ANALYSIS OF EXISTING ACTS AND POLICIES

for plastic waste management in Nepal

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Special acknowledgement to Dr. Bimal Raj Regmi and Dr. Khim Lal Devkota, for their contribution in editing and supporting the policy brief report.

This report undertakes an in-depth analysis of the legislative acts and policies pertaining to plastic waste management in Nepal. It comprehensively explains the existing acts and policies while also presenting a forward-looking perspective, including policy recommendations regarding data collection, management, and dissemination, enhancements in source segregation, improvements in the design of plastics for recyclability, addressing issues related to micro-plastics, engaging private sectors in solid waste management, establishing a national task force to chart the course for plastic sustainability, developing recycling standards and guidelines, instituting taxation on virgin plastics, formalizing extended producer responsibility, and integrating the informal sector into plastic waste management.

FOREWORD BY PRESIDENT

Aanand Mishra

Founder and President,
CREASION

Nepal stands as a captivating nation embraced by pristine mountains, flowing rivers, and captivating architecture. Nepal's culture is delicately woven, painting a rich and intricate picture. Amidst these splendors, however, waste management emerges as a significant challenge. Nepal has taken strides to address this issue, yet there exists a crucial need to seamlessly integrate recycling and the workforce into the system, while refining policies and laws.

CREASION has been at the forefront in bringing light to the issues of waste management in Nepal and approaching development through an innovative, multi-faceted lens, always putting sustainability at the forefront of our work. We have been actively recognizing the valuable contributions of waste workers, giving them a platform to share their voices, and ensuring their active participation in driving positive changes through multiple channels. CREASION is dedicated to enhancing their livelihoods and dismantling societal taboos tied to their occupations. Additionally, CREASION takes a leading role in recycling PET bottles, confronting the pressing challenges of plastic pollution, and steering us towards a sustainable future.

Laws and policies serve as the foundation of any country, granting access to justice and driving social and environmental development. Familiarity with these regulations is vital for every citizen. Thus, this policy review sheds light on Nepal's legal framework concerning solid waste management. Given the magnitude of waste management challenges in Nepal, comprehending the content of these laws and policies becomes imperative. By understanding and actively engaging with them, we collectively contribute to forging a better, greener, and sustainable world.

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INTRODUCTION

The consumption of plastics has increased significantly over the last few decades, thereby creating significant challenges for plastic waste management. According to the recent data published by the Department of Customs, Nepal imported around 380,000 tons of plastic and plastic articles worth NRS 60.85 billion in FY 79/80 which is around 2% of the total import value [1]. There are around 375 registered plastic industries in Nepal[2] that produce around 165,000 tons[3] of plastic articles. However, it is important to note that these data do not reflect the plastic packaging data[4] . The current 'take-make-dispose' model of linear economy coupled with lack of waste management infrastructures has led to high plastic leakage to the environment.

The recent discovery of macro plastic particles in the greater one-horned rhino dung in Chitwan National Park highlights its negative impacts on Nepal's biodiversity. Although plastic ingestion is one of the major causes of mortality in marine ecosystems, its effect on terrestrial ecosystems is relatively understudied. Similarly, research has indicated that microplastics interact with different organic matters present in soil, affecting soil geochemistry, ultimately impacting the overall productivity of soil[5]. The prevalence of plastic in our environment is highlighted by the recent study that discovered microplastic in Mount Everest at an altitude of 8440 meters[6]. Human exposure to microplastics is estimated to be anywhere between tens of thousands and millions per year which make way into our body through air, drinking water, and mainly food. A study conducted at Phewa lake shoreline sediments found the abundance of microplastics ranging from 55 to 112.5 particles/kg[7]. The impact of microplastics on human health are inflammation, oxidative stress, neurotoxicity, metabolism disturbances and gut microbiota dysbiosis[8]. Furthermore, some of the chemicals present in plastics such as vinyl chloride (VC) are also linked with carcinogenic effect on human beings[9]. However, a detailed study is needed to understand the impact of microplastics depending upon the exposure time and the quantity of exposure.

According to a report from the World Bank Group published in 2020, around 600 TPD plastic waste is dumped in the landfills across Nepal[10] which is around 219,000 TPY. Similarly, plastic leakage in Nepal is estimated at around 20,600 TPY[11]. Based on these findings, plastic leakage to the environment currently stands at around 9%. These plastics accumulate over time in the environment and disintegrate into macro and micro plastics causing negative impacts.

Despite different environmental and health challenges posed by plastics, it is inaccurate to frame them as 'evil'. Plastic has played an important role in technological innovation and development. For instance, the development of disposable plastics in the healthcare industry has significantly reduced the risks associated with cross-contamination.

On the same note, it is important to highlight that the plastic industries are more focused on aesthetics and functionality of plastic articles. They have less incentive to consider designing sustainable products that are easy to manage. One good example of such is single-use plastic (SUP) bags, which go against the concept of circular economy. In Nepal, around 208 SUP bags are used per capita per year[12], which means that around 6.06 billion bags are discarded every year. Similarly, Multi-Layered Plastics (MLPs) are also extensively used which are hard to manage, resulting in high leakage in environment.

