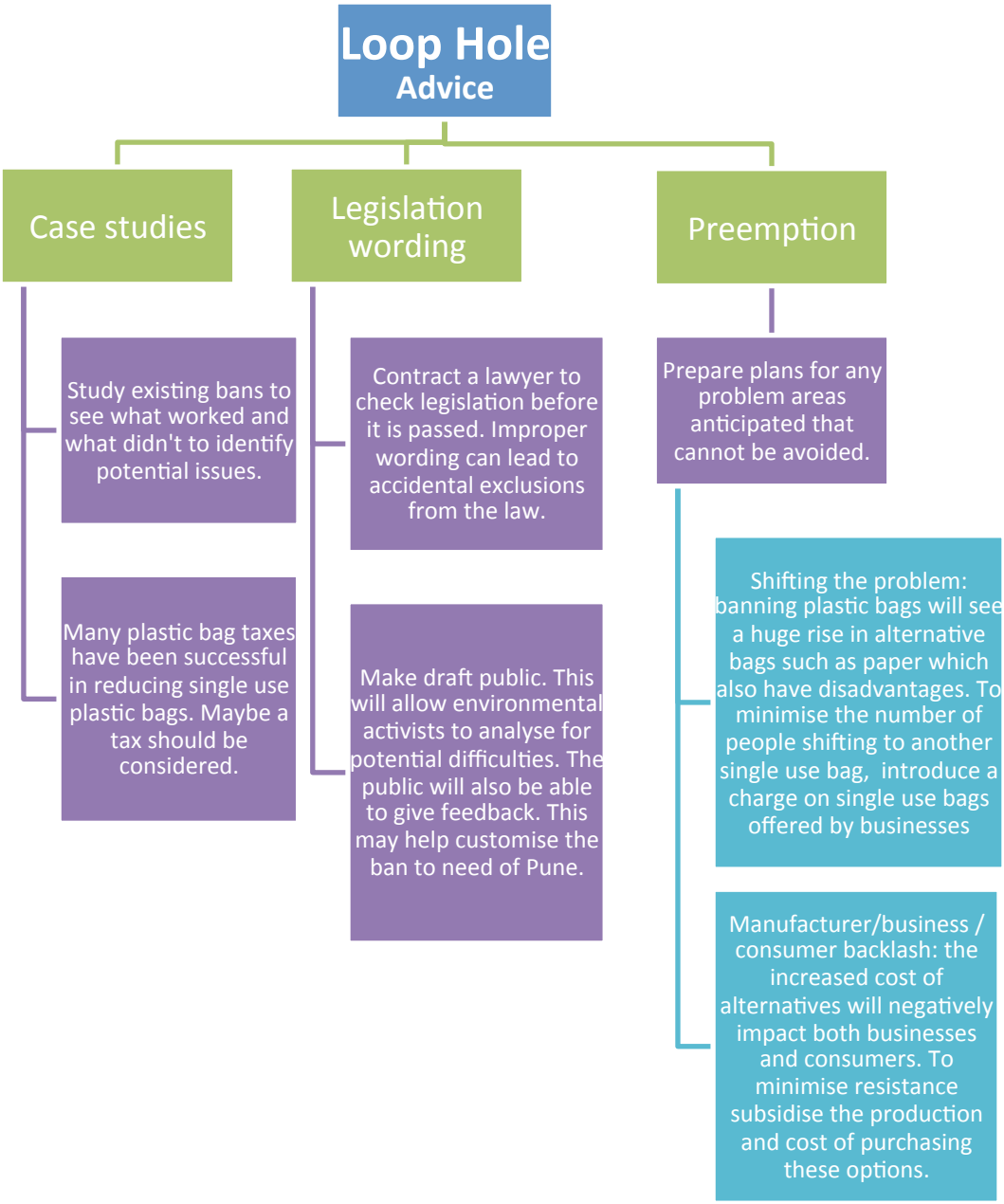


[22] https://idjournal.co.uk/2017/04/24/reflecting-rwandas-plastic-bags-ban/

4. Loop holes

When drafting the legislation it is important to identify any loopholes that manufacturers and businesses may be able to exploit. It is also important to consider the types of bags included in the ban. For example if bags below 40 microns are banned manufacturers are likely to just start producing thicker bags.

