

## Master of Science in Geography

### Public-Private Partnership Implementation Process in the Solid Waste Management in Kathmandu Valley

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## Summary

This research provides a comprehensive analysis of the current waste management situation in Kathmandu Valley and evaluates the process and impact of implementing a Public-private partnership with the Nepwaste company. It explores the complex challenges faced by the project and its repercussions on the existing Solid Waste Management (SWM) system. The study is structured into two main sections: a review of the current state of waste management and its recent evolution, followed by an in-depth exploration of the Nepwaste project and its implementation challenges. Despite its initiation in 2009, the project remains incomplete, with various challenges impeding its progress.

The findings reveal a complex system of command, inefficient communication, and limited collaboration among stakeholders, frequent changes in project leadership, and a constant lack of transparency and public involvement in the process. The research also underlines the significant role of bureaucratic issues, unclear and shifting legal framework, and lack of dedicated entities in prolonging the project's implementation.

The current SWM system in Kathmandu is inadequate and stagnated because of the Nepwaste project. The expectation of the project's completion has led to reduced investments in the sector, causing injustice to the most affected populations, such as the urban poor and residents of Sisdol. The situation in Kathmandu Valley is particularly intriguing due to the complexity and multitude of actors involved, as well as the ambiguity surrounding the legal status of the sector. Local authorities, namely municipalities, are legally accountable for SWM. However, most of daily waste collection is carried out by private enterprises.

This research concludes that effective decision-making, a clear legal framework, and increased collaboration between stakeholders are imperative for successful and sustainable waste management solutions. The Nepwaste project holds potential for significant improvements; however, its eventual success depends on addressing these systemic issues. Future research should aim to provide more comprehensive data through diverse sources, monitor the project's progress and implementation, and evaluate its impact on the local communities.

Key words: Solid Waste Management, Kathmandu Valley, PPP process, Urban Political Ecology, Stakeholders' perspective

## Résumé

Cette recherche fournit une analyse complète de la situation actuelle de la gestion des déchets dans la vallée de Katmandou et évalue le processus et l'impact de la mise en œuvre d'un PPP avec l'entreprise Nepwaste. Elle explore la complexité des défis auxquels le projet est confronté et ses répercussions sur le système existant de gestion des déchets solides (GDS). L'étude est divisée en deux sections principales : une analyse de l'état actuel de la gestion des déchets et de son évolution récente, suivi d'une exploration en profondeur du projet Nepwaste et de ses défis de mise en œuvre. Bien qu'il ait été lancé en 2009, le projet reste inachevé, divers obstacles et défis ayant entravé sa progression.

L'analyse révèle une chaîne de commandement complexe, une communication et une collaboration inefficaces entre les parties prenantes, des changements fréquents dans la direction du projet et un manque persistant de transparence et d'implication du public dans le processus. L'étude souligne également le rôle important des problèmes bureaucratiques, du cadre juridique flou et changeant et du manque d'entités spécialisées dans la prolongation de la mise en œuvre du projet.

Le système actuel de GDS à Katmandou est inadéquat et en stagnation à cause du projet Nepwaste. L'attente de l'achèvement du projet a conduit à une réduction des investissements dans le secteur, impactant principalement les populations défavorisées. La situation dans la vallée de Katmandou est particulièrement intrigante en raison de la complexité et de la multitude des acteurs impliqués, ainsi que de l'ambiguïté entourant le statut juridique du secteur. Les autorités locales, à savoir les municipalités, sont légalement responsables de la GDS. Cependant, la plupart des collectes quotidiennes de déchets sont effectuées par des entreprises privées.

Cette étude conclut qu'un processus décisionnel efficace, un cadre juridique clair et une collaboration accrue entre les parties prenantes sont impératifs pour que les solutions de gestion des déchets soient efficaces et durables. Le projet Nepwaste est susceptible d'apporter des améliorations significatives. Toutefois, son succès éventuel dépend de la résolution de ces problèmes systémiques. Les recherches futures devraient viser à fournir des données plus complètes à partir de diverses sources, à suivre les progrès et la mise en œuvre du projet et à évaluer son impact sur les communautés locales.

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## List of abbreviations

BLS	Banchare Danda Landfill Site
CIUD	Center for Integrated Urban Development
DoUDBC	Department of Urban Development and Building Construction
DPR	Detailed Project Report
EEE	Electrical and Electronic Equipment
FDI	Foreign Direct Investment
IBN	Investment Board Nepal
IWW	Informal Waste Workers
KMC	Kathmandu Metropolitan City
KV	Kathmandu Valley
MoFAGA	Ministry of federal Affairs and General Administration
MoU	Memorandum of Understanding
MoUD	Ministry of Urban Development
NCCR	Nepal Center for Contemporary research
NCP	Nepal Communist Party
NPR	Nepalese Rupees
PDA	Project Development Agreement
PM	Prime Minister
SaSaJa	Sanyukta Safai Jaagaran
SLS	Sisdol Landfill Site
StEP	Solving the E-Waste Problem
SWM	Solid Waste Management
SWMTSC	Solid Waste Management Technical Support Center
SWMRMC	Solid Waste Management and Resource Mobilization Center
UPE	Urban Political Ecology
USD	US Dollar

# 1. Introduction

## 1.1 Waste management in developing countries

Rapid global urbanization and evolving consumption habits are putting huge pressure on the environment. Over half the world's population, approximately 4.2 billion people, reside in urban areas (Dodman et al., 2022). This figure has increased by 397 million between 2015 and 2020, mainly in less developed regions (Ibid.). By comparison, in 1850, the urban population was only 6.5%, and 29% in 1950 (Lowry, 1990). UN projects that 68% of the global population will inhabit in cities by 2050 (Desa, 2018). This demographic shift profoundly impacts South Asia, where these changes present significant waste management challenges.

The World Bank (2023a) reports an increase in urban population in this region from 27% to 35% between 2000 and 2021, coupled with an increase from 1.41 billion to 1.9 billion in total inhabitants. Consequently, the total urban population in South Asia increased from 380 million in 2000 to 665 million in 2021, a 75% increase (World Bank, 2023b). Shifts in consumption patterns, accompanied by more consumerism, adds to the growing urbanization, leading to a drastic increase in solid waste<sup>1</sup> production.

Cities generate over 720 billion tons of waste annually (Gutberlet, 2018), equivalent to the weight of 5 billion blue whales. Experts predict that South Asia's waste production will grow by a factor of 2.8 between 2010 and 2025 (Hoorweg and Bhada-Tata, 2012 in Véron et al., 2018). Additionally, there is a shift in waste composition. Previously dominated by organic waste, the region now has a rise in other types of waste, particularly plastic, which has seen a surge in production during the 1980s and 1990s and poses countless problems due to its omnipresence and recycling difficulties (Demaria & Schindler, 2016).

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<sup>1</sup> "Solid Waste" means domestic waste, industrial waste, chemical waste, health institution related waste or harmful waste and this word shall also mean the materials which cannot be used presently, thrown away or in rotten stage or in solid, liquid, gaseous, thick liquid, smoke, or dust form emitted out damaging the environment or materials and equipments used for electrical or information technology or any other materials of such nature or posters, pamphlets posted unauthorized at public places or other substances prescribed as solid waste through publication of notice in the Nepal Gazette by the Government of Nepal from time to time. (SWM Act 2011, article 2 al.o)

The growing production of e-waste<sup>2</sup> is another increasing issue for these countries, which lack processing infrastructure for this kind of waste. The production of e-waste in Southeast and East Asia increased by 63% between 2010 and 2015 (Kuah & Wang, 2020)! Rising waste production and its diversification escalate pressure on cities and their inhabitants, exacerbated by inadequate planning and lack of waste management options (Mohammadi et al., 2019). Urban sprawl further reduces available space for waste management (Véron et al., 2018).

In many cases, the problems start with waste collection. According to Ezeah et al. (2013), only 30 to 70% of the waste produced in developing countries are collected for disposal. The rest of the waste ends up in open dumps, along roadsides, or in rivers (Ibid.).

Figure 1 identifies the risks associated with waste mismanagement.

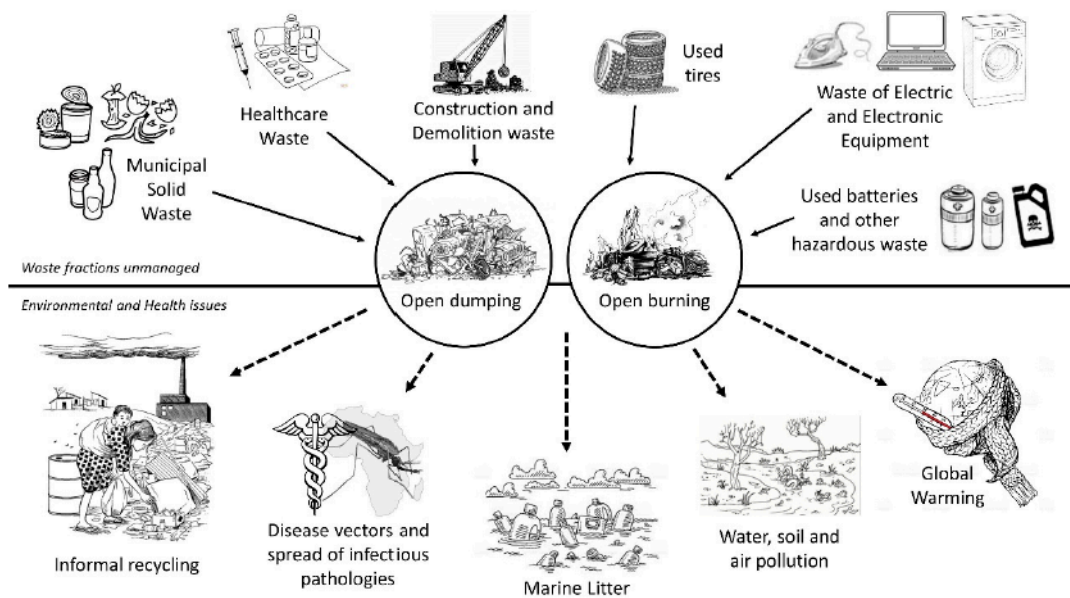


Figure 1 Solid Waste Mismanagement impact (Ferronato & Torretta, 2019)

High costs, growing waste production, and insufficient large-scale waste handling expertise complicate waste management in developing countries. The sector's multifaceted nature demands involvement across various domains like political commitment, infrastructure adequacy, vehicle maintenance, and staff training (Guerrero et al., 2013). To address these

<sup>2</sup> E-waste is defined by StEP (Solving the E-Waste Problem) as "a term used to cover items of all types of electrical and electronic equipment (EEE) and its parts that have been discarded by the owner as waste without the intention of reuse." (Danish et al., 2023)

challenges, governments frequently ally with larger entities, including multinational corporations and global institutions. Such associations often lead states and municipalities to emphasize environmental initiatives, good governance, and sizable private sector involvement via public-private partnerships (PPPs) (Marshall et Farahbakhsh, 2013 in Véron et al., 2018).

A Public-Private Partnership (PPP) is a form of collaboration between a government or a public agency and one or more private companies, in which both parties share risks, responsibilities, and resources to provide public services or develop public infrastructure (Jamali, 2004).

PPPs are often used to finance large-scale projects, where the government does not have enough funds or expertise to undertake the project on its own. PPPs generally involve a long-term contract, in which the private partner assumes some of the risks associated with the project and invests its own capital, while the government provides regulatory oversight, support, and funding. A PPP aims to create a mutually beneficial partnership that leverages the strengths of both the public and private sectors to achieve common goals (Ibid.).

This paper examines a Public-Private Partnership (PPP) in the Solid Waste Management system in Kathmandu Valley (KV), Nepal, between Nepwaste, a transnational company, and 11 municipalities in the KV, including Kathmandu Metropolitan City (KMC). The project aims to transfer all waste management duties, currently legally assigned to the municipalities, to Nepwaste. An intriguing situation arises as numerous municipalities, although legally obligated to manage solid waste, have effectively been replaced by private companies that collect household waste, compensating for the municipalities' deficiencies. This creates a complex scenario wherein the PPP between the municipalities and Nepwaste must consider other daily waste management stakeholders.

Initially, the research aimed to focus on the local population's response and private companies' strategies to the Nepwaste project, which could significantly impact them. However, the reality is that private companies are organized under an entity known as the "Solid Waste Management Association Nepal" (SWMAN), which defends their interests and acts as their representative in the KV, forming their primary line of defense and strength. Consequently, no additional actions were required, as their organization is already robust and respected among other stakeholders, including the proponents of the Nepwaste project.

Regarding public perception, the lack of accessible information excludes an extensive understanding of public opinion until the project is fully presented to them. The tender call started at the end of 2009, but the project remains unimplemented, leading to a unique situation where the entire system is on hold, awaiting implementation.

This study seeks to explore the process initiated over 12 years ago, and to understand the roles of the various stakeholders, their relationships, and their evolution throughout the project's duration. The goal is to highlight the reasons explaining the process's duration and the stakeholders' perspectives on the current waste management and this project.

To better understand the situation, this study will first provide a literature review highlighting other cases of Public-Private Partnerships (PPP) in waste management in various contexts (ch.1.3). The theoretical framework of Urban Political Ecology (UPE) will be employed, aiming to shed light on how decision-makers' power and choices affect the broader society (ch.1.5). This will be followed by a significant contextualization section (ch.2 and 3), exploring the unique situation of the Kathmandu Valley. These chapters will also discuss current waste management practices, its functioning, challenges, and the major stakeholders involved. Based on this foundation, the Nepwaste project process will be discussed (ch.4), developing some issues explaining this timeline, along with the perspectives of various stakeholders on this project. The broader implications of this project will then be analyzed (ch.5) and linked with the current situation, to highlight the critical role of the stakeholders and their impact, in an UPE perspective.

## 1.2 Research rationale

The current solid waste management situation in Kathmandu city and its surroundings poses significant challenges due to the complex interactions between various actors involved, public, private, both formal and informal, and the lack of proper planning and effective management strategies (Upreti et al., 2020). This situation is not only problematic for the present but also raises concerns for the future, considering the continuous demographic growth in the region and the increase in consumption. It is crucial to find rapid and sustainable solutions to address the solid waste management crisis to mitigate its impact on air, water and soil quality, as well as the overall well-being and health of the population.

The solid waste management issue in Kathmandu has also become a tool for political opposition and individuals expressing their views and demands, highlighting the significance and power that must be attributed to this problem (Giri, 2021). Furthermore, the concept of Public-Private Partnerships (PPP) has gained popularity in recent years, and exploring how PPP can be leveraged for waste management in this context is crucial.

The success or failure of waste management projects in the city will have direct and indirect consequences for thousands of employees working in the sector, while also affecting the lives of millions of residents (Pathak, 2021).

There is a noticeable lack of resources and research on the specific case of waste management in Kathmandu, in relation to the arrival of the Nepwaste project. Most existing studies focus on informal waste workers, but the unique circumstances of this city call for a more in-depth examination. This research will try to contribute to understanding the initial processes involved before the implementation of a PPP in the waste management, which are often overlooked in favor of assessing the outcomes of completed projects.

The situation in Kathmandu Valley may serve as a precedent for other cities and countries facing similar challenges in their waste management systems. Looking into KV's waste management system can teach useful lessons for similar projects in other situations.