1.1 Plastic Waste Management Scenario in Nepal

Around 16% of the total Municipal Solid Waste (MSW) comprises of plastic waste[13]. Plastic waste generation is comparatively higher for metropolitan cities than sub-metropolitans and municipalities. Plastics are divided into 7 major categories which are: PET, HDPE, LDPE, PS, PVC, PP, and Other. The six types of plastics are divided on the basis of their wide availability and the type of plastic resins that are used in manufacturing them. Similarly, the 'Other' category is used to broadly categorize all the plastics that do not fall under the six categories. Plastics in the 'other' category are hard to recycle. In Nepal, the plastic characterization is given by the diagram below:

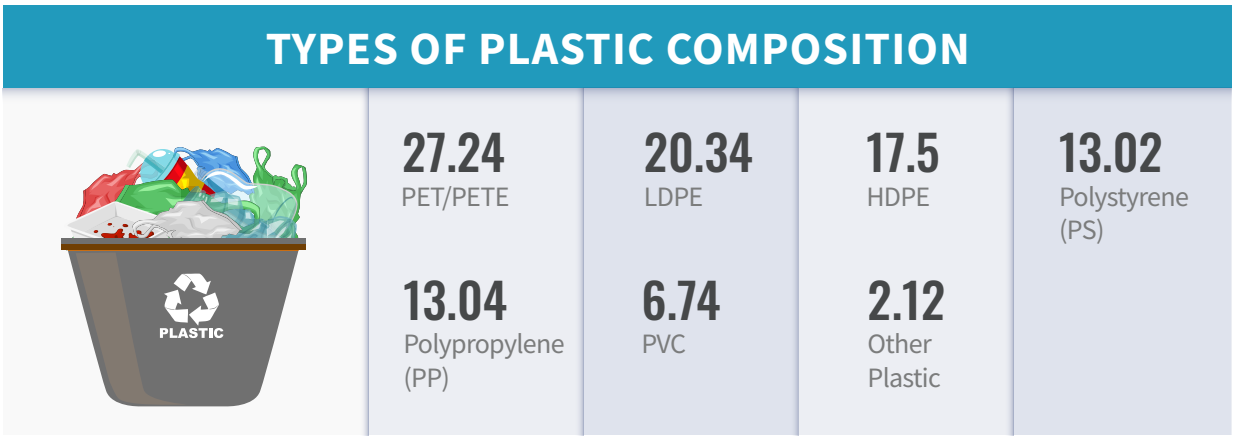

Figure 1: Plastic waste composition of Nepal (Adapted from UNDP report title 'Exploring the avenues of plastic waste management'

To understand the plastic waste management scenario in Nepal, it is important to understand the overall Solid Waste Management (SWM) context. As per the SWM Act of 2011, the responsibility of solid waste management is given to the local governments (LGs). Only a certain percentage of municipalities collect fees for waste management, so the revenue generation in this sector is weak. As suggested by a key informant from a local government, local level parliamentary members allocate budget for SWM. However, the key informant also highlighted that the budget headings are not always clear and definitive. LGs receive funds for environmental protection and sanitation, of which a certain percentage is allocated to SWM. Similarly, LGs can also request additional budget from the Provincial Governments (PGs) and Federal Government (FG) especially for SWM related projects such as construction of transfer stations and landfills. For instance, the construction of Banchare Danda Landfill site was overseen by the Ministry of Urban Development (MoUD) and handed over to Kathmandu Metropolitan City (KMC)[14]. Hence, LGs are reliant on PGs and FG for SWM which indicates their weak financial position for investing in this sector. The diagram below indicates fund disbursement mechanisms for SWM projects.

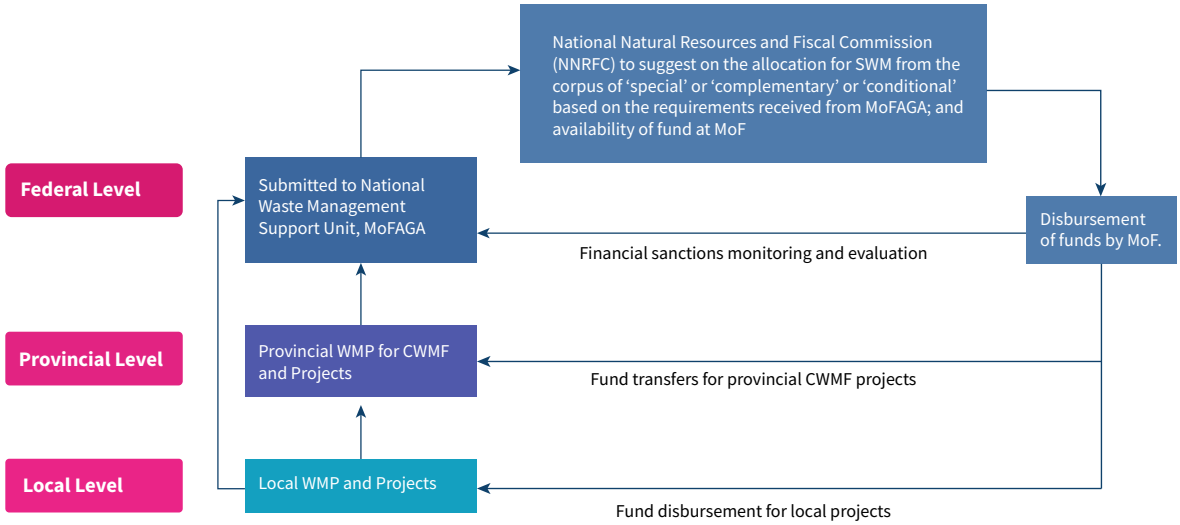

Figure 2: Indicative fund disbursement mechanism for SWM projects
(Source: Assessment of SWM Services and Systems in Nepal 2020, World Bank Group)

