

1                   **Plastic waste management strategies towards zero waste: status,**  
2                   **perspective and recommendation for Ethiopia**  
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8                   **Abstract**

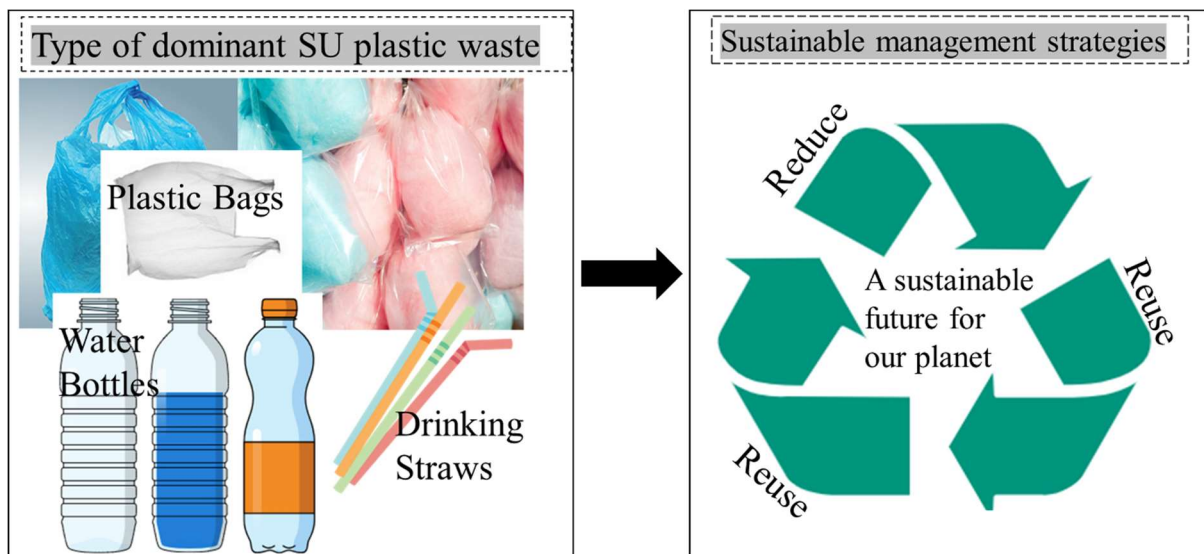
9                   Since 1979, plastic companies have significantly expanded their markets. Evidence suggests  
10                  that excessive plastic use in Ethiopia has exacerbated environmental pollution, contributing to  
11                  a "quadruple crisis" involving climate change, biodiversity loss, pollution, and public health  
12                  and economic impacts. To address this, the Ethiopian government needs to establish effective  
13                  plastic waste management strategies. Key future direction and recommendation include 1)  
14                  Developing and enforcing national strategies, including a ban on many single-use plastics, for  
15                  sustainable plastic waste management; 2) Adopting international best practices and policies to  
16                  move toward a zero-waste approach; 3) Investing in a circular economy and plastic waste  
17                  management systems; 4) Strengthening policies through comprehensive legislation and  
18                  extended producer responsibility frameworks; 5) Establishing a council to integrate scientific  
19                  research into policymaking; 6) Promoting green technologies and innovations, such as plastic  
20                  waste-to-energy and smart waste management; 7) Engaging in global efforts to monitor  
21                  hazardous chemicals in plastics and support transparency in a toxic-free circular economy to  
22                  ensure the public's right to information.  
23

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## 24 Graphical Abstract



25

26 **Impact statement**

27 The rise in single-use plastic waste has raised global concern due to its significant  
 28 environmental and health threats, prompting worldwide calls for zero-waste initiatives and  
 29 better management strategies. Preventing plastic pollution requires public awareness,  
 30 cooperation, and investment in research and policy. Sustainable strategies like reduction,  
 31 recycling, and reuse are key to minimizing its impact. Also, switching from conventional  
 32 plastic production and usage to alternative sustainable materials is encouraged to address  
 33 environmental crisis issues. Alternative sustainable materials should be further explored in  
 34 future research by advancing the science.