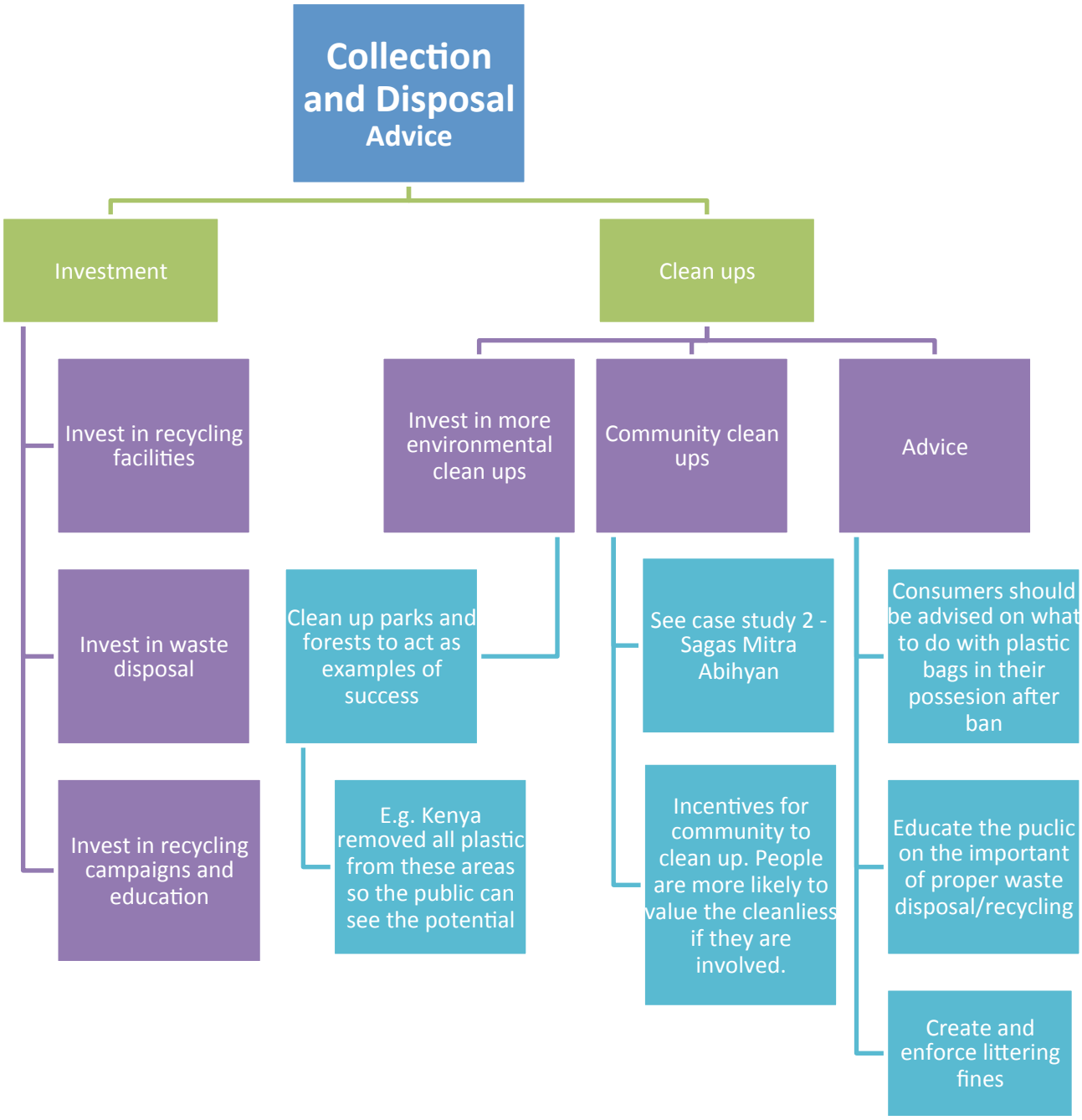
Countries such as Kenya tried implementing bans on plastic bags below a certain thickness but found it hard to monitor. They later changed their ban to include all plastic bags. By including all plastic bags in the ban it is easier for the authorities to identify and prosecute offenders breaking the law.



