Keeping Retail Plastic Bag Pollution out of The Anacostia River

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1. Abstract

In 2010, Washington DC became the first US jurisdiction to implement a fee on every plastic bag used at retail grocery stores. The following years saw continued declines in the number of plastic bags ending up in the Anacostia River. However, the societal changes brought on by the COVID-19 pandemic led to a significant reversal in plastic bag pollution trends. With a new commitment from the District government to eliminate single-use plastics by 2025, this paper, prepared for Anacostia Riverkeeper, examines what policy changes should be taken to ensure a just transition away from single-use retail plastic bags. To accomplish this, the success of the District's current bag fee is examined along with other US cities tackling the same problem. Four distinct policies are proposed and given a weighted score based on their ability to meet the criteria set by Anacostia Riverkeeper. Ultimately, we conclude that the current 5-cent bag fee is inadequate to address plastic bag pollution within the Anacostia River. Instead, the District should both ban single-use plastic bags from retail grocery stores and increase the fee to 10 cents for any remaining retail bags. Those receiving public nutrition assistance should be exempt from the new 10-cent fee to ensure this policy does not create an inequitable burden.

2. Project Introduction

This project is conducted for the client, Anacostia Riverkeeper (ARK), in partnership with its representatives Petra Baldwin and Quinn Molner. This analysis is intended to help ARK plan for future advocacy around reducing plastic bag pollution from entering the Anacostia Watershed. The client is mainly concerned with identifying a policy solution to rising rates of retail plastic bag pollution. However, this analysis will also consider knock-on effects on topics like maintaining existing environmental programs in disadvantaged communities and an inequitable distribution of costs.

After defining the scope of research with the client, we identified the core policy question for our client and this project: What is the best policy for the District to decrease retail plastic bag pollution in the Anacostia River?

With the core policy question and the client's needs in mind, we created three objectives to guide the research for this project:

1. Assess the efficacy of the current 5-cent retail bag fee within Washington DC.
2. Compare policy alternatives that could provide a more effective reduction
3. Provide a policy recommendation for ARK to advocate for reducing the recent rise in plastic retail bag pollution in the Anacostia River.

This analysis evaluates the current plastic bag reduction strategies in Washington DC as well as several alternatives to achieve the District's goals. The client, ARK, has asked our team to focus strictly on retail plastic bags. Therefore, we analyzed policy options that influence retailers and consumers to reduce or eliminate retail plastic bags. With this focus in mind, we seek to achieve our client's goal of diverting retail plastic bags from entering the Anacostia River. First, this analysis will use a literature review to broadly analyze the common themes around plastic bag pollution in the Anacostia River. These themes will include the effects of plastic and plastic bag pollution, how DC has addressed the issue previously, and how other jurisdictions and private entities have reduced plastic pollution.

Next, a series of policy alternatives will be selected for comparison. These alternatives will be based on similar policies to reduce plastic bag pollution in other parts of the country as compared to the business-as-usual policy in DC. These policies will be analyzed based on a

selection of priorities given to the project team. Based on how ARK views the importance of these priorities, a specific weight will be attached to each to score every alternative against one another effectively. Tradeoffs of each policy will also be discussed. Finally, a policy recommendation will be presented based on the results of the analysis. This recommendation will be found after generating a weighted sum from each policy alternative based on their performance on each weighted scoring criterion.

3. Literature Review

3.1 *Plastic and Retail Plastic Bag Pollution*

Plastic has brought an enormous level of convenience to nearly every part of American life. However, this convenience has also spurred new challenges that test the well-being of the natural world and humanity alike. Thanks to its widespread use and the subsequent failure to recover and reuse plastic products, plastic pollution has grown to be one of the largest environmental issues affecting a multitude of arenas.

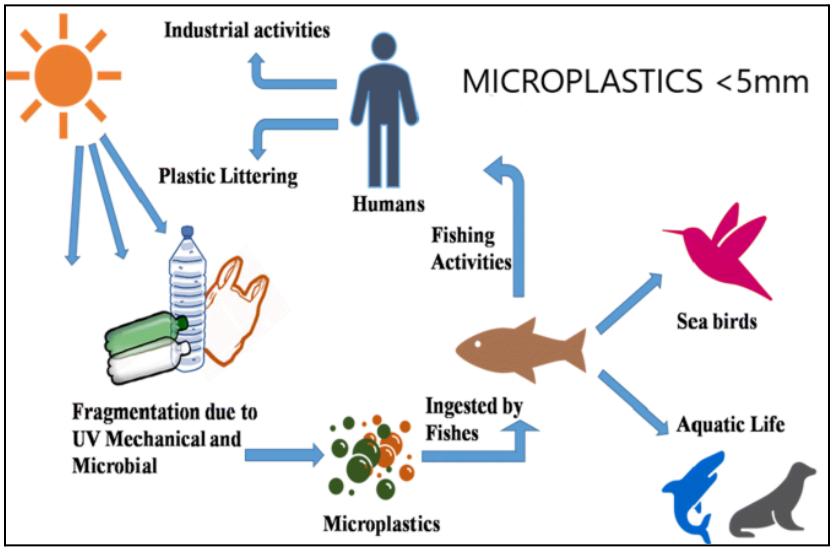

Figure 1. Plastic pollution breaks down to form microplastics which can find their way into various trophic levels with ease.

According to one estimate, plastic represents somewhere between 70% and 80% of all pollution in land and marine ecosystems.[1] This level of pollution is due in part to the fact that plastic does

[1] National Academies of Sciences, Engineering, and Medicine. 2022. *Reckoning with the U.S. Role in Global Ocean Plastic Waste.* Washington, DC: The National Academies Press. https://doi.org/10.17226/26132.

not biodegrade in the natural world. Instead, it only breaks into increasingly smaller particles called microplastics. As shown in Figure 1[2], these microplastics can then disperse themselves with ease across entire ecosystems.[3] The problem is so large that some academics have developed a new term to define our current epoch "the Plasticine," as the presence of microplastics can be used to determine the age of surrounding sedimentary deposits.[4]

The plastic industry sees no sign of slowing down either. One estimate of combined production and waste is expected to triple by 2060. What's more, it can be expected that much of the world's plastic usage can be attributed to the United States. The US consumes close to 20% of the world's plastic. Its per capita usage is the highest among any country with the average American using close to double the amount of plastic compared to someone living in the European Union.[5]

Plastic bags, the main subject of this research, are one of the most common forms of plastic in everyday life. Like any other plastic, they are derived from oil and other potentially harmful chemicals. There are various types of plastic polymers, but the main one used in retail plastic bags is called high-density polyethylene.[6] Before the 1970s, paper bags were the primary shopping bag given to customers. However, with the introduction of plastic bags stores could use a more cost-effective option for their bottom line while giving consumers a more convenient way