In conclusion, this research is essential for several reasons. First, it addresses a pressing topic that affects the environment and the well-being of the population, while also impacting the political landscape. Second, it seeks to fill the knowledge gap in the literature by examining the unique circumstances of waste management in Kathmandu. Finally, this research has the potential to serve as an example for future waste management projects in other cities and countries, providing insights and lessons learned from the specific case of Kathmandu.

By undertaking this research, the aim is to contribute to a better understanding of the complexities surrounding solid waste management in the city and to see how policies implemented by the elites directly impact the lives of millions of people. The Nepwaste project is a good case study to understand the reasons for the current situation and to highlight how the actions of the decision-makers positively or negatively influence the various stakeholders of solid waste management.



### 1.3 Literature review

In a very costly field such as waste management, setting up PPPs allows for the provision of infrastructure for which states do not have enough resources and expertise to provide alone (Forsyth, 2005). Ideally, this allows for the involvement of local populations, who can provide solutions that companies can then implement with their financial means (Ibid).

However, there are many criticisms to this system. Indeed, the political implications of these partnerships often outweigh the potential benefits of implementing environmental policies (Osbourne, 2000 in Forsyth, 2005). One of the main issues is the commercialization of the environment with the risk that commercial objectives may surpass the real environmental and social problems. The reduction of the state's influence in different areas is also a problem, as social objectives may be replaced by objectives in terms of productivity and profitability for the companies (Forsyth, 2005). Some studies have suggested that a lack of civil society participation and a lack of good governance can lead to policies that are unfavorable to poor populations and reinforce the elites' positions of domination (Ibid.). Ahmed and Ali (2006) underscore that facilitating people's involvement in public-private partnerships for solid waste management can lead to significant positive outcomes by fostering community ownership. This approach tends to generate greater support and engagement from the local population, which can bolster the overall success and sustainability of the project.

Analyzing implemented public-private partnerships allows for a highlight of successful projects that have been accepted by the population. This approach provides an opportunity to identify key factors contributing to the success or failure of various initiatives, providing crucial insights to scrutinize the Nepwaste project process. Recognizing the factors that have led to success or failure in these different projects equips us to better understand the potential trajectory of the Nepwaste project. Moreover, identifying the stakeholders involved, or not involved, in the project is a vital component, corroborating Ahmed and Ali's (2006) assertion of the importance of public participation.

Fahmi and Sutton (2010) describes the situation in the city of Cairo, the capital of Egypt. Traditionally, waste management has been the responsibility of informal workers known as Zabbaleen, who represent a part of the Christian minority in Egypt and collect recyclable materials while using organic waste to feed pigs. This system was changed when the

municipality started a PPP with transnational companies from Spain and Italy. These companies brought technological innovation, but came into conflict with the Zabbaleen, who found themselves in competition for access to waste. In a beautification policy, the city sought to exclude informal waste workers from the center, considered dirty and unhygienic, to send them to the periphery. The center was "cleaned" to make way for luxury hotels, restaurants, banks, etc, to satisfy the elites' desire for a modern center, resulting in a struggling periphery. Investors brought new recycling facilities and gained access to a new landfill. The agreement with the city stipulates that companies must recycle 20% of the waste, with the rest ending up in the landfill. Before the PPP, the recycling efforts of the Zabbaleen resulted in a significantly reduced amount of waste that ended up in landfills and making their system the world's most efficient plastic waste recycling system, with recycling rates above 80%, compared to 25% in France (Migné, 2022). Consequently, the project not only led to reduced recycling but also diminished the means of livelihood for the Zabbaleen, and the waste collection system has proven to be ineffective and has not eliminated the Zabbaleen, who continue to collect waste to this day (Fahmi and Sutton, 2010).

The Zabbaleen's situation in Cairo exemplifies the potential pitfalls of implementing PPPs without adequate consideration for existing local structures and the communities involved. While the introduction of innovative recycling infrastructure had potential, the disregard for the Zabbaleen community's established waste management role led to a less effective system. The imposed solution led not only to reduced recycling rates, but also jeopardized the livelihood of the Zabbaleen, reflecting a classic conflict of interest between waste as a means of survival and as a source of energy through waste-to-energy infrastructure (Ibid.). This case serves as a reminder of the critical need to include all stakeholders in such projects. Other regions, such as Buenos Aires, Argentina, have faced similar issues, where beautification policies have overlooked the health and livelihoods of informal waste workers (Parizeau, 2015).

Another important factor highlighted in the literature is the deployment of inappropriate technology in developing countries. For instance, in Timarpur, Delhi, in 1984, a waste incinerator using Danish technology was installed (Forsyth, 2005). However, the project miscalculated the moisture content of the available waste in Delhi, leading to the incinerator's inability to burn the waste without the addition of diesel. Following a month of unsuccessful

attempts, the incinerator was shut down. The composition of waste varies between countries, and the failure to consider this factor can doom the project (Ibid.). The misuse of expensive technology is a common issue in partnerships for solid waste management, where high-tech equipment is deployed without adequate training or adaptation to the local context (Yousif & Scott, 2007; McAllister, 2015).

In Delhi, in 2005, the city began to search for investors to handle waste management in the city, mainly the collection and deposit in the landfill site (Demaria & Schindler, 2016). The second phase of the project involved establishing two waste-to-energy plants, and the final phase aimed to create a value chain to recover high-calorific-value materials for improved incineration performance. A common difficulty in installing waste-to-energy infrastructure is the lack of space. In this case, *"[A] series of nontransparent deals led to the transfer of land and the right to build the incinerator from a parastatal institution to a large corporation owned by a sitting Parliamentarian"* (Demaria & Schindler, 2016, p.294). Absence of participation is problematic and, not surprisingly, the project was rejected by the civilian population. However, this case is particularly interesting due to the protests that followed. Two distinct groups saw their daily lives degraded by this policy and allied themselves to fight against this project. Informal workers saw their means of subsistence being burned, as was also the case in Cairo. In this case, they were either excluded from transfer stations by the entity in charge or had to pay a fee to access waste. According to a worker cited in Demaria & Schindler (2016, p.301), *"They want to produce electricity by burning our livelihood."* This statement describes well the situation.

The specificity of this case lies in the revolt of the middle class living close to waste-to-energy facilities, where the air quality has drastically decreased due to the emission of harmful smoke from the factory.

These two distinct groups, therefore, joined forces and campaigned together for the closure of the factory, forming the Okhla Anti-Incinerator Committee. A member of this committee highlighted the members' motivation for seeking redress, stating, *"We are now planning to file a case for human rights violation at the National Human Rights Commission. We feel our fundamental rights have been violated, particularly the right to life and the right to a clean environment."* (Demaria & Schindler, 2016, p.305). This adds to a situation where the

population already lacks trust in their elites, accusing them of profiting at their expense through such projects.

Once again, this illustrates that decision-makers must consider the opinions and the interests of different groups. Without doing so, the population that is affected by the novelty can oppose it, drastically complicating the task of the elites and newly arrived companies. This also highlights that an incineration facility cannot be developed in a populated area, due to the health impacts on the population.

Baabereyir et al. (2012) study on Accra, Ghana, highlight waste segregation in the city even though it doesn't focus on a PPP project. Wealthy neighborhoods have more frequent waste collection than poor ones, with high-income areas having weekly house-to-house collections while low-income areas rely on communal skips. Worryingly, waste from wealthier neighborhoods is often dumped in poorer ones, causing environmental injustice. The placement of landfills in disadvantaged areas causes local pollution and even affects drinking water. The study underscores an inequitable waste management system where the affluent live in cleaner environments despite their higher waste generation, while the poor bear the brunt of pollution.

These various examples have illustrated reasons why large PPP projects are not accepted by certain groups in the population. The emerging trend is that a lack of collaboration with the local population can lead to conflict and hinder the effectiveness of a project. Additionally, the elites tend to focus on improving their living areas and the cultural and touristic centers, excluding disadvantaged communities from these strategic locations, and making them bear the consequences of their high waste production, which frequently ends up in their living environments. Most of the literature depicts the failures of these projects, but there are still positive examples.

The article by Forsyth (2005) partially focuses on the city of Lucknow, an Indian city with a population of approximately 3 million, which is quite similar in size to the KV. The city has implemented a biomethanation infrastructure that processes 400 to 500 tons of organic material daily, producing 5 MW of electricity. The success of this project lies in the collaboration established with informal workers. Before the waste enters the biomethanation process, these workers have access to valuable materials. This allows them to secure their

livelihood, enhance recycling efforts, and prevent the incineration of polluting inorganic materials. The population has responded positively and accepted this new system. This example is relevant to demonstrate that involving workers enables them to maintain their livelihoods while avoiding potential system blockages. In a country like India where most of the waste is organic, a biomethanation infrastructure combined with the recovery of recyclable materials by informal workers looks like a positive combination, at least to reduce the quantity of waste ending up in the landfill.

Another important success factor highlighted in the article from Lohri et al. (2014) is the profitability of the company. In many cases, the enterprise depends primarily, if not exclusively, on household fees and is therefore vulnerable to being unprofitable. This can occur when fees are set too low or when the rates of fee collection are insufficient. In some countries, fee collection rates may be well below 100%. For example, in the city of Bahir Dar, Ethiopia, fee collection rates are around 50%, making it difficult for the company to be financially sustainable (Lohri et al., 2014). If the company with which a partnership is created is not financially sustainable, it may stop its activities and leave a complicated situation for the city, which will have to reinvest resources to find a new partner and the system may be blocked for a long period (Lohri et al., 2014).

In conclusion, this review emphasizes the key roles of local communities' involvement and financial sustainability in the success of public-private partnership projects in waste management. Policies should be transparent and inclusive, especially towards those directly affected, such as informal waste workers. Opacity and lack of consultation can provoke resistance from stakeholders and the public. The case of Kathmandu Valley is very specific with the multiplicity of stakeholders involved in the SWM system. This work will seek to analyse the process prior to the implementation of the PPP project led by Nepwaste, and to understand the impact of such a project on the functioning of the system and its stakeholders.

## 1.4 General research question

These case studies demonstrate the challenges of implementing an effective SWM system within a PPP framework. The objective of this study is to examine the stages of the Nepwaste process and assess its implications on waste management in the Kathmandu Valley. Consequently, this study seeks to address the central research question: **"What is the process of implementing the Nepwaste project and how has this process impacted the current Solid Waste Management system?"**

To answer this main research question, it will be necessary to answer the following sub-questions:

1. What are the dynamics impacting the current SWM situation in Kathmandu Valley?
2. What factors have contributed to the lengthy duration of the project?
3. Who are the main stakeholders involved in the Nepwaste Project implementation, and what are their roles and influence in the decision-making process?
4. What are stakeholders' perspectives on the Nepwaste Project?

To address these questions, this thesis will be structured into two main sections. The first part will analyze the stakeholders involved in Solid Waste Management (SWM), seeking to understand their respective roles, responsibilities, and contributions to the current SWM situation. This part will also identify the current challenges and impacts associated with SWM. To provide comprehensive insight, it will be necessary to understand the historical process that led to the present situation, as well as the existing legal framework and its evolution over recent years.

The second section will focus on the implementation process of the Nepwaste project, detailing the various phases the project has experienced. It will identify the stakeholders engaged at each stage, as well as those who might have been overlooked. Furthermore, this section will investigate the reasons why the implementation process has been so prolonged, incorporating the diverse perspectives of various SWM stakeholders on the project.

Integrating these two sections will enable this research to address the central research question and propose hypotheses on the influence of the project's process on the existing system. In conclusion of the discussion, a separate segment will be dedicated to constructing a SWOT analysis. This will provide a comprehensive perspective of the project, facilitating an assessment of the strengths, weaknesses, opportunities, and threats associated with the project's potential implementation.

## 1.5 Urban Political Ecology

To address this research question, the theoretical approach should emphasize political aspects, while also taking into account economic, social, and environmental elements, and offer an analysis within an urban context in the “Global South” (cf. Gutberlet, 2018). The approach of Urban Political Ecology (UPE) provides the framework for the incorporation of all these dimensions and examines power relations that shape interactions among actors (Véron et al., 2018; Véron, 2006) and between actors and their environment. This approach highlights how economic and political factors contribute to urban inequalities. It is relevant to this research, because it considers the city as a form of nature and relates power relations to ecological processes and resource characteristics (Cornea et al., 2017). The urban space is considered unequal, because decisions are largely made by individuals with power, often disregarding the poorest populations or certain specific groups (Zimmer, 2015). UPE considers an urban environment as the result of a historical-geographical production process of combined physical and societal nature, where the results of the process are physical, social, economic, and cultural (Bjerkli, 2015). The aim of UPE is to analyze these processes to formulate strategies fostering a more balanced distribution of power, ultimately leading to improved urban environments and socio-environmental equality (Ibid.).

UPE is a sub-branch of Political Ecology, developed to provide a critical analysis of rural spaces. The goal of this field of research is to assist the empowerment of the most disadvantaged groups. The objective is not to study crisis situations, but rather everyday injustices (Swyngedouw & Heynen, 2003). As Zimmer (2010, p.345) stipulates: « *[T]he focus is on what is considered "normal" under current political, economical, and social conditions and thus goes unnoticed. [...] Urban Political Ecology [...] looks mainly into issues that have not been discussed in terms of change and that have not received public attention so far.* ». The current capitalist system prevails globally, setting the stage for discussions on justice and socio-ecological inequalities: « *Urban political-ecology research has begun to show that because of the underlying economic, political and cultural processes inherent to urban landscape production, urban change tends to be spatially differentiated and highly uneven* » (Swyngedouw & Heynen, 2003, p.910). This field emerged in response to global urbanization, which has intensified inequalities in cities, where more than half of the world's population has



lived since 2008 (Zimmer, 2010), and due to the Political Ecology's inability to study urban space (Heynen et al., 2006).

There are two major currents within UPE: the Marxist and the post-structuralist. The latter is more recent and goes beyond class and capital analyses to focus on complex networks of actors. Influenced by Foucauldian ideas about discourse, it regards power as more diffuse and relational. Its focus is largely on the relationships between state and non-state actors and how these relationships influence everyday forms of power and control (Cornea et al., 2017).

However, this study will employ the Marxist current. As its name suggests, this approach draws on theories developed by Karl Marx in the 19th century. According to this theoretical framework, « *Marxist urban political ecology more explicitly recognises that the material conditions that comprise urban environments are controlled and manipulated and serve the interests of the elite at the expense of marginalised populations.* » (Swyngedouw & Heynen, 2003, p.902). Urban spaces are designed to benefit the elites, through a variety of political, economic, social, and ecological strategies (Ibid.). These processes have historically led to the creation of inequalities and continue to do so, producing an extremely unequal urban space. Swyngedouw and Kaika (2000 in Swyngedouw & Heynen, 2003) summarize this as follows: "*In sum, the environment of the city - both social and physical - is the result of a historical-geographical process of the urbanisation of nature*" (p.900).

Power refers to the capability of certain actors or groups to control and influence the distribution and use of resources in urban areas (Ahlborg and Nightingale, 2018). UPE strives to identify the different actors involved in resource governance projects and analyze how power is distributed among them. This includes exploring the political and economic structures that enable certain actors to dominate and control resources, as well as analyzing the ways in which actors use discourses, knowledge, and narratives to legitimize their power. By understanding power relations in urban areas, UPE aims to challenge existing power structures and promote more equitable and sustainable forms of resource governance (Ahlborg and Nightingale, 2018). Within this paper, « elites » will denote the actors who possess the power to control and influence the distribution and use of resources in urban areas. The objective of this study is to identify the specific stakeholders who make up this group and investigate how they use their power.