In most of the municipalities, solid waste management is carried out through a Public Private Partnership (PPP) model. The SWM Act of 2011 has provisions of private sector involvement in solid waste management. Chapter 4 of the Act highlights that *'The concerned local body may issue a license to a private company for collection, transportation and disposal of solid waste, use, reuse, recycled use or processing of solid waste, and enhancement of public awareness in the reduction of solid waste'*. Similarly, the government of Nepal has also formulated and enacted a Public-Private Partnership Policy, 2072. In that policy document, it is highlighted that PPP at local levels will be prioritized at the environmental sector including solid waste management[15]. Some of the best examples of this are Hetauda Sub-Metropolitan, and Biratnagar Metropolitan. In most of the PPP models, the private sector is responsible for collecting, transporting, segregating, and dumping the waste while municipalities are responsible for managing the transfer stations and landfill sites. Similarly, municipalities are also engaged in street sweeping activities. Other details regarding this partnership vary between municipalities. In Kathmandu and Lalitpur metropolitan, the metropolitan city itself engages in waste collection and management in the core areas, whereas a PPP model is existent in the outskirts. The diagram below shows the engagement of Lalitpur Metropolitan City (LMC) and private sector for waste management in LMC:

S.N.	Waste Management Operator	Waste Collection Wards	
		Complete Collection	Partial Collection
01.	Lalitpur Metropolitan City (LMC)		6, 7, 8, 9, 10, 11, 12, 16, 17, 19 and 20
02.	NEPSEMYAK (Private)	4, 13	2, 3, 5, 14, 18, 19, 20, 21, 22, and 25
03.	Bahu Udeshiye Cleaning Service Pvt. Ltd.	5	12, 13, 15, 19, 20, and 30
04.	Other Waste Collectors	Remaining Wards	

Dhankuta, Nepalgunj, and Kapilvastu are some of the municipalities that collect and manage their waste without any private sector involvement.

1.1.1 Plastic Waste Collection

Both formal and informal sectors are engaged in plastic waste collection in Nepal.
The diagram below depicts the plastic waste flow analysis along with the financial flow.

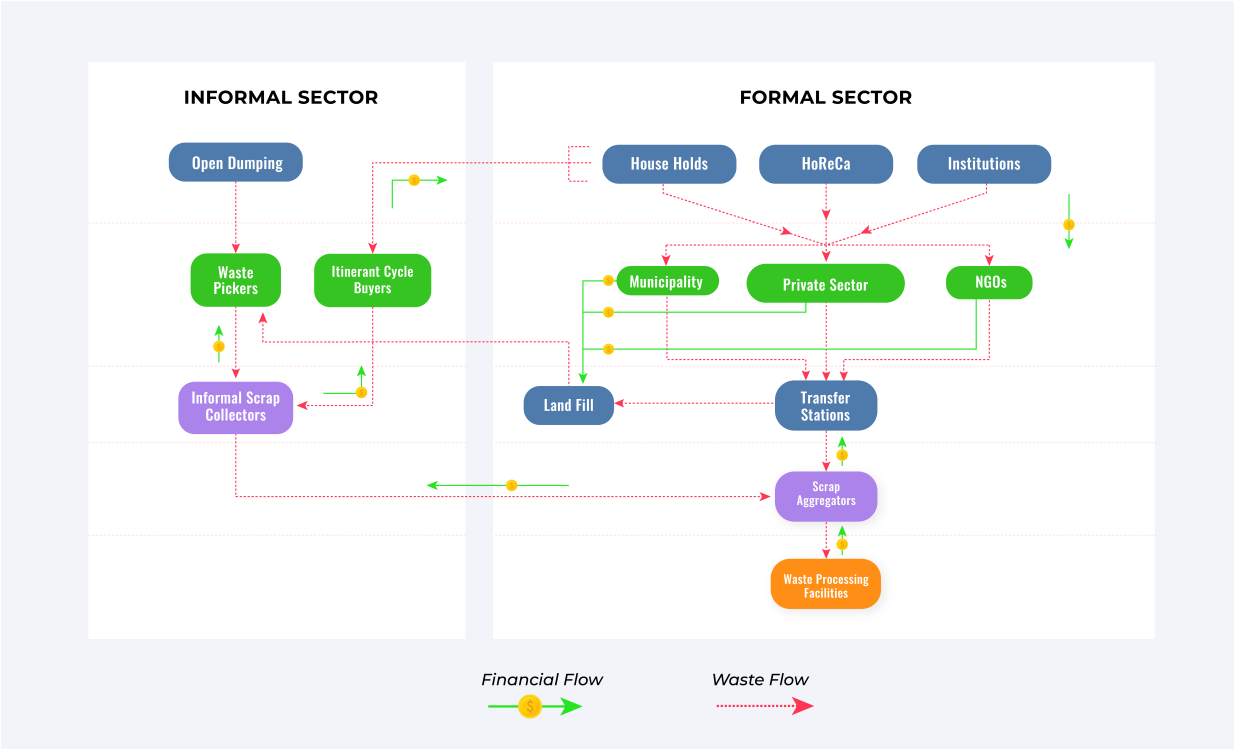

Figure 3: Material Flow Analysis of Plastics in Nepal

Formal Sector engagement in waste collection

In most municipalities, waste management- from collection to segregation to dumping is done either by municipalities, private waste management companies or a combination of both. The collected waste is then transported to the transfer stations where recyclables including plastics and non-recyclables are segregated. The non-recyclables are transported to the landfill or dumping sites and recyclables are sold to the scrap aggregators. Waste management companies or municipalities segregate recyclables themselves or handover segregation to third party via contract. Segregated recyclables are sold to informal scrap centers or scrap aggregators. Scrap Aggregators are larger registered collection centers where another level of segregation occurs. In the case of plastic waste, usually mixed plastic waste is segregated based on the plastic type which is then sent to respective recycling facilities.

