

Breaking the plastic cycle in Africa: Advancing sustainable solutions for single-use plastic reduction in marine ecosystem beyond current policies

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1.0 Abstract :

Plastic pollution is a growing environmental problem that affects ecosystems worldwide. With a population of over 1.4 billion people, Africa has the potential to be a major contributor to the global plastic waste crisis, generating an estimated 17 million tons of plastic waste annually. The impact of plastic pollution in Africa is particularly severe, with large quantities of plastic waste ending up in rivers and oceans, leading to the death of marine life and the destruction of ecosystems. Although policies aimed at reducing plastic waste exist in many African countries, their effectiveness has been limited due to poor governance, inadequate resources, and a lack of focus on the root causes of plastic pollution. To effectively address plastic pollution, sustainable solutions such as the circular economy, innovative technology, public awareness, and international collaboration are needed.

2.0 Introduction :

Plastic pollution is an urgent and escalating environmental problem that affects ecosystems across the globe. While plastic production has increased rapidly in recent years, with an estimated 300 million tons produced each year [1], much of this plastic ends up in the ocean and other bodies of water. Plastics currently make up to 85% of marine trash, and this percentage is expected to triple by 2040 [2]. This is particularly concerning for Africa, which has a population of over 1.4 billion people in 2022 [3], and generates an estimated 17 million tons of plastic waste each year [4]. With a projected population of 2.5 billion by 2050 [4], the demand for plastics, especially single-use plastics (SUP), is likely to increase further. Unfortunately, the effects of SUP pollution are particularly severe in Africa, where enormous volumes end up in rivers and seas, killing marine life and destroying ecosystems [4].

While many African nations have regulations in place to reduce SUP waste, their efficacy has been limited. Some regulations focus on banning SUP, but enforcement has been difficult due to inadequate funding and poor governance. Furthermore, these policies do not address the underlying issues that contribute to SUP pollution, such as inadequate recycling infrastructure and deficient waste management systems. Between 1990 and 2017, 230 metric tons of plastics, including SUP, entered Africa, with the highest proportion going to Egypt, Nigeria, South Africa, Algeria, Morocco, and Tunisia [5]. Primary plastic manufacture in eight African nations produced only 15 metric tons between 2009 and 2015 [5]. Much of this waste ends up in the ocean, leading to negative impacts on marine ecosystems and local communities. Inadequate waste management systems and poor public awareness exacerbate the problem, leading to the accumulation of plastic waste, particularly SUP, in landfills and oceans. It is therefore obvious that current policies alone are not enough to comprehensively address the issue of SUP pollution in Africa. This commentary aims to shed light on the impact of SUP on the marine ecosystem, highlight the current policies and strategies to reduce SUP in Africa, and explore sustainable solutions to reduce SUP pollution in Africa.

2.1 Impact of SUP on marine ecosystems:

One of the major impacts of SUP on marine ecosystems is the ingestion of plastic [6]. When exposed to the sun's UV rays, wind, currents, and natural processes, plastic breaks down into microplastics (particles smaller than 5 mm) or even nanoplastics (particles smaller than 100 nm). These tiny particles closely resemble plankton or other small organisms that marine animals consume [7]. Ingesting SUP can lead to blockages in the animals' digestive systems, resulting in starvation, malnutrition, and even death [8]. Moreover, SUP debris can release toxic chemicals into the animals' bodies, leading to various health problems such as hormonal disruptions, reproductive failure, and organ damage [8]. This poses a significant threat to the well-being and survival of numerous marine species, contributing significantly to the decline in their populations.

Another significant impact of SUP on marine ecosystems is entanglement [8]. Marine animals such as sea turtles, whales, and seabirds are at risk of getting trapped or entangled in fishing gear, plastic bags, ropes, and other debris, which can lead to severe consequences such as injury, infection, starvation, suffocation, drowning, and even death [9]. This predicament is particularly perilous for marine mammals like whales and dolphins, which depend on surfacing to breathe [9].

Also, plastics pose a multifaceted threat to marine ecosystems. Coral reefs, in particular, suffer greatly from plastic's destructive influence [8]. The accumulation of plastic waste on reefs not only suffocates the organisms inhabiting them, but it also obstructs vital sunlight from reaching the corals and the organisms dependent on them for sustenance [10][11]. The significance of coral reefs as habitats cannot be overstated; they provide refuge and safeguard for a rich diversity of marine life, encompassing fish, crustaceans, and mollusks [11]. Moreover, coral reefs occupy a crucial role in the ocean's delicate food web by acting as nurseries for commercially significant fish species [12]. Consequently, the loss of coral reefs bears catastrophic consequences for marine organisms that rely on them for survival [12]. Without the protective haven offered by healthy coral reefs, countless species become susceptible to predation and other environmental stressors, culminating in diminished fish populations and a decline in overall marine life, creating a ripple effect throughout the ecosystem [13].

Additionally, the detrimental effects of SUP extend far beyond the marine ecosystem and encompass critical implications for both climate change and ocean acidification [14]. The production and disposal of plastics, particularly SUP, result in the emission of greenhouse gases, thereby intensifying global warming and exacerbating the challenges of climate change [15]. Furthermore, the presence of SUP waste in our oceans facilitates the absorption and subsequent release of carbon dioxide, triggering the process of ocean acidification. This phenomenon poses a severe threat to marine organisms, especially those dependent on calcium carbonate, such as coral reefs and shellfish [14]. Consequently, the disruption caused to the entire marine ecosystem yields profound and devastating consequences.