The concentration of decision-making power within elites generates unequal situations with winners and losers. The latter are generally disadvantaged social classes, or they can represent any group of people excluded from decision-making for example due to their religion, as the Uyghurs in China (Zhang et al., 2014) or their skin color in Apartheid situation (Leonard, 2012). Marxist UPE examines the influence of capitalist structures and elites in the formation of urban spaces.

UPE considers waste not only as an externality, but *“as constitutive of urban, social and political processes”* (Véron et al., 2018, p.7). The power relations are prevalent throughout the waste management chain, which reinforces existing inequalities (Ibid.). First, wealthy populations consume more and generate more waste than poor populations (Zimmer, 2010). Ineffective waste management practices then affect populations living in proximity to disposal areas, leading to increased pollution levels (Swyngedouw & Heynen, 2003). Waste is frequently extracted from centers where consumption is high and transported to the periphery, far from the view of elites and tourists, where disadvantaged populations are living and suffering the consequences of living in close contact with waste (Vitz, 2018). Dumps, whether legal or illegal, are typically located close to the homes of the poor, who are in contact with the waste and suffer the consequences (Keucheyan, 2017). As highlighted by Parizeau (2015), poor recycling conditions and waste management inefficiencies are not contextual problems, but the outcomes of larger processes and repeated management inefficiencies over time.

Informal workers are frequently excluded from decision-making due to the informality of their work (Fahmi & Sutton, 2010). However, the repeated failure of waste management policies ensures that informal waste management persists, where working conditions are often harsh, sanitation conditions are deplorable, and exposure to diseases is high (Bjerkli, 2013). So, the livelihood of these people depends on elite decisions, and their inability to create and implement political reforms. In the context of a waste-to-energy project, the entire urban metabolism is reconfigured and impacts positively and negatively certain groups (Demaria & Schindler, 2016).

Overall, the UPE argues that policies implemented by elites do not serve the interests of all, but rather their own interests, and it is usually the disadvantaged populations that suffer the

negative consequences of these policies. In waste management, this is reflected in the poor working conditions of waste workers and the entire population affected by the problems generated by the mismanagement of waste within the city, mainly the poor who have no choice but to live close with waste.

## 1.6 Methodology

My initial research question focused on the response of the local population and private companies to the Nepwaste project. Despite the scarcity of information available in articles and newspapers on the subject, my on-site observations revealed that the organization of these enterprises under the SWMAN entity served as their primary defense and strength. Consequently, no additional means of action were required, as their organization was already strong and respected among other stakeholders.

As a result, I shifted my approach to study the process before the implementation as there is a lack of study on this subject in the literature. This approach enabled me to identify the key actors in the process, their roles and how their actions impact the process of the studied Project, and the current waste management in the Valley. I employed Urban Political Ecology as a framework to examine the power relations between the various stakeholders within broader processes in a capitalist context characterized by liberal governance and a PPP of a legally public sector. Identifying the key actors and their actions will allow for a better understanding of the situation and the power dynamics at play. In a broader perspective, the Nepwaste project process will serve as a case study to apprehend the power dynamics in the current daily waste management.

The fieldwork was conducted from January 26th to March 25th, 2022, with additional days in April 2022. This allowed me to collect primary data, understand stakeholder's everyday life, and interact directly with them, which enriched the data's quality and relevance. The research area was defined by the project's geographical boundaries. I also visited key locations, such as the Teku Transfer Station and the landfill in Sisdol, as well as observing numerous sites throughout the city where transfer stations were located. The objective was to gain the largest possible understanding of daily waste management, the system, and the actions of various

actors. During my fieldwork, I lived with a Nepali family, which not only made me feel incredibly welcome and integrated but also allowed me to understand the daily waste management of a Nepali family and their perspectives on the challenges it posed, as well as their understanding of the situation.

During the field work, I conducted semi-structured interviews with various stakeholders to gather diverse perspectives on the issue. Semi-Structured interviews allow the interviewee to develop their point. These interviews included:

- Four private companies collecting household waste, to understand their roles and perspectives in the Nepwaste Project process, and two interviews with SWMAN. The first happened early in my fieldwork, while the second took place at the end, as many questions arose concerning them during my other interviews.
- Two private companies acting as collectors for recyclable waste, to understand alternative approaches and solutions.
- A representative of Nepwaste to get the company's point of view on the project's process.
- Three municipalities' representatives, from Tokha, Gokarneshwor and Kageshwori Manohara, and the Kathmandu Metropolitan City (KMC) Environment Office, as well as a representative of the Kathmandu City Planning Commission, to gain insight into local government involvement and to get their understanding and opinion of the project, as well as to understand the situation in the valley outside KMC.
- The KMC Workers' Union to explore labor issues.
- A journalist to gain insight into media coverage and public perception and to try to get new information as most actors were lacking it
- Consultations with research centers and actors outside of the waste field, including Bishnu Upreti, Center for Integrated Urban Development (CIUD), Nepal Center for Contemporary research (NCCR), and the Swiss Embassy, to comprehend the broader context and gather preliminary information.

A group interview was also done with Informal Waste Workers (IWW) associated with the cooperative Sanyukta Safai Jaagan (SaSaJa), to learn about informal workers' rights and

concerns, as well as to understand their opinion of the project. The workers interviewed were informal recyclers working in the valley.

These interviews provided valuable insights from various stakeholders, helping me to form a comprehensive understanding of the project and its implications. Most of the interviews were in English, and a few in Nepali with Yash Man Karmacharya helping me as translator.

While there was no identical questionnaire for each interview, as every actor had unique aspects that needed to be addressed, some recurring questions included:

- What are the main challenges of the current situation, and what are the most significant changes that have occurred in the last 5-10 years?
- What is your opinion on the Nepwaste project? What do you know about it, and what do you think of it? What are your feelings towards it - do you trust the negotiators?

The goal of these questions was to gain a deeper understanding of the current system and to learn how the main actors perceive and explain the issues, as well as the reasons behind these issues. As the subject was complex and sensitive, the final question of every interview was to ask the interviewee if they wanted to add anything more to the discussion. This approach allowed them to speak more openly and provided me with valuable insights and crucial information. The duration of most interviews ranged between 30 minutes and 1 hour, with some longer interviews, particularly with SWMAN and the group interview with SaSaJa. Almost all the interviews were conducted in the interviewees' offices, with one interview conducted at the interviewee's home, one in a cafe and one in a hotel.

One of the main challenges in this research was contacting the key actors. As the subject was complex and kept secret to many people, I had to find the few individuals with relevant information. Many companies, particularly smaller ones, do not have offices, which made it difficult to contact them. For the municipalities, I attempted to reach out by mail and phone, without success. Either the contact numbers were incorrect, or the person answering did not speak English. I had to visit the municipal offices directly to introduce myself, explain my research, and share my objectives. This created an issue, as I didn't know in advance which specific actor would agree to answer my questions. The only municipality that I managed to contact and schedule an appointment with had forgotten about it. Fortunately, all

interviewees were very open and available once met, and several people took time out of their workday to answer my questions, even though the meeting was unannounced. After several weeks of fieldwork interviewing municipalities and companies, I struggled to access the following key stakeholders. However, I was lucky and grateful to receive significant assistance from a member of NCCR, Yash Man Karmacharya, who helped me so much in organizing interviews with Sarita Rai from the KMC Environment Office, SaSaJa, KMC Workers Union, a journalist, and finally, Nepwaste, in April after their representative came back to Kathmandu and accepted a meeting. This explains the additional fieldwork days in April.

In this study, I also utilized photographs. This approach enables the capture of raw information and provides readers with the opportunity to conduct their own analysis of the situation as suggested by Dion and Ladwein (2014). The inclusion of visual materials helps readers better approach and understand the context of the research setting. As Warren (2009) notes, photographs can evoke emotions in the reader, enabling them to analyze the subject matter from a different perspective, and allowing them to contribute their own interpretation of the image alongside the author's analysis. In this work, the use of numerous photographs aims to ensure the reader to gain a comprehensive understanding of the research environment, as well as to raise emotions or feelings about a difficult and shocking situation.

Upon returning to Switzerland, all interviews were transcribed. Some were conducted in Nepali and translated, once again by Yash Man and even his sister helped me to transcribe from Nepali to English. The objective was to get as much information as possible, as the subject was complex, with political implications and actors having interests that could distort reality. The challenge was that I received different information from different actors, especially concerning figures, which contributed to the overall ambiguity on the subject. For example, even SaSaJa, who represents informal waste workers, could not provide an exact number of such workers. To manage this problem, any information confirmed only by a single actor will be explicitly stated, and it will be noted when information varies between stakeholders.

This leads to the difficulties and weaknesses of the work, the first of which is the difficulty of confirming data. Several interviews were conducted in Nepali, with Yash Man acting as a translator. This inevitably limited the amount of information retained, potentially leading to

the loss of details or information. Another main issue was the lack of information people had and the tension around the subject of Solid Waste Management, especially considering its confidential aspects. For this reason, the interviewees will be anonymized in this paper, except for those who clearly stated that I could use their names.

Despite these limitations, it was clear that the actors were eager to share their views with an outsider, and they offered access to valuable information, both regarding the topic and their perceptions of the decision-makers. Several actors appeared relieved to discuss the issue with a foreigner, expressing their disappointment and sadness linked to the current situation. As a result, the research offers valuable insights into the complex subject of Solid Waste Management and the various perspectives of stakeholders in the field.

## 2. Kathmandu Valley: geographical, political, historical, and legal aspects

### 2.1 The situation in Kathmandu, Nepal

Home to the tallest mountain peak in the world, Buddha's birthplace and ancient Kingdom of the Himalayas, Nepal is an Asian country, landlocked between the major powers of India to the south and China to the north, with Nepal sharing its border with Tibet (Figure 2).

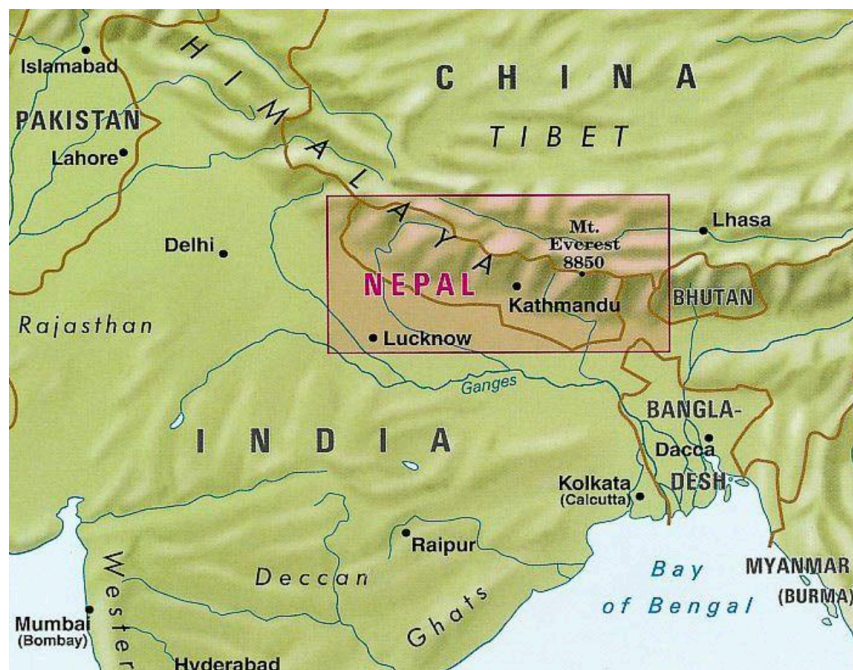


Figure 2 Geographical location of Nepal in South Asia

Nepal's land extends from the Himalayas in the north, where the world's highest peak, Mount Everest, rises to 8,848 meters, to the southern Terai region, which is as low as 60 meters above sea level. With a majority Hindu population, Nepal had 30 million inhabitants in 2022 (UNFPA, 2022).

Kathmandu Valley serves as the central hub of the country and is affected by the process of urbanization. Located in the center of the territory as seen in Figure 2, it has historically been the place where people from different Himalayan valleys have gathered in search of employment opportunities or markets to sell their products. The Nepalese capital is situated in a large valley on a plateau at an altitude of 1400 meters.



Despite being officially abolished in 1963, the caste system remains a significant societal factor in Nepal. The new constitution recognizes the "*right against untouchability and discrimination*" as a fundamental right. Despite efforts to abolish this system, it remains a significant part of Nepalese society, influencing many aspects of daily life, including marriage, employment, and social interactions. The Dalit is the name used for the lowest caste. Dalit people are frequently subjected to various forms of physical and verbal abuse, and they are often denied economic opportunities and political representation (Sharma, 2016b). Most of the waste workers are from low caste, reducing their opportunities and increasing the risk of discrimination (Ibid.).

The valley has 18 municipalities, including Kathmandu, Lalitpur (Patan) and Bhaktapur, three former kingdoms. These three municipalities are urban, with high density. The other municipalities in the Valley are historically rural places, but with the increase in the urbanization, they are becoming more and more urbanized. Figure 3 shows a map of Kathmandu Valley with Sisdol Landfill Site being flagged on the North-West of the Map. This study will focus on KV, with a particular focus on the 11 municipalities that make up the Nepwaste project.

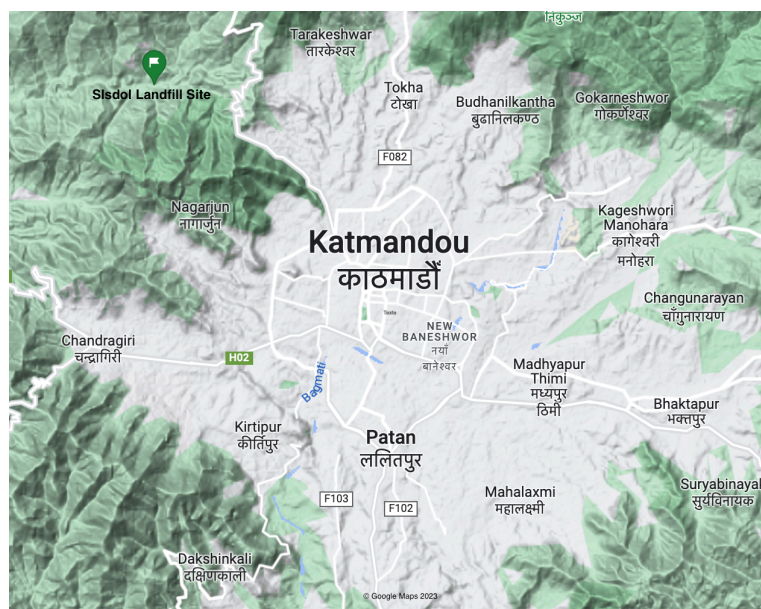


Figure 3 Map of Kathmandu Valley

The urbanization in the valley has reached a level where agricultural spaces are becoming increasingly scarce. The city has a population of approximately two million inhabitants, while the valley has a population of 3.3 million. (Mesta et al., 2022).

