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A Regional Response to the Global Challenge of Single-Use Plastic Pollution: Regulatory Frameworks in IGAD Countries

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Abstract

Single-use plastic (SUP) pollution has emerged as a major sustainability and environmental-governance challenge in developing and institutionally fragile regions characterized by weak waste-management systems, uneven enforcement capacity, and fragmented regional coordination. This paper examines the regulation of SUPs in the Intergovernmental Authority on Development (IGAD) member states as a case of regional environmental governance in contexts of institutional diversity and limited regulatory capacity. Using a structured doctrinal and comparative legal-analysis methodology, the study evaluates formally enacted national and selected subnational legal and policy instruments through the framework of international environmental law principles, particularly prevention, precaution, polluter-pays, cooperation, and life-cycle governance. The findings reveal substantial divergence in plastics governance across the region. Some countries, including Eritrea, Djibouti, and Somalia, rely primarily on direct bans and preventive restrictions, while others regulate plastics indirectly through broader environmental and waste-management frameworks. Kenya demonstrates the region's most integrated governance model through preventive regulation, extended producer responsibility (EPR), recycling obligations, and circular-economy measures, whereas responsibility-based governance remains weak across much of the region. The study further shows that fragmented legal systems, weak enforcement capacity, limited recycling infrastructure, and insufficient regional coordination continue to undermine effective plastics governance in IGAD. From a sustainability-law perspective, the paper demonstrates how fragmented institutional environments and uneven governance capacities shape plastics governance in underexamined, fragile regional contexts. It concludes that progressive regional harmonization integrating prevention, producer responsibility, recycling systems, lifecycle governance, and transboundary cooperation offers the most viable pathway toward sustainable plastics governance in the IGAD region while contributing to discussions concerning SDGs 12, 13, 14, 16, and 17. The findings further suggest that IGAD institutions and member-state governments should strengthen extended producer responsibility frameworks, invest in recycling and waste-management infrastructure, enhance enforcement capacity, and promote coordinated regional policies to support a transition toward a circular economy and reduce transboundary plastic pollution.

Keywords: single-use plastics; plastics governance; IGAD; international environmental law; circular economy; extended producer responsibility; regional harmonization; transboundary pollution



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1. Introduction

Single-use plastics (SUPs) are among the most widely used plastics, especially in packaging, drinking bottles, plastic bags, and other disposable products. They have been consumed to a great extent, and the global production of plastic has grown from 1.7 million metric tonnes in 1950 to 360 million metric tonnes in 2018, with packaging being one of the major uses [1–3]. This rapid increase has created significant waste management challenges, with most plastic waste either being landfilled, explicitly dumped or leaking into the environment, and with only a minor share being recycled [1,3].

SUP pollution presents a structural sustainability challenge because of the mismatch between their short functional lifespan and long environmental persistence. These products contribute to land and marine pollution, damage to ecosystems and rising environmental pressures [4,5]. Their impacts are closely linked to multiple Sustainable Development Goals (SDGs), including SDG 12 (Responsible Consumption and Production), SDG 14 (Marine Pollution) and SDG 13 (Climate-related Environmental Pressures), as well as SDG 16 and SDG 17 (Governance), via regulatory capacity, institutional coordination and transboundary cooperation [6].

In Africa, plastic pollution is increasing despite the continent accounting for a relatively small share of global plastic production. The growing use of single-use plastics (SUPs), rapid urbanization, population growth, inadequate waste-management systems, limited recycling infrastructure, and weak regulatory enforcement have contributed to the accumulation of plastic waste across terrestrial, freshwater, and marine environments [4]. Improper disposal and ineffective waste-management practices have resulted in widespread contamination of soil, water, and ecosystems, while poorly managed plastic waste contributes to environmental degradation and growing pressures on biodiversity [7]. Plastic pollution also facilitates the accumulation of microplastics in terrestrial and aquatic environments, creating long-term risks for wildlife, marine organisms, and human health [4]. Beyond environmental impacts, inadequate plastic waste management generates significant socio-economic challenges by increasing pressure on already constrained waste-management systems and undermining sustainable development objectives across the region [7]. In the IGAD region, weak institutions, cross-border movement of plastic waste, limited recycling capacity, and uneven regulatory implementation further complicate plastics governance. Although several countries have introduced measures such as plastic bans and extended producer responsibility (EPR) schemes, their effectiveness remains uneven because enforcement capacity, monitoring systems, and waste-management infrastructure vary considerably across the region [8].

At the global level, plastics governance is evolving through international initiatives, including the 2022 United Nations Environment Assembly resolution to negotiate a legally binding instrument on plastic pollution based on a life-cycle approach [9]. However, while global momentum is increasing, the translation of these frameworks into effective regional and national governance structures remains uneven, particularly in developing and fragile regions.

Research on plastic pollution and the regulation of single-use plastics (SUPs) has grown considerably over the years as concerns regarding environmental pollution, marine litter, and plastic waste management have intensified globally [4]. However, much of the existing literature focuses on global assessments of plastic pollution or analyses of individual countries, particularly developed and emerging economies [10,11]. While governance issues have received increasing scholarly attention, a substantial proportion of the literature continues to emphasize the environmental impacts, waste-management challenges, and technical aspects of plastic pollution rather than regional governance arrangements and institutional coordination mechanisms [12]. As a result, there remains

limited understanding of how regional organizations and transboundary governance frameworks can address plastic pollution in institutionally diverse and fragile regions such as IGAD. Unlike the European Union, which operates through a more coordinated and legally binding system, IGAD relies on a less centralized and more flexible form of regional cooperation, similar in some ways to ASEAN. The region is especially important to examine because many member states face weak institutional coordination, post-conflict governance challenges, and limited plastics-specific legal frameworks. These conditions often make policy implementation inconsistent and reduce effective cooperation among member states.