[2] Issac, M.N., Kandasubramanian, B. 2021. *Effect of microplastics in water and aquatic systems.* Environ Science and Pollution Research 28, 19544–19562. https://doi.org/10.1007/s11356-021-13184-2
[3] NOAA. 2023. *What are microplastics? https://oceanservice.noaa.gov/facts/microplastics.html*
[4] Center for International Environmental Law. 2019. *Plastic & Health: The Hidden Costs of a Plastic Planet. https://www.ciel.org/plasticandhealth/*
[5] Organization for Economic Co-operation and Development. 2022. *Global plastics outlook: Economic drivers, environmental impacts and policy options.* OECD Publishing. https://doi.org/10.1787/de747aef-en.
[6] Durak, Sevgi Güneş. 2016. *Investigation and Evaluation of the Effect to Environmental Pollution of Plastic Shopping Bags*. Türk Bilimsel Derlemeler Dergisi, no.2: 20-24.

to carry their items.[7] Within just a few decades, plastic bags represented over 60% of the shopping bag market while also becoming the face of a burgeoning pollution problem.[8]

Recovery and reuse of plastic retail bags is a complicated task for the solid waste industry in the US. Retail plastic bags are easily blown around by the wind as they are made up of an extremely lightweight polyethylene polymer. This allows them to scatter miles from their source. This type of pollution can create an immediate threat to an ecosystem. Animals may consume the bag by mistake. The bags can break down into microplastics in the soil or sources of bodies of water releasing potentially toxic compounds into agricultural products and drinking water systems. Microplastics have been found in every corner of the earth.[9] Eventually, these microplastics can make their way into the body through the consumption of polluted food and water. Depending on the diet, a person can consume around 39,000–52,000 microplastic particles every year.[10]

Compounding this issue is the fact that retail plastic bags cannot be recycled through the normal municipal recycling streams. If allowed into the recycling process, they often jam machines, blow all through the facility, and create safety issues for the staff. As a result, facilities often need to stop the entire recycling process just to remove the plastic bags. This means that even if placed in a recycling bin, the bags will nonetheless make their way to a landfill.[11] Once in a landfill, plastic bags may take up to 1,000 years to completely decompose depending on the

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[7] Bell, L., Todoran, G.S. 2022. *Plastic bag legislation in the United States: influential factors on its creation. J Environ Stud Sci* 12, 260–271. https://doi.org/10.1007/s13412-021-00736-8

[8] Petroski, Henry. *"The Evolution of the Grocery Bag."* The American Scholar 72, no. 4 (2003): 99–111. http://www.jstor.org/stable/41221195.

[9] Zhang, Y et al. 2016. *Environmental Health Perspectives: In utero exposure to endocrine disruptors: review of global status and prospects with a focus on China*. Environmental Health Perspectives 124, 11. https://doi.org/10.1021/envhealth.3c00052.

[10] Center for International Environmental Law. 2019.

[11] Huun, Kate. 2022. *Issues with plastic bags and the ripple effect.* University of Colorado Boulder. https://www.colorado.edu/ecenter/2022/02/23/issues-plastic-bags-and-ripple-effect

surrounding conditions.[12] As they break down, like any other form of waste, plastic bags release greenhouse gasses like carbon dioxide, methane, and the carcinogenic gas ethylene.[13] Retail plastic bags can also be incinerated instead of landfilled – up to 12% of plastic bags are already disposed of in this manner. However, this waste management process also emits harmful pollutants like greenhouse gasses, dioxins, mercury, and polychlorinated biphenyls.[14] This widespread pollution does not stop at landfills; the pervasive nature of plastic bags extends their detrimental effects to aquatic ecosystems, further endangering marine life and water quality.

For decades, China served as a primary destination for a substantial portion of the world's recycling waste, driven by its demand for plastic goods. In 2018, according to the EPA, the US exported 292.4 million tons of waste, yet only 94 million tons underwent the recycling process.[15] Many of the materials exported for recycling were contaminated by non-recyclables, leading to pervasive environmental pollution, promoting the implementation of the "National Sword" policy by China. This aimed to enhance regulations on waste trafficking of recyclable materials and restrict the importation of contaminated waste. Despite these measures, western countries continue to export over 1 million tons of plastic annually to nations in Southeast Asia, South Asia, and Africa.[16] These regions share common characteristics such as limited environmental regulations and cheap labor. A significant portion of the waste imported to these regions proves

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[12] Nace, T. 2019. *Here's a list of every city in the US to ban plastic bags, will your city be next?* Forbes. https://www.forbes.com/sites/trevornace/2018/09/20/heres-a-list-of-every-city-in-the-us-to-ban-plastic-bags-will-your-city-be-next/?sh=285646563243

[13] Daniel, H., Moehlig, M., Schumann, S., Meinert, J., & Solms, J. 2018. *The potential for food protein-derived peptides to act as co-agonists of the SGLT1 transporter.* PLOS ONE 13, 7. https://doi.org/10.1371/journal.pone.0200574

[14] Liu, C., Zheng, D., Li, L., & Xu, L. 2016. *Biological activities and potential health benefits of polysaccharides isolated from Lycium barbarum L.* Trends in Food Science & Technology 54. https://www.sciencedirect.com/science/article/pii/S187802961630158X

[15] US EPA. 2023. *Frequent Questions regarding EPA's Facts and Figures about Materials, Waste and Recycling*. The United States Environmental Protection Agency. https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/

[16] McCormick, E., et al, (2019). *Where does your plastic go? global investigation reveals america's Dirty Secret*. The Guardian. https://www.theguardian.com/us-news/2019/jun/17/recycled-plastic-america-global-crisis

unsuitable for recycling, exacerbating environmental pollution. Prior to the ban, Stamford, CT generated $95,000 in revenue from the sale of recyclables. While in 2018, incurred expenses of $700,000 for the removal of plastic waste.[17] Many cities across the US find themselves financially strained, unable to afford the costs associated with overseas shipment, resulting in cutbacks in recycling programs nationwide. The illicit trade of waste generates approximately $10-12 billion annually worldwide.[18]

3.2 *Plastic Pollution in Aquatic Ecosystems*

Retail plastic bags pose a significant threat to aquatic biodiversity. As previously mentioned, fish, birds, and other wildlife often ingest plastic debris, mistaking it for food. This can lead to internal injuries, digestive issues, and, in some cases, starvation due to the ingestion of non-nutritive material.[19] The accumulation of plastic bags and other plastic debris in rivers can also adversely affect water quality. As plastics break down into microplastics, they release harmful chemicals, such as bisphenol A and phthalates, into the water. These chemicals can disrupt endocrine systems in both wildlife and humans, leading to a host of health problems.[20]

The Anacostia River has been significantly impacted by plastic pollution. Retail plastic bags are among the most common types of debris collected during clean-up efforts along the river.[21] These bags not only mar the natural beauty of the river but also contribute to the

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[17] Cho, R. (2020). *Recycling in the U.S. is broken. how do we fix it?*. State of the Planet. https://news.climate.columbia.edu/2020/03/13/fix-recycling-america/

[18] *Illegal waste trade: What's driving this multi-billion dollar transnational crime and what could stop it?* Basel Institute on Governance. (2021). https://baselgovernance.org/news/illegal-waste-trade-whats-driving-multi-billion-dollar-transnational-crime-and-what-could-stop

[19] Center for International Environmental Law. 2019.