Name	1975	1990	2000	2018	2030	2040	2050
Built-up area (km <sup>2</sup> )	41	46	53	177	301	342	352
Urban land percentage (%)	5.7	6.4	7.4	24.6	41.7	47.4	48.8
Annual growth rate (%)		0.8	1.4	6.9	4.5	1.3	0.3

Figure 4 Changes in Kathmandu Valley's built-up areas over time (Mesta et al., 2022)

The figure 4 above presents the evolution of the built-up area in the city from 1975 to 2018 with projection until 2050. From 1975 to 2018, the Urban land percentage increased from 5.7% to 24.6%, more than four times more. The urbanization growth is impressive. Figure 5 below shows this evolution on a map. The last two maps in the series depict the evolution of the transportation network. This shows the poor planning of the city. Over the past 20 years, urbanization has grown at rates of around 5% per year. However, during the same period, transportation infrastructure has failed to evolve due to a lack of planning (Mesta et al., 2022) and legislation (Thapa & Murayama, 2012).

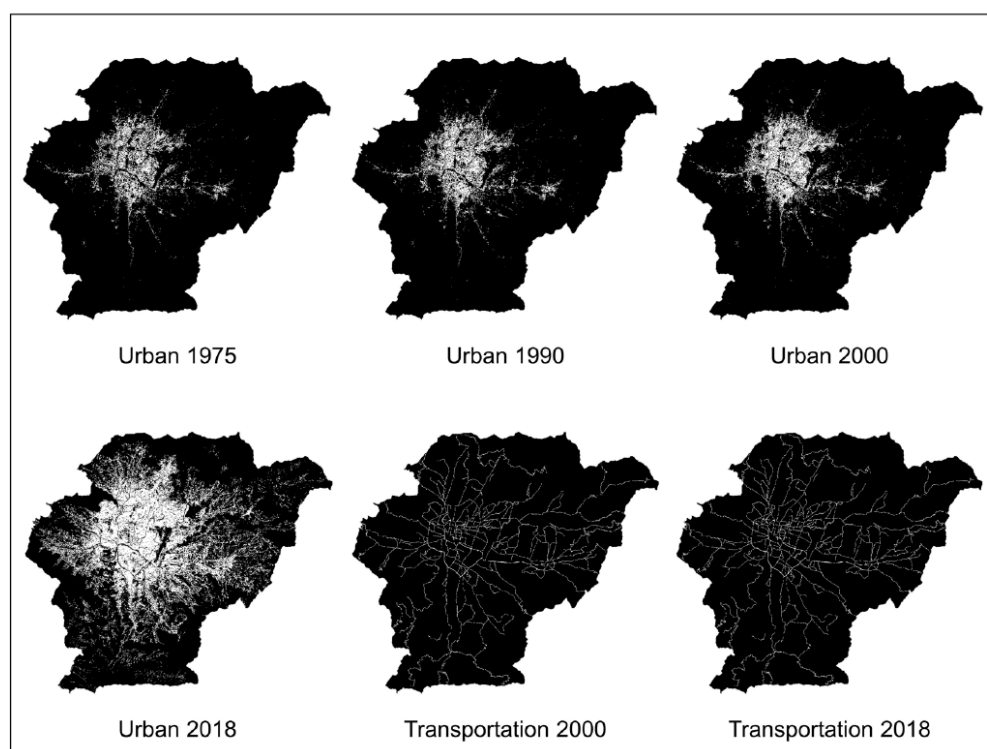


Figure 5 Map of the evolution of urbanization (Mesta et al., 2022)

This trend is not likely to stop. According to Mesta et al. (2022), despite being one of the least urbanized nations on the continent, Nepal is projected to become one of the 10 countries with the fastest urbanization rates between 2018 and 2050.

The phenomenon of urbanization has its roots in the late 1950s (Singh & Buju, 2001). Prior to this period, the valley was divided into distinct parts with an urban center and agricultural plots all around, which provided food for the city, which was much less dense and less populated. According to World Population Review (2023), there were approximately 120,000 inhabitants in Kathmandu in 1960. Since that decade, the country has aimed to modernize its economy and to promote scientific and technological advancements to combat poverty, improve health, and encourage innovation in agriculture. Rostow (1959) considers that modernization takes place in 5 stages, starting with traditional society and moving towards mass consumption. For Nepal, this will result in the establishment of infrastructure, roads, and communication channels allowing for better interconnection between Kathmandu and the rest of the country (Singh & Buju, 2001). The consequences are an increase in attractiveness, which will lead to rural exodus and internal migration towards cities (Upreti et al., 2017). Agricultural plots are being replaced by built-up areas and urban sprawl is accelerating (Ibid.). This growth, combined with poor planning and lack of economic opportunities outside the valley, explains the current situation. The two photos below (figure 6 and 7) were taken in March 2022 to illustrate this phenomenon.



*Figure 6 North of Kathmandu Valley (© TB)*

Figure 6 portrays an agricultural zone situated in the northern part of the Valley. The recent housing developments are gradually encroaching upon the remaining agricultural spaces, with ongoing construction activities amid the last cultivated zones. Figure 7 shows an area in the

north-western part of the valley where the high density of housing in what was once a rural area is striking. Housing developments are even beginning to spread onto the slopes of the valley, leaving very little space devoted to agriculture.



*Figure 7 North-West of Kathmandu Valley (© TB)*

Urban growth and modern living in recent decades have led to more waste and crowded cities, leaving less space to handle and get rid of waste. The 2015 earthquake destroyed many homes and took many lives. This tragedy led to more people moving to Kathmandu, looking for ways to rebuild their homes. This increase in people and their activities resulted in a big rise in waste needing to be handled. Dugar et al. (2020) said that the earthquake led to a waste volume that was 5-15 times more than what is usually produced in a year.

## 2.2 Political System

Nepal is marked by political instability, with numerous changes in its political system. Nepal transformed from a monarchy to a federal democratic republic over the past 20 years. Initially established as a kingdom in 1768 by King Prithvi Narayan of the Shah dynasty, the country transitioned into a constitutional monarchy in 1991, followed by a decade-long civil war initiated by the Maoist Party in 1996 (Whelpton, 2005; Pradhan & Visweswaran, 2011; Hachhethu, 2007).

This war ended on April 21, 2006, with the signing of a peace agreement, after more than 17,000 people died in the fighting (Pradhan, 2009). A provisional constitution was implemented in 2007, followed by a definitive constitution in 2015, which is still the fundamental text today, and Nepal became a federal democratic republic with seven provinces. The country is led by a president, a prime minister, and two chambers - the National Assembly and the House of Representatives (Vaughn, 2021). The first elections in this new system were held in 2017, with the Nepal Communist Party (NCP) winning the majority of seats at the federal level and in six of the seven provinces (Jamil & Paudel, 2023).

Internal disagreements and political crises within the NCP led to the dissolution of parliament twice by the prime minister, Khadga Prasad Oli, decisions later deemed illegal by the Supreme Court (Jamil & Paudel, 2023). Following this crisis, Sher Bahadur Deuba, Congress President, was appointed as Prime Minister. The NCP subsequently split into the Nepali Communist Party and the Maoist Party.

In 2022, Nepal held significant local and legislative elections. Independent candidate Balendra Shah, a former rapper, was elected as Kathmandu's new mayor in May, while legislative elections in November saw the Congress party securing the most seats (89 out of 275). However, the Nepalese Communist Party (78 seats) and the Maoist Party (32 seats) re-formed their coalition to gain majority control, leading to the appointment of Maoist leader, Pushpa Kamal Dahal, as the Prime Minister (Jamil & Paudel, 2023).

### 2.3 History of waste management in Kathmandu

Kathmandu Metropolitan City is responsible for the Waste Management and sanitation in the whole Kathmandu Valley since 1919 (Shrestha et al., 2018 in Upreti et al., 2020). During the 1950s, when the population of the valley was around 100,000 people (Véron et al., 2008), waste was mainly organic and managed directly at home (Sharma, 2016b). The Valley was divided into three different municipalities: Kathmandu, Lalitpur, and Bhaktapur. Each of them was responsible for its own waste (Thapa, 1998). Population grew up in the 1960s and waste quantities started to rise with the country becoming more open to innovations (Sharma, 2016b). No formal waste management system existed at that time, so people started to dump waste in the river and elsewhere (Ibid.). In the late 1970s, Germany's GTZ, the German Technical Cooperation Agency helped to build a landfill in Gokarna, North of the Valley (Lohani et al., 2021). The Solid Waste Management and Resource Mobilization Center (SWMRMC) was created in 1987 and took up the responsibility for the management of waste in the Valley (Upreti et al., 2020). He changed name later to become the Solid Waste Management Technical Support Center (SWMTSC). In 1986, with the help of GTZ, the landfill was built in Gokarna and a compost production and resource recovery plant was established at Teku (Giri, 2011 in Upreti et al., 2020). The composting plant was closed in 1990. In 1993, the whole project and the cooperation with GTZ was stopped because of insufficient funds to pay the employees (Dangi et al., 2015). According to GTZ, the SWM problems were not technical, but institutional, organizational, economic, and financial (Oeltzschner & Betts, 1996). Germany gave a lot of machinery, trucks and tractors, but KMC could not repair it locally (Dangi et al., 2015). Shikura and Harada (2004 in Dangi et al., 2015) conclude that the project in collaboration with GTZ was a complete failure: « *The national government exhibited poor leadership and the various organizations involved did not cooperate.* » (Dangi et al., 2015, p.397). KMC's budget was almost fully used to pay the wages, so it did not have enough for vehicle maintenance and capital investment, leading to financial failure (Ibid.).

Gokarna landfill faced protests by locals in 1994, causing waste to be dumped into riverbanks (Upreti et al., 2020). This landfill closed officially in 1999, being considered full (Ibid.). The Gokarna Landfill Site was supposed to be the dumping site for 200 years, but only lasted a few

years. During that period, municipalities, struggling with increasing urbanization and limited resources, had to independently manage waste, leading to widespread dumping and consequent public protests. The Bagmati river who crosses Kathmandu is « *aesthetically destroyed and biologically dead [..] all riverbanks have become informal dumping sites.* » (Sharma, 2016b). The picture on the right shows waste on the riverbank in 2022, highlighting the persistent of the issue (figure 8).



Figure 8 Waste on Bagmati riverbanks

(©TB)

Following the GTZ aid, India provided equipment such as dumpers, placers, compactors, loaders, containers, sprinklers, and cranes to aid waste management (Dangi et al., 2015). 30% of this equipment was inappropriate and remained unused, adding to the waste (Ibid.). For example, three mechanical brooms were given, but never used, because the operation cost was too high, consuming one liter of fuel per kilometer. This is a typical problem of foreign aid, where inadequate equipment is given and finally never used by the receiving country (Ogawa, 1996).

From 2004, Japan International Cooperation Agency (JICA) took steps to develop a SWM plan and transfer technology (MoLD & JICA, 2005). The construction of a waste processing/composting facility, an additional transfer station and a long-term sanitary landfill were the goals of the partnership between JICA and KMC, with an improvement of the collection and transportation system (Ibid.). During the same period, more and more private companies started to develop in response to the lack of action by the responsible municipalities in the valley (Dangi et al., 2015). Their business model is based on the payment of a fee by the inhabitants in exchange for the collection of household waste. As said by Dangi et al. (2015, p.399), « *the government and Kathmandu city haven't established a practice of recognizing and working with private companies until very recently.* ». The Japanese helped to build a temporary landfill in Sisdol, a place in the Nuwakot Region, 1.5 hours by truck northwest of Kathmandu. Located on the bed of Kolpu Khola (river), the leachate, a liquid formed from a mixture of water and various contaminants with hazardous potential (Raghab et al., 2013), generated from the landfill and flowing down during rainy periods risks polluting the river very heavily (Dangi et al., 2015). Initially, Sisdol landfill Site (SLS) was supposed to be

used only for 2 years, until January 2008 and the plan was to build a permanent landfill in Banchare Danda, a few kilometers away from Sisdol. During the first years of SLS use, the inhabitants of Sisdol blocked the road more than a hundred times in protest (Ibid.). Consequently, it was only in 2015 that the construction of BLS began.

The 2015 earthquake resulted in more debris, further burdening the waste management system (Hall et al., 2017). 2015 also represents the year in which the new constitution was put in place. Despite foreign aid, their effectiveness was undermined due to the inadequate utilization of equipment and inefficient decision-making by the authorities.

## 2.4 Historical development of the legal framework

In parallel to the cooperation agreements, the legal framework of the country evolved too. The 1990 Constitution of Nepal states that: *"The State shall give priority to the protection of the environment of the country and also prevent damage due to physical development activities by making people conscious of environmental cleanliness and by making special arrangements for the protection of rare animal species, forest and vegetation"*. Waste Management did not give specific national policies before 1996, despite the creation of SWMRMC in 1987 (Upreti et al., 2020).

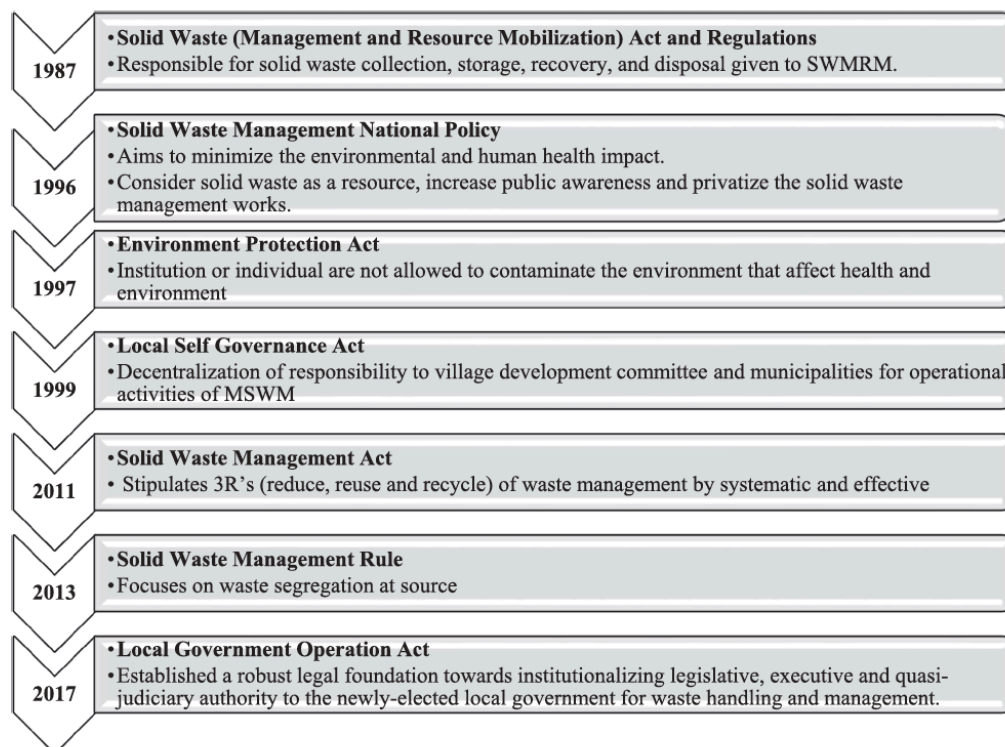


Figure 9 SWM rules and regulations evolution (Lohani et al., 2021)



Figure 9 above shows the rules and regulations evolution in the last years. In 1996, Nepal's first national policy on waste management was created, followed by the significant Local Self Governance Act in 1999, decentralizing waste management to local governments. The 10th National Plan of the country (2002-2007) introduces polluter pays principle, and private sector participation is encouraged in waste management (Upreti et al., 2020). This coincided with the arrival of the first private companies active in the sector.