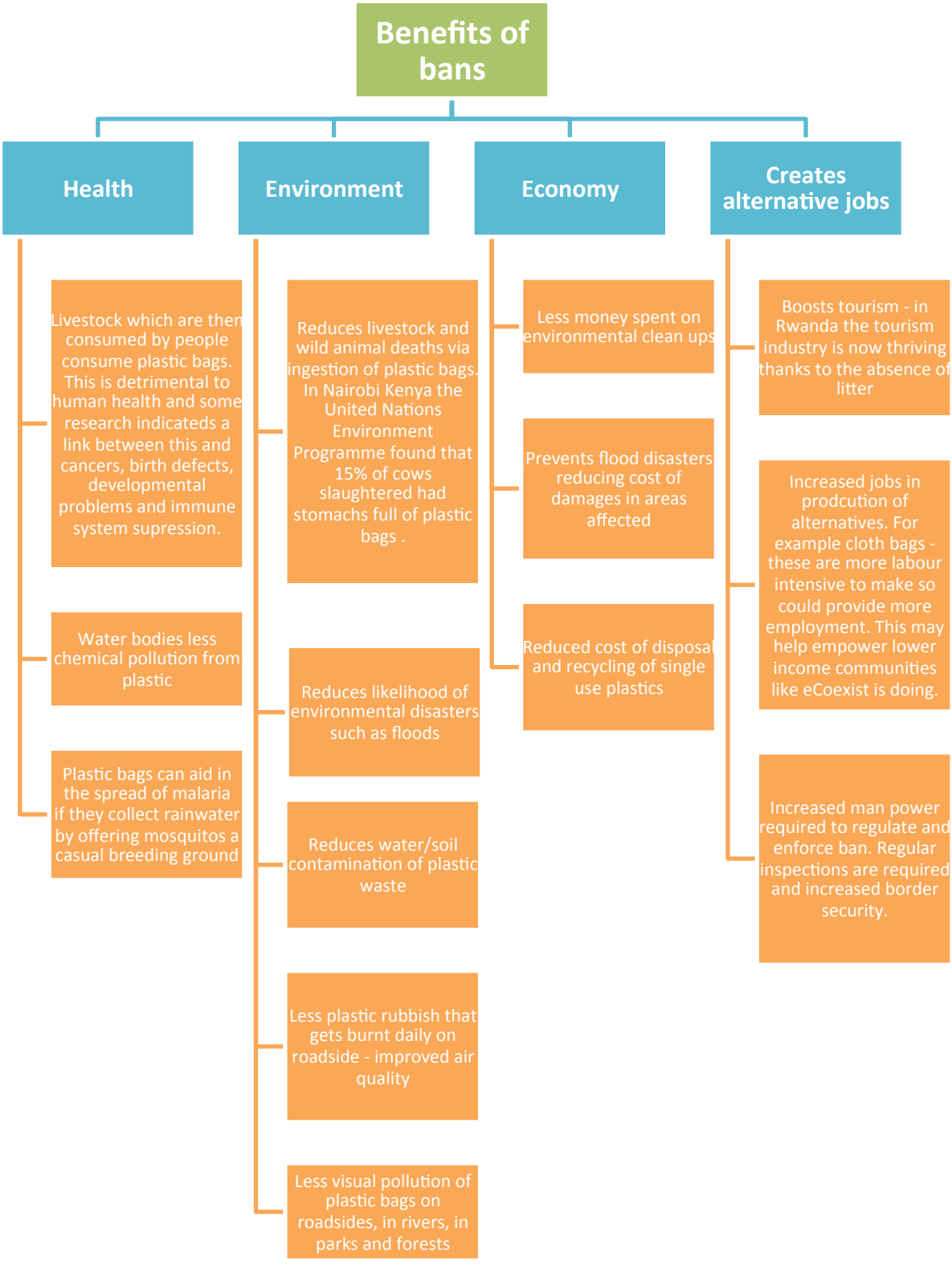
5. Collection and disposal

Plastic bag bans do not address the larger problem of poor waste disposal systems. These two issues must be tackled together. Banning plastic bags is a huge step to eliminating plastic waste pollution but effective systems need to be in place to remove waste that is already littering the environment, for example recycling centers, waste disposal centers or alternative energy plants.

The government needs to make it clear what consumers are to do with bags after a ban is introduced. Will it be legal to keep plastic bags at home for reuse or will recycling/disposal systems need to be set up in stores or community centers to collect plastic bags.