35 **Keywords:** Ethiopia; Single-use plastics, Pollution; 3Rs; Environmental sustainability

36 **Highlights**

- 37 ✓ The per capita consumption of plastics in Ethiopia has drastically increased.
- 38 ✓ The unprecedented increase in plastic consumption is an environmental challenge.
- 39 ✓ Ethiopia should implement at least a 3Rs plastics management strategy.
- 40 ✓ Bans on single-use plastics and strategic implementation of plastic waste management  
 41 are required.
- 42 ✓ Financing and citizen-science-based waste management practices can reduce this  
 43 problem.

44 **1. Introduction**

45 Plastic pollution is widely recognized as contributing to a triple planetary crisis: climate  
46 change, natural and biodiversity losses, and pollution and waste (Hellweg et al., 2023). Plastic  
47 pollution and climate change are closely linked throughout the plastic life cycle, from  
48 production to disposal. Most plastics are made from fossil fuels, and their extraction,  
49 refinement, and manufacturing require energy from carbon-intensive sources, leading to  
50 greenhouse gas emissions. Improper disposal, including landfills and incineration, further  
51 exacerbates climate change. Plastic pollution also harms natural carbon sinks like marine  
52 ecosystems and soils. As plastics degrade, especially in oceans and landfills, they release  
53 methane and ethylene, which contribute to global warming. In addition, a recent study has  
54 confirmed that plastic pollution can contribute to public health and economic crises. Trasande  
55 et al. (2024) reported that exposure to plastics containing endocrine-disrupting chemicals added  
56 an estimated \$249 billion to healthcare costs in the US in 2018 (Trasande et al., 2024). This  
57 finding underscores the potential economic and public health crisis linked to plastic pollution.  
58 Consequently, plastic pollution must be recognized as contributing to a "quadruple crisis." For  
59 example, climate change is not only an environmental issue but also has significant  
60 implications for the global economy, with its economic costs being staggering.

61 Plastic pollution includes microplastics, which can be categorized as primary, or secondary  
62 microplastic debris (Browne et al., 2010). Primary microplastics are intentionally  
63 manufactured for use in products like cosmetics and industrial abrasives. Secondary  
64 microplastics result from the degradation of larger plastic items, such as bottles and bags,  
65 breaking down into smaller fragments over time. This distinction is important for  
66 understanding the sources and impacts of microplastics on the environment and human health  
67 Regardless of their size, microplastics pose a greater risk than macroplastics by harming the  
68 environment and impacting more species, owing to their small size and high bioavailability  
69 (Kurniawan et al., 2021; Pettipas et al., 2016; Walker & Xanthos, 2018).

70 Plastic consumption in Ethiopia has been 0.044 million metric tons since 2007, but has  
71 drastically increased, reaching 0.308 million metric tons in 2020, a seven-fold increase  
72 (Statista, 2023). In addition, the Federal Democratic Republic of Ethiopia's Environmental  
73 Protection Agency (FDRE-EPA) reported that plastic imports increased from 86,000 to 386,000  
74 tons from 2007 to 2022, representing a 421% increase over 15 years (EEPA, 2024). Of these,  
75 58.2 % were packaging plastics out of all plastics imported. According to Euromap, Ethiopia's  
76 per capita consumption of plastics has grown exponentially from 0.6 kg in 2007 to 2.6 kg in  
77 2021. This increase has made Ethiopia the second-largest importer of plastic in East and Central