The SWM Act (2011) is the first law targeting specifically the solid waste management (Upreti et al., 2020). This act repeats from the beginning that: « *The local body shall be responsible for the management of solid waste by construction and operation of infrastructure like transfer station, landfill site, processing plant, compost plant, biogas-plant and also collection of waste, final disposal and processing.* » (art. 3.1). This act also encourages to reduce the amount of waste and « *The local body shall prescribe to separate the solid waste into at least organic and inorganic including different kinds at its source.* » (art. 6.1). The chapter 4 of the act is called: Involvement of Private and Community Sector in the Management of Solid Waste. The first article says that « *Nobody shall, without obtaining a license from the local body carry out activities relating to the management of solid waste.* » (art.13.1). Then, it sets out the conditions under which these partnerships must be carried out, specifying in particular in Article 13.4 that « *Local body may issue a license under Sub-section (3) only after obtaining permission from the Government of Nepal on condition that the technology shall be transferred by the foreign company, organization or body within the time period mentioned in the agreement in case of non-availability of technology necessary for the management, recycle use, processing or disposal of solid waste.* ». Article 15 specifies that the local body must call tender. Overall, it outlined local bodies' responsibilities, encouraged waste reduction, segregation at source, and involvement of the private and community sector. With this act, waste management transitioned from being a public service to a business opportunity, fostering the growth of private companies in the early 2010s.

To supplement the 2011 Act, the 2013 SWM Rule further clarified the involvement of the private sector. The Rule specified that private entities must adhere to standards set by local bodies (art. 15.1), and non-compliance could result in permission revocation (art. 15.2).

The Local Government Operation Act (2017) is the first Act about Waste Management after the inauguration of the country's first constitution in 2015. It « *encourages coordination, cooperation and partnership with the private and non-governmental sectors in waste management and it promotes sanitation and waste management at the local level.* » (Upreti et al., p.14). The problem is that « *legislations and policies specifically relating to solid waste, such as the Solid Waste Management Act 2011, Solid Waste Management Regulations 2013 and the National Policy 2007 have not been revised. This has led to a situation of legal ambivalence and uncertainty, particularly about the division of responsibilities between the central and local bodies.* » (Upreti et al., 2020, p.14).

Many articles encourage the implementation of public-private partnerships (PPPs), but only Article 13 of the 2011 Act mentions the collaboration with a foreign company, highlighting the possibility of making such agreements and emphasizing that the local body must have the agreement of the Nepalese government for this kind of agreement.

### 3. The current Solid Waste Management in Kathmandu Valley

#### 3.1 The waste cycle

This chapter analyses the actual solid waste management (SWM) in KV. It is important to note that limited data is available and, more importantly, verifying their authenticity is difficult. As mentioned by Upreti et al. (2020): “[D]ata availability on SWM in Nepal on general is scarce and contested. » (p.13). The production of waste marks the first step in the waste cycle, with waste amounts in KV rising due to urbanization and population growth, as illustrated in Figure 10.

Year	Waste generation (tons/day)
2011	321
2012	334
2013	348
2016	409
2018	440

Figure 10 Waste generation growth from 2011 to 2018 (Lohani et al., 2021)

Recent changes in waste composition are also noteworthy. There has been a decrease in organic matter, accompanied by an increase in plastic, textile, and "other" types of waste (Khadka et al., 2021; Lohani et al., 2021) as shown in Figures 11 and 12. Additionally, there is a marked increase in e-waste production. While the exact quantity is currently undetermined, Giri & Adhikari (2020) argue that this quantity is rising rapidly. However, it's important to interpret these trends with caution due to limitations in the available data.

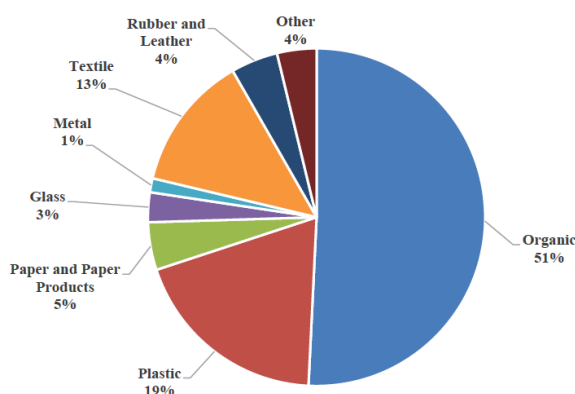


Figure 11 Waste Composition in KMC in 2021 (Khadka et al., 2021)

Waste (%)	Moisture (%)	2004	2005	2007	2009	2013	2016
Organic	70	67	70.9	71	65.3	56	63.2
Plastics	5	16	9.2	12	11.2	16	10.8
Paper	20	10	8.5	7.5	9.3	16	9
Textile	—	4	3	0.9	2.4	1	2.3
Rubber/leather	—	0.4	0.7	0.3	1.2	1	1.2
Metal	—	1	0.9	0.5	0.4	2	0.4
Inert	—	1	4.3	5	4.6	—	4.5
Glass	—	1	2.5	1.3	5.6	3	5.4
Others	10	0.2	—	0.7	—	4	1.2

Figure 12 Evolution of the Waste Composition in KMC (Lohani et al., 2021)

Despite the 2011 Act requiring waste segregation at source, only half of the households comply (Upreti et al., 2022). Ineffective segregation complicates efficient waste management, and many of the interviewees highlight this issue as the most important to address for improving Solid Waste Management.

Once produced, waste undergoes numerous stages from its point of origin. The first step is door-to-door collection, which involves trucks collecting waste directly from households. Upon reaching a street, the trucks whistle to alert residents of their arrival. The residents then bring out their garbage bags and the truck picks them up. In Kathmandu, two systems complement each other for this purpose. Some of these trucks belong to the municipality of Kathmandu, while others are owned by private companies (Upreti et al., 2020). Figure 13 depicts a truck collecting waste in Ward-32 of Kathmandu. Most of these trucks have open trunks, often resulting in bags falling onto the road.



*Figure 13 Truck collecting waste door-to-door in KMC (©TB)*

According to KMC regulation, the trucks should pass every day before 9 am (Bhele, 2019), but it's common to see trucks collecting waste after that time. While some areas have daily collection, notably tourist areas and residential areas where wealthy people live, others do not (Flacke et al., 2022). Collection often does not take place for long periods of time, either because the road to the dump is inaccessible, blocked or in a too bad condition for trucks to use, or because of the inability of the actors to ensure daily collection (Ball, 2022). This system is problematic if residents are not at home at the time of collection. This creates situations where residents frequently put their waste outside as they can't handle too many wastes at home. During the rainy season, the waste is washed away by the rain and scattered in the street. Figure 14 below shows this phenomenon during a rainy episode in March when residents put out their waste after a long period without collection and the collection bags were damaged by the rain, allowing the waste to disperse.



*Figure 14 Waste lying on the street damaged by rain (©TB)*

Attempts have been made to separate the type of waste according to the day of the week by collecting organic waste on one day and inorganic on the other day, but there are two problems. Firstly, as said before, most households do not separate their waste at source (ADB, 2013; Lohani et al., 2021). Secondly, even when they do, trucks sometimes mix wastes despite the theoretical separation of days, making efforts to segregate at source useless and further reducing people's willingness to make this effort (Ojha, 2022d; Himalayan News Service, 2022).

Once collected, a significant portion of the waste goes to transfer stations. Teku is the transfer station for the city of Kathmandu (Figure 15), where the waste collected by municipal employees are deposited (Shrestha, 2015). Waste collected by private companies go to private transfer stations if the company owns one, or directly to the landfill. Regarding waste passing through transfer stations, there are often informal workers who search for recyclable materials amidst the waste. Those transfer stations are often just dumping spot under a bridge near a river where informal workers segregate (as on Figure 16) (Sharma, 2016b; Plaza Cabrera, 2018). The owner of a company that was interviewed stated that their space is too small for their needs, allowing them to recycle only 5-10% of the total recyclable material.



Figure 15 Teku Transfer Station (©TB)



Figure 16 Transfer Station on Bagmati Riverside (©TB)

Teku transfer station is interesting to understand the situation in the city. In addition to the daily waste, it contains a lot of bulky waste, which has been stored in the transfer station for several years. Figure 17 below shows a bio-methanization plant infrastructure, which was inaugurated in 2017 with support from the European Commission but was only used for a few months before it broke down and was never repaired. It has been stored here since, unused (Lohani et al., 2021). Figure 18 shows the the back of Teku with several vehicles dumped and stored here.



Figure 17 Bio-methanization plant infrastructure in Teku (©TB)



Figure 18 Dumped vehicles in Teku (©TB)

Figure 19 provides a wider view of the transfer station. Many vehicles can be seen and most of them are no longer in working order. There is a dozen of truck in the background. According to the CEO of a company interviewed, these trucks were donated by India, China, and Japan, but once they broke down, nothing was done to repair them, and they have been stored here for several years.



*Figure 19 Vehicles in Teku Transfer Station (©TB)*

A major fire broke out at Teku in 2021 due to flammable waste and methane gas accumulation (Wagle & Dixit, 2021). This caused toxic gases and as Teku is located in the center of the city (see figure 20), many houses are adjacent to the transfer station. This fire is an exceptional event, but it adds to an already difficult situation for the neighbors who suffer from the odors and pollution inherent in the dump (Fei et al., 2021). In addition, birds of prey and dogs are attracted by the odors and waste from the station, a potential vector of disease for the inhabitants (Ibid.).

The remaining waste is transported to the Sisdol Landfill Site (SLS). At the time of my fieldwork, and since 2005, SLS was the only landfill serving the entire Valley. Since then, Sisdol has been

replaced by Banchare Danda Landfill Site (BLS) from May 24, 2022, a landfill located 2km away from SLS (Republica, 2022). Figure 20 below shows the location of SLS and Teku, as well as the road from Kathmandu to the landfills. It takes approximately 1.5 hours for trucks to travel the 25 km from Teku to the landfill. There is only one road to make this trip, which is made of unpaved and poorly maintained terrain, making it often unusable during the rainy season and complicating waste disposal.



Figure 20 Map of Kathmandu Valley with Sisdol and Teku

Each rainy season is marked by periods during which the road is inaccessible, causing Kathmandu to become filled with waste, trapped in the valley. The year 2022 was marked by an extremely long rainy season, which began earlier, and ended later than usual. The road suffered significant damages, frequently preventing trucks from reaching the Sisdol Landfill. An interviewee stated, "If the landfill site is blocked for a few days, the whole system collapses." Figures 21 and 22 illustrate the challenging road conditions, respectively near Sisdol and halfway between Kathmandu and Sisdol. These conditions, exacerbated by heavy



rain and the frequent passage of trucks, sometimes cut off the road access entirely (Ojha, 2020a; Bhele, 2019).



*Figure 21 Road near SLS (©TB)*



*Figure 22 Road between KMC and SLS (©TB)*

According to Republica (2023), around 200 trucks are going to the landfill every day. The vehicles are checked at the entrance and must have an authorization to enter the landfill, as well as pay a fee of around 400 Nepalese Rupees (NPR) (around 3 USD) for each truck dropping waste in the landfill. Figure 23 below shows the queue of trucks outside the landfill.



*Figure 23 Queue of trucks outside SLS (©TB)*

Upon reaching the landfill, trucks unload their waste, which is then sorted by informal workers, often lacking protective gear, and working in harsh conditions (Khanal et al., 2021). Figure 24 depicts these workers sorting recyclable materials; however, much of it remains unprocessed due to the large volume. Informal workers report disregard from truck drivers, leading to accidents and casualties.



Figure 24 Informal Waste Workers working in Sisdol (©TB)

Daily waste intake at Sisdol has risen from 450 tons in 2011 to 1,200 tons in 2022, necessitating more trucks and informal labor (Waste of(f) Life, 2022). Sisdol is overfilled with deplorable sanitary conditions and harmful environmental effects. A mountain of waste can be found there, with layers of waste forming the soil strata (figure 25 and 26). Annual rainfall creates a toxic leachate that pollutes the river next to the landfill, as well as the surrounding environment: *“Now that the whole country is suffering from damage due to excessive rainfall, it is evident that the leachate would mix with the river water downstream, loaded with millions of disease-causing vectors and bacteria. The bitter truth is that the water from Kolpu is used for drinking, washing, cattle, and irrigation. »* (Wagle & Dixit, 2021).



Figure 25 Layers of waste in SLS (©TB)



Figure 26 Layers of waste in SLS from close (©TB)

Sisdol landfill emits a powerful odor early in the day and becomes a contamination site for all types of waste due to inadequate segregation and sorting. E-waste and medical waste are frequently found at Sisdol, as seen on figure 27. A lot of hazardous components are also found in the leachate as said by Wagle & Dixit (2021): « *Studies have shown that the leachate at the site contains heavy metals such as arsenic, iron, copper, cadmium, chromium, lead, and nickel.* » The environment around Sisdol is made up of agricultural fields and houses with deplorable sanitary conditions. The surrounding environment, comprising agricultural fields and residences, suffers from poor sanitation. The nearby river is so polluted it can't sustain livestock or aquatic life (Shrestha et al., 2014). Overall, the system consists of collecting waste and dumping it, and only the informal sector contributes to reducing the amount of waste dumped.



Figure 27 Hazardous waste in Sisdol (©TB)

## 3.2 Stakeholders in the Solid Waste Management System

### 3.2.1 Local bodies / Municipalities

The new constitution assigns waste management responsibility to local-level governments in Nepal (Art.4 SWM Act). Municipalities play a vital role in the construction, operation, and management of infrastructure for the collection, treatment, and final disposal of solid waste, alongside ensuring the proper functioning of the landfill and transfer stations (Art.3 and 12 SWM Act; ADB, 2013).

In addition, they develop, implement, and enforce policies and guidelines (Art.39 and 52.2 SWM Act). A significant portion of their responsibilities centers on public awareness and education, emphasizing the critical importance of proper waste management practices for citizens (Art.10 SWM Act). This includes advocating for waste reduction, reuse, and recycling (3R), as well as proper waste segregation at the source. Overall, their responsibilities span all aspects of solid waste management in the city.

Kathmandu Metropolitan City (KMC) is the local government body responsible for supervising solid waste management in the city. According to the KMC environment office, approximately 700 employees are dedicated to the SWM sector within KMC, their main duties being household waste collection and street sweeping. A significant 40% of the environment office's budget is allocated to waste management. This budget covers KMC employee salaries and running costs of the system, but as stated by Sarita Rai from KMC Environment Office, it does not extend to funding innovative infrastructure, repairing existing equipment, or purchasing new equipment.

Due to the lack of resources to handle all the SWM in the Valley independently, KMC is required to collaborate with private companies. Article 13 of the Act states that the local body is responsible for providing licenses to the private companies, meaning that each municipality should have an agreement with the companies operating within their jurisdiction.

Kathmandu Valley consists of 18 municipalities. Each of these municipalities is responsible for SWM in its area, as mandated by the SWM Act. Like KMC, these municipalities rely on the Sisdol Landfill for their waste disposal.