[20] Environmental Protection Agency. *Learn About Aquatic Trash.* 2023. https://www.epa.gov/trash-free-waters/learn-about-aquatic-trash

[21] Moyer, Justin. 2023 *Microplastics were found in the D.C. rivers. Researchers want to find why*. https://www.washingtonpost.com/dc-md-va/2023/11/27/dc-microplastics-anacostia-potomac-river-research/.

degradation of its ecosystems. The aesthetic degradation wrought by plastic pollution in the Anacostia River, not only ruins these natural landscapes but also undermines their cultural and recreational value. The Anacostia River, once teeming with biodiversity and serving as a cornerstone for community recreation and cultural heritage, now suffers from a visual plastic blight.[22] This pollution detracts from the inherent beauty that aquatic ecosystems are meant to offer, impacting community well-being and local economies. The Anacostia River's struggle with plastic retail bag waste exemplifies the broader economic risks associated with future plastic use, as polluted rivers can dissuade tourism and recreational activities, key economic drivers for many river-adjacent communities.[23]

The pollution of rivers by plastics, particularly plastic bags, has far-reaching effects on water quality, aquatic life, and biodiversity. The Anacostia River serves as a poignant example of how urban waterways are particularly vulnerable to this type of pollution. Addressing this issue requires a multifaceted approach that includes policy changes, public education, and improvements in waste management infrastructure. By focusing on these areas, it is possible to mitigate the impacts of plastic pollution on rivers and ensure the health and sustainability of these vital ecosystems.

3.3 *The Role of Private Industry in Plastic Bag Pollution*

The US retail industry is one of the largest consumers of single-use plastic bags. In California alone, retailers distribute more than 19 billion plastic bags annually.[24] The retail sector

[22] Basu, Rebecca. 2023. *Researchers Investigate Microplastics in D.C.'s Waterways.* https://www.american.edu/media/news/20230920_microplastics-pollution.cfm.
[23] Muposhi, Asphat, Mercy Mpinganjira, and Marius Wait. National Library of Medicine. 2021. *Considerations, Benefits and Unintended Consequences of Banning Plastic Shopping Bags for Environmental Sustainability: A Systematic Literature Review*. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8847762/.
[24] Keep California Beautiful. n.d. *The Basics on Plastic Grocery and Retail Bag Source Reduction and Recycling Opportunities* http://dpw.lacounty.gov/epd/PlasticBags/pdf/KCB_PlasticGroceryRetailBagFactSheet.pdf

in DC is foundational for the District's economy. Over 125k jobs, accounting for 14% of all jobs, are supported by retail with an $11.7 billion annual impact on the city's GDP.[25] As plastic bag fees and bans are scaled up and expanded, governments may find that small and independent businesses are unable to competitively raise prices to offset the cost increase and remain competitive.

Some retailers began implementing plastic bag bans and fees without a government mandate. In 2023, Target began automatically charging a one-dollar fee for every ten plastic bags used when customers place a drive-up or pickup order, and an adjusted amount if customers use fewer than ten bags.[26] At the beginning of 2024, supermarket chain Aldi announced they were banning plastic bags from all of their more than 2,300 US stores, requiring shoppers to bring a reusable bag or purchase a store-brand reusable bag.[27] This made Aldi the first major US retailer to eliminate plastic bag usage.

The Consortium to Reinvent the Retail Bag has implemented several pilot programs with multiple retailers such as CVS Health, Target, Dick's Sporting Goods, Dollar General, Kroger, TJX, and Ulta Beauty to reduce the usage of plastic bags.[28] The pilot programs started with 150 national and local shops to reduce the use of plastic bags or adopt bag reuse. They focused on two main pilot programs named Returnable Bag.

The initiative took place in two cities Denver, Colorado, and Tucson, Arizona. This program encouraged customers to create habits of bringing their own bags to shop.[29]

[25] National Retail Federation. 2020. *District of Columbia Retail by the Numbers*. NRF. https://nrf.com/retails-impact/district-columbia
[26] Altman-Devilbiss, A. 2023. *Target begins charging plastic bag fee for drive-up, pickup orders*. WPDE. https://wpde.com/news/local/target-begins-charging-plastic-bag-fee-for-drive-up-pickup-orders
[27] Brieskorn, K., & Bink, A. 2024. *Aldi eliminates plastic shopping bags in US stores*. The Hill. https://thehill.com/changing-america/sustainability/environment/4412204-aldi-eliminates-plastic-shopping-bags-in-us-stores/
[28] Closed Loop Partners. 2023.*Beyond the Bag.* https://www.closedlooppartners.com/beyond-the-bag/
[29] Closed Loop Partners. 2023. *Bring your own bag pilot*. https://www.closedlooppartners.com/beyond-the-bag/byo/

Participating retailers placed key points throughout the store reminding customers to bring their own bags. Additionally, through other marketing strategies such as public messaging in public spaces and social media, shoppers were reminded to bring their preowned bags. These initiatives were taken to encourage and remind shoppers to bring reusable bags. In addition to plastic reduction, another goal of the Bring Your Own Bag initiative is to understand how well collective retail action can influence a reduction in single-use plastic utilization.

The Consortium's Returnable Bag Pilot provides customers who forget to bring their bag with the option to acquire a reusable bag during their point of sale, accompanied by a deposit of $1. The next time customers come to the store, they may bring back the previously borrowed bag and receive their deposit back.[30] The bags are then redistributed to another customer. The two pilot programs envision a scenario wherein the concurrent implementation of strategies effectively mitigates the use of single-use plastics.

3.4 What DC Has Done to Reduce Retail Plastic Bag Pollution

In 2008, the District of Columbia commissioned a report to assess the types of pollution present in the Anacostia River. This study found that plastic bags were one of the most common trash items found in the river.[31] In response to this, DC passed the Anacostia River Clean Up and Protection Act of 2009, commonly known as the "Bag Law". This law took effect on September 23rd, 2009, and it requires businesses that sell food or alcohol to charge a 5-cent fee per bag for paper or plastic bags distributed during a purchase. Fee collection began on January 1st, 2010, and the revenue goes towards the Anacostia River Clean Up and Protection Fund. The fund is used to support watershed protection and clean-up efforts.[32] However, even with this law, the

[30] Closed Loop Partners. 2023. *Returnable bag pilot*. https://www.closedlooppartners.com/beyond-the-bag/returnablebag /
[31] Department of Energy and Environment. 2008. *Anacostia River Trash Study.* https://doee.dc.gov/node/10252
[32] Department of Energy and Environment. 2023. *Purpose and Impact of the Bag Law*. https://doee.dc.gov/service/purpose-and-impact-bag-law

environmental threat from retail plastic bag pollution in the Anacostia River has not been eliminated.

Significantly, the Anacostia River was mandated to have multiple total maximum daily loads (TMDL) under the Clean Water Act, Section 303(d) because it was not meeting water quality standards. There are TMDLs for suspended solids, bacteria (specifically e.coli), organics and metals, and oil and grease.[33] In 2010, the Maryland Department of the Environment and the DC Department of Energy and Environment (DOEE) submitted a TMDL report to the EPA to bring the Anacostia watershed into attainment. This report splits the Anacostia into upper and lower portions, with TMDLs of 484.7 lbs/day removed and 180.3 lbs/day removed, respectively.[34] The EPA approved this plan which guides DC's efforts towards plastic reduction in the Anacostia.