This paper examines the governance of SUPs in IGAD member states as an example of fragmented regional environmental governance. It evaluates the extent to which national and selected subnational regulatory approaches in Djibouti, Eritrea, Ethiopia, Kenya, Somalia, South Sudan, Sudan, and Uganda align with the fundamental principles of international environmental law. Through a structured qualitative legal analysis of officially adopted legal and policy instruments, the study compares regulatory approaches, identifies gaps and coherence, and assesses prospects for harmonization.

The study systematically examines single-use plastic governance across IGAD member states through an analytical framework that integrates international environmental law principles, circular economy approaches, and regional governance perspectives. By documenting the region's weak and uneven institutional context, it expands on the literature on plastics governance, which is largely focused on the global and national scenarios, by demonstrating how a lack of coordination, producer responsibility, and regional cooperation weakens sustainable plastics governance in the Horn of Africa.

This study contributes to the literature in three respects. First, it extends comparative research on plastics governance to the relatively underexamined IGAD region, highlighting its institutional diversity and transboundary environmental challenges. Second, it adopts a sustainability-law perspective to evaluate not only the existence of regulatory instruments but also their coherence, integration, and alignment with life-cycle governance principles. Third, it examines the extent to which fragmented and institutionally diverse governance settings require policy approaches that move beyond product bans toward broader frameworks incorporating prevention, extended producer responsibility, circular economy principles, and regional cooperation.

2. Conceptual Framework: Sustainability Law, Life-Cycle Governance, and Regional Fragmentation

2.1. Global Plastics Governance and Sustainability Law

Plastic pollution is gaining momentum as a multi-layered global governance problem within global production, trade and waste systems that has environmental and socio-economic consequences [13,14]. The effective governance of plastic pollution is a cross-border issue through rivers, oceans, trade, and waste flows, which must be addressed at the global, regional, national, and subnational levels [15,16]. As a result, law is a crucial part of developing systems of regulation, responsibility and enforcement of environmental protection [17].

From a sustainability-law perspective, plastics governance is guided by principles including prevention, precaution, polluter pays, cooperation, and life-cycle responsibility [17,18]. The principle of prevention is expressed in international action on marine litter as well as in MARPOL Annex V, which bans the discharge of plastics from ships into the sea [3,19]. The precautionary principle also applies, as there are questions about the effects of microplastics and harmful additives on ecosystems and human health. Governance measures are included in the Stockholm Convention and the 2019 amendments to the Basel

Convention on the Control of Transboundary Movement of Hazardous Waste and Other Forms of Harmful Waste [20].

The polluter-pays principle is particularly important in plastics governance because it shifts responsibility for post-consumer waste from governments to producers and importers through extended producer responsibility (EPR) systems [11,21]. Closely connected to this is the life-cycle approach, which promotes regulation across production, consumption, collection, recycling, and disposal, rather than focusing only on waste management [11,22].

Cooperation is another key principle because plastic pollution cannot be effectively addressed by states acting independently. International agreements such as UNCLOS, the London Convention, and the Basel Convention require states to cooperate in preventing marine pollution, regulating waste movements, and developing shared environmental standards [20,23,24].

Together, these instruments demonstrate a gradual shift from fragmented waste and marine pollution regulation toward a broader sustainability-law framework grounded in prevention, cooperation, producer responsibility, and life-cycle governance. However, the international governance of plastics is also fragmented, as rules on plastics exist in several different legal regimes and are not centralised in any specific binding global plastics agreement [10,25]. In developing and institutionally fragile areas like IGAD, the enforcement capacity is relatively low, and waste-management systems are weak, making implementation more challenging as a result of these governance gaps [26,27]. This global framework therefore provides the basis for assessing how IGAD member states incorporate prevention, precaution, polluter-pays, cooperation, and life-cycle principles into their plastics governance systems.

2.2. Regional Approaches to Plastics Governance and the Circular Economy

Regional approaches to plastics governance differ in terms of legal integration, institutional capacity, and policy coordination. The European Union (EU) and the Association of Southeast Asian Nations (ASEAN) provide useful comparative models because they represent contrasting governance approaches. The EU relies on legally binding and highly integrated regulation, while ASEAN emphasizes cooperation, policy coordination, and capacity building [28–30]. The EU represents one of the most advanced regional approaches to plastics governance through its circular economy framework. The Circular Economy Action Plan and Directive (EU) 2019/904 combine bans on selected single-use plastics with recycling targets, labelling requirements, sustainable product design, and extended producer responsibility systems [31]. This integrated approach regulates plastics across their life cycle rather than focusing only on waste disposal.

ASEAN adopts a more flexible and cooperative model. Its regional frameworks prioritize waste reduction, recycling, innovation, and marine debris management through coordination, technical support, and voluntary implementation, rather than binding legal obligations [30–32]. Initiatives such as 3RproMar further support waste management and circular economy practices through regional collaboration and knowledge sharing [33].

These models illustrate different pathways toward regional plastics governance. The EU demonstrates the role of harmonized standards, EPR systems, and coordinated enforcement, while ASEAN highlights the importance of gradual institutional development and flexible cooperation in regions with diverse capacities. For IGAD, the ASEAN-style approach is likely to be more feasible in the short term because member states differ significantly in institutional strength, legal development, and waste-management infrastructure. Over time, however, IGAD may progressively strengthen harmonization through common standards, regional monitoring, producer responsibility systems, and coordinated waste-management policies [8].

2.3. National and Subnational Legal Responses Across the Plastics Life Cycle

The regulation of single-use plastics involves multiple actors, including governments, local authorities, producers, retailers, and consumers. From a life-cycle perspective, plastics governance can be assessed across four main stages: production and design, consumption and use, recycling and collection, and disposal and transboundary waste management [3,11]. In practice, however, many national legal frameworks continue to focus primarily on product restrictions and downstream waste management.

At the production and design stage, regulatory measures may include product standards, bans on certain materials, recycled-content requirements, design-for-recyclability rules, and EPR systems. These measures are important because they address plastic pollution upstream before products enter circulation. Nevertheless, many national frameworks remain more focused on waste management than on product redesign or production incentives [3,11].