### 3.2.2 Government and Ministries

While the constitution assigns primary responsibility for the SWM to local bodies, other institutional actors are also involved with important roles as stated by Upreti et al. (2020): “Several national level government agencies, ranging from ministries to authorities, remain involved in solid waste management” (p.17). The challenge arises from the SWM Act, which places nearly all responsibility on the Local Body, leaving the roles of other entities vague and undefined. Upreti et al. (2020, p.17) gives the following example: « The Ministry of Forests and Environment (MOFE) is responsible for formulating SWM policy although it does not play any role in the implementation, for which the municipalities and the rural municipalities now have the authority. » That leads to a situation where the roles of each actor are “ill-defined” (Ibid, p.17).

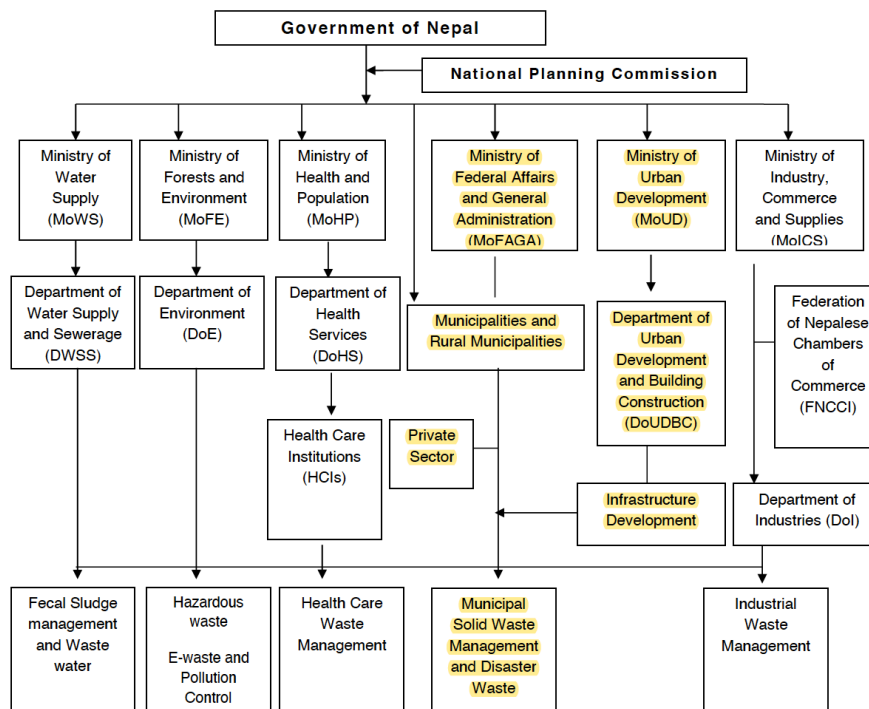


Figure 28 Composition and organization of the Nepalese government (Gyawali, 2019 in Upreti et al., 2020)

Figure 28 illustrates the composition and organization of the Nepalese government, with the distribution of different ministries involved in waste management and policy implementation in this field. The two ministries highlighted are the most important for the Solid Waste Management : the Ministry of Federal Affairs and General Administration (MoFAGA) and the Ministry of Urban Development (MoUD).

MoFAGA oversees the municipalities and facilitates coordination between entities, primarily the federal and local governments. According to their website (MoFaGa, 2020), its aim is to encourage development and construction at the local level and coordinate interaction between municipalities, especially for infrastructure that involves multiple municipalities. MoFAGA also provides data on Solid Waste Management in the country.

MoUD, particularly through the Department of Urban Development and Building Construction (DoUDBC), plays a significant role in SWM. MoUD created the Solid Waste Management Act, 2011 and is responsible for infrastructure development. This ministry is responsible for constructing the new Banchare Danda landfill (Himalayan News Service, 2019), which, once completed, will be handed over to KMC. Before it was dissolved in 2017, the Solid Waste Management Technical Support Center (SWMTSC) fell under this ministry. Its mission was to offer technical support to all local bodies for effective and sustainable SWM and for research and development in this sector. Currently, MoUD's role theoretically encompasses the tasks previously performed by the SWMTSC, which was not replaced. MoUD is also tasked with constructing road infrastructure and bridges (Ibid.). This is particularly crucial, as efficient solid waste management cannot be achieved without high-quality road infrastructure. In the context of Kathmandu Valley, MoUD is responsible for ensuring all city roads are accessible to collection trucks and is specifically in charge of rehabilitating the road to SLS (Ibid.).

### 3.2.3 Investment Board Nepal

Established in 2011, the Investment Board Nepal (IBN) is a government entity aimed at propelling economic development by creating an investor-friendly environment (Upadhyay & Gaudel, 2018). Under the direct purview of the Prime Minister, IBN acts as a service center for investors, streamlining investment processes by liaising with government agencies and offering policy guidance. It deals with high-cost projects, typically around 10 billion NPR (approximately 100 million USD) (Kharel, 2019).

IBN concentrates on attracting investment in priority sectors such as hydropower, tourism, infrastructure, agriculture, and waste management. These sectors play a crucial role in driving sustainable development and economic growth in Nepal. As part of its mandate, IBN encourages public-private partnerships (PPPs) and foreign direct investment (FDI) for large-scale projects. In the context of solid waste management, IBN facilitates resource mobilization

and fosters partnerships between public and private entities (Ibid.). Its role is critical to the waste sector given the involvement of numerous entities. IBN is capable of implementing any project in direct negotiation with an interested applicant on a fast track, and it has the authority to issue licenses directly (Ibid.).

#### 3.2.4 Private companies

The actors who handle most of the waste in the valley are private companies, who can make profit in this sector since the legislation of the polluter pays principle in the SWM Act of 2011. According to SWMAN, around 70% of the waste collected in Kathmandu municipality is collected by private companies and 100% in most of the other municipalities in the valley. The number of active companies varies according to the sources but was around 80 in 2022. This number is changing rapidly, and some companies consist of only a few employees and a single truck. According to SWMAN, there are more than 3,000 employees working in companies in this sector.

The business model of these companies is based on households paying a fee in exchange for daily waste collection services. The household fee varies depending on the companies and the type of housing. The interviewed companies charged between 350 and 500 NPR per month per household (approx. 3-4 USD), generally per house, meaning that the cost would be the same regardless of whether the house is occupied by 1 or 5 families. Another way of charging is by kitchen, as each family usually has an independent kitchen, which means that each family can be charged in the same way. This is the strategy used by KMC and a few private companies. While many of these companies do not have the resources to collect waste daily, the majority tries to adhere to a schedule to collect segregated waste, separating the days for "dry waste" and "wet waste." The most common companies are those with 1 or 2 trucks, and they are accompanied by a few large companies with experience and longevity in this field. They usually have a small space where employees or informal workers search for recyclable waste, which is extracted before sending the rest of the waste to Sisdol. Two coexisting systems exist regarding the payment of employee salaries. Small businesses typically operate by paying low salaries to their employees, but allowing them to sell recyclable products themselves, which enables them to generate a daily income. These are generally companies that do not have their own sorting spaces to manage waste. Most of the large enterprises offer higher salaries but retrieve and resell recyclable materials themselves.

Several NGOs were created in the late 1990s, the State not objecting to them, because their work was effective and was closing a gap in the sector, acting as waste collector. As they became important, these NGOs organized themselves and created the “*Federation of the Environment and Conservation*” in 2005, which aims to represent them, defend their interests, and improve their coordination. However, as NGOs cannot generate profit, NGOs transformed into private enterprises with the potential to earn revenue from their work. Thus, the Federation of the Environment and Conservation became the Solid Waste Management Association Nepal (SWMAN) in 2016.

### 3.2.5 The Solid Waste Management Association Nepal (SWMAN)

All the information of this part come from the Interview with a member of SWMAN or from their website.

SWMAN is an organization representing private companies active in the waste sector in the Valley. Although it is a national association and any company active in SWM in Nepal can be a member, it currently consists almost exclusively of companies active in the KV, and almost all of them are part of the association. The aim of SWMAN is to provide support for solving existing problems, and to share information and knowledge between members. They are also responsible for monitoring their member companies, which must comply with the association's code of conduct, under penalty of being reported by SWMAN to the government, which can then punish them and impose a fine, for example, if a company dumps waste in a forest or river instead of in the landfill site. The association exists in agreement with KMC and there is a mutual respect between the two entities. It also acts as a coordinator to ensure that waste collection takes place in all areas of the city and to resolve any conflict that may arise between companies over the sharing of areas or for any other reason. In the event of a conflict, representatives of the companies are convened to the office of SWMAN, which acts as a mediator. The public can also complain to them if a company is not doing a good enough job and SWMAN will make sure that it improves.

Over the years, SWMAN has become a reference point and has increased its activities, offering awareness programs, or days when the population is invited to participate in the cleaning of rivers or other areas of the city. There are also discussions with many companies and municipalities outside the valley, for which workshops will be organized by SWMAN to



improve their skills. Bringing all these companies together in one entity allows all the experience gained in the field to be shared, and seminars are organized to improve the capacity of each company, which can learn from the experiences of others in the sector.

The large number of people represented by SWMAN gives legitimacy and power in political decisions concerning waste management. According to them, some companies in the valley exist without being part of the association, but it is necessary to have a SWMAN sticker to enter the landfill, so it is difficult to be active without being part of it. Belonging to SWMAN gives a company the guarantee of its investment and the insurance to be protected in case of a dispute. The association is working as a bridge between the people, the companies, and the government, defending the companies, but also making sure that they are not doing anything illegal and are acting in the interest of the population.

### 3.2.6 Innovative companies

Most of the active companies in the sector pick-up the waste in households, segregate if possible and then drop it in the landfill. However, there are some innovative companies in the valley, such as Doko Recyclers and Khaalिसisi, that have developed business models that involve recovering and reselling recyclable materials.

Khaalिसisi connects informal waste workers to the formal waste management system. Through its platform, individuals, businesses, and industries can schedule a pickup time for their non-mixed recyclable waste, which is then collected by one of the informal waste workers called a "Khaalिसisi friend." These workers collect the non-mixed recyclable waste either for free or by purchasing it and then sell it to recycling companies, reducing the amount of recyclable waste that would otherwise end up in landfill. While these workers are not formally employed by the company, there is a social contract between them and their Khaalिसisi friends, with the objective of optimizing their efficiency through the platform. The co-founder of this company called it the *"Uber for waste management"*.

Doko Recyclers also provides pickup services for recyclable waste, but with a key difference. Unlike Khaalिसisi, Doko has its own employees who collect the waste using company vehicles. In addition, Doko specializes in e-waste recycling, but due to limited infrastructure and

resources, not all e-waste can be recycled. Exporting e-waste is also illegal and complex, posing a challenge for Doko and the industry.

Those two actors illustrate innovative actions that take place in the SWM in the Valley.

### 3.2.7 Informal workers

Other crucial actors in the solid waste management system are the informal workers. They extract recyclable materials from mixed waste to resell them and generate income. Since 2013, informal workers have been represented by a cooperative formed and managed by informal waste workers (IWW) called Sanyukta Safai Jaagaran Bachat tatha Rin Sahakari, known as SaSaJa (Waste of(f) Life, 2019). This is the only organization of its kind in the entire country, consisting of two distinct parts. The cooperative aspect offers workers the ability to save money, access loans, and create a health fund to cover unexpected health problems. The NGO aspect advocates for the recognition of IWW, mitigation of occupational risks, and worker empowerment. There is an ongoing project called « *Healthy Waste Workers for Sustainable Waste Management* » with the support of French association Médecins du Monde. The aim is to improve the working conditions of those people by increasing their recognition, reducing the health risk of their job, and increasing access to health service for IWWs and their community.

According to SaSaJa, there are around 10'000 IWW in the Valley, but this is a fast-changing number, and no clear data are available. 747 IWW were part of the cooperative in April 2022 (Karmachya, 2022). They are the primary recyclers in the valley and enable the recovery of a significant amount of recyclable waste that would otherwise end up in landfills, also providing employment opportunities for the formal recycling sector. According to SaSaJa, one ton of recyclable waste is sorted by IWW every day! These workers are involved in various stages of the waste value chain. Informal workers can be found on their bicycles in the streets of the city, at the transfer stations of certain companies, in Teku, in Sisdol, or along the river, recycling waste dropped there. Many workers are employed by a company for a low salary of around 4000-5000 NPR per month (approximately 30-40 USD per month) but own the recovered waste and have an informal component to their work that escapes state control. The working conditions of IWW differ for each of them.

### 3.2.8 Kathmandu Valley residents

The Kathmandu Valley is currently home to approximately 3.3 million residents, a number which is growing daily (Mesta et al., 2022). All these individuals are dependent on the current waste management system and must adapt to its shortcomings daily.

Nonetheless, people also have a role to play in waste management and must act on their scale by segregating waste at the source and changing their habits. It is common to observe Nepalis throwing plastic directly onto the streets or out of bus windows. Plastic bags are often requested on buses for spitting, only to be thrown out of windows. It is difficult to find an immaculate location without plastic, whether in urban or rural areas. An anecdote is revealing of the attitudes of people. I was invited by a family in the countryside with a friend, who offered them chocolate, which, it must be said, was accompanied by a significant amount of plastic packaging. A month later, we were invited back by the same family, who had enjoyed the chocolate a lot, but whose packaging was still visible in their garden and the environment around their house. This corroborates the statement made by one of the interviewees: *“Nepalese homes are extremely clean, but that's all that matters to them [Nepali people]. As long as waste is outside their doorstep, they are not bothered, and only the cleanliness inside their homes is important.”*

### 3.2.9 Residents near the landfill and its access road

In addition to the valley residents, those living between Kathmandu and the Sisdol landfill are directly impacted by the waste management system in place, forced to endure the daily truck traffic transporting waste to the landfill, which damages the road and causes waste to spill out of improperly sealed trucks. Finally, local communities residing near open dumping sites or informal waste processing areas are also heavily impacted, and the quality of their lives is dependent on the policies in place in the valley.

### 3.3 Solid Waste Management Issues and critical role of the actors

The aim of this section is to take up the actors presented above and analyze their actual role in the current system.

#### 3.3.1 Local bodies / Municipalities

Despite the legal responsibilities outlined, municipalities have struggled to manage the solid waste sector effectively, missing opportunities for substantial revenue generation. A notable deficiency is the under-investment in technology enhancements and new services. Most municipal resources are consumed in maintaining the status quo and paying their employees, as stated by a company CEO: *“Maintenance costs are severely reduced, the infrastructure, the vehicles, everything is downsizing now in KMC ».*

There is a poor management of donated equipment and scarce infrastructure developments, such as recycling facilities, city roads, and appropriate vehicles. There has been a lack of enforcement of laws and promotion of waste segregation at the source. While Mayor Balendra Shah expressed a willingness to promote waste segregation in his inaugural speech in May, reports soon emerged that segregated waste was being mixed in the trucks, rendering the initiative ineffective (Himalayan News Service, 2022; Ojha, 2022b ; Ojha, 2022d).

Furthermore, municipalities lack proper urban planning for many years, as demonstrated by the current mayor's efforts to combat illegal constructions and inadequate road development (Ojha, 2022c), with almost no new road in the city in the last 20 years (Sharma, 2016b). Newly established municipalities lack expertise in waste management, and they have inherited a sector in which private enterprises were already operating. According to them, they do not possess the necessary mechanisms, staff, or data to manage waste effectively. KMC has staff, but according to many interviewees, they are doing an inefficient job with large salaries. Since around ten years, when the decision was made to involve a multinational company in managing the waste sector, KMC has not hired any new employee. Consequently, the number of available personnel has gradually decreased due to retirements.