Informal Sector engagement in waste collection

In Nepal, there are mainly two existing end solutions for plastic waste which are recycling and Alternative Fuel (AF). The existing recycling sector in Nepal is dominated by the informal sector. The most common types of plastics recycled in Nepal are PET, HDPE, LDPE, and PP. Similarly, MLPs have limited options for recycling and are mostly used as AF in clinker factories. However, waste burning often releases hazardous substances including dioxin and furan which are linked to several health impacts.

1.1.2 Plastic Waste Processing

In Nepal, there are mainly two existing end solutions for plastic waste which are recycling and Alternative Fuel (AF). The existing recycling sector in Nepal is dominated by the informal sector. The most common types of plastics recycled in Nepal are PET, HDPE, LDPE, and PP. Similarly, MLPs have limited options for recycling and are mostly used as AF in clinker factories. However, waste burning often releases hazardous substances including dioxin and furan which are linked to several health impacts.

ANALYSIS OF EXISTING ACTS AND POLICIES

The constitution of Nepal mandates local governments to handle the municipal solid waste. The legislative regulations that guide the local governmental bodies in solid waste management (plastic waste) after the promulgation of new constitution are:

- The Constitution of Nepal
- List of Power and Unbundling Report
- Federal, Provincial and Local Level [coordination and interrelation] Act 2077
- Inter-Governmental fiscal Transfer Act 2074
- Solid Waste Management National Policy, 2079 (2022)
- Solid Waste Management Act, 2068 (2011)
- Solid Waste Management Rules, 2070 (2013)
- Local Government Operation Act, 2074 (2018)
- Environment Protection Act, 2076 (2019)
- Environment Protection Rules, 2077 (2020)

The Constitution of Nepal

Fundamental Rights as per constitution Article 30. Right to Clean Environment:

(1) Every citizen shall have the right to live in a clean and healthy environment.

(2) The victim shall have the right to obtain compensation, in accordance with law, for any damage caused by environmental pollution or degradation.

(3) This Article shall not be deemed to prevent the making of necessary legal provisions for a proper balance between environment and development in development works of the nation.

In fundamental Rights article 35. Right relating to Health:

(1) Every citizen shall have the right to free basic health services from the State, and no one shall be deprived of emergency health services.

(2) Every person shall have the right to get information about his or her medical treatment.

(3) Every citizen shall have equal access to health services.

(4) Every citizen shall have the right of access to clean drinking water and sanitation.

The constitution of Nepal institutionalized federalism. According to the article 56:

(1) The main structure of the Federal Democratic Republic of Nepal shall be of three levels, namely the Federation, the Province and the Local Level.

(2) The Federation, Provinces and Local Levels shall exercise the State power of Nepal in accordance with this Constitution and law. Similarly, article 57 has mentioned distribution of power as per schedule of the constitution.

List of Power and Unbundling Report

As per the scheduled and unbundling report the jurisdiction of solid waste management falls under local level. Management of local services has mentioned in no 5, basic health and sanitation in 9 and 10. It has been mentioned in unbundling report as following:

9	Basic health and sanitation	9.1	Policy, law, standards, planning, implementation and regulation relating to basic health and sanitation
		9.2	Operation and promotion of basic health services
		9.3	Establishment and operation of hospitals and other health institutions
		9.4	Physical infrastructures development and management relating to health services
		9.5	Matters relating to healthy drinking water and quality of food materials and air and sound pollution control
		9.6	Management of sanitation awareness program and health related waste
		9.7	Collection, reuse, processing, disposal, determination of service fee and regulation of health related solid waste
		9.8	Matters relating to blood circulation service, local and urban health service
		9.9	Matters relating to medical shop operation and regulation

10	Local market management, environment protection and bio-diversity	10.2	Environmental protection and bio-diversity
		10.2.1	Policy, law, standards, planning, implementation and regulation relating to local environment protection and biodiversity
		10.2.2	Environmental risk reduction in local level
		10.2.3	Pollution control and regulation and management of harmful materials in local level
		10.2.4	Sanitation and solid waste management in local level
		10.2.5	Minimum carbon related and environment friendly development in local level
		10.2.6	Green areas production in local level
		10.2.7	Determination of environment protection areas and management in local level

Federal, Provincial and Local Level[coordination and interrelation] Act 2077

The waste management issue is a local, but it has to be coordination from federal and local Exclusive list and concurrent list management system has been mentioned in the act. Coordination and collaboration in principle has been mentioned in the act. National coordination council and provincial coordination council formation and functions.

Even in concurrent list the law has mentioned in clause 6 of the Act as *"The regulation and awareness at the local level regarding the quality of service delivery and public health, including consumption, public service delivery at the local level will be from the local level or against the local law."*

Solid Waste Management Act, 2068 (2011) and Solid Waste Management Rules, 2070 (2013)

Among the aforementioned regulations, SWM Act and Rules are the governing regulations for solid waste management in Nepal. The act has been formulated to make the management of the municipal solid waste in a systematic and effective way (from source to discharge) and for maintaining a clean and healthy environment through the reduction of adverse effects by amending the existing laws related to the management of solid waste. This act covers management of household, industrial, chemical, health and harmful waste. The local bodies act on these regulations for reduction, re-use, recycling and issuing necessary directives for their effective implementation. Until 2020, only 150 urban municipalities have developed waste management plans and policies[16]. The SWM act of 2011 was endorsed before the promulgation of three tiers of government and their responsibilities. The act also missed out on several other solid wastes such as plastic waste, demolition waste/disaster waste, electronic waste. Plastic waste being the second largest solid waste (~16% of the total composition as stated by studies from scholars, World Bank Group, UNDP, ADB) has not been emphasized in the regulation. Considering the necessity of refined regulation, the SWM act is currently being revised by MoFAGA with support from UNOPS.