Consumption-stage regulation is the most visible form of plastics governance and commonly includes bans, restrictions, taxes, and levies on plastic bags and other single-use products. UNEP reports that more than 120 countries have adopted some form of plastic bag regulation, although fewer countries regulate a wider range of plastic products [3]. While such measures can reduce litter and visible plastic waste, they are generally insufficient without broader life-cycle governance.

Recycling and collection measures connect consumption control to circular economy objectives. Legal frameworks may establish waste-sorting requirements, collection targets, deposit systems, and producer or municipal responsibilities for recycling. Research suggests that bans and taxes are most effective when combined with public awareness campaigns, affordable alternatives, phased implementation, and effective enforcement [34]. OECD analysis further indicates that long-term reductions in plastic pollution require integrated approaches that combine demand reduction, recycling expansion, product redesign, and leak prevention [35].

Disposal and transboundary waste management create additional governance challenges because plastic waste is frequently traded across borders. The global redistribution of plastic waste following China's import ban highlighted the weaknesses of waste systems dependent on external disposal [36]. In response, the Basel Convention amendments introduced stricter controls on contaminated and non-recyclable plastic waste through prior informed consent procedures.

National and subnational regulatory approaches differ because countries face varying institutional, economic, and political conditions. Factors such as enforcement capacity, tourism dependence, business interests, and environmental leadership influence the timing and strictness of plastic regulation [3,37]. In the IGAD region, these differences create fragmented regulatory systems that may weaken enforcement and facilitate cross-border movement of plastic products and waste. As a result, the key governance challenge is not simply whether states regulate plastics, but whether regulation is coordinated across the plastics life cycle and harmonized regionally.

2.4. Sustainability Principles for Assessing Plastics Regulation

Law is a critical foundation for sustainability as it sets standards, obligations, and policy frameworks for minimizing environmental impacts and for sustainable production and consumption [38]. This is crucial for single-use plastics because their impacts occur during the extraction, production, use, and post-consumer disposal phases, not just disposal [18]. Principles of sustainable development (intergenerational equity, sustainable use of natural resources, intra-generational equity, and integration of environmental considerations into

development) offer the normative foundation for the analysis of plastic regulation, but their implementation requires operationalisation through legal rules and institutions [18].

This research adopts the IUCN Framework for Assessing and Improving Law for Sustainability, which considers the implementation of legal principles through formal legal arrangements, government actions, behaviors, and social and environmental impacts. This research focuses on formal legal arrangements to evaluate whether sustainability principles are incorporated into IGAD's laws and policies governing single-use plastics. The key principles are prevention, precaution, the polluter-pays principle, and good-faith cooperation. These principles can be used to evaluate whether laws prevent harmful plastics before they cause harm, respond to uncertainty about microplastics and toxic chemicals in plastics, allocate responsibility to producers or consumers, and facilitate regional coordination and transboundary waste management [39,40].

The framework integrates a circular economy and life-cycle approach to turning these principles into action. This assesses the life-cycle (production, consumption, disposal, and recovery) of single-use plastics while encouraging the reduction of unnecessary plastics, innovation for reusable or recyclable plastics and recirculation of material in the economy [22,41,42]. The relevant policy instruments and tools include bans, taxes, subsidies, education, labelling, certification, extended producer responsibility, circular public procurement, recycling measures, and regional and transboundary cooperation [21,43,44]. The conceptual framework illustrating these relationships is presented in Figure 1.

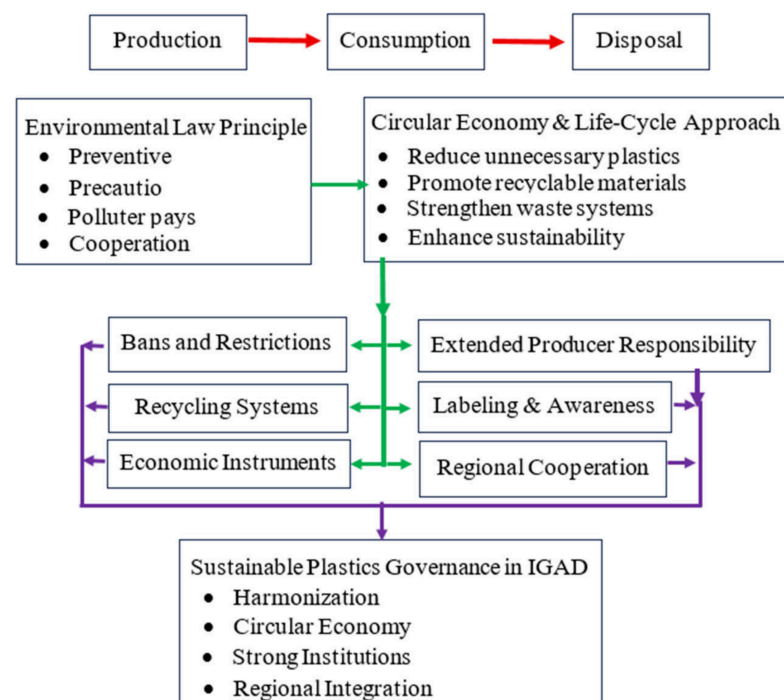


Figure 1. Conceptual framework for assessing sustainable plastics governance in IGAD. The framework links environmental law principles, circular economy and life-cycle governance, regulatory instruments, and expected governance outcomes.

Overall, the framework offers a systematic and temporal analysis of sustainability principles in terms of their recognition in law, institutionalization through legal arrangements and operationalization through regulatory tools. The framework also captures the relationship between principles and regulatory instruments, connecting them to life-cycle approaches and to various measures, including bans and restrictions, extended producer responsibility (EPR), recycling, economic instruments, labelling and regional cooperation, leading to sustainable plastics governance.