Moreover, a disconnect between the law and reality has led to an informal waste management system in many municipalities. An interviewee summarized the situation well: *« According to the Act, SWM is a business, not a service, that's why we must make tender. But*

*tender is difficult, that's why we have no tender. That's why we don't act formally in our SWM, we do it informally, in another way illegally. We don't have contract with anybody. We are doing something illegal and the companies too. Everything is done by private companies in our municipality. [...] The problem is that it takes 2-3 months to make tender, because of tender process. That means, if we do this, the actual companies working will stop their work as a protest and no waste collection during a period that long is not acceptable for anyone. That's why the system is blocked. ».* An employee of a municipality said that: *"They just inform us that they are working."* This is an extremely important aspect for understanding the situation. Without an agreement, data are often not shared, and the municipalities no longer have control over waste management. No information exists regarding the amount of collected waste that ends up in locations other than the landfill (Ibid.).

In conclusion, public sentiment and the views of other stakeholders reflect a general mistrust towards the municipalities' actions and intentions in waste management. As an employee of a private company succinctly puts it: *"With less effort, they want to earn more. The municipalities don't want to invest, but they want to take the profit. KMC is not transparent at all."*

### 3.3.2 Federal level

While waste management primarily falls under the jurisdiction of municipalities, numerous factors at the federal level significantly influence its efficacy. There is an urgent need for clarity in the division of roles among institutional actors, prevention of role duplication, and a clear delineation of responsibilities. Both the federal state and municipalities have failed to invest adequately in infrastructural improvements or necessary technological advancements for the sector's efficiency.

A significant obstacle to effective waste management is the poor condition of the landfill-access road, a maintenance task which is the responsibility of the federal government. Continuity is also disrupted by frequent changes in administrative positions, necessitating constant renegotiations and training for new officials. A member of SWMAN illustrates this problem: *"These people are elected, we talk to them, explaining the situation and our opinion on how to do it, then another person comes, and it starts again. That makes 10 times!"*

Confusion among the population arises from the lack of clarity in government taxes, leading to the perception of paying double taxes for waste management services - to both private enterprises and the municipality (Rahman & Bohara, 2023 ; Velis et al., 2023). The system's inefficiency and opacity contribute to this confusion. Even the CEO of a prominent company, who has been active in this sector for over a decade, expressed confusion about what exactly the municipal taxes included.

Systemic corruption is « *rampant* » in Nepal (Jha, 2023), characterized by the imposition of large taxes on the population and non-transparency in the use of these funds. In 2022, Nepal ranked 110th out of 180 countries in Transparency International's annual survey receiving a score of 34 out of a possible 100 - where 100 signifies no corruption (Transparency International, 2023). According to many interviewees, the waste management sector is not immune to this issue, with personal gain often prioritized over actual problem-solving. An interviewee stated: « *Corruption is a global problem in Nepal [...] They are not thinking about waste management, they are thinking about how to make money from this* ».

The absence of a central body for addressing waste management issues, following the dissolution of the Solid Waste Management Technical Support Center in 2017, has amplified these challenges. The reasons for the dissolution remain ambiguous, with some interviewees suggesting it was due to an ego issue.

Inadequate landfill management, insufficient communication and consultation with local authorities, and ill-defined roles of the entities involved have all contributed to the poor state of landfills.

Lastly, the waste management system's inefficiency is underscored by service inequalities across the city and an overreliance on landfill sites.

In conclusion, issues like role ambiguity, lack of coordination, budget constraints, and ineffective decision-makers have plagued Nepal's waste management sector, leading to a system that falls short of serving the population effectively.

### 3.3.3 Private companies

Private businesses in Nepal's waste management sector bridge the gap formed by the limited effectiveness of responsible authorities. Their significant contribution, often delivered informally, is recognized, as one interviewee noted: *"The staff of KMC feel that they can't just question us because we are helping them. This is their job to make the city clean. They don't have proper access now, because their maintenance is bad."*

These companies, however, encounter numerous barriers. Smaller one, with scarce resources and personnel, prioritize revenue generation over proper waste management practices. They lack the capacity to invest in and improve the existing system. There are also big companies that have already significantly invested in the sector, as another Interviewee stated, *"We have invested so much money and time in this sector, so we are looking at the situation with attention."* They just don't have enough to invest much more and bring better infrastructure.

SWMAN compensates for the state's lack of coordination and monitoring role while also improving scientific knowledge and experience exchange between private companies and the public through organized events. The space limitation issue in the valley is a common challenge shared by these companies. This leads to a scenario where a majority of the waste, due to lack of segregation, ends up in landfills, as voiced by a company's CEO: *"Organizations and companies like us are struggling because they don't have much space for the establishment of waste processing. There is just enough space to manage it and take some revenues, service fees from the citizens."* Certain



Figure 29 Waste segregation on riverbanks (©TB)

companies have acted against the health of this sector and committed serious faults such as dumping waste in a river or forest, posing a problem for the credibility of the entire sector among the population as highlighted by a member of SWMAN. Some companies are still

dropping waste in the riverbanks too as highlighted by the photo above (figure 29). The workers are segregating waste before going to the landfill, but a lot of waste is “lost” and stays on the riverbanks, often finishing in the river.

Healthy relationships exist between private companies in the sector, largely due to SWMAN's role as a mediator, with an interviewee stating, "*There is no competition in the sector actually*". "*There is also a healthy relationship with municipalities*" as explained by another Interviewee, who mentioned that the association has been established to define the responsibilities of each company and keep them under control. Municipalities are aware that the companies are acting for the well-being of the Valley and its inhabitants, and are in frequent contact with SWMAN.

In conclusion, private companies in Nepal's waste management sector operate in an environment with legal ambiguity, limited resources, and space constraints. They work alongside municipalities and have a healthy relationship with each other, mediated by SWMAN. Despite the challenges, these companies play an essential role in supporting waste management in Nepal. However, transparency in the disposal process remains an issue, with some disposal practices being environmentally hazardous and illegal. Municipalities may be hesitant to act against these companies due to their dependence on them for waste collection services (Bhele, 2019).

#### 3.3.4 Informal Workers

Informal waste workers in Kathmandu play a crucial role collecting, sorting, and selling recyclable materials, filling the gap created by the formal sector's inability to achieve efficiency (Karmacharya, 2022). The NGO SaSaJa has provided identity to around 1,000 workers, acknowledging the importance of their work, such as cleaning the rivers, and helping to recover recyclable materials. SaSaJa has enabled them to organize themselves better and to work in groups, while they used to work alone.

Even with these conditions, some informal workers are hesitant to transition to formal employment with private companies, as they prioritize the daily income from selling recyclable goods and the flexibility of working independently or in small groups. A member of



SaSaJa explained that her problem with formalization is that she would not be allowed to work, as she is older than the legal retirement age of 58 years.

The conditions of waste workers at the Sisdol landfill is alarming. They operate in terrible conditions, facing physical injuries and persistent health issues due to insufficient Personal Protective Equipment (PPE) (Black et al., 2019 ; Khanal et al., 2021). Workers at the Sisdol landfill also suffer from inadequate facilities, such as a lack of changing rooms or meeting spaces, limited access to drinking water, and no space to store their food or eating without being exposed to the smell emitted by the landfill. SaSaJa explained that efforts to improve their situation have faced bureaucratic obstacles and insufficient support from local and central governments. Furthermore, the Sisdol workers experience environmental hazards due to the proximity of their work to the landfill. The pollution, foul smells, and potential fires during the dry season exacerbate their already terrible working conditions, as illustrated in Figure 24. The elites, already showing little interest in the formal sector, demonstrate even less concern for the informal sector. Consequently, they make no efforts to create more adequate living and working conditions (Karmacharya, 2022).

In conclusion, the situation of informal waste workers in Kathmandu and Sisdol requires urgent attention. Their crucial role in the waste management system, including the reduction of recyclable materials ending up in landfills or the environment, should not be underestimated.

### 3.3.5 Kathmandu Valley Population

The population of KV, which is currently exacerbating waste management issues with their behaviors and mismanagement practices, faces many challenges. A primary concern is the inadequate waste segregation at source (Upreti et al., 2022). Many institutional actors and private companies during the interviews have highlighted this as a significant issue, underscoring the necessity of behavioral changes at both household and industry levels. Public awareness campaigns and education initiatives might play a crucial role in improving waste segregation practices among the population. Some interviewed actors believe that the population's consumption habits are a major problem, and that a reduction in waste production is necessary to improve waste management. Efforts to encourage more

sustainable practices, such as reducing single-use plastic usage, can lead to a decrease in waste production.

Environmental disrespect is evident in Kathmandu, where waste is commonly found on streets, rivers, and other public spaces (figures 30 and 31). The city's practice of burning waste exacerbates air pollution, posing significant health hazards (Das et al., 2018) (figure 32).



Figure 30 Waste on the road (©TB)



Figure 31 Waste in the river (©TB)

The residents also struggle with the insufficient provision of trash cans, which has led to the use of makeshift waste disposal options like cardboard boxes outside shops. As stated by an Interviewee: *“There was a waste bin project funded by Japan, but it was misused by people who either broke the bins or moved them aside.”* This is interesting because it shows that the population does not respect these infrastructures enough, and that the municipality has not taken any responsibility, neither for financing these trash cans nor for repairing them or ensuring their proper functioning.



*Figure 32 Waste burning under a bridge (©TB)*

Frequent blockages and periods without waste collection services further exacerbate the problem. Due to the lack of storage options outside their homes, residents are forced to keep waste inside their living spaces during periods of collection disruptions, often resorting to dropping waste outdoors when it becomes impossible to store it inside their homes. It creates a situation where wastes are dropped everywhere in the city as seen on figure 33.



*Figure 33 Waste littering on the street (©TB)*

The urban poor, particularly those residing near rivers, are disproportionately affected by these issues, facing localized pollution and environmental injustice. During my fieldwork, most of informal dwellings I saw were located next to the river (figure 34), which is the most polluted area in the city, making the daily lives of these residents even more difficult than it already is, and the poor waste management contributes to amplifying this issue. Affluent neighborhoods, on the other hand, enjoy more frequent collection services (Bhele, 2019).



Figure 34 Dwellings next to the river (©TB)

In conclusion, this sentence from Sharma (2016b) perfectly summarize the actual situation: « *Land, water and food are contaminated. The garbage piles stink. Frequent waste fires pollute the air. The urban poor in particular are exposed to health hazards, not least as waste has an impact on water supply. Many public taps are near waste disposal sites, so there are risks of water-borne diseases. Moreover, clogged drains create small ponds where mosquitos and other disease vectors breed* ».

### 3.3.7 Residents near the landfill and its access road

The impacts of inefficient waste management within Kathmandu extend beyond the valley's borders, primarily affecting areas like Sisdol and the intervening villages. Constant truck traffic, often spilling waste, leads to road degradation, noise, air pollution, and visual disturbance. Road conditions sometimes deteriorate to unusable states, particularly during the rainy season. Unlike Sisdol, these villages receive no compensation for these impacts, according to Bhele (2019).

Sisdol and its surrounding areas bear the most significant impacts. The landfill's proximity degrades and pollutes the environment, impacting local wildlife and creating unpleasant odors. Waste of(f) Life (2019) reports instances where the stench was so unbearable that residents couldn't eat their meals indoors. Moreover, these areas have witnessed an increase in bird hazards, particularly involving eagles and other birds of prey. Figure 35 below was taken from the landfill side and show some impacted housing in the opposite side.



Figure 35 Housing next to SLS (@TB)

The area has experienced an increase in diseases and waste-related issues with their life environment completely polluted. Residents frequently block the road to Sisdol, demonstrating the ease with which a system relying on a single route can be disrupted. According to Gautam & Chhetri (2016), regular operations at SLS are hindered by strikes or protests organized by political parties or people living near the landfill. The impact on Sisdol and its surroundings has been disastrous, with a municipality representative stating: "*Sisdol people give everything, and the government doesn't do anything; they don't even have the right to transportation.*" Another interviewee adds: "*It's a case of environmental injustice.*"

Although residents receive financial compensation due to protests, it is insufficient compared to the enormous impacts they experience. As reported by Upreti et al. (2020), the Sisdol landfill site has remained controversial due to frequent disputes between locals and concerned stakeholders. The capacity of SLS to accumulate waste has reached beyond its limit, and the demands of residents have been increasing day by day. Demands include better waste management, managing leachate, tree planting, and youth employment opportunities (Upreti et al., 2020).

The current waste disposal method at Sisdol is subpar, with no agency overseeing the health hazards posed to the local community. This calls not only for improved city management but also for active measures towards environmental justice (Upreti et al., 2020 ; Bhele, 2019). Despite the impending operation end, the valley's waste has been dumped in Sisdol for 17 years, necessitating its continued management. The new Banchare Danda Landfill, situated in

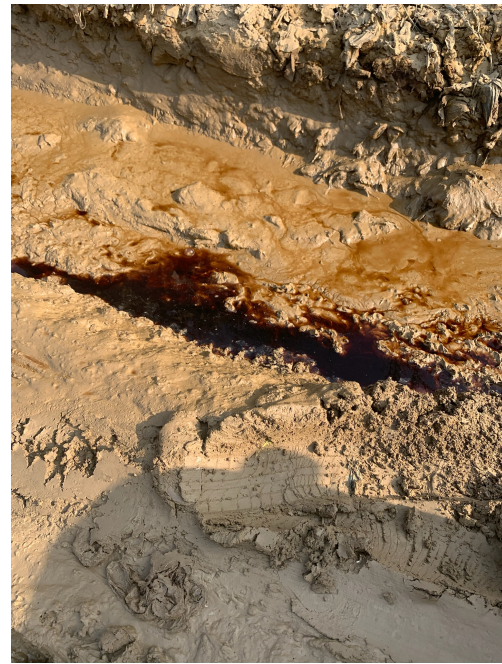
a similar environment to Sisdol, will likely not significantly improve the situation for the inhabitants.

### 3.3.8 The Environment

The environment has been significantly affected by waste management problems. The river near the landfill is lifeless and filled with waste (Figure 36). This pollution heavily impacts adjacent fields and the produce they yield, which locals either consume or sell.



*Figure 36 River next to SLS (©TB)*



*Figure 37 Leachate draining from SLS (©TB)*

Figure 37 shows leachate, a liquid produced by landfills that, when combined with river water, contaminates resources used for drinking, washing, livestock, and irrigation (Wagle & Dixit, 2021). This liquid carries harmful heavy metals like arsenic, iron, copper, cadmium, chromium, lead, and nickel (Ibid.). When it mixes with ground and surface water, it poses serious health risks. Landfills also produce high levels of methane gas, a major contributor to global climate change (Chavan et al., 2022).

The dry season presents risks of landfill fires, exemplified by the 2021 incident in Teku (Ibid.). These fires, coupled with a tendency to shift responsibility among stakeholders, exacerbate control efforts. Furthermore, organic waste breakdown by microorganisms releases additional greenhouse gases, with landfills contributing to 4% of global emissions (Sharma, 2016a).