In February 2024, multiple DC government agencies, led by the Department of Public Works, published the Zero Waste DC plan to divert 80% of the waste stream from landfills. One specific goal of Zero Waste DC is the phasing out of single-use plastics, including plastic bags, by 2025.[35] Through the publication of this plan, it is clear that DC is continuing to address plastic pollution, including plastic bag pollution, and is prepared to make significant investments into achieving these goals. It is important, therefore, that DC invests in methods that will be effective towards this end.

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[33] Department of Energy and Environment. n.d. *Total Maximum Daily Load (TMDL) documents*. https://doee.dc.gov/node/29002.
[34] Department of Energy and Environment. 2010. *Anacostia Watershed Trash TMDL*. https://doee.dc.gov/publication/anacostia-watershed-trash-tmdl
[35] Zero Waste DC. 2024. *Zero Waste DC Plan*. https://zerowaste.dc.gov/zwdcplan#:~:text=The%20Zero%20Waste%20DC%20Plan,effective%2C%20sustainable%20solid%20waste%20management.

The Anacostia River in Washington DC, serves as a poignant example of how urban waterways are particularly vulnerable to plastic pollution. As an urban river, the Anacostia is continually receiving new pollutants from stormwater runoff, illegal dumping, and littering. Effective management strategies need to focus not only on reducing the use of plastic bags but also on improving waste management practices and public awareness to prevent plastic pollution from reaching the river in the first place.

3.5 What Other Cities Have Done to Reduce Retail Plastic Bag Pollution

Cities around the country are moving towards banning or charging for single-use plastic bags because of the destructive environmental impact. Two of the most common methods to reduce plastic bag use and therefore pollution is through banning plastic bags altogether, or a bag fee like that of Washington DC. A third method is a ban and a fee that does not apply to individuals utilizing food assistance programs.

The method of implementing only a ban on plastic bags without mandating a fee for other retail bags is not widely adopted among cities addressing plastic bag pollution; generally, a city will also charge a fee per bag for paper, reusable, or biodegradable bags available at checkout. Nearby to DC, however, Takoma Park, Maryland banned single-use plastic bags at the point of sale in 2016. The city does not mandate a fee for paper or biodegradable bags provided at checkout. However, if businesses would like to charge for these bags, they may.[36] Environment America found that plastic bag bans can reduce up to 300 plastic bags per person, per year.[37]

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[36] City of Takoma Park. 2016. Plastic bag ban. https://takomaparkmd.gov/government/housing-and-community-development/code-enforcement/plastic-bag-ban/.

[37] Meiffren-Swango, C. 2024. *Good news: Bag bans are reducing billions of single-use plastic bags. Environment America.* https://environmentamerica.org/articles/good-news-bag-bans-are-reducing-billions-of-single-use-plastic-bags/#:~:text=A%20recent%20report%20found%20that,and%20associated%20litter%20and%20pollution .

A bag fee is considered the most cost-effective, with the consumer cost per kg of plastic estimated to be between 4 and 9 cents.[38] This also allows the fee-collecting government to raise revenue that can be put towards any number of uses. By far the most popular method to approach plastic bag pollution is for cities to institute a ban on single-use plastic bags in combination with a fee on any other (paper, reusable, or biodegradable) bag given to consumers at the register. Seattle, Washington currently bans single-use plastic bags and charges an 8-cent fee for any other retail bag. There, single-use plastic carryout bags are prohibited in all food service businesses, including retail and grocery stores, restaurants, takeout establishments, festivals, and markets. Businesses are permitted to have single-use paper bags as long as they are charged 8 cents per bag and made from at least 40% recycled material.

Additionally, thick, reusable plastic bags are permitted, as long as they are also charged 8 cents per bag. This has resulted in a 78% reduction in plastic bag use.[39] Baltimore County, Maryland became one of the more recent urban areas to address plastic bag pollution. In November 2023, it banned most stores and restaurants from giving customers plastic bags.[40] There are some exemptions to the ban; small businesses may still provide plastic bags to customers. These stores must operate solely in Baltimore County or adjoining jurisdictions, have

[38] Nikiema, J., & Asiedu, Z. 2022. *A review of the cost and effectiveness of solutions to address plastic pollution. Environmental Science and Pollution Research*, *29*(17), 24547–24573. https://doi.org/10.1007/s11356-021-18038-5
[39] City of Seattle. 2021. *Washington State bag Requirements - Utilities.* https://www.seattle.gov/utilities/protecting-our-environment/sustainability-tips/waste-prevention/at-work/bag-requirements.
[40] Hunter, J. 2023. *Baltimore County's plastic bag ban is now in effect*. WMAR 2 News Baltimore. https://www.wmar2news.com/homepage-showcase/baltimore-countys-plastic-bag-ban-is-now-in-effect#:~:text=Restaurants%20and%20stores%20are%20no,or%20fewer%20locations%2C%20are%20exempt

three or fewer locations, and may not be part of a franchise corporation, corporate control group, or partnership with physical locations outside of Baltimore County and adjoining jurisdictions.[41]

The first city in the US to institute a ban on plastic bags was San Francisco, California. San Francisco banned plastic bags in 2007 and instituted a 25-cent fee per bag provided at checkout. These bags can be paper, reusable, or biodegradable. The 25-cent charge is one of the highest in the country and was raised in 2020 from the original price of 10 cents. This fee, however, does not apply to EBT, WIC, SNAP, or food stamp program transactions. As a result, there has been a reduction in plastic bag pollution of 72%.[42] Another city that has implemented a bag fee that excludes those who participate in state or federal food assistance programs is Boulder, Colorado. Boulder bans single-use bags in "large stores", but "small" stores defined as stores that operate solely in Colorado, have three or fewer locations, and are not part of a franchise, corporation, or partnerships with physical locations outside Colorado, are allowed to provide single-use plastic bags as long as they charge the 10-cent fee for each bag used. Boulder has seen a 70% decrease in the number of plastic bags used statewide as a result of this policy.[43]

The responses of other cities to plastic bag pollution will help inform our analysis of DC's current plastic bag fee.

4. Policy Analysis

4.1 Analysis Strategy

This project will use case study reviews and standard policy evaluation to determine the best way to approach plastic bag pollution in the Anacostia River. Additionally, the research

[41] Baltimore County. 2023. *Bring your own bag law*. https://www.baltimorecountymd.gov/departments/pai/code-enforcement/bring-your-own-bag
[42] San Francisco Environment Department (SFE). 2020. *Checkout bag charge ordinance*. https://www.sfenvironment.org/checkout-bag-ordinance
[43] City of Boulder. 2024. *Disposable bag fee.* https://bouldercolorado.gov/services/disposable-bag-fee

team will review the plastic bag collection data provided by ARK and analyze it for trends in the collection of plastic bags from the Anacostia River. Possible new policy options for the District will be reviewed and scored based on a weighted matrix to determine the most viable way to address plastic bag pollution. The policy options considered will be pulled from the case studies being evaluated in this report. Cities generally use either a full plastic bag ban, charge a fee for the use of store-provided bags, or elect to use a combination of the two. The scoring matrix will rank each policy alternative based on its performance towards the priorities of Equity, Feasibility, Cost, and Effectiveness to score potential policy solutions.