3. IGAD Context: Plastics, Institutions, and Transboundary Governance Challenges

The Intergovernmental Authority on Development (IGAD) is a regional intergovernmental organization in Eastern Africa that was established in 1996 to succeed the Intergovernmental Authority on Drought and Development, which was originally formed in 1986 to address the challenges of drought, famine, environmental degradation, and economic hardships in the Horn of Africa. IGAD is one of the eight Regional Economic Communities (RECs) recognized by the African Union and serves as an institutional framework for regional integration [45]. Its role has grown to include peace and security, economic cooperation, food security, the environment, regional integration, and drought (Intergovernmental Authority on Development) [46]. Recent institutional developments in IGAD include Eritrea's withdrawal from IGAD in December 2025; however, for this study, Eritrea is managed as part of the broader IGAD legal–regional context where appropriate [47].

In IGAD, environmental governance has increasingly been institutionalized through regional strategies and dedicated institutions to address climate vulnerability, environmental degradation, and resource-led development [48]. The establishment of the IGAD Center of Excellence for Climate Change Adaptation and Environmental Protection improved regional coordination on climate adaptation and environmental protection [47]. This has also been supported by the IGAD Climate Adaptation Strategy 2023–2030 and the Regional Blue Economy Strategy, which also prioritize sustainability, ecosystem conservation, circular-economy principles, and waste management [48,49]. Plastic pollution and waste management are significant challenges for IGAD member states, with comparable data on individual countries being scarce due to very weak monitoring systems in many of them [38,50]. The available evidence suggests a lack of collection capacity, recycling, and open dumping, as well as inconsistent institutional capacity [38]. This means plastics governance is not only constrained by legal design but also by poor data systems, inadequate infrastructure, and weak capacity [38,50].

Plastic pollution is also a transboundary issue. Coastal IGAD nations (Djibouti, Kenya, Somalia, Sudan) are affected by marine and coastal pollution, while the landlocked nations are impacted by plastics through urban waste management, land-based leakage and poor disposal [38,47]. Open borders, regional trade relationships, and weak enforcement enable the transboundary movement of plastic products and waste [40]. As such, plastics governance in IGAD is not just a national regulatory problem but also a regional governance issue that calls for legal and institutional harmonization and capacity-building in waste management [50].

IGAD is aware of these threats through its environment and blue economy policy. This includes enhanced management of water pollution, protection of ecosystems, sustainable management of marine and freshwater resources, and the promotion of circular economies [47]. The Regional Blue Economy Strategy also highlights pollution prevention and better waste management as areas to focus on for sustainable blue economy development in the region [47]. Recently, IGAD has taken another step to develop the Regional Plastic Pollution Prevention Strategy and Implementation Plan [50]. IGAD developed and technically validated a Regional Plastic Pollution Prevention Strategy in 2025, which was subsequently adopted at the ministerial level in December 2025 as a regional framework for addressing plastic pollution through a circular economy approach [50]. The draft strategy was technically validated in February 2025, promoted in June 2025, and ministerially endorsed in December 2025 as the 2026–2035 strategy [8,50]. This prioritizes circular economy, sustainable production, enhanced waste management, and regional collaboration [8].

In addition to IGAD's regional strategies, member states are also connected to wider international and regional environmental agreements relevant to plastics, marine pollution, hazardous waste, and transboundary environmental governance. Table 1 summarizes the status of selected agreements across IGAD member states.

Table 1. Status of selected international and regional environmental agreements relevant to plastic governance in IGAD member states.

Country	[19]	[23]	[24]	[20]	[39]	[51]	[52]
Djibouti	X		X	X	X		
Ethiopia				X	X	X	
Kenya	X	X	X	X	X		X
Somalia			X	X	X		X
South Sudan							
Sudan	X		X	X	X	X	
Uganda			X	X	X	X	
Eritrea				X	X		

This institutional and cross-border context justifies the following focus on national legal pathways, responsibility-based approaches (such as extended producer responsibility), regulations on recycling and waste management, and harmonization opportunities [50]. The question here is whether IGAD member states are building integrated plastics governance frameworks that incorporate prevention, producer responsibility, circular economy, and regional collaboration [50].

While Table 1 shows the formal participation of IGAD member states in key international environmental agreements, treaty ratification alone does not necessarily indicate effective implementation at the national level. A more systematic comparison between international obligations and domestic legal frameworks reveals varying degrees of alignment. For instance, obligations under MARPOL Annex V and UNCLOS require states to prevent marine plastic pollution, which is more directly reflected in countries adopting explicit plastic bans, such as Djibouti, Eritrea, and Kenya. Similarly, the Basel Convention and its 2019 plastic waste amendments emphasize control over transboundary waste movements and environmentally sound management, yet only a limited number of countries, particularly Kenya, have developed regulatory frameworks that begin to operationalize these requirements through extended producer responsibility and waste management systems. In contrast, countries relying primarily on general environmental legislation, such as Sudan and South Sudan, demonstrate weaker alignment, as their legal frameworks lack specific provisions, enforcement mechanisms, and lifecycle approaches required under international environmental law. This comparison highlights a gap between formal treaty participation and substantive legal implementation across the region.

4. Research Materials and Methods

This study adopts the illustrative regional case-study method in the IGAD member states and the broader IGAD legal–regional context (which in some cases includes Eritrea historically) to examine the legal and policy responses to single-use plastics (SUPs). While Eritrea announced its intention to withdraw from IGAD in December 2025, this study includes it because it examines the broader IGAD legal–regional environment and because Eritrea was included in the regional framework for much of the time period [8]. The research considers the regulation of plastics not just as an environmental matter but as one of sustainability, regulatory coordination, and regional governance in a context of

unequal institutional capacities and disjointed waste-management systems. The focus of the analysis is therefore on how national and regional legal instruments in the IGAD region address key principles of environmental law, including the principles of prevention, precaution, polluter-pays, and cooperation. This study is primarily a doctrinal and comparative legal analysis focusing on formally adopted legal and policy frameworks rather than a full implementation-effectiveness assessment. Although selected implementation examples and secondary evidence are discussed where available, the study does not systematically measure behavioral, environmental, or enforcement outcomes across IGAD member states. The analysis therefore focuses principally on legal design, regulatory coherence, sustainability principles, and comparative governance structures.