78 Africa, with an annual spending of 17 million Euros on plastic packaging imports (Seyoum,  
79 2023).

80 Quantitative plastic waste management strategies, such as the amounts of plastic that are  
81 recycled, reused, and incinerated, are critical for effective waste management in any country.  
82 However, in Ethiopia, there is a lack of clear information in most cities regarding the quantities  
83 of plastic waste that have been recycled or reused, as well as other management strategies, due  
84 to insufficient databases and information systems. Limited data is available for some major  
85 cities, including Hosanna, Addis Ababa, Bahir Dar, Hawassa, and Dire Dawa, where only 9%  
86 of all plastic waste is recycled and 12% is incinerated (EEPA, 2024). The remaining 79%  
87 accumulates through open dumping and ultimately ends up in the aquatic environment.  
88 Additionally, recycling single-use plastic polymers is challenging and problematic (Walker et  
89 al., 2024). In this regard, there are no clear policy guidelines on how collection and sorting  
90 strategies differentiate between thermoset and thermoplastic types, which makes recycling  
91 difficult and poses challenges for plastic management in Ethiopia. The current plastic waste  
92 management strategy in Ethiopia is inadequate, harming ecosystem services, threatening  
93 livelihoods and vulnerable communities, and posing significant environmental challenges.  
94 Plastic waste has already been observed in water bodies and on walkways (Fig. 1), as well as  
95 documented in the published literature. Numerous single-use plastics have been identified in  
96 aquatic environments. Studies have confirmed that Ethiopian aquatic environments such as  
97 Lake Ziway (Merga et al., 2020), Lake Hawassa (Jeevanandam et al., 2022), Lake Tana  
98 (Aragaw, 2021), (Aragaw et al., 2022), and urban environments (Gela & Aragaw, 2022) are  
99 highly polluted by single-use plastic waste.

100 In 2007, the Federal Democratic Republic of Ethiopia (FDRE) established policies for the  
101 management of solid waste (FDRE, 2007). Under Proclamation No. 62/1999 and 2007, the  
102 directive includes the following key policy content aimed at minimizing plastic pollution.  
103 These are: 1) ban on production and import: the directive specifically bans the production and  
104 importation of plastic bags with a thickness of less than 0.03 mm. This regulation targets thin  
105 plastic bags, which are more prone to littering and environmental pollution; 2) plastic waste  
106 reduction: the policy is designed to reduce the environmental impact of single-use plastics,  
107 particularly thin plastic bags that contribute significantly to plastic pollution in landfills, water  
108 bodies, and urban areas; 3) compliance and enforcement: the directive would require  
109 monitoring and enforcement to ensure that manufacturers, importers, and retailers comply with  
110 the ban on thin plastic bags, promoting the use of alternatives. These measures align with  
111 broader efforts to manage plastic waste and address its environmental impact by targeting

112 problematic products like thin plastic bags. However, this policy lacks details on plastic waste  
113 management strategies, roadmaps, and implementation, making it ineffective in progressing  
114 toward zero plastic waste. Additionally, regional environmental authorities have not yet been  
115 established in all parts of the country (Ketema et al., 2023), rendering the policy impractical.  
116 Under the existing policy (Proclamation No. 62/1999 and 2007), some non-governmental  
117 organizations have engaged in efforts to reduce and prevent plastic pollution, but the outcomes  
118 have not been fruitful. For example, the UNDP has provided baling machines to the Ministry  
119 of Urban and Infrastructure of Ethiopia to assist cities in managing plastic waste (UNDP, 2022).  
120 The UNDP provided thirteen baling machines to Ethiopia's Ministry of Urban and  
121 Infrastructure to assist in managing plastic waste. These machines were distributed to five  
122 major cities—Adama, Bahir Dar, Bishoftu, Dire Dawa, and Hawassa—where they compress  
123 plastic to one-third of its original volume, facilitating transport for waste collection businesses.  
124 Although the initiative aimed to combat plastic pollution and enhance business efficiency and  
125 income, it has not continued or been successful as planned.

126 Although there have been no updates to the plastic waste management policy from 2007 to  
127 2023, the FDRE-EPA has recently developed national policies and legal instruments for plastic  
128 waste management strategies (EEPA, 2024). This policy emphasizes the paramount importance  
129 of the 3Rs—reduce, reuse, and recycle—as a critical preventive philosophy to foster  
130 sustainable production and consumption of plastics. It also aligns with a climate-resilient green  
131 economy and promotes a green legacy. Effective plastic waste management can rely on industry  
132 stewardship, making the implementation of the 3Rs mandatory through initiatives that reduce  
133 plastic consumption and production. The policy stipulates that sustained measures should be  
134 taken to improve end-of-life plastic waste management, to recycle 25% of plastic waste.

135 Although plastic plays a vital role in the economy, particularly in developing countries like  
136 Ethiopia, there is growing international momentum to rethink its entire life cycle—from design  
137 to disposal—and to reduce plastic litter in the environment. This paper aims to provide an  
138 overview of plastic waste management strategies and offer recommendations for Ethiopia. It  
139 also discusses existing international and national policy instruments, as well as future  
140 directives, to serve as a foundation for developing policy documents to address plastic pollution  
141 in Ethiopia.