4.2 Possible Limitations

Although the team has a thorough data collection plan, there are some limitations to the evaluation design which include, but are not limited to a lack of comprehensive demographic data, policy recency, spatial and temporal variability, and conflicting information.

Policy recency could be a limitation as it may be difficult to glean the results from our evaluations of new policies enacted by other bodies to make a policy recommendation to ARK. If the District implements any changes to current bag pollution policies, a similar time lag may occur between its implementation and clear signs of pollution reduction. While this limitation will not influence the proceeding analysis, it is something that should be understood by all relevant stakeholders. As a result, any policy change should be given enough time and support to show its ability to affect positive change.

Spatial and temporal variability could be a limitation because plastic bag pollution levels can vary spatially (Maryland vs. DC) and temporally due to factors like river flow, weather conditions, and differing levels of human activity.

Conflicting information could be a possible limitation because although there is a wealth of information regarding plastic bag pollution, the effectiveness of potential solutions varies from state to state, and even city to city.

5. Analyzing DC's Existing Bag Fee

In January 2010, the Bag Law made Washington DC the first in the nation to collect a fee at the point of sale for single-use retail bags. The Bag Law also created the Anacostia River Clean Up and Protection Fund (Bag Fund) to collect the fee levied on every retail plastic bag. Voluntary tax contributions, Anacostia River commemorative license plate sales, interest, and enforcement actions against companies also generate revenue for the Bag Fund. However, the fee represents the largest source of revenue for the bag fund, generating over 94% of the total available funds. Figure 2 shows the total amount of revenue generated for the Bag Fund has totaled $28,819,013.20.[44]

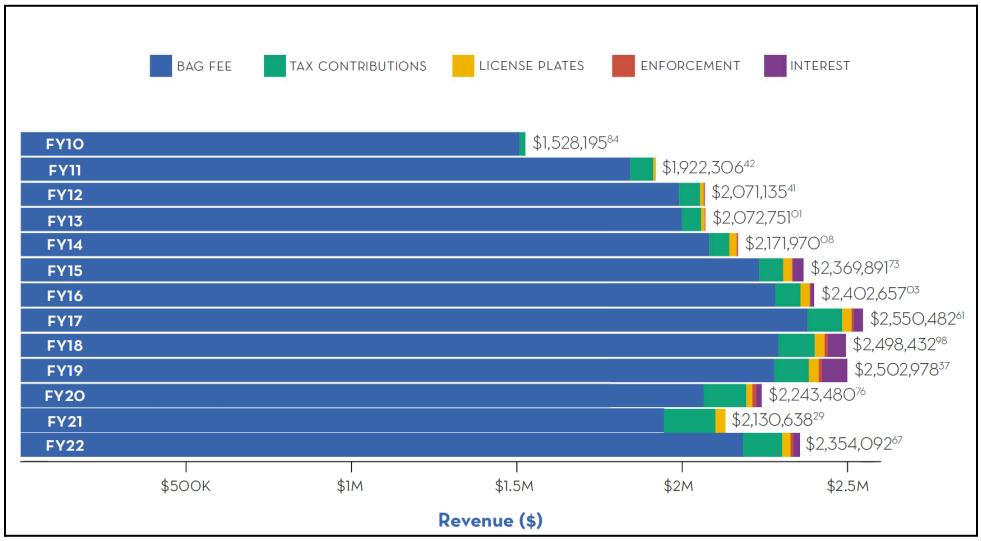

Figure 2. Bag Fund revenue by source from FY10-FY22.

[44] Department of Energy and Environment. 2022. *Anacostia River Cleanup and Protection Fund FY 22 Summary Report.* https://doee.dc.gov/sites/default/files/dc/sites/doee/publication/attachments/FY22%20Bag%20Law%20Report%20.pdf

5.1 Pollution Reduction Effectiveness

In the initial years after the passage of the Bag Law, retail plastic bags entering the Anacostia River were significantly reduced. Two studies were commissioned to assess the efficacy of the law in 2010 and 2013. Both found that single-use plastic bag usage was down dramatically. Specifically, the more recent 2013 study found that 80% of residents were carrying reusable bags to the stores and using fewer bags, generally. Further, the study claimed that District residents had reduced the number of retail plastic bags by 60%.[45] Additionally, since the Bag Law took effect, there has been a 72% reduction in plastic bags being found during river cleanups.[46]

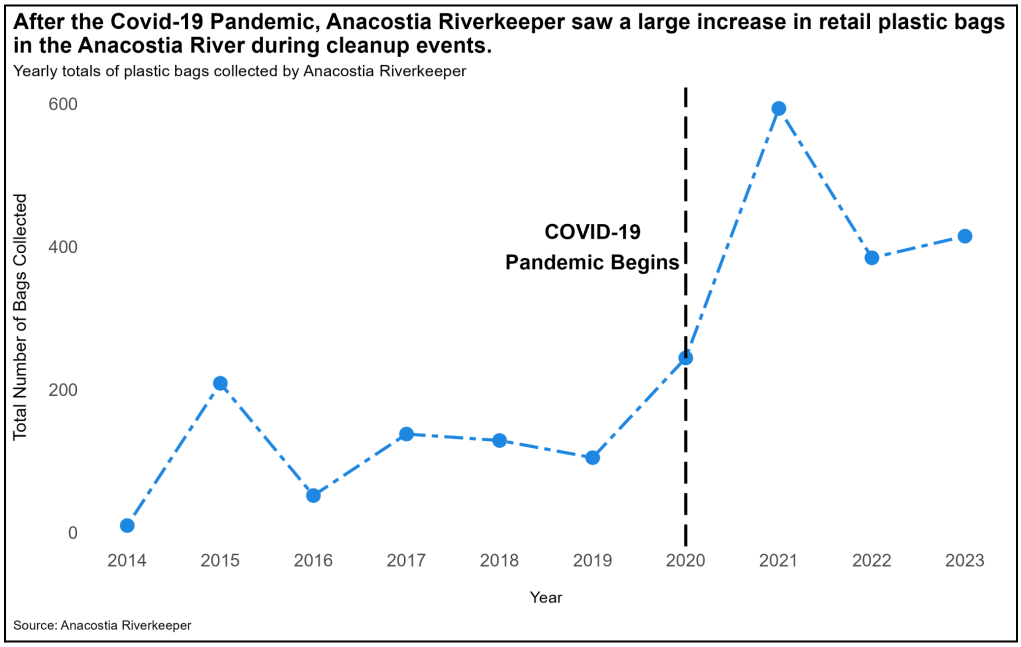

Figure 3. Total number of bags collected by Anacostia Riverkeeper, 2014-2023.