Benefits of plastic bag bans



(*Sources:* http://www.xinhuanet.com/english/2017-08/31/c_136571990.htm)

Conclusion of Considerations for Pune

There are countless considerations to make when drafting a ban. It is important to have clear legislation to enable all stakeholders to understand what the ban entails. If the wording of the bill is incomprehensible then compliance will be reduced, lawyers should be contracted to assess the final draft before the government passes it. Additionally, more accessible guides should be made available on the government website for stakeholders such as businesses and consumers to review (these should be more visual with less text).

The wording of the legislation for each of the countries studied in this report varied considerably in detail. They should be studied alongside this report to better understand the technicalities of a plastic bag ban. The table below was constructed to act as a basis for eCoexist to construct a graph from. It is a conclusion of some of the factors that must be looked into further for various aspects of the ban.

Ban start date	The ban comes into affect 01/04/2018
Bags includes in ban	○ Clear dimensions and capacity e.g. length, width, thickness, handles, material, weight, lifespan (See San Jose) ○ Which bags should be included in the ban? ○ It may be better to transition into a complete plastic bag ban. The success of plastic bag taxes in Europe and elsewhere have been an effective first step to reducing plastic bag use and changing consumer habits. After consumers have had some time to adjust stricter regulation can begin. (see Katherine's report from virtual internship)
Bags excluded from ban	Clear dimensions and capacity
Extent of ban	Ban use, manufacture, sale and import of plastic bags
Preparation for ban	6. Step 1: Raising awareness i. Educate population about the issue (If people decide they do not want to use plastic then there is no market for it and businesses will stop producing it!) ii. Educate communities and business about legislation, what's included etc. and penalties for breaking the law iii. Have campaigns on social media, tv, radio, newspapers, posters to drill information into everyone's minds 7. Step 2: Develop alternatives i. Invest money into identifying the best alternative (pre-ban) ii. Invest into developing alternatives iii. Promote alternatives iv. Subsidise alternatives v. Ensure systems are in place to deal with alternatives. For example if compostable bags are used they require aerobic conditions to break down so cannot go into landfill. New waste centers required. vi. Plan for job creation – jobs in production of bags, disposal, and construction of new facilities. 8. Step 3: Partnerships i. Partnerships to enforce ban e.g. whatsapp police

	ii. Partnerships to supply alternatives iii. Partnerships to raise awareness e.g. eCoexist proposing poster to government iv. Partnerships to clean up e.g. Friends of the Ocean school initiative
Alternatives to plastic bags	○ Bill should include retailer charges for alternatives ○ Bill should tax alternatives to discourage throw away attitude and change consumer behaviour. ○ Revenue from tax could be invested into research and development of alternatives ○ Hygiene of alternatives must be considered ○ In Sikkim local foods such as churpi (cottage cheese) are sold in wrapped leaves or bamboo. Could this work in Pune?
Enforcement of ban	○ Different penalty for different groups of retailers e.g. street vendors vs. malls ○ Predict manpower/ budget required to enforce ban ○ Increased border crossing security ○ Community service penalty ○ Make clear which suppliers are legitimate and comply with new bag rules
Steps to make alternatives successful	○ Make reusable bags convenient for consumers – assist and enable use of own bags. For example in India if you bring your own bags they must be left outside, how can obstacles like this be overcome? ○ Address forgetfulness ○ Ensure investment into industry to produce alternatives ○ Job creation – cloth bags more labour intensive ○ Incentives for reusable bags – app, game, vouchers ○ Heavy advertising

Case studies

Case study 1 – Reusable bags and hygiene

There has been speculation about links between the plastic bag ban and a Hepatitis A outbreak among the homeless in California which has reportedly killed more than a dozen people and infected around 400 more. Although there is no conclusive proof of a connection it raises an important issue as it is possible that a plastic bag ban could contribute to an outbreak like this if people are using these bags unsafely.

Health Officer Wilma Wooten confirmed homeless people in California frequently use plastic bags as toilets. With single use plastic bags unavailable and with alternatives coming at a price it is likely open defecation has increased - which may have facilitated the spread of the disease. Homeless people also do not have the facilities to frequently wash plastic bags, similar issues could be experienced in India amongst lower income groups. Additionally, unclean reusable bags pose a health hazard in supermarkets if they come from unsanitary environments. If everyone brings their own reusable bags countless strains of bacteria will come into contact with check out areas, trolleys, baskets and shop employees which could easily be transferred to food items and enter people's homes. [23]

Study 1: Dr. Richard Summerbell a microbiologist in Toronto, Canada conducted a study to test 49 used reusable bags. The following results were found:

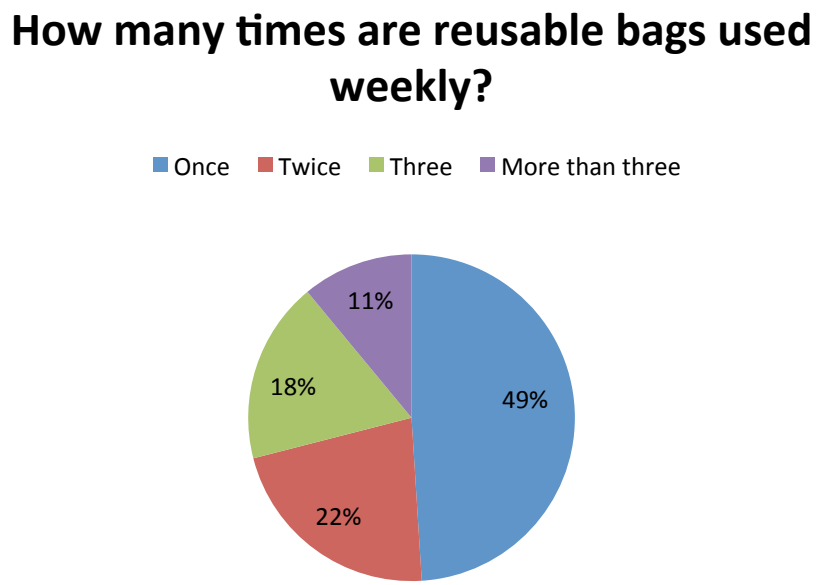
- 64% of bags tested had some level of bacteria
- 30% of bags tested had elevated bacterial counts
- 24% of bags tested showed presence of mold
- 20% of bags tested indicated the presence of yeast
- 12% of bags tested had an unacceptable coliform count

The study concluded reusable bags can become a microbial habitat and breeding grounds if they are not washed correctly. Yeast and mould are particularly concerning for older people and people with allergies. [24]

Study 2: the Department of Soil, Water and Environmental Science at the University of Arizona in Tucson and the School of Public Health, Loma Linda University in Loma Linda, California (Gerba, Williams, & Sinclair, 2010) sampled 84 reusable bags to determine a profile of bag usage.

[23] https://fighttheplasticbagban.com/
[24] https://fighttheplasticbagban.files.wordpress.com/2014/10/bacterial-and-viral-health-hazards-of-reusable-shopping-bags_rev_1.pdf

The results are as follows:



Other results

- 70% used the bag solely for groceries; 30%, for other uses
- **Only 25% used separate bags for meats and vegetables**; 75% did not
- 55% transported bags in the automobile trunk; 45% in the back seat
- 55% stored bags in the home; 45%, in the automobile
- **Only 3% washed their bags**; 97% did not
- 51% of bags had Coliform bacteria
- 12% of bags had Escherichia Coli (E. Coli)

It is concerning that 97% did not wash their bags and 75% did not use separate bags for meats and vegetables. The study also identified bags stored in the trunk of car for two hours resulted in a 10-fold increase in bacteria; this is another concern as 45% of people stored bags in the car.

Both studies showed single use plastic bags to have no presence of bacteria on them. This study also identified that hand or machine washing was effective in reducing the quantity of bacteria in reusable bags by more than 99.9%.

Advice for use:

1. Bags should be washed regularly.
2. Separate bags should be used for raw meat/fish.
3. Bags should not be stored in the car.
4. Bags should be single purpose, e.g. have separate bags for carrying your gym clothes and your food items.

Reusable bags and Epidemics

In 2010 six girls from a football team in Oregon fell ill with Norovirus which was transmitted via a reusable shopping bag. This was confirmed by the Public health authorities who investigated the case.

"This incident should serve as a warning bell: permitting shoppers to bring unwashed reusable bags into grocery and retail stores not only poses a health risk to baggers but also to the next shoppers in the checkout line." *Dr. Charles Gerba*

"The latest outbreak of norovirus reinforces the research we have conducted about the propensity of reusable grocery bags to act as hosts for dangerous foodborne bacteria and viruses. In reality, reusable bags are likely at fault much more often than we realize: cases often go unreported and uninvestigated. " - *Dr. Charles Gerba, a professor in the Departments of Soil, Water and Environmental Science at the University of*

This incident raises the issue of disease transmission via unclean reusable bags, there is some fear improper use could lead to epidemics. Other diseases that are believed could be spread via reusable bags include common cold, influenza, cold sores, conjunctivitis, coxsackievirus (hand-foot-mouth disease), croup, E. coli infection, Giardia infection, influenza, lice, meningitis, rotavirus diarrhea, Respiratory syncytial virus (RSV), ebola and strep.