142

143 Figure. 1 Some photographic examples of plastic litter captured from Bahir Dar Shore of

144

144 Lake Tana-the largest Lake in Ethiopia: Photo credit-the present author

145

## 145 2. Policy instruments

146

146 Several African countries have implemented plastic waste management practices and policies

147

147 to tackle plastic pollution. For example, Kenya implemented one of the strictest plastic bag

148

148 bans in 2017, prohibiting the use, manufacture, and importation of plastic bags (UNEP, 2021).

149

149 The ban includes harsh penalties for violations. This policy instrument also includes public

150

150 awareness so that the country promotes waste segregation and plastic recycling through

151

151 initiatives and partnerships with private organizations and incentivization. Similarly, Rwanda

152

152 has been a leader in environmental protection, banning non-biodegradable plastic bags as early

153

153 as 2008. The country has strict enforcement, and it is often cited as one of Africa's cleanest

154

154 countries due to its commitment to waste management (GAIA, 2021). Rwanda promotes

155

155 alternatives to plastics and supports eco-friendly products like paper bags with financial

156

156 support. Furthermore, many of the developed countries have implemented plastic waste

157

157 management policy instruments. For example, France banned plastic bags in 2016 and has

158

158 extended bans to single-use plastic items like straws, cups, and plates. By 2040, the country

159

159 aims to phase out all single-use plastics (CMS Expert Guide, 2024). France has set goals to

160

160 improve recycling rates and reduce plastic waste, including a deposit return system for plastic

161

161 bottles. Like many countries worldwide, Ethiopia needs to address the significant amount of

162

162 plastic waste and its associated pollution by establishing effective policy instruments. This

163 issue must be urgently prioritized, as Ethiopia currently lacks suitable strategies to manage  
164 plastic waste and must quickly devise and implement practices that incorporate the 3Rs  
165 (reduce, reuse, and recycle). Changing consumer behavior and implementing strategies for  
166 proper plastic management are essential for reducing pollution. Additionally, the plastic waste  
167 management system should include specific strategies, such as incentives, by adopting best  
168 practices from international policies Reports confirm that international policies and the lack of  
169 financial incentives to discourage single-use plastics hinder efforts to curb their proliferation  
170 (Xanthos & Walker, 2017).

171 Many countries around the world, including those from East Africa like Kenya, have already  
172 successfully implemented bans on plastics, especially single-use plastic bags, while Ethiopia  
173 has only issued a restriction on the thickness ( $>0.03\text{mm}$ ) of the plastic bags. Although there is  
174 a ban on plastic thickness, it has not been effectively enforced. Additionally, Ethiopia needs to  
175 adopt various international policy instruments to assess and recommend an international plastic  
176 treaty that will support a clear national plastic management strategy. Policies banning plastic  
177 drinking straws, facilitating the return of plastic bottles, and establishing producer  
178 responsibility are also necessary to reduce single-use plastics, holding producers accountable  
179 for the entire life cycle of their products. Recently, plastic straws have been used in large  
180 quantities in restaurants, recreational areas (such as beaches), and travel (Aragaw, 2023). This  
181 issue necessitates that Ethiopia develop sustainable management practices to move toward zero  
182 plastic waste programs, which can support the concept of a circular economy and address  
183 environmental pollution.

184 As a result of its multiple sources and transport pathways, plastic litter pollutes the natural  
185 environment worldwide, from the Antarctic to the Arctic, and from the deep sea to the summit  
186 of Everest (Napper et al., 2020; Tekman et al., 2017) and the atmosphere (Allen et al., 2019;  
187 Wright et al., 2020). Consequently, governments around the world have struggled to establish  
188 conventions aimed at reducing plastic debris pollution. For example, the International  
189 Convention to prevent pollution from Ships (MARPOL 73/78) was signed in 1973 to prohibit  
190 the disposal of plastics at sea (IMO, 1973). In 2015, G7 leaders recognized plastic pollution  
191 as a major threat at the United Nations Environment Assembly (UNEP, 2015). Most recently,  
192 UN members adopted a mandate for the International Negotiating Committee (INC) to develop  
193 a legally binding UN treaty on plastic pollution (UNEP, 2022). his mandate aims to address the  
194 entire plastic life cycle, from source to sea. A scientific group called “The Scientists’ Coalition  
195 for an Effective Plastic Treaty” has been established (Norad, 2022), consisting of