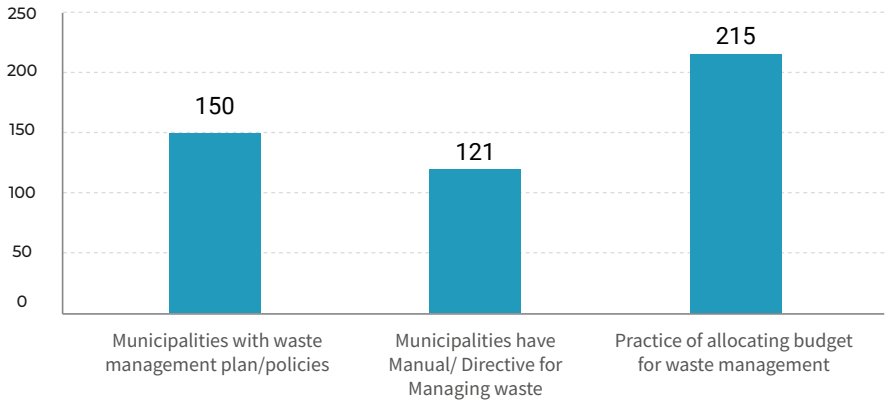

Figure 4: Municipalities with SWM policies/plans/directives, (Source: UNDP report titled 'Exploring the avenues of plastic waste management')

Most of the recyclables are recovered by the informal sector across the country, but their contribution has not been considered in any of the current regulations.

Solid Waste Management National Policy, 2079 (2022)

The new Solid Waste Management National Policy 2022 replaced the Solid Waste Management National Policy 1996 to accommodate increased urbanization, increased per capita waste, and three tiers of government along with development of participatory approach for infrastructural development the national policy aims to promote waste as resource by supporting circular economy, guide SWM acts and regulations. The policy intends to guide the management of solid waste generated from households, industrial area, and service areas; and encourage private sector engagement in order to reduce the advert effect from SWM. Along with responsibility division among local, provincial and federal governmental bodies, the policy has also defined the roles of each governmental bodies which are as follows:

Table 2: Responsibilities of governments for SWM as per the Solid Waste Management National Policy of 2022

Government	Roles
Federal	Development of acts, policies and regulations; conduct research and technology development; and attract foreign investment in SWM
Provincial	Development of infrastructure such as landfill and coordinate the local governmental bodies within its jurisdiction
Local	Management of MSW from source to disposal and development of municipal acts for management of waste

The policy highlights the following strategy for proper management of solid waste:

- Development of laws based on its source and types for management of solid waste
- Development of laws for management of solid waste based on its type
- Promotion of source segregation for reduction in disposal
- Increasing public awareness and encouraging public participation
- Setting clear responsibilities for all tiers of government
- Increasing public private partnership and investment in waste management
- Development of baseline data and research on technology
- Capacity building of relevant stakeholders for management of SW

Environment Protection Act, 2076 (2019) and Environment Protection Rules, 2077 (2020)

EPA is the governing legislation to control environmental pollution. The environment protection act and rules state that the council led by the prime minister has the power to set policy for the development of a national system for the control of pollution and management of waste. All the acts on solid waste management, ban on single use plastic are enforced based on chapter 3, section 15, sub section 6 which states *"The Government of Nepal may, by a notification in the Nepal Gazette, determine necessary standards for the mitigation or doing away with the impacts of pollution from any motor vehicle, device, equipment, industrial enterprise, hotel, restaurant or other place or goods or activity or effects from the disposal or emission of any hazardous substance. (2) No person shall create pollution in such a manner as to cause significant adverse impacts on the public life, public health and environment or do, or cause to be done, any act contrary to the standards determined by the Government of Nepal pursuant to sub-section (1)."*

As stated, the local level governments are mandated to carry out waste management operations in accordance with the prevailing environmental standards. However, at present there are no prescribed environmental standards for solid waste management sector which are required to be complied with.

Local Government Operation Act, 2074 (2018)

Local Government Operation Act mandates the local bodies to carry out operations of solid waste management. The act enables the local governmental bodies to formulate their own laws or policy, but the followings criteria are set during the formulation process:

- Shouldn't encroach upon exclusive powers of Federal and Province Level
- Avoid duplication with the federal and provincial laws by maintaining implementation role by local level
- Remain consistent with federal law
- Remain consistent with national policy or priorities

Policies Targeting on Plastic Types

Legal framework in support of plastic waste management has been evolving in recent years that caters to specific types of plastic waste. There are specifically two policies that aims to reduce/control the plastics production, usage and leakage in the environment:

- Plastic Bag Ban Action Plan, 2079 (2021)
- Ban on production, import, sales, distribution and storage of plastic flower (2022)

A national level ban on plastic bags was initiated in 2011 with Plastic Bag Regulation and Control Directive prohibiting the production, import, sale, distribution and use of plastic bags less than 20 micron in thickness[17]. And, it has been revised three times[18]. Simultaneously, the local government also had the power to ban plastic items if deemed necessary according to the Nepal Local Self Governance Act 1999 and Regulation 2000. Based on the act, several local governmental bodies implemented the banning of plastic bags such as Ilam Municipality, Kathmandu Metropolitan City, Baglung Municipality, Dhangadi Municipality, Khumbu Pasang Lhamu rural municipality, Tilottama Municipality etc. Most of the ban on plastic bags were ineffective until the recent rule of ban on plastic bags below 40-micron published in Nepal Gazette in 2021[19]. Kathmandu Metropolitan City is currently strictly enforcing the plastic ban act by conducting stringent monitoring.