However, much of this success was erased after the start of the COVID-19 Pandemic. Through data provided by ARK[47] shown in Figure 3, the pandemic marked the beginning of multiple years of increasing bag pollution without a return to pre-pandemic levels. From this dramatic increase, ARK began to explore what a more successful policy might look like to eliminate plastic bag pollution from the Anacostia River.

[45] Department of Energy and Environment. N.D. *Skip the Bag, Save the River.* https://doee.dc.gov/node/21442
[46] Alice Ferguson Foundation. 2024. *Alice Ferguson Foundation*. https://www.fergusonfoundation.org/
[47] Anacostia River Keeper. 2024. *Event Litter Breakdown - Lifetime Stats*. Internal Data Only.

5.2 Revenue Generation of Bag Fee

The money held in the Bag Fund is diverted to several programs across the district representing the 7 priority areas shown in Figure 4.[48] These programs are a mixture of projects run by the DC government and grants issued to non-profits and other organizations to support these priorities. It should be noted that the Client of this report, Anacostia Riverkeeper receives funding from the bag fund. The Bag Fund provides funds for the Anacostia Rivers Explorers program which offers free tours primarily to District residents, but open to all. These tours provide education on the history of the Anacostia River, threats to the River's water quality, and what work is being done to give the river a healthier future. In 2022, 3,005 people took part in a river tour [49] and Anacostia Riverkeeper received a total of $106,000 for tours and other Anacostia River clean-up activities.[50]

Green Infrastructure	Installations on public and private property that use vegetation and other techniques to reduce stormwater runoff by mimicking the natural water cycle
Watershed Education and Access	Initiatives to educate students and broader community members about the District's watersheds and efforts to ensure equitable access to educational, recreational, and vocational opportunities
Trash Capture and Monitoring	Programs and installations designed to remove trash from District communities and rivers, as well as research and monitoring of plastics and other pollutants
Stream Restoration and Wildlife Conservation	Projects that improve and restore the health of District waterbodies to enhance streams, wildlife habitat, and the aquatic ecosystem
Outreach and Reusable Bag Distribution	Purchase and donation of reusable bags to District residents and organizations as well as other community-supported efforts
Enforcement and Fee Collection	Programs and personnel responsible for implementing and enforcing the Bag Fee and Bag Fund requirements
Program Administration	Costs related to maintenance and administration of the Bag Fee program and Bag Fund

Figure 4. The 7 priorities supported by the Bag Fund.

Other programs funded by the Bag Fund include the installation of trash traps in the River, wildlife rehabilitation, pollution prevention at mechanic and autobody shops, and DOEE's collection of RiverSmart programs. The RiverSmart programs address stormwater runoff at three

[48] Code of the District of Columbia. § 8–102.05. Establishment of the Anacostia River Clean Up and Protection Fund.
[49] Department of Energy and Environment. 2022.
[50] Quinn Molner. E-mail message to authors. April 23, 2024.

different levels: the amount of permeable pavement on residential properties, green rooftops, and green infrastructure within communities.[51]

The programs funded by the Bag Fund do not just support important ecological projects within the District, they also advance crucial environmental justice initiatives for residents. Looking at the communities that surround the Anacostia River in Figure 5, nearly every single census tract is rated as "disadvantaged" by the Climate and Economic Justice Screening Tool.[52] This tool analyzes US census tracts on various environmental and social factors and assigns the "disadvantaged" rating if a census tract meets certain criteria. What's more, another environmental justice tool, the Climate Vulnerability Index, identifies these same surrounding census tracts as being extremely vulnerable to river line flooding, sea level rise, and socioeconomic stressors like education levels and poverty.[53]

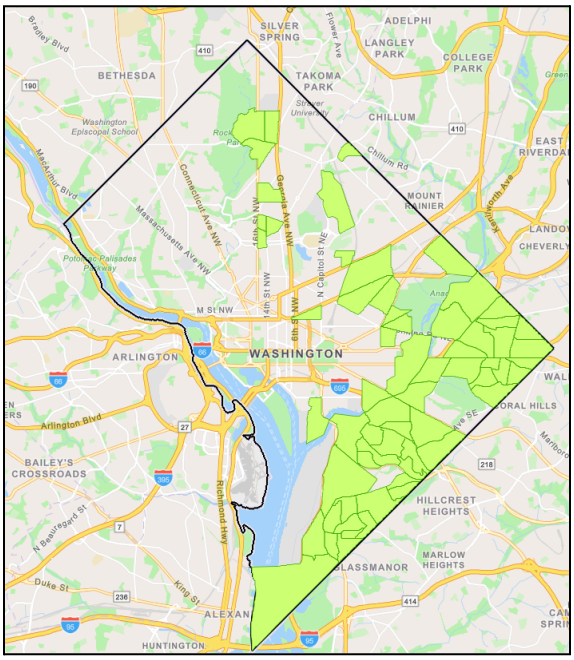

Figure 5. Disadvantaged locations in DC.
Data: Climate and Economic Justice Screening Tool

One such program the Bag Fund supports is DOEE's Green Zone Environmental Program (GZEP). GZEP is a summer program that offers environmental education and job training opportunities to District youth. They interact daily with environmental professionals and learn hands-on skills that can directly lead to entry-level green economy jobs.[54] Lastly, DOEE

[51] Department of Energy and Environment. 2022.
[52] US EPA. (n.d.). *Climate and Economic Justice Screening Tool*. https://screeningtool.geoplatform.gov/en/#11.71/38.9034/-76.9814
[53] Environmental Defense Fund. 2024. *Climate Vulnerability Index*. https://climatevulnerabilityindex.org/
[54] Department of Energy and Environment. 2024. *Green Zone Environmental Program GZEP.* https://doee.dc.gov/summer

uses the Bag Fund to support an open-ended grant that creates community-oriented solutions to issues facing the Anacostia River. In 2022, DOEE issued over $300,000 to 12 programs,[55] as seen in Figure 6, with all the projects occurring in or very near a "disadvantaged" census tract.

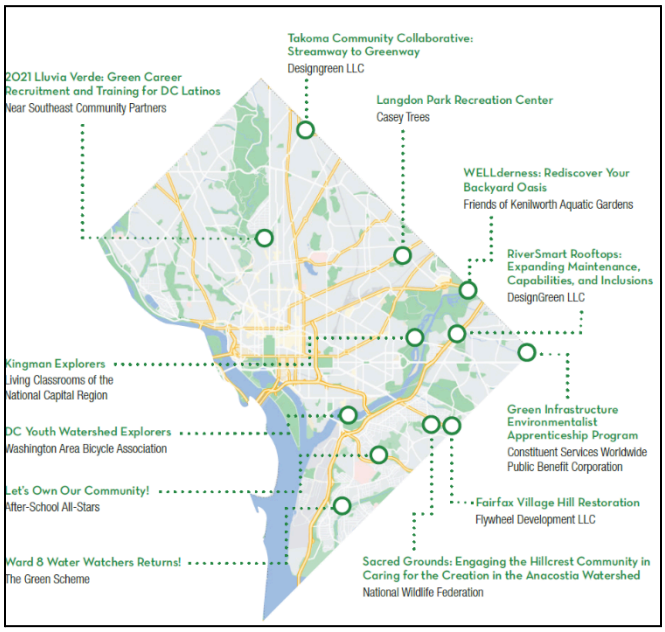

Figure 6. Location of 12 community grant projects funded with Bag Fund FY22 funds.