However, as mentioned previously hand or machine washing is effective in reducing the quantity of bacteria in reusable bags by more than 99.9%. So if used correctly the risk of health hazards should be eliminated. [25]

[25] https://fightttheplasticbagban.files.wordpress.com/2014/10/bacterial-and-viral-health-hazards-of-reusable-shopping-bags_rev_1.pdf

Case study 2- Sagas Mitra Abihyan, Pune [26]

Initiative

- Students are shown a simple presentation about the harmful effects of single use plastic on our environment
- Students are then given a plastic bag to fill with plastic waste over the next 30 day period, at least one item per day is advised. These items include plastic bags, bottles, wrappers, old combs
- Once a month children hand over bag to school and are named 'a friend of the ocean' The plastic is collected by a Sagar-Mitra it is weighed and packed into the vehicle. Schools get Rs 8 per kg for the school's green fund.
- The plastic is delivered to Clean Garbage Manufacturing Pvt. Ltd. (CGMPL), who recycle the plastic waste into diesel or hard boards like table tops and pots.

Results

- In just five years Sagas Mitra Abihyan grew from 150 students in one school to over 100,000 students across Pune.
- In 5 years students contributed 50 tones of plastic
- Spreads awareness in children and from children to families
- The practice of collecting plastic has become of daily habit for many children just like brushing their teeth, this has also been passed onto family members and ex students are continuing to bring bags of plastic waste to their old schools.
- This scheme has been introduced in 40 towns in India
- Aims to cover all 780 schools in Pune by 2018
- Scheme featured in two research papers at the 15th World Lake Conference held at Perugia, Italy in 2014 - inspiring similar initiatives in New York and Morocco.

This is significant given that only one ton of plastic is extracted after sorting through 150 tones of mixed garbage.

[26] https://www.thebetterindia.com/78151/sagar-mitra-abhiyan-pune-plastic-problem/

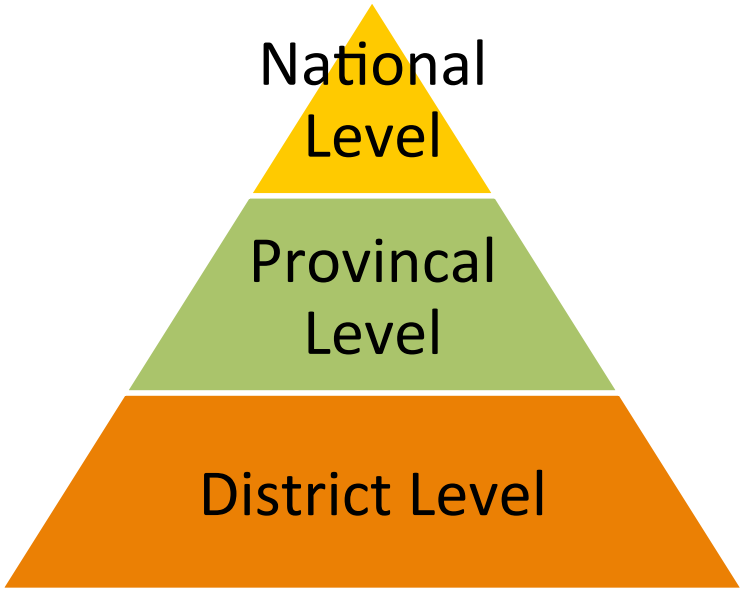
Case Study 3: Umuganda, Rwanda[27]

What is Umuganda?

When translated Umuganda means 'coming together in common purpose to achieve an outcome'. Umuganda is organized community work, in which about 80% of Rwandans take part in on the last Saturday of every month. It is compulsory for Rwandans between the ages of 18-65 to come together for just 3 hours and work on projects that usually involve infrastructure development or environmental protection. Expatriates and those over 65 who are able to take part are also encouraged to do so.