A handful of local governments have formulated specific plastic waste policies for reduction of plastic waste viz. Tilottama Municipality, Khumbu Pasang Lhamu rural municipality and Dhangadi Sub-metropolitan city. Dhangadi sub-metropolitan city banning of plastic articles act enforces ban on production, storing, distribution on all type of single use plastics in its jurisdiction and encourages biodegradable bags. Similarly, Tilottama municipality in 2019 declared itself as plastic-bag free zone with plastic bag prohibition campaign that prohibited plastic cups, plates and spoons along with plastic bags. Khumbu Pasang Lhamu rural municipality in the foothills of the Himalaya completely bans the use of plastic bags and bottles in 2020 to reduce the negative effects of plastic in climate change, human health and mountainous ecosystem.

Published in Nepal Gazette in 2022, the government imposed complete ban on production, import, sales, distribution and storage of plastic flower. The ban forecasted the halt on import of decorative materials made of plastic worth Rs 10 crore annually. But the ban has not been implemented effectively with 15 Tons of import in the first month of the ban[20].

ISSUES OF PLASTIC WASTE MANAGEMENT

3.1 Lack of funds at local levels for waste management

Most of the local governments have expressed that they lack sufficient budget for solid waste management. Since most of the LGs are directly dependent on the PGs and FG for budget allocation, their financial position is weak for investing in waste management projects[21]. According to a KII conducted by CREASION in six municipalities at Bagmati and Madhesh provinces, lack of land for landfill setup and lack of budget for waste management were identified as the two major problems at LGs for waste management. Similarly, a study conducted by UNDP on 285 municipalities, budget allocation was found to be minimal with ore than 85% municipalities allocating less than 5% of the total budget for waste management[22].

3.2 Lack of source segregation

Source segregation is important in plastic waste management as it saves sorting and segregation costs and also ensures a supply of cleaner plastic waste for recyclers which helps to improve the quality of recycled products.

Lack of source segregation is a major issue of plastic waste management in Nepal. This issue directly stems from lack of public awareness and lack of mechanism for segregated waste pick up. Several LGs have initiated public awareness programs for source segregation of waste. However, the effectiveness of such programs is still questionable. In 2022, KMC announced that it will start penalizing people/households who do not segregate their waste into degradable and non-degradable[23]. However, there was no proper planning behind it and ultimately it didn't come into implementation. Additionally, lack of adequate source segregation is also one of the reasons for high plastic waste leakage[24].

Furthermore, lack of source segregation means plastic waste is usually mixed with organic waste which can decrease its recyclability or result in lower grade output. Thus, source segregation is important in efficient plastic waste management process.

3.3 Lack of SWM policies/directives/guidelines at LGs

SWM Act highlights that 'The concerned Local Body may formulate and implement necessary guidelines for the management of solid waste'. The UNDP report highlights that out of 285 municipalities surveyed only 150 had solid waste management policies and directives. The existing laws/policies at local levels are not properly and appropriately developed in line with the constitution and SWM act. Furthermore, the lack of a guiding document has hindered the waste collection and management process at local levels. Although waste management at local levels is mainly implemented through a PPP model, there are no proper guidelines to dictate this government-private partnership. SWM Act 2011 highlights that the private sector involvement in waste management should highlight *'Details of manpower and technology required relating to the management of solid waste'*. However, in several municipalities, private companies do not have required manpower and technology for waste collection and management. Seventy-three urban municipalities lacked proper institutional mechanism for effective waste management[25].

Not all municipalities have specified waste management units, in many of the municipality's waste/environment units have been merged with sanitation, health, administration, urban, and disaster. Thus, resulting in weak institutional mechanism and proper implementation. Furthermore, the informal sector plays an important role in waste management, but their contribution is not recognized, and they aren't integrated properly in the solid waste value chain. For instance, scrap centers establishment and operation has been banned within the metropolitan area (KMC and LMC) due to the higher risk and vulnerability from incidence such as fire. Similarly, they are moving the existing scrap centers. However, both LMC and KMC lack proper resettlement plans for these scrap centers. Hence, local SWM policies are important to contextualize local level problems and address them through policy action.

3.4 Lack of sanitary landfill sites

According to MIT, four major requirements need to be met for a sanitary landfill site which are: full or partial hydrogeological isolation, Formal engineering preparation, Permanent control, and Planned waste emplacement and covering[26]. Lack of sanitary landfill sites is a major issue, not just in Kathmandu valley, but throughout the country. Most of the municipalities have temporary landfill sites that are located along the riverbanks. One such example is Bharatpur Metropolitan city whose landfill site is located along the banks of Narayani River. The waste from this landfill is carried to the Chitwan National Park especially during monsoon season. The discovery of macro plastics in rhino dung can also be linked to this. Furthermore, the existing landfill sites are open landfills meaning that they do not have proper treatment of leachate. Construction of a sanitary landfill site requires huge investments, but local governments lack funding and technological knowledge in this regard.

3.5 Taxation on waste transportation

As per the constitution, federal provincial and local level equally able to perform their duty within their jurisdiction such as law-making budget making, policy formation, development of program and implementations. Similarly, as per inter-governmental fiscal transfer Act 2074 , clause 3(3) local government are competent to collection of tax and non-tax according to schedule 3 of the Act.
Clause 5 of the act has clearly mentioned that there will be no any duplication in taxation therefore single tax administration provision has managed. If anything else, the issues will be handled by intergovernmental fiscal council headed by federal finance minister. However, there are number of hassles beyond the legal provisions in daily practices. The daily practices beyond the laws have to be regulated.