6. Policy Alternatives

6.1 Policy Alternative #1: Status Quo

In this policy option, Washington DC will make no additional policy change to managing plastic bag pollution in the Anacostia River. The District will continue to enforce a 5-cent fee for single-use carryout bags at retail and food-serving businesses. Under this policy, single-use plastics will continue to exist and may continue to increase without policy intervention.

[55] Department of Energy and Environment. 2022.

6.2 Policy Alternative #2: Increase Bag Fee to 10 Cents with a Carveout for Nutrition Assistance Recipients

In this policy option, the District would increase the current bag fee from 5 to 10 cents, with the stipulation that residents who utilize social programs including the Supplemental Nutrition Assistance Program (SNAP), the SNAP for Women, Infants and Children (WIC) and Temporary Assistance for Needy Families (TANF). The USDA, which administers SNAP benefits, does not allow the money to be spent on non-food items, so individuals and families that receive these benefits are not able to use them to pay for the bag fee. For this policy to be equitable, and not disproportionately impact low-income families, those who utilize social programs will be excluded from the fee. This is especially important under this policy, which would see the current fee on bags increase. In this program, the city would set a date to increase the fee and inform businesses not to charge the aforementioned population. Businesses not following the requirements of the policy will still be subject to fines for non-compliance.

6.3 Policy Alternative #3: Ban Plastic Bags

In this policy option, the District will ban retail plastic bags for all locations previously covered under the original bag fee. After the legislation has been enacted, businesses will be required to abide by the requirements of the bill, if they do not comply businesses will receive warnings and fines for non-compliance. It will be mandatory for shops to provide reusable bags for purchase or paper bags at no additional cost.

6.4 Policy Alternative #4: Ban Plastic Retail Bags, Charge 10 Cents for any Other Retail Bag with New Carveout for Nutrition Assistance Recipients

Under this policy, the District government would both ban single-use plastic bags and charge a fee for any other retail bag provided. This policy alternative would also exclude the fee charged to individuals and families using government nutritional assistance programs, such as SNAP, WIC, or TANF. This was discussed in more detail above, in policy option #2. Implementation of this policy would require the city to set a timeline for phasing out plastic bags. Businesses that violate the policy requirements will be charged a fine for non-compliance.

7. Criteria to Evaluate Policy Alternatives

The following section describes the criteria on which this policy analysis will evaluate the previously described policy alternatives. These include the relative weight each criterion has on the final score. The client chose the criteria and scoring weights based on their organizational priorities.

7.1 Criterion #1: Maximize Efficacy

This criterion is measured by the potential to reduce plastic bags in the Anacostia River. A policy would receive a one if it will have little to no effect on retail plastic bag pollution, while a 5 will greatly reduce or eliminate plastic bag pollution.

7.2 Criterion #2: Maximize Equity

This criterion measures the overall effect on disadvantaged communities. Effects can include whether the policy would unfairly levy a fee on residents receiving public assistance, and

the extent that a proposed policy would reduce funding for the Bag Fund. A policy that receives a score of 1 will maximize inequity, while a policy that is scored a 5 will maximize equity.

7.3 Criterion #3: Minimize Cost to Relevant Stakeholders

This criterion measures each policy option's overall cost to relevant stakeholders in dollars. A cost increase to stakeholders is usually in the form of an additional charge on the price of a plastic bag alternative. Relevant industry stakeholders include retailers and shoppers. This criterion is measured on a scale from one to five, with one meaning there is a high cost to retailers and customers and five meaning no additional costs.

7.4 Criterion #4: Maximize Administrative Feasibility

The administrative feasibility of a policy alternative measures the likelihood that the policy can be implemented by the District government. A policy that receives a score of one is overly complex and requires too many resources and stakeholder cooperation, while a five demonstrates a policy option that will require minimum new effort from the government to enact and enforce.

8. Outcome Projection and Scoring

Each policy will now receive a score from one (lowest) to five (highest) based on how effective the policy meets the definition of each criterion. From these scores, a weighted sum will be generated based on the individual weighting the client scored each criterion. The policy alternative with the highest weighted sum will be deemed the most effective policy to pursue.

8.1 Business as Usual (BAU) | Weighted Score: 2.9

Efficacy: 3

Before the COVID-19 Pandemic, retail plastic bag pollution in the Anacostia River was largely under control, according to the previously mentioned data provided by Anacostia Riverkeeper. However, it remains to be seen if the District can return to these pollution levels soon without new policy tools. The pandemic dramatically affected how people view single-use plastic bags and expecting them to make new efforts against plastic pollution may not be possible without action.[56] District Government can leverage other sources of funding or government programs to put the issue of plastic pollution back on the radar of residents. However, this will require time and money that could be devoted to other similarly worthwhile environmental issues within the District. For these reasons, the Business as Usual policy alternative receives a score of 3.

Equity: 1

Currently, no carveout exists for residents who receive financial assistance to avoid the 5-cent bag fee. This creates an environment where, while all residents experience an equal financial cost of the current policy, the financial burden is inequitably distributed. Though it may appear small, fair and just policies should not create such a burden. Similarly, the District has seen the post-COVID increase in plastic bag pollution under this policy resulting in more pollution within environmental justice communities along the Anacostia River. Finally, without an increase in the amount of revenue being generated for conservation programs, this policy option does not create any additional support for clean waterways in the District. Because of this BAU receives a score of 1.

[56] Calma, Justine. 2020. *Plastic Bags Are Making a Comeback Because of COVID-19.* The Verge. https://www.theverge.com/2020/4/2/21204094/plastic-bag-ban-reusable-grocery-coronavirus-covid-19.

Cost: 5

Under the BAU policy alternative, there would not be any additional costs imposed on the District government to implement the policy. DOEE already employs staff to maintain enforcement. Therefore, BAU scores a 5.

Feasibility:5

Since this policy is already enacted, nothing more is needed to implement it. Therefore this policy receives a 5.

8.2 Increase Bag Fee to 10 Cents with a Carveout for Financial Assistance Recipients | Weighted Score:3.7

Efficacy:4

Increasing the bag fee could potentially reduce the use of plastic bags further by making the financial disincentive stronger. This adjustment might encourage broader compliance and reduce plastic bag pollution significantly. Therefore, efficacy receives a 4.

Equity:4

Introducing a carveout for financial assistance recipients addresses the equity issue directly, making this policy more equitable than the current situation. It reduces the financial burden on lower-income residents while maintaining the disincentive for those who can afford to pay. The inclusion of a carveout for financial assistance recipients targets the policy's benefits and burdens more equitably. For these reasons, equity is scored as a 4.

Cost:3

While there are no significant new costs to implement the increased fee, the system to manage carveouts may require additional administrative effort, potentially introducing minimal new costs for managing exemptions. Cost receives a 3.