To enhance methodological rigor and reproducibility, the study employed a structured comparative legal-analysis protocol applied uniformly across all IGAD member states. Relevant legal and policy instruments were systematically identified through official government gazettes, ministry websites, IGAD publications, and recognized legal repositories. Wherever possible, instruments were verified against official legal sources to reduce the risk of outdated or unrepresentative materials. Only formally adopted and legally enforceable instruments related to plastics regulation, waste management, recycling, environmental protection, or circular economy governance were included, while draft documents and non-binding strategies were excluded.

The analytical process followed four sequential stages within a structured comparative framework-analysis methodology. First, the selected legal instruments were screened according to predefined inclusion criteria. Second, the instruments were coded using a standardized codebook developed specifically for this study. Third, framework analysis was conducted by systematically examining how each legal framework operationalized key sustainability-law principles, including prevention, precaution, polluter-pays, cooperation, and life-cycle governance. Fourth, the coded data were comparatively assessed to identify patterns of convergence, divergence, regulatory coherence, and governance gaps across IGAD member states.

To improve analytical consistency and reduce interpretive bias, uniform coding definitions and analytical criteria were applied across all countries. Ambiguous provisions were interpreted in relation to the instrument's legal scope, enforcement mechanisms, and regulatory objectives. The coded data were subsequently organized in Microsoft Excel to facilitate systematic cross-country comparison. The final dataset comprised 41 national and subnational legal instruments across the eight IGAD member states, as summarized in Table 2. This methodological approach strengthens the transparency, analytical consistency, comparability, and reproducibility of the findings.

Table 2. National and subnational legislation were selected for the framework analysis.

Countries	National	Subnational	Total
Djibouti	2	0	2
Eritrea	3	0	3
Ethiopia	7	1	8
Kenya	5	3	8
Somalia	7	2	9
South Sudan	3	0	3
Sudan	3	0	3
Uganda	4	1	5
Total	34	7	41

Source: self-elaboration from data collection.

5. Results

The findings are organized around three related themes. First, the analysis examines national legal approaches to single-use plastic regulation across IGAD countries. Second, it considers responsibility-based and circular economy measures, including extended producer responsibility, recycling, and economic instruments. Third, it assesses sub-regional cooperation, legal fragmentation, and opportunities for harmonization.

5.1. Divergent National Legal Pathways in IGAD Plastics Regulation

In the IGAD countries, SUP regulation has been mainly addressed as an environmental and public health concern arising from unsustainable production, consumption, and management practices. Regulation of SUPs has generally been based on preventive regulation through prohibitions, restrictions, waste management, recycling requirements, and sanctions. Nonetheless, the application of responsibility-based approaches like EPR, economic instruments, and life cycle regulation has been inconsistent among the IGAD countries. From the comparative study of SUP regulations in IGAD countries, two main pathways for addressing SUP have emerged. First, there is product-based regulation involving prohibitions and restrictions on specific products such as plastic bags with an aim of reducing plastic consumption. Second, there are general environmental, pollution control, and waste management laws, which indirectly address plastic pollution as part of environmental regulation.

Countries such as Djibouti, Eritrea, Somalia, and partially Kenya have adopted prevention-oriented regulatory models based on direct restrictions or bans on problematic plastic products. Djibouti has a product-specific regulation (arrêté No. 2016-284/PRE) in addition to a broad environmental governance framework (Environment Code), covering environmental protection, waste management and environmental liability. In the same way, Eritrea has adopted one of the earliest direct prohibition regimes in the region with the Regulations to Prohibit the Production, Importation, Sale, or Distribution of Plastic Bags (2002) and its Amendment in 2004. Recently, Somalia has taken steps toward targeted plastics governance, with the MoECC Plastic Bag Ban Announcement 2024 and [53].

These prevention-oriented approaches focus primarily on reducing plastic consumption through direct prohibition and behavioural change. Comparative evidence from other jurisdictions suggests that such measures can substantially reduce plastic bag consumption and alter consumer behaviour where enforcement and alternatives are available [54–56]. In the IGAD context, however, their practical outcomes vary considerably across countries due to differences in institutional capacity, monitoring systems, and waste-management infrastructure. Djibouti and Eritrea demonstrate stronger preventive orientation, while Somalia remains at an early stage of plastics governance due to institutional fragility, weak enforcement mechanisms, and limited monitoring systems. Although these models contribute to source reduction and align more closely with prevention principles under international environmental law, particularly MARPOL Annex V and UNCLOS obligations relating to marine pollution prevention, they remain limited in terms of lifecycle governance because recycling systems, EPR schemes, and economic instruments are largely absent.

A different regulatory pathway is evident in Ethiopia, Uganda, Sudan, and South Sudan, where plastics governance is embedded within broader environmental and waste-management frameworks rather than dedicated SUP legislation. Ethiopia regulates plastic-related environmental harms through instruments such as the Environmental Pollution Control Proclamation No. 300/2002, the Solid Waste Management Proclamation No. 513/2007, and related pollution-control and hazardous-waste regulations. Uganda similarly relies on a multi-instrument environmental governance framework, including the National Environment Act 2019 and the National Environment (Waste Management) Regulations 2020,

complemented by local waste-management ordinances. Sudan and South Sudan adopt even broader approaches, where plastics governance is addressed indirectly through general environmental protection, public health, climate adaptation, and development-planning instruments rather than targeted plastic regulation.

Compared with direct bans, these broader governance frameworks provide wider institutional coverage across multiple stages of the plastics life cycle, including pollution control, waste management, disposal, and environmental administration. However, their indirect nature limits their effectiveness in reducing plastic consumption at the source because they do not directly regulate production or use of problematic plastics. Their implementation therefore depends heavily on institutional coordination, enforcement capacity, waste-collection infrastructure, and compliance systems, which remain inconsistent across much of the region. In Uganda, waste collection and plastic waste management systems remain inadequate, contributing to the accumulation of unmanaged plastic waste in drainage systems, informal dumping areas, and urban waterways despite existing regulatory frameworks [57,58]. Similar implementation gaps are evident in Ethiopia, Sudan, and South Sudan, where broad environmental frameworks provide legal recognition of pollution management but lack product-specific obligations, measurable targets, and effective enforcement systems.