'Local level may impose taxes on matters falling within their respective jurisdiction and collect revenue from these sources'. Similarly, Section 19 further goes on to highlight that 'The Local Level may levy tax by making a law on matters falling within its jurisdiction without prejudice to national economic policies, carriage of goods and services, capital and labor market, and the neighboring Province or Local Level' This suggests that Local Levels cannot impose taxes or regulations that might hinder or obstruct the smooth flow of goods and services within and across different regions of Nepal.

Despite these clear provisions in the constitution, LGs are levying taxes (commonly referred to as kabadi tax in this sector) at multiple points for the transportation of waste. The amount of kabadi tax ranges from NRS 0.5/kg to 1.5/kg. For instance, if plastic waste collected in Kathmandu is being transported to Birgunj for recycling, a collector has to pay kabadi tax at around four different points. This adds up to a significant amount which has discouraged the collectors (private sector) from engaging in waste collection and management.

3.6 New law or reform in existing laws

Policies related to management of solid waste were first introduced in 1987[27] which mostly focused on characterization of solid waste and setting responsibility of management of waste produced. Since waste composition has tremendously changed with increment of recyclables such as plastics, there is need for new policies that govern plastic waste. This is one of the barriers that has held back the recycling potential in the country. With enormous recycling potential in the country according to UNDP, only 30% is currently being recycled1. Recycling is an evolving market but with lack of standard criteria set by the government of waste plastic and different recycled polymers is also seen as a barrier to the market. The plastic manufacturers are uncertain of the recycled pellets quality thus recycled pellets are scarcely used by the manufacturers and absence of recycling standard consequently hampers the qualities of recycled plastic.

3.7 Low Demand for recycled plastics

Although recycled plastics cost cheaper than virgin plastics, their market demand is low. Furthermore, the demand for recycled plastics and pellets is directly linked with the prices of virgin plastics. When the prices of virgin plastics are high, the demand for recycled plastics is high, and vice versa. So, the market for recycled plastics is volatile. This can be directly attributed to the lack of government standards for recycled products. Without any government standards, the existing recyclers do not have the mandate to produce a certain quality to compete with the virgin plastics. Different studies have already concluded that the quality of recycled plastics isn't that far off the virgin plastics. But several factors including, low price difference between recycled and virgin plastics, lack of government standards for assuring quality, and lack of consumer education on recycled products have all been attributed to the low demand for recycled plastics.

CONCLUSION

As plastic consumption continues to grow, the health and environment impacts associated with it will also intensify. The recent discovery of macro-plastics in the dung of one-horned rhinos and in the snow samples of Mt. Everest have highlighted the ever-growing issue of plastic pollution in Nepal.

The policy brief demonstrates that the biggest challenge in plastic waste management is lack of strong governance and monitoring. The recent Solid Waste Management National Policy 2022 has addressed the increased urbanization and changing waste composition and provides a set of guidelines for effective SWM. However, there is a need for institutional strengthening, financial support, and capacity-building at local levels for addressing the issue of plastic waste. This policy brief has compiled a set of recommendations based on the existing plastic waste management scenarios, and an analysis of acts and policies, which is targeted at key stakeholders engaged in the process.

WAY FORWARD/ POLICY RECOMMENDATIONS

5.1 Data collection, management, and dissemination:

Data plays an important role in informing policies. So, improving data collection through a uniform methodology to understand the waste collection rates and efficiency, and waste recovery rates will help make efficient plans for different SWM activities. For the data collection, it is important to develop an integrated methodology that can be adopted locally throughout the country. Furthermore, periodic updates of the data will also play a crucial role in monitoring progress. In most of the existing research documents, waste collection and recycling data from informal sector is not well incorporated. Hence, to have a better understanding of the overall solid waste management sector, it is important to develop a methodology to incorporate the data of informal sector as well.

Along with the data collection, proper dissemination of the data will be important in informing the general public and other key stakeholders about the existing scenario of SWM. Thus, training LGs on proper data collection, management, and dissemination will support evidence-based policies for efficient SWM management. Additionally, local governments will also need training on plastic types, recycling process, and their overall impact to better understand the gravity of the issue.

5.2 Improvement in source segregation:

Source segregation plays an important role in improving the economics of waste by supplying clean raw materials to the recyclers or re-processors[28]. Rotational collection or scheduled collection is one of the ways to promote source segregation. NEPSEMYAK, a private waste collection company has already started scheduled collection in certain areas of Kritipur and Nagarjun municipalities. Furthermore, case studies from India also show that scheduled collection is an effective method for source segregation. Similarly, another approach for promoting source segregation is penalties for non-compliance. Although KMC had planned to enforce penalties, it did not come into implementation. A case study from Bangalore, India, indicates that penalties for non-compliance on source segregation was able to achieve 35% source segregation within one year of its implementation. Thus, scheduled collection and penalties can promote source segregation culture in Nepal.

5.3 Improve plastic designing for recyclability:

Most plastics (and products in general) are designed for aesthetics and functionality. The design of plastic can affect the value and quality of recycling[29]. For instance, green PET bottles' recycling value is lower as compared to the transparent bottles. It is estimated that the recycling costs of plastic packaging can be reduced up to 50% through improvements in designs. In addition, the manufacturers do not have incentives to promote sustainable designs that are easy to recycle. Thus, the policy reform should target providing financial incentive to manufacturers for sustainable designs. Extended Producers Responsibility (EPR) mechanism is a proven and efficient way to incentivize sustainable product designing to complement recycling process.