Feasibility:3.5

The policy builds on the existing system, making it relatively straightforward to implement with some modifications for the carveout. The existing infrastructure for collecting fees can be used with adjustments. Therefore, feasibility is scored as a 3.5.

8.3 Ban Plastic Retail Bags| Weighted Score: 3.8

Efficacy: 5

Completely banning plastic retail bags would drastically reduce pollution if effectively enforced. Given prior examples in other cities, a ban could significantly impact reducing plastic bag use. This approach directly removes a major source of environmental pollution, potentially leading to cleaner urban and aquatic environments, including significant waterways like the Anacostia River. The success observed in other jurisdictions that have implemented similar bans suggests a promising outcome for reducing visible litter and the long-term environmental impact associated with plastic degradation. Efficacy receives a 5.

Equity:3

Under this policy, the District would remove an inequitably applied fee on low-income residents. This outcome is undoubtedly good. However, important funding would also be removed from organizations that do important cleanup and educational work on the Anacostia River. With the vast majority of these areas viewed as environmental justice communities, important services that highlight the importance of the Anacostia to these communities and DC would no longer be able to continue. This policy receives a score of 3.

Cost:3.5

While there would not be any significant cost to enact this proposal, there would likely be additional costs due to enforcement of the ban. More staff members may be needed to ensure retailers comply with the new policy. This policy receives a score of 3.5.

Feasibility:4.5

Considering Mayor Bowser's approval of policies eliminating single-use plastics, as noted, political support for this measure seems plausible[57]. In 2013, the DC Department of Energy and Environment surveyed the 5-cent plastic bag fee on DC residents and businesses responsible for implementing the fee. The survey indicated customers would accept the fee and businesses overwhelmingly supported the fee if they received assistance from the District Government on public education.[58] The primary challenge lies in enforcement and ensuring compliance across all retailers. The feasibility of this policy hinges on the ability of local government agencies to effectively monitor and enforce compliance, which may require the development of new regulatory mechanisms or the strengthening of existing ones. Support from political leaders could facilitate the necessary resource allocation for enforcement activities and public awareness campaigns, making this ambitious environmental policy a realistic goal for the District. For these reasons, feasibility is scored at a 4.5.

8.4 Ban Plastic Retail Bags, Charge 10 Cents for any Other Retail Bag with New Carveout for Financial Assistance Recipients| Weighted Score: 4.0

Efficacy:5

[57] Zero Waste DC. 2024. *Zero Waste DC Plan*. https://zerowaste.dc.gov/zwdcplan#:~:text=The%20Zero%20Waste%20DC%20Plan,effective%2C%20sustainable%20solid%20waste%20management.
[58] DDOE. 2013. *DDOE/Alice Ferguson Foundation DC Resident and Business Bag Use Surveys.* https://doee.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/DDOE%202013%20Bag%20Law%20Survey%20Final%20Report%20(2).pdf

This combined approach targets the root cause—plastic bags—while also discouraging the overuse of alternative single-use bags through a fee. It's a comprehensive strategy that would significantly reduce overall bag consumption. By directly eliminating the source of a significant portion of plastic pollution and incentivizing consumers to switch to reusable options, this policy could lead to a marked decrease in the environmental impact of bag waste. Efficacy receives a score of 5.

Equity:4

This policy is designed to be equitable by exempting those who receive financial assistance from the bag fee, reducing the financial impact on lower-income individuals while still promoting environmental responsibility. The exemption acknowledges and addresses the disproportionate economic burden that such environmental policies can place on vulnerable populations, ensuring that efforts to clean up the Anacostia River do not come at the expense of equity and social justice. Therefore, equity receives a 4.

Cost:3

The cost of implementing this policy might be higher due to the need to enforce the ban and manage the carveout system for financial assistance recipients. However, the impact could justify the expenses. The initial investment in setting up and maintaining an effective enforcement mechanism, along with the administrative costs associated with managing exemptions, could be offset by long-term savings in waste management, environmental cleanup efforts, and improved public health outcomes resulting from cleaner urban environments. Therefore, cost receives a 3.

Feasibility:3.5

This policy is ambitious and combines elements of the other options. Implementation would require careful planning and could face resistance from retailers. However, the current political climate seems to support such measures, suggesting it could be feasible with enough public and political support.[59] The successful adoption of this policy hinges on clear communication of its benefits to all stakeholders, including retailers who may initially resist change. By highlighting the environmental and social advantages, as well as providing support to businesses during the transition, this policy could achieve significant improvements in reducing plastic bag pollution. Feasibility receives a score of 3.5

[59] Kanga, Zoe. *End Plastic Pollution: Leading Anti-Plastic Legislation in the U.S.*. *Earth Day*, 6 July 2022. https://www.earthday.org/end-plastic-pollution-leading-anti-plastic-legislation-in-the-us/

9. Criteria Alternative Matrix

Criteria Alternatives Matrix		Criteria				Weighted Score
		Efficacy	Equity	Cost	Feasibility	
Weight		25%	40%	20%	15%	100%
Policy Alternatives	Business as Usual	3	1	5	5	2.9
	Raise Fee to 10 Cents	4	4	3	3.5	3.7
	Ban	5	3	3.5	4.5	3.8
	Ban + 10 Cent Fee	5	4	3	3.5	**4.0**

10. Assessing Tradeoffs

Based on the scoring from the Criteria Alternatives Matrix, the Ban and 10-Cent Fee, with a carveout for those utilizing nutrition assistance programs, wins overall. This policy alternative scored highly because of its strong scores in both efficacy (4.5) and equity (4), which are the most important criteria, and have the greatest weights. The Ban and 10-Cent Fee scores lower in cost (3) and feasibility (3.5), though as these criteria are weighted lower, it still scores the highest overall.

Scoring just lower than the Ban and the 10-Cent Fee is Raising the Fee. This policy alternative scored the same as the Ban and 10-Cent Fee option in equity (4), but lower in efficacy (4). This alternative would also provide a carveout for those utilizing nutrition assistance programs. Raising the fee to ten cents is a good secondary policy alternative, as scoring highly in

equity is important to the client. However, because it would not be as effective as the ban plus the fee, it received fewer points than the policy option that we are recommending. The Business as Usual alternative scored the highest in both cost (5) and feasibility (5), though as these were the least important, and lowest weighted, criteria, it should not be considered a lucrative alternative. A ban without a fee scored as high in efficacy (4.5) as a Ban and 10-Cent Fee, though it scored lower in equity (3), and therefore is also not a viable alternative to fit the needs of the client.

11. Final Recommendation

As a result of this policy alternative analysis, the team concluded that implementing a plastic bag ban with a 10-cent fee for any other retail bag, with an included new carveout for nutrition assistance program recipients, will optimize the four chosen criteria. If enacted, this policy alternative will result in the largest reduction in plastic pollution entering the Anacostia River. Additionally, raising the fee on other retail bags will allow for continued funding of important conservation work across the District and within disadvantaged communities. To allow for an efficient implementation, the project team supports the creation of a 6-month grace period. This will allow businesses time to develop the necessary internal systems to comply with the law and source enough non-plastic retail bags for their customers.

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