Kenya represents the most integrated governance model in the region because it combines preventive regulation, waste governance, recycling measures, and responsibility-based approaches within a broader circular-economy framework. Although Kenya does not have a single stand-alone SUP law, its Environmental Management and Co-ordination Act, Sustainable Waste Management Act 2022, Waste Management Regulations 2024, and Extended Producer Responsibility Regulations 2024 collectively establish one of the region's most advanced plastics governance systems. Kenya's framework integrates upstream and downstream measures through product restrictions, waste-management obligations, recycling systems, institutional coordination, and EPR requirements that obligate producers and importers to participate in collection and recycling throughout the product life cycle.

This hybrid governance model demonstrates stronger alignment with international environmental law principles, particularly prevention, polluter-pays, and lifecycle governance under the Basel Convention. Evidence suggests that Kenya's plastic bag ban contributed to substantial reductions in plastic bag use and visible plastic pollution, although enforcement and waste-management challenges remain [37]. Nevertheless, implementation constraints remain significant, including incomplete waste collection, infrastructure limitations, informal waste systems, and enforcement gaps. Informal waste collectors continue to play a central role in plastic recovery and recycling, although their limited integration into formal EPR systems constrains overall governance effectiveness.

Overall, the comparative analysis demonstrates that direct prevention-oriented regulation generally produces more immediate reductions in plastic consumption because it targets production and consumption at the source. In contrast, broader environmental governance frameworks offer wider institutional coverage but often generate weaker environmental outcomes due to indirect policy focus, fragmented implementation, and limited enforcement capacity. At the same time, direct bans alone remain insufficient for long-term plastics governance, where recycling systems, producer responsibility, economic instruments, and lifecycle management are underdeveloped. The findings therefore suggest that the most effective pathway for sustainable plastics governance in the IGAD region is a hybrid governance model that combines targeted preventive measures with broader lifecycle and responsibility-based regulatory frameworks.

As illustrated in Table 3, hybrid governance systems demonstrate stronger integration of lifecycle and responsibility-based measures than prevention-oriented or broadly structured environmental frameworks.

Table 3. Major governance pathways identified across IGAD member states and comparison of their relative levels of enforcement strength, lifecycle integration, producer responsibility, and governance capacity.

Group 1—Direct Prevention-Oriented Governance		Group 2—Hybrid Lifecycle Governance		Group 3—Broad Environmental Governance	
 Governance focused on bans, restrictions and behaviour change to reduce plastic use at the source.		 Combination of preventive measures, waste management, recycling systems and emerging producer responsibility mechanisms.		 Plastics are regulated indirectly through general environmental pollution control and development planning instruments.	
Eritrea  [59,60]		Kenya  [61–64]		Ethiopia  [65]	
Somalia  [53]		Uganda  [66,67]		Sudan  [68,69]	
Djibouti  [70]				S. Sudan  [71–73]	
Comparative Indicators	Group 1 (Direct Prevention)	Group 2 (Hybrid Lifecycle)		Group 3 (Broad Governance)	
Enforcement strength	Moderate–Low	Moderate–High		Low	
Lifecycle integration	Low	High		Moderate–Low	
EPR maturity	Very–Low	Moderate–High		Very–Low	
Governance capacity	Moderate–Low	Moderate–High		Low	

5.2. Responsibility-Based Governance and Circular Economy Measures

Responsibility-based governance and circular economy measures vary across the IGAD region. Preventive regulation through bans, restrictions, and waste-control measures is common; fewer countries have incorporated legal frameworks that require producers, importers, distributors, or consumers to take responsibility for the entire life cycle of plastic products.

Table 4 compares the strength of responsibility-based and circular economy measures in IGAD countries: EPR, recycling, waste segregation, economic instruments, green procurement, and producer responsibilities.

This is particularly true in Kenya. It has a waste governance framework that includes extended producer responsibility, recycling, institutional coordination, and circular economy measures. The Sustainable Waste Management Act, Waste Management Regulations, and Extended Producer Responsibility Regulations offer a more holistic framework for producer responsibility and recovery, recycling, and waste-management systems [61–64]. Thus, Kenya goes beyond bans by connecting plastic regulation to producer responsibility, waste separation, recycling, and the circular economy.

Uganda also exhibits a shift towards responsibility-based governance, but to a lesser extent than Kenya. Waste management, disposal, and institutional roles are governed by the National Environment Act and Waste Management Regulations [66,67]. Uganda's efforts suggest a movement from general waste regulation to more formalized environmental

governance, but the producer responsibility, recycling mandates, and economic measures are less developed than in Kenya.

Table 4. Responsibility-based and circular economy measures across IGAD countries.

Country	Ban	Restriction	Tax	EPR	Recycling	Penalty
Djibouti	✓	✓	—	△	✓	✓
Ethiopia	—/△	✓	—	△	✓	✓
Somalia	✓	✓	—	—	△	✓
Uganda	△	✓	△	△	✓	✓
Eritrea	✓	—	—	—	—/△	✓
South Sudan	—	△	—	—	△	△
Sudan	—	△	—	—	△	✓
Kenya	✓	✓	✓	✓	✓	✓

Note: ✓ indicates a clearly identifiable provision in a binding legal instrument; △ indicates an indirect, emerging, or policy-based measure; — indicates that no clear provision was identified in the reviewed instruments.

In contrast, Ethiopia, Somalia, Djibouti, and Eritrea have more preventive and restrictive measures. Somalia, Djibouti and Eritrea adopt direct bans on plastic bags or supras (SUPs), while Ethiopia addresses plastic-related harms primarily through general pollution and waste-management regulations [53,59,60,65,70]. These approaches play a crucial role in curbing the availability and consumption of problematic plastics but are less advanced with respect to reuse, recyclability, sorting, green procurement, producer responsibility, and economic incentives.