5.4 Addressing the issue of Micro-Plastics:

Microplastics (MPs) are tiny plastic particles that result from the breakdown of larger plastic particles. Microplastics are less than 5 millimeters in length and as a result of their tiny size, they enter our food and water sources easily. To address the issues of microplastics, preventive responses are more efficient than mitigation measures[30]. Due to the nature and impact of microplastics, it is important to incorporate MPs in our policies. Furthermore, the plastic waste management solutions should also expand on technological advancement with a focus on MPs.

5.5 Engaging private sector in SWM:

Although the private sector is widely involved in SWM through PPP model, their role mainly extends to waste collection and disposal. The existing private sector are not able to expand their services due to lack of sustainable financing. One of the ways to ensure sustainable financing is by increasing the collection fees, but the research indicates that households are unwilling to pay higher collection fees[31]. According to the World Bank, Output-Based Aid (OBA) is an instrument that allows for efficient use of funds which can be an effective tool for enhancing private sector involvement in the sector[32]. Currently, the sources for revenue generation for the private sector involved in municipal SWM are limited which adds to their financial risks. OBA subsidies targeted at the private sector can help in improving services while significantly reducing the financial risks. This can ultimately help in increasing private sector involvement in SWM. Another way to encourage private sector involvement in SWM is by supporting the LGs to establish MRFs. A study concluded that revenue generation can be increased by increasing the efficiency of recovering high-value waste materials[33]. Thus, establishment of municipal level MRFs, coupled with source segregation, and improved designs of plastics will help generate more profit for the private sector.

5.6 Formation of a national taskforce to develop roadmap for plastic sustainability:

A comprehensive way of dealing with plastic waste management is involvement of all stakeholders (recyclers, academicians, governmental representative, activists, FNCCI, CNI) in the formation of a national taskforce to develop a roadmap for plastic waste management and reduction. The roadmap should include sustainable financing, plastic alternatives, innovations and technologies that support plastic recycling. The roadmap provides areas of investment in the development and expansion of waste collection infrastructure, including efficient waste management systems, recycling centers, and collection points. The roadmap will be important to:

I. Establish a well-coordinated network of collection facilities across urban and rural areas to ensure widespread access to recycling services.
II. Encourage collaborations between the government, private sector, and non-governmental organizations to enhance plastic waste recycling efforts.
III. Foster partnerships to develop and fund recycling initiatives, technology advancements, and capacity building programs.

5.7 Development of recycling standards/ guidelines/certification:

Recycling standards, rules, and certification should be developed with the help of the government, Nepal Bureau of Standards and Metrology (NBSM), and recyclers to promote the circularity of plastics throughout the nation. Bringing value chain participants together will make it easier for manufacturers to communicate required standards to aggregators, sorters, and waste management companies. It will also enable cooperation between waste management companies and manufacturers on more practical holistic solutions for designing for recyclability, ensuring that waste management process and design for recycling are in line. A standard or guideline guarantees that producers will set up a system to certify goods created in conformity with the standards. Promoting and supporting certification of recycled plastic builds confidence in its production from recycled materials. However, manufacturers hesitate to use recycled sources due to uncertainty about material quality. Certification ensures quality and traceability of recycled plastics, creating a robust market framework for waste sorters, compounders/recyclers, and manufacturers/producers. It also promotes transparent communication throughout the value chain. This will provide a complete end-to-end recycling solution for plastic waste.

5.8 Provision of taxation on virgin plastics:

One of the major barriers to recycling is low demand for recycled products which stems directly from low price difference with virgin plastics. To even the playing field, the government should levy additional taxes for virgin plastics. Additional tax will help limit the imports of virgin plastics and boost the recycling industry. This will encourage plastic manufacturers to use recycled pellets for manufacturing plastic articles.

5.9 Institutionalizing Extended Producers Responsibility (EPR):

According to OECD, EPR is *'an environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle.'* EPR has two major provisions:

i) To shift the responsibility (either physically or economically, either fully or partially) towards the producers and away from the municipalities,

ii) To incentivize sustainable product designing[34]. The introduction of EPR has had a positive impact on plastic collection and recycling throughout the globe[35]. According to a study, developing countries like Nepal should focus on '*differentiating the responsibility of producers depending on recyclability, focusing on rural areas, involving informal sector, joint facilities in recycling park, and expanding waste collection services*'[36].

Extended Producers Responsibility (EPR) is a part of polluters pay that ensures the primary producers, importers, are responsible for disposal/ handling post-consumer products imported or produced in the country. The polluters' pay principle is also highlighted in the Local Self-Governance Act but the consumers (public and institutions) that subscribe to the waste management services are recognized as the polluters.

5.10 Integration of Informal Sector in Plastic Waste Management:

Informal Sector usually collects waste from two major avenues: i) Source collection, and ii) environment leakage points such as dumping sites and landfills. Hence, they play an integral role in waste management in Nepal. They promote source segregation by collecting recyclables from households, and other institutions, and prevent waste leakage into the environment. So, it is important to integrate the informal sector into the waste management planning process. Similarly, the recycling sector in Nepal is also dominated by the informal sector. So, the knowledge and know-how on waste management accumulated by this sector should be integrated into the planning and policy process for effective waste management.

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ABOUT **CREASION**

Center for Research and Sustainable Development Nepal (CREASION) is a not-for-profit organization that was established in 2005. Since it was founded, CREASION has been a leader in environmental protection in Nepal through recycling, research, emergency response, grassroots and circular economy related interventions. CREASION also houses innovative, impact-based projects as well as a learning center for youth. CREASION's work is majorly centered around four thematic areas; Environment and Sustainability, Emergency Disaster Response and Youth Empowerment.

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