Umuganda dates back to 1962 but it was not until 2007 with the passing of Organic Law Number 53/2007 and then in August 24, 2009 with Prime Ministerial Order Number 58/03 that it was institutionalized in Rwanda.

Organisation



[27] http://www.rwandapedia.rw/explore/umuganda

National level:	• Steering committee: plan, assess and encourage Rwandans to take part in Umuganda and to publicise the results • Technical Committee: responsible for coordinating, monitoring, evaluating and developing the program for Umuganda
Provincial level:	• Steering Committee: coordinates and evaluates the Umuganda that takes place at the district level and reports to the Supervising Committee. • Provincial Technical Committee: is responsible for analysing district reports and providing a summary to the Ministry of Local Government
District level:	• Technical Committee: prepares and supervises Umuganda, evaluates community work and reports to the Supervising Committee at the provincial or City of Kigali level. • Technical Committees also exist at the sector, cell and village level.

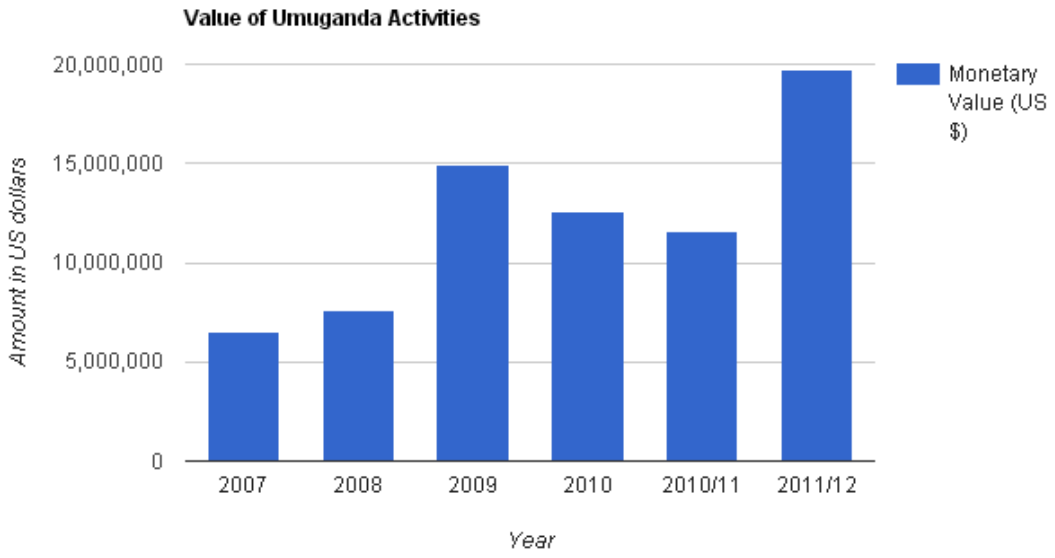
Coordination

If citizens cannot participate for any reason they can inform the committee, however community members who are able to participate and don't can be fined up to $8 (5,000Rwf). Before fines are given the person will be warned and encouraged to participate, revenue from fines supports the community work. There are several levels of coordination for Umuganda, their roles are listed below.

Supervising Committees	• Planning the work • Organise and supervise the community • Evaluate community work and making a report indicating the monetary value of the work
Local Leaders	• To promote participation • To set up maintenance mechanisms for activities achieved • To set up ways for everyone to be actively involved
The Community	• To take ownership of planning and organising • To ensure activities can be sustained

Outcomes of Umuganda

Successful outcomes of this national volunteering day are spectacular and include: the building of schools, medical centers and hydroelectric plants to rehabilitating wetlands and creating clean water supplies. As well as creating a beautiful sense of community bringing the countries citizens closer together, Umuganda is estimated to have contributed more than $60 million worth to the countries development since 2007.



The Government of Rwanda introduced the National Umuganda Competition in 2009 to raise awareness of Umuganda and increased participation. All levels of Rwandan society are involved – from the village up to the national level. The best activity in each district gets a certificate and funding for future projects. Additionally, the best three projects from across Rwanda are awarded a cash prize of between US $1,500 and $2,300.

In Rwanda Umuganda allowed the country to clear up plastic bag waste from drains, rivers, farms, cities, villages – by working together Rwanda has become the cleanest country in East Africa. It is a simple, cost effective way to address some of society's most pressing issues. Similar action, even on a smaller scale, could greatly help India (or any country) to tackle waste pollution.