196 approximately 250 experts from 50 nations who are advocating for an agreement that will set  
197 legally binding targets to reduce plastic production. However, progress from government and  
198 industry representatives has been disappointingly slow, and negotiations have yet to deliver on  
199 their promises. These strategies have been adopted worldwide to address the specific needs of  
200 different countries. Ethiopia endorsed the resolution on plastic pollution during the fifth session  
201 of the United Nations Environment Assembly (UNEA) in 2022.

202 Strategies for managing plastic bags vary in range and scope across different countries.  
203 International governments have implemented measures such as banning the sale of lightweight  
204 bags, charging customers, and imposing taxes on stores that sell them. For example, authorities  
205 in North America have enacted bans, partial bans, and fees. In contrast, most European  
206 countries have adopted national approaches (Xanthos & Walker, 2017). In Ethiopia, the policy  
207 establishes a ban on plastic bags with a thickness of less than 0.03 mm. Therefore, initial studies  
208 are needed to assess the efficacy of single-use plastic bags, and it is essential to adapt  
209 international policies to ban single-use plastic bags regardless of their thickness. Similarly,  
210 many countries have implemented federal bans on single-use microbeads, with some, like  
211 Canada, designating them as toxic chemicals (Walker & Xanthos, 2018). However, Ethiopia  
212 currently lacks a policy to ban single-use microbeads, making it urgent to implement federal  
213 regulations for this material. Diverse sources of microbeads, including those from toiletries and  
214 cosmetics, pose significant risks to marine life, the environment, and human health (Bostan et  
215 al., 2023).

### 216 **3. Limitation of plastic waste cleanup in water bodies**

217 Plastic waste management in Ethiopia's water bodies is still in its early stages, but efforts are  
218 underway to address the growing concern of plastic pollution. Key activities and initiatives  
219 include waste collection and cleanup efforts, legislation and policy development, public  
220 awareness and education, recycling initiatives, plastic waste management in major cities, and  
221 research and monitoring. Among these, waste collection and cleanup activities have been  
222 increasingly implemented in Ethiopia's water bodies. Local communities, non-governmental  
223 organizations, and environmental organizations have organized cleanup campaigns around  
224 rivers, lakes, and reservoirs to remove plastic waste, particularly around Lake Tana.  
225 Additionally, regional and federal environmental authorities, along with urban administrations,  
226 lead cleanup efforts in urban areas where plastic waste is prevalent. However, while these  
227 activities contribute to pollution reduction, they can also negatively impact marine organisms



228 and biodiversity. To mitigate these risks, Ethiopia must adopt sustainable practices that balance  
229 both short- and long-term ecological impacts for effective plastic management in its water  
230 bodies.

231

232 Plastics pollute both land and oceans, with 80% of plastic pollution originating from land  
233 sources. This pollution alters habitats and disrupts natural processes, reducing the ability of  
234 ecosystem services to adapt to climate change and negatively impacting livelihoods, food  
235 production, and social well-being. Plastics in water bodies harm food chains and threaten food  
236 security, affecting both wildlife and humans. Although the exact amount of plastic litter  
237 entering the ocean is uncertain, it is estimated that 1.7 million tonnes are transported, while 6.0  
238 million tonnes enter rivers and coastlines (Ritchie & Roser, 2023).