Sudan and South Sudan are examples of more indirect approaches. Their legislative efforts are primarily focused on general environmental, health, climate, or development-planning instruments rather than plastics- or circular-economy-specific laws [68,69,71–74]. As a consequence, their governance for responsibility is limited, and their plastic waste governance is still largely dependent on the government.

5.3. Regional Cooperation and Harmonization Patterns

Cooperation is a central principle of international environmental law because plastic pollution frequently crosses borders through trade, marine systems, rivers, and waste flows [15,16]. International instruments such as UNCLOS and the Basel Convention therefore require states to cooperate in preventing marine pollution, regulating transboundary waste movements, exchanging information, and developing common environmental standards [20,24]. These obligations are particularly relevant in the IGAD region, where weak enforcement systems and uneven national regulations create risks of cross-border plastic leakage and inconsistent waste governance [11,50].

Cooperation is crucial in the IGAD region, where there is diversity in national legislation. Some (such as Kenya and Uganda) have more integrated approaches that include prevention regulation, recycling obligations, institutional mechanisms and producer-focused measures. Some rely primarily on general environmental laws or bans. This reflects that regulation is on the rise, but it also represents the possibility of unregulated spaces where further movement of plastic products or waste may occur through cross-border markets, other trade routes, and poorly regulated waste-management systems [11].

The IGAD Regional Plastic Pollution Prevention Strategy and Implementation Plan is a key step in overcoming this challenge. It demonstrates an awareness of the need for coordinated responses, improved waste-management systems, a circular economy, and

regional collaboration [8]. IGAD can thus assist in establishing harmonized standards and monitoring tools and legal responses, among member states.

Table 5 compares the plastics governance of selected areas in IGAD countries against the more mature European Union (EU) to benchmark IGAD's current emerging regional plastics governance. The comparison should not be seen as suggesting that IGAD should urgently copy the EU approach but to use the EU as a comparison to identify areas where IGAD's regional plastics governance can gradually be strengthened.

Table 5. Comparative assessment of key plastics governance policy areas between IGAD member states and the European Union.

Policy Area	IGAD Countries	EU Policies
Product bans/restrictions	Present in several countries, but uneven in scope and enforcement.	Harmonized bans and restrictions on selected SUPs and problematic plastics.
EPR and producer responsibility	Limited; strongest in Kenya and emerging in Uganda.	Well-developed and central to plastics governance.
Recycling and collection	Weak or emerging, with limited targets and infrastructure.	Strong recycling rules, collection targets, and recycled-content requirements.
Labelling and consumer information	Minimal across most countries.	Mandatory labelling for selected plastic products.
Economic instruments	Limited use of levies, taxes, and incentives.	Combined with regulatory tools and producer-cost obligations.
Institutional and regional coordination	Increasing through IGAD strategy, but still fragmented.	Strongly coordinated through binding regional directives and reporting systems.

The table shows that IGAD nations have made progress, especially in implementing bans, restrictions and nascent waste-management policies. However, producer responsibility, recycling and labelling regulations, collection targets, economic instruments and harmonized monitoring are still in their infancy compared to the EU. This does not necessarily mean that an EU approach is immediately possible. Instead, it highlights areas where IGAD can gradually strengthen regional plastics governance.

6. Discussion

The findings show that IGAD countries differ not only in how many plastic laws they have adopted but also in how those laws are designed. Direct bans reflect a clear response to visible plastic pollution; however, they do not comprehensively regulate plastics from production through disposal and recovery.

This implies that plastic bans may generate short-term reductions in specific products, particularly plastic bags, but their long-term effectiveness depends on complementary mechanisms such as producer responsibility, public awareness, institutional coordination, and functioning waste-management systems. While prevention-oriented measures are widely recognized as effective, evidence within the IGAD region remains limited due to weak monitoring systems and uneven implementation capacity. In contrast, countries with more developed waste management and extended producer responsibility (EPR) systems demonstrate a shift toward life-cycle governance.

A key regulatory challenge in the IGAD region is not only the absence of plastic laws in some jurisdictions but also the lack of integration across the plastics life cycle. Broad and indirectly structured legal frameworks often lack clear mandates, measurable targets, and product-specific obligations, weakening institutional accountability and complicating enforcement across different governance levels.

From a circular economy perspective, current frameworks do not adequately regulate plastics across the value chain. Effective governance would require stronger provisions on product design, reuse, recyclability, waste sorting, recycling targets, green public procurement, and economic instruments. Without these, bans alone are insufficient to establish a sustainable system for reducing plastic waste and internalizing environmental costs.

From an international environmental law perspective, the findings reveal a gap between formal treaty participation and substantive implementation. While most IGAD countries are parties to key agreements such as UNCLOS and the Basel Convention, national legal frameworks do not consistently translate these obligations into enforceable and targeted measures. Countries adopting direct bans and integrated life-cycle approaches show stronger alignment with prevention and polluter-pays principles, whereas those relying on general environmental legislation exhibit weaker compliance due to limited specificity, enforcement capacity, and coordination.

Overall, IGAD countries are at different stages of developing circular and responsibility-based plastics governance. Responsibility-based governance mechanisms remain unevenly institutionalized across the region. Kenya demonstrates the most advanced framework, although enforcement challenges persist due to monitoring gaps and infrastructure limitations. Uganda shows emerging progress but lacks enforceable mechanisms, while other countries rely mainly on preventive measures with limited integration of producer responsibility. Across the region, weak institutional capacity, limited resources, and informal waste systems constrain effective implementation, leaving the polluter-pays principle largely normative.

A critical but underexplored dimension of plastics governance in the IGAD region is the role of informal waste management systems. Informal actors play a significant role in collection, sorting, and recycling, particularly in urban areas, partially compensating for limited formal infrastructure. However, their exclusion from formal regulatory frameworks, including EPR systems, limits the effectiveness, accountability, and scalability of waste management. Integrating these actors through recognition, incentives, and institutional coordination could strengthen both recycling outcomes and circular economy implementation.