Also, the economic impacts of SUP on marine ecosystems are both significant and diverse. The financial burden associated with marine plastic pollution is staggering, with annual expenses per tonne estimated to range from \$3300 to \$33,000 [16]. These costs encompass a wide range of factors, including the expenses incurred in cleaning up plastic waste, the detrimental effects on revenue within the fisheries and tourism sectors, and the potential consequences on human health [4]. The accumulation of SUP waste in our oceans poses a grave threat to fisheries and other industries that heavily rely on the vitality of marine ecosystems [7]. Moreover, the presence of SUP waste not only jeopardizes marine life but also presents a significant risk to human health, as it contaminates seafood and contributes to severe issues such as cancer, reproductive problems, and immune system damage [17]. The devastating effects of SUP on marine ecosystems underscore the urgent need to take action.

2.2 Current policies to reduce single-use plastics in Africa:

A number of African countries have taken steps to address the issue of SUP through legislative bans, particularly focused on SUP bags. Rwanda was an early adopter of such a law in 2008, which prohibited the production, use, import, and sale of non-biodegradable plastic bags [18]. Kenya followed suit with a similar

ban in 2018, which imposed fines and jail time for violators [19]. Nigeria also implemented a plastic bag ban in 2019, with comparable restrictions [20]. In total, 34 out of 54 African countries have introduced policies aimed at reducing SUP, including bans on plastic bags [21]. Alongside the plastic bag bans, some African countries have also introduced extended producer responsibility (EPR) policies, which hold manufacturers accountable for the environmental impacts of their products [20]. For certain products, South Africa and Kenya have introduced EPR policies that can incentivize manufacturers to reduce their use of SUP [22].

2.3 Advancing sustainable solutions to reduce SUP in Africa: Beyond current strategies

While it is commendable that several African countries have implemented bans or levies on certain types of SUP, these measures alone are insufficient to bring about lasting change. SUP waste still poses a significant threat to the environment. Reducing plastic pollution in Africa and other parts of the world requires a multifaceted and holistic approach that encompasses various stakeholders and leverages innovative solutions. Therefore, raising awareness and promoting education about the environmental impact of plastic waste should be a priority in Africa. Governments, NGOs, and the private sector should collaborate to develop targeted campaigns that engage communities, schools, and businesses in understanding the consequences of plastic pollution. For instance, educational programs can be organized in schools to teach children about the harmful effects of plastic waste on marine life and the importance of recycling. Public awareness campaigns through television, radio, and social media can also play a crucial role in reaching a wider audience.

Furthermore, investing in research and development of eco-friendly alternatives to SUP is crucial in Africa. Africa government should support scientific innovation and entrepreneurship to develop viable substitutes that are affordable, accessible, and locally produced. For example, researchers can be given grants and other incentives to carry out researches that will focus on creating biodegradable packaging materials derived from agricultural waste, such as cassava or sugarcane. Promoting the adoption of these sustainable alternatives, will significantly reduce the demand for SUP.

Moreover, improving waste management systems is also paramount in Africa. Many African countries face challenges in waste collection, recycling infrastructure, and disposal. African governments should allocate resources to enhance recycling facilities, establish waste-to-energy plants, and incentivize waste management companies to develop efficient and sustainable waste management practices. Collaborating with international partners and sharing best practices can accelerate progress in this area.

In addition, fostering collaboration between government, industry, and civil society is vital. The private sector, including manufacturers, retailers, and packaging companies, must take responsibility for the lifecycle of their products and adopt environmentally friendly practices. Governments can incentivize sustainable packaging and reward businesses that implement recycling and waste reduction initiatives. NGOs and community organizations can also play a significant role in advocacy, education, and grassroots initiatives that promote sustainable living. For instance, community-led initiatives can organize plastic cleanup drives in coastal areas or promote the use of reusable bags through local markets.

Lastly, regional cooperation and knowledge sharing can strengthen efforts to combat plastic pollution. African countries can learn from successful initiatives implemented in other regions and adapt them to their specific contexts. By sharing experiences, lessons learned, and best practices, Africa can accelerate progress and avoid reinventing the wheel. Collaborative platforms, such as regional conferences or online forums, can facilitate these exchanges and foster partnerships. Moreover, the Plastic Treaty, set to be enacted in 2024, presents a crucial opportunity for African countries to tackle plastic pollution [24]. Therefore, it is crucial for African nations to prioritize developing and implementing national strategic plans to ensure the treaty's objectives are achieved [24].

Conclusion:

Plastic pollution is a serious threat to the environment, particularly to marine ecosystems in Africa. Despite some efforts by African countries to reduce the use of SUP, their impact has been limited. To effectively address this problem, a comprehensive approach that includes sustainable solutions like the circular econ-

omy, innovative technology, increased public awareness, and international collaboration is necessary. These solutions not only create new economic opportunities for Africa but also promote sustainable practices that will reduce plastic waste and protect the environment. Therefore, it is essential for individuals, businesses, and governments in Africa to work together and implement effective and sustainable measures to tackle this global crisis.

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