239 Recently, ocean cleanup campaigns have been implemented worldwide to remove waste plastic  
240 and mitigate the impacts of plastic pollution in marine environments. These campaigns have  
241 also extended to freshwater systems, including rivers and lakes. However, this approach is not  
242 a sustainable solution, as it can disrupt the balance of ecosystem services. Aquatic  
243 environments are home to interconnected animals, plants, and microorganisms that rely on one  
244 another and their surroundings, all of which can be negatively impacted during cleanup efforts.  
245 These ecosystems exhibit complex energy and material cycles, highlighting the  
246 interdependence of primary producers and predators. The adage "prevention is better than cure"  
247 is particularly relevant here; reducing the risk of complications to ecosystem services and  
248 improving long-term environmental health is essential. Efforts to clean up plastics from the  
249 ocean can negatively impact organisms and biodiversity in several ways. Common negative  
250 effects include: (1) disruption of habitats: physical disturbances and the removal of non-plastic  
251 debris can degrade marine environments; (2) bycatch and mortality: the unintentional capture  
252 of non-target species can lead to injury or stress within populations; and (3) chemical pollution:  
253 the release of toxic substances and plastic fragmentation can harm marine life. Additionally,  
254 disruptions to food chains—such as altered food webs and ecosystem imbalances—along with  
255 community disruptions, particularly regarding local communities, are significant concerns for  
256 ocean-dwelling organisms. A recent study highlighted serious issues within an ocean cleanup  
257 campaign, indicating that such efforts can pose considerable risks to the organisms inhabiting  
258 the ocean (Bergmann et al., 2023; Spencer et al., 2023; Tessnow-von Wysocki et al., 2023).  
259 According to Spencer et al. (2023), in the worst-case scenario, ocean cleanup activities could  
260 severely harm surface-dwelling species, and no company operating under such uncertain  
261 conditions can guarantee otherwise. Specifically, cleanup operations must understand the

262 anthropogenic environment composed of plastic and microorganisms, known as the  
263 'plastisphere,' and how these microorganisms are affected. While removing plastics from the  
264 ocean is necessary, it is crucial to approach these efforts with a focus on minimizing harm to  
265 marine organisms and biodiversity. This includes careful planning, using less invasive  
266 techniques, and prioritizing strategies that reduce plastic pollution at its source.

#### 267 **4. Future perspectives**

268 Globally, around 400 million tons of plastic are produced each year, with projections indicating  
269 that production could double by 2050. Alarmingly, only 7-9% of this plastic is recycled  
270 annually, while a significant portion ends up in landfills or the environment (OECD, 2022; UN,  
271 2023). In Ethiopia, plastic consumption has risen sharply, increasing from 0.044 million metric  
272 tons in 2007 to 0.308 million metric tons in 2020. Plastic imports grew by 421% from 2007 to  
273 2022 (EEPA, 2024). Despite the increasing production and import of plastics to meet rising  
274 demand, Ethiopia's plastic waste management system remains underdeveloped. If this  
275 consumption trend continues without improved waste management practices, plastic could  
276 outnumber fish in Ethiopian water bodies. Therefore, a robust plastic pollution reduction  
277 strategy is urgently needed, focusing on reducing virgin plastic production and implementing  
278 effective mitigation and waste management programs. Ethiopia could focus on several key  
279 areas to advance towards a sustainable and effective plastic waste management system. These  
280 potential future directions include 1) strengthening policy and regulations, 2) promoting a  
281 circular economy, 3) increasing public awareness and education, 4) investing in green  
282 technology and innovation, 5) enhancing regional and international collaboration, 6) improving  
283 monitoring, data collection, and research, 7) integrating plastic management with climate  
284 action, and 8) adopting the 3Rs (reduce, reuse, recycle) and a zero-waste approach.

285

286 Plastic users can contribute to a plastic-free future by adopting conscious and intentional living,  
287 such as using recycled bags, reusable utensils, plates, and cups, and eliminating plastic bottles.  
288 This shift in consumer behavior could indirectly reduce plastic production. Additionally, it is  
289 feasible to achieve near-zero mismanaged plastic waste if plastic pollution reduction policies  
290 are fully committed to and implemented. While completely ending plastic pollution may be  
291 challenging, significant reductions can be achieved by applying a comprehensive mix of plastic  
292 reduction policies. Future plastic production and imports should shift towards sustainable  
293 alternative materials and processes, reducing waste and pollution. Materials derived from  
294 renewable resources could serve as alternatives to petroleum-based plastics, playing a vital role  
295 in future plastic manufacturing.