The limited development of responsibility-based regulation means that plastic waste management continues to rely heavily on governments and consumers rather than producers. While bans can reduce visible plastic pollution, long-term progress toward a circular economy requires complementary measures, including EPR, recycling systems, public awareness, and regional coordination.

In terms of regional governance, the most appropriate pathway for IGAD is a phased approach to harmonization rather than immediate legal convergence. However, implementation is constrained by institutional and political barriers, including differences in legal capacity, enforcement systems, and economic conditions across member states. Weak coordination, limited monitoring systems, and fragmented governance structures further hinder alignment, while political factors such as sovereignty concerns and varying policy priorities reduce commitment to binding regional frameworks. Resource constraints and the prevalence of informal waste systems also limit the feasibility of harmonized policies. A gradual and flexible approach is therefore necessary, focusing on harmonized standards, improved monitoring, strengthened producer responsibility, recycling systems, economic instruments, and control of transboundary plastic waste flows.

From a comparative perspective, IGAD's plastics governance differs significantly from the European Union's integrated and legally binding approach, which combines bans, extended producer responsibility, and harmonized standards across member states. Instead, IGAD more closely resembles flexible regional models such as ASEAN, where governance

is based on coordination, policy alignment, and gradual institutional development. This comparison indicates that while IGAD faces structural and capacity constraints, it also has a realistic pathway toward progressive regional harmonization.

Regional harmonization is therefore not only politically desirable but also legally and institutionally necessary, as conflicting national regulations can facilitate the transboundary movement of plastic products and waste. A more coordinated approach would enable a transition from fragmented national systems to integrated governance based on prevention, responsibility, circular economy principles, and regional cooperation.

The study also has implications for the Sustainable Development Goals. Limited progress in EPR and producer responsibility highlights challenges in achieving sustainable consumption and production (SDG 12). Weak institutional coordination and enforcement reflect constraints related to SDG 16, while limited regional cooperation underscores gaps in SDG 17. Strengthening plastics governance in IGAD is therefore both an environmental and a broader sustainability priority.

7. Future Perspectives and Policy Recommendations

Future progress in addressing single-use plastic pollution within the IGAD region will require a transition from fragmented national approaches toward more coordinated regional governance. While several member states have introduced bans and restrictions on selected plastic products, long-term effectiveness will depend on the development of integrated policy frameworks that combine prevention, circular-economy principles, producer responsibility, recycling systems, and effective enforcement mechanisms.

From a regional perspective, IGAD should consider developing a minimum standards framework for single-use plastics that promotes harmonized definitions of problematic SUPs, common recycling and recovery targets, and shared principles for extended producer responsibility (EPR). Such a framework could be supported by regional monitoring and reporting systems covering plastic production, imports, consumption, collection, recycling, and transboundary waste flows. Greater cooperation among member states would also help reduce regulatory inconsistencies and limit cross-border movement of banned or poorly managed plastic products.

Policy priorities should also reflect national circumstances. Countries with relatively advanced regulatory systems, such as Kenya and Uganda, could expand EPR implementation, recycling infrastructure, and circular-economy initiatives. Countries where plastics governance remains less developed may benefit from strengthening legal frameworks, institutional capacity, waste-collection systems, and enforcement mechanisms. Across the region, investment in waste segregation, recycling facilities, public awareness campaigns, and green public procurement could support more sustainable plastic consumption and production patterns.

However, the implementation of these measures must recognize the economic and administrative constraints facing many IGAD member states. Financial limitations, infrastructure gaps, institutional capacity challenges, and limited technical expertise may restrict the pace of reform. Consequently, regional initiatives should be supported through phased implementation strategies, technical assistance, capacity-building programs, and international cooperation to ensure that policy objectives remain both achievable and effective.

Future research should move beyond legal and policy analysis to examine implementation effectiveness, enforcement practices, behavioral responses, and environmental outcomes associated with SUP regulations. Comparative studies involving other African regional organizations and developing regions would further contribute to understanding how regional governance arrangements can support more effective and sustainable plastics management.

8. Conclusions

This study demonstrates that single-use plastic governance in the IGAD region is increasingly connected to broader sustainability goals, including sustainable consumption and production, environmental protection, and marine plastic pollution. Legal measures are expanding across the region but vary in coverage, design, and enforcement. The findings reveal divergent national approaches: Some countries rely on direct measures such as bans, while others address plastic pollution through broader environmental and waste-management frameworks. Although this reflects growing regulatory attention, regulatory inconsistency across member states continues to weaken the effectiveness of regional responses to a transboundary environmental problem.

The analysis further shows that prevention is the dominant regulatory approach, while producer responsibility and circular-economy instruments remain comparatively limited across much of the region. Countries such as Kenya, and, to a lesser extent, Uganda, have moved toward more integrated systems, but the region overall remains focused on product control and downstream waste management. Strengthening plastics governance therefore requires greater policy coordination across national, subnational, and regional levels, alongside expanded use of extended producer responsibility (EPR), economic instruments, recycling systems, and enforcement. In this context, a gradual approach to regional harmonization—based on standardization, monitoring, producer responsibility, and transboundary cooperation—offers the most viable pathway. These findings also highlight the relevance of plastics governance to SDGs 12, 13, 14, 16, and 17 through its links to circular economy principles, institutional development, and regional coordination.

A key limitation of this study is that plastics governance in the IGAD region remains relatively new and evolving, with legal and policy information dispersed across multiple sources rather than centralized databases. This constrains comparative legal analysis and reflects broader institutional challenges in data collection and policy monitoring. Consequently, while the study provides insights into legal structures and coherence, it is less able to assess effectiveness in terms of behavioral change, waste reduction, or environmental outcomes.

Overall, the IGAD experience demonstrates that in institutionally diverse and capacity-constrained contexts, plastics governance cannot rely solely on bans or isolated regulatory measures. It requires a coordinated regional framework that integrates prevention, responsibility, and cooperation across the entire plastics life cycle.

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