296

## 297 **5. Conclusion and recommendations**

### 298 **5.1.Conclusion**

299 Plastics have placed immense pressure on the ecological balance of the natural environment.  
300 In Ethiopia, large quantities of plastics, particularly single-use plastics, are generated and  
301 improperly disposed of, resulting in widespread environmental pollution. Consequently, the  
302 large amount of plastic waste entering aquatic environments is rising, posing ongoing and  
303 severe threats to ecosystems and living organisms. This paper discusses the status, perspectives,  
304 and future directives of plastic waste management strategies in Ethiopia. It highlights several  
305 issues related to plastic pollution in aquatic environments, including management practices,  
306 national and international bans, and the impact of ocean cleanup efforts on ecosystem services.  
307 Given Ethiopia's current inadequacies in plastic waste management, it is crucial for the  
308 government to urgently address and implement policies to mitigate plastic pollution. As seen  
309 in many other countries, implementing plastic management strategies, such as reducing,  
310 reusing, and recycling, along with introducing plastic bans, is unlikely to hinder Ethiopia's  
311 sustainable economic growth. Many nations have successfully adopted these practices.  
312 However, the government may need to establish a council or scientific body to provide  
313 feedback and recommendations for a national plastic treaty before formulating policies.  
314 Additionally, adopting international policies and adapting them to the specific context of  
315 developing countries is crucial for effectively reducing plastic pollution in Ethiopia.

### 316 **5.2.Recommendations**

317 It is strongly recommended that the Government of Ethiopia adopt a strict plastic management  
318 system, including the banning of various single-use plastics, such as plastic bags, drinking  
319 straws, plastic packaging, and other items, as well as microplastics like microbeads found in  
320 health and beauty products. The Ethiopian parliament, in its annual and semi-annual sessions,  
321 should have an agenda on developing and implementing strategies to address plastic pollution  
322 by promoting the reduction, reuse, and recycling of plastics. Therefore, we urge the  
323 Government of Ethiopia to establish practical strategies that address the entire the life cycle of  
324 plastics.

325 The following points are recommended for Ethiopia and a broad perspective worldwide as  
326 strategies to reduce plastic pollution.

- 327 • Poor archiving of online data sources on plastic production and consumption can hinder  
328 effective waste management and limit informed policymaking. These data should be openly  
329 available in national and international databases, as accessible data is crucial for science-  
330 based decision-making to combat plastic pollution. Collecting comprehensive data on  
331 annual plastic consumption, recycling and reuse rates, and waste amounts is essential for  
332 addressing the root causes of plastic pollution.
- 333 • Academicians, researchers, and policymakers should prioritize plastic pollution as a critical  
334 issue. It is essential to conduct research and implement interventions to develop policies  
335 for plastic management and related policy instruments. This approach will enhance societal  
336 decision-making by providing timely, reliable, and effective decision support.
- 337 • The country should finance and incentivize plastic waste minimization approaches such as  
338 recycling, reusing, redesigning, rethinking, and reducing plastic usage. As international  
339 negotiations for a plastic treaty to combat pollution are underway and expected to yield a  
340 list of control measures, Ethiopia should proactively adopt these practices, regardless of the  
341 outcome of the negotiations.
- 342 • An extended producer responsibility (EPR) framework is essential. To implement EPR  
343 effectively, producer responsibility organizations (PROs) must be established to coordinate  
344 national and international policies and assist businesses in overcoming challenges related  
345 to sustainable management.
- 346 • It is essential to establish a council of African unions focused on science, research, and  
347 innovation, with Ethiopia as a participant. Integrating science into policymaking is crucial,  
348 as it provides policymakers with the essential data needed to make informed decisions and  
349 shapes political outcomes effectively.
- 350 • Finally, transparency regarding the chemical constituents of plastics must be addressed  
351 throughout the value chain and plastic life cycle to restrict harmful chemicals and explore  
352 alternatives. Over 13,000 chemicals associated with plastic production are identified as  
353 highly toxic and capable of migrating from plastics (UNEP, 2023). Disclosing this  
354 information is vital, as it affects the lifecycle management of plastic waste. Ethiopia should  
355 actively participate in this campaign, as it can contribute to reducing plastic pollution and  
356 promoting resource efficiency within a toxic-free circular economy, while also ensuring the  
357 public's right to know.

358 **CRediT authorship contribution statement**

359 **Tadele Assefa Aragaw:** Conceptualization, Validation, Formal analysis, Investigation,  
360 Writing-Original Draft, Writing-review & editing.

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