Environmental issues extend beyond the landfill site. Widespread waste, consumed by both wildlife and livestock, pollutes rivers and their banks throughout the valley. City waste burning emits harmful gases (Ferronato & Torretta, 2019), contaminates land, water, and food, and produces unpleasant odors. Air pollution from frequent waste fires exposes communities, particularly the poor, to health hazards (Sharma, 2016b). Poorly managed waste also poses a risk of waterborne diseases due to the proximity of public taps to waste disposal sites and breeding of disease vectors in clogged drains. A 2022 cholera outbreak, attributed to improper waste management (Khadka et al., 2022), emphasizes the critical interplay between waste management and sanitation.

The Banchare Danda landfill, designed to replace the SLS, continues to raise uncertainties about its impact on the environment, as does the management of the closure of Sisdol. All the valley's waste has been dumped at Sisdol for the past 17 years and there is a lack of information about how the closure of Sisdol will be managed.

## 4. Nepwaste's Project

Unless otherwise indicated, the information in sections 4.1 to 4.7 originates from interviews conducted with a member of the City Planning Commission, a representative of Nepwaste, or an independent journalist.

The Nepwaste project's process began in December 2009, when the Nepali government issued an international call for private companies to submit proposals for an Integrated Solid Waste Management Service (Plaza Cabrera, 2018). At the time, the Solid Waste Management and Resource Mobilization Center (SWMRMC) under the Ministry of Local Development was responsible for the project. Over 70 companies applied for the tender, but only two were selected by the Investment Board Nepal (IBN): Nepwaste and Clean Valley Company. Nepwaste was awarded Pack 1, which included 10 municipalities, including the Kathmandu Metropolitan City (KMC) (figure 38), while Clean Valley Company, a Nepali Indian joint venture, was responsible for Packs 2 and 3, which included Lalitpur, Kirtipur, Bhaktapur, and surrounding municipalities. Initially, another company had won the bidding for Pack 1, but after a field visit, it was discovered that false information had been provided, and Nepwaste, the second initial choice, was ultimately awarded the project. This resulted in a delay, as the other company did not accept the defeat and the matter went to court. Finally, in June 2011, Nepwaste won the case and was officially granted the contract, signing the Memorandum of Understanding (MoU) - the first formal agreement between the two parties.

### 4.1 What is Nepwaste?

Nepwaste Pvt. Ltd is a joint venture between Finland-based companies Compunication, Poyry, Bioste, and the Dutch-Nepali enterprise The Organic Village (Karki, 2020). Nepwaste, specially formed for the waste management project in Kathmandu doesn't engage in any other activities. Therefore, there are no projects from this company that can be used for comparison. At the project's inception, the Finnish companies were mainly responsible for the technological aspect of the project, while The Organic Village was responsible for the social and financial aspects. The Nepwaste project leaders are from Kathmandu and therefore know the environment in which they will have to operate.



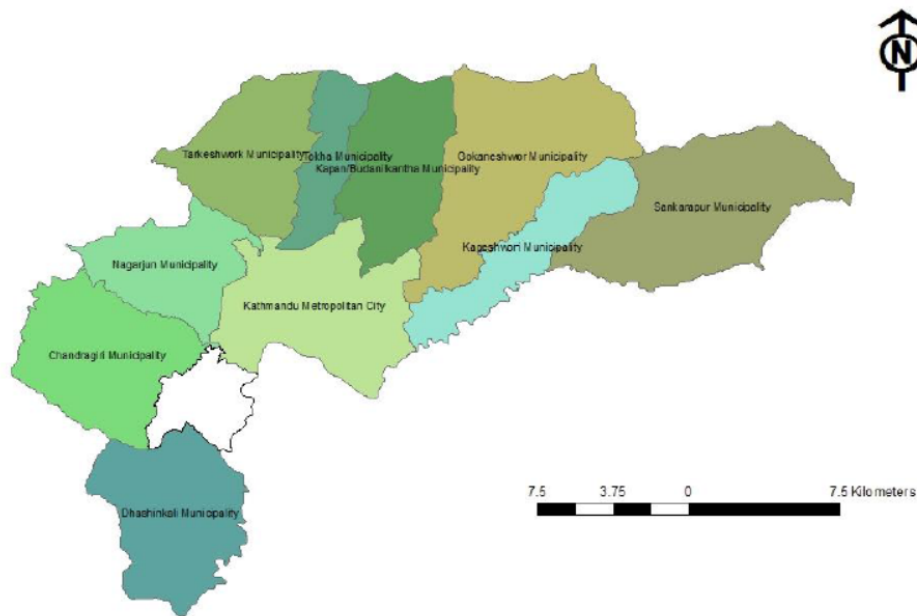


Figure 38 Municipalities under Package 1

#### 4.2 What is the project?

One important point to emphasize first is the lack of available data and transparency around this project. Limited information is available, and validating the information shared among a few people is difficult. Although no implementation date has been set, there is no indication that the project has been cancelled and a resolution seems still possible.

The 2011 agreement between Nepwaste and the government mandated that the company was to become responsible for waste management in the municipality of Kathmandu and 10 surrounding municipalities for a period of 22 years, consisting of 2 years of construction and 20 years of operation. After this period, the infrastructure will be transferred to the government. The distribution of municipalities between Nepwaste and Clean Valley Company can be seen in the map above (figure 38). This study will focus on the Nepwaste project due to its handling of nearly 20 times more waste, inclusion of KMC, and its more advanced status. Initially, according to a Nepwaste representative, implementation was supposed to have occurred in 2013.

The initial estimated cost of the first package of the project was around 5 billion NPR, approximately 65 million USD (Plaza Cabrera, 2018). The aim was to add waste-to-energy infrastructure to the existing system. Initially, the plan was to use anaerobic digestion to generate biogas from the organic waste (60-70% of the waste) to contribute to climate change

mitigation. In the long term, the objective was to develop an infrastructure for compressed natural gas (CNG) to be used as fuel.

From the beginning of the project, the current waste management sector was taken into consideration, and the project involved existing formal actors, according to Nepwaste and SWMAN. The idea was for Nepwaste to become the upper entity that provides the necessary technology and investment to take over the whole sector. The proposed system is a three-level umbrella system, with Nepwaste at the top as the main responsible entity, providing the necessary infrastructure for the system to function properly. They will be legally responsible and must comply with the law. Therefore, their responsibility is to establish rules and regulations, in accordance with federal laws, that other companies must adhere to. The Nepwaste representative explains that: *“We are going to set up a rule book of how, what, and when to do. How to collect, one way to do things and what should not be tolerated, collection at certain frequencies, we have to follow that. [...] Basically, there will be a strict code of conduct. And we will work with the companies who accept it”*. At the second level are 17 major companies that are currently present, each of which will have a specific sector to manage. KMC will be divided into 8 clusters, each managed by a company, and the 9 surrounding municipalities will each be managed by a separate company. These companies are responsible for their sector, meaning they have to follow the rules and regulations set by Nepwaste, and ensure the companies working under them do so as well. Finally, the remaining existing companies will work under their direction, forming the last level which will collect household waste. Discussions between Nepwaste and these companies have not progressed far enough to determine if the second-tier companies will also be responsible for collection, or if this will be solely the third tier's role. The main companies are selected based on their importance and their ability to manage the sector, taking their experience into account. The role of the collecting companies is described by a Nepwaste representative: *“They should go to the houses, collect the wastes at a certain frequency. Not anytime, but before 8 o'clock every day. We will have them organize in a better way. If they cannot perform, there will be someone else who can. We will outsource, we will not be part of the organization, but there will be a stakeholder in terms of collection and service. Transportation has to be done on a proper vehicle system. Leachate and waste on the road... that shouldn't happen. We have rules to respect and that's why those companies will have to respect them too. There will be penalties*

*if it's not respected*". They will also be responsible for cleaning the streets for an additional fee. Hazardous waste is the responsibility of the producer according to the law, but it seems that Nepwaste will also take the responsibility to manage this waste, for an additional cost. The collection fees will go to Nepwaste, who will pay the companies working under their supervision for a fixed remuneration.

The second-tier private company will also be responsible for the awareness campaign and for the promotion of waste segregation at source. According to Nepwaste, they will not collect mix waste and will collect organic and non-organic waste on different frequencies. To achieve this, they plan to give bins to households that allow them to separate their waste easily.

Regarding the monitoring, it was initially the responsibility of the SWMRMC, which has since been dissolved. According to stakeholders from KMC, a new entity, the "Project Monitoring Mechanism," will be established when the project enters the operational phase. This entity is expected to operate under the Ministry of Urban Development.

In summary, Nepwaste will assume full responsibility for waste management, including the collection and handling of all types of waste such as hazardous and e-waste, sweeping the roads, and leading awareness campaigns. All these tasks will be delegated to companies currently in service, and Nepwaste will be responsible for providing waste treatment infrastructure to reduce the amount of waste ending up in landfills. The project plans to send only 20% of waste to landfills, which was an initial requirement in the call for tender. Furthermore, Nepwaste will have to pay royalties to the municipalities, which will increase exponentially over the 20 years of service. The total amount is estimated to be around 1.8 billion NPR over 20 years (approx. 14 million USD). In exchange for these royalties, Nepwaste will receive all functional equipment and infrastructure, including the landfill, belonging to KMC, for the duration of the concession, i.e. 20 years.

The service fees to be paid by residents will also increase each year, starting at 255 NPR (approx. 2USD) per household and rising annually at a rate of 4 to 6% per year. In this project, one household is defined as one kitchen. This means that if multiple families live in the same house, they will each be taxed individually. This differs from the practices of most companies today.

### 4.3 First steps of the project

Between 2011 and 2013, the Nepwaste Proposal was under study by the SWMRMC, and not much progress was made during that time. In August 2013, the IBN Act was promoted and became effective, making it the responsibility of the IBN as a PPP project worth a significant amount of money. After this, several field verifications were conducted by the IBN, Ministries and Municipalities to ensure the success of the project, combined with many meetings with the interested stakeholders. Those field verifications were completed in June 2014 and a document was submitted to IBN for review in the same month. In November 2014, Nepwaste was granted permission to bring in FDI from the National Bank of Nepal.

Unfortunately, there is a significant lack of available information on the period between 2011 and 2014. However, it appears that the IBN Act significantly slowed down the process, and during this period, Nepwaste representatives had to negotiate with several interlocutors, causing delays.

On February 11th, 2015, Nepwaste was instructed to prepare a Detailed Project Report (DPR) within six months. Until then, the project remained largely conceptual and lacked many specifics. However, the earthquake in April 2015 led to an extension for the DPR submission, which was ultimately submitted in December 2015. The IBN reviewed the DPR and worked with a Canadian company to evaluate it, focusing on the project's technical aspects. The DPR needed to demonstrate the project's technical and financial feasibility (Shrestha, 2015). As specified in the MoU signed in June 2011, the DPR had to cover 16 points, including the project description, feasibility studies, implementation plan, projected companies' revenues, funding sources, costs to residents, royalties' payments, and the integration of the existing sector into the project, encompassing facilities, infrastructure, city employees, and businesses currently operating in the valley. Interestingly, the agreement stipulates that once submitted, the DPR becomes the property of the Government of Nepal. It was accepted on May 29th, 2016, but with the condition that 19 requirements must be included in the Project Development Agreement (PDA) that Nepwaste was requested to prepare. Since then, several meetings have been held to discuss these conditions.

The initial PDA was submitted in November 2017 after a year of talks, meetings, and drafts. In March 2018, after more than 30 meetings, the IBN and Nepwaste signed the initial PDA. The

term "initial" is significant, as it is emphasized in the agreement that there were still 22 issues that needed to be resolved before the final PDA could be signed. Although it is an initial document, it still consists of nearly 200 pages and highlights most of the project's aspects. This agreement was only between Nepwaste and IBN, the municipalities and ministries were not part of the agreement. According to interviewees, these entities were not certain at that time whether the project would happen, so they decided not to sign for the moment, due to the many issues that needed to be resolved. According to some actors interviewed, it seems that the mayor of Kathmandu was not motivated by this project, mainly for political reasons. At that time, Nepal's Prime Minister, Khadga Prasad Sharma Oli, and the Mayor, Bidya Sundar Shakya, were both members of the Communist Party. However, despite their affiliation to the same party, it seems that political disagreements between them hindered the possibility of reaching an agreement. Indications of their tense relationship can be observed in newspapers. For example, Online Khabar (2018) states that the Prime Minister requested an assessment of the mayor's inaugural year in office, insinuating that the progress achieved was insufficient. In an article from November 2017, the spokesperson for the IBN said that: « *We have not received consent from the Kathmandu Metropolitan City and few other municipalities of Kathmandu district to collect waste from their area. It is delaying the PDA negotiations.* » (Republica, 2017). Finally, IBN decided to sign the initial PDA with Nepwaste, even without the agreement of all municipalities, making it less binding.

#### 4.4 Main issues explaining the length of the process

Many issues were highlighted during the process. 22 were highlighted in the first PDA. The most problematic issues according to the interviewees will be developed in this part.

The first major issue concerned the land for transfer stations. Already a problem in the current SWM system, the lack of space remains a significant challenge for implementing this project. Indeed, Nepwaste requires KMC to provide additional transfer stations within the valley, as well as in each of the project's municipalities: "*Every municipality has to provide at least one transfer station*". The difficulty lies in the fact that the valley is densely populated, leaving very little available space, and nobody wants a transfer station near their house. Some municipalities still have rural areas within their territory, which makes it possible, but it creates a problem for others.

More importantly, the land does not belong to the municipalities or to the private companies but to the federal government. This means that the municipalities must first find and choose spaces to establish transfer stations that meet Nepwaste's criteria, and then the national government must agree to lend these lands to the company. The mayor of one municipality said that this was the biggest problem for him, because *“we don't have that land”*. Later, he said that *“we have land in the northern part of our municipality, but we are not able to organize all those things and we can't convince people to create a transfer station near houses.”* » The recycling infrastructure that Nepwaste planned to add was initially intended to be located within the valley to reduce the amount of waste to be transported (The Kathmandu Post, 2017). However, the lack of space prevented them from implementing this, and the facilities will be built next to the landfill site (Ibid.). The risk of local pollution also deterred them. The case of Delhi, discussed earlier (Demaria & Schindler, 2016), illustrated the impact of such infrastructure on local air pollution. Placing these facilities near the population increases the risk of not gaining acceptance from the community and adding pollution to an already highly polluted air in Kathmandu.

Another land-related issue concerns the landfill site. The residents of Sisdol no longer want a landfill near their homes, but Banchara Danda, which is only 2 km away from SLS, has been under construction since 2015 and began accepting waste in 2022. The initial PDA stipulates that Nepwaste must manage the closure of SLS. This could explain the delay in using the new Landfill site, which has appeared to be ready for quite some time. Closing Sisdol before reaching an agreement with Nepwaste would mean that the authorities would have to find another entity to manage the closure or manage it themselves, and managing the closure of Sisdol seems difficult given the social and environmental issues involved.

An article from March 2023 communicates the distress of the Sisdol residents about Banchara Danda and explains that they will have to block the system if nothing is done to address their concerns.: *“[I]f the government fails to initiate any groundwork to either make the landfill site free of human settlement or make the area waste-free, they will be forced to stop all solid waste management there from May 15 onwards”* (Himalayan News Service, 2023). Once again, the poor management affects the residents of Sisdol, and the problems persist even after the landfill's closure. The authorities were aware of the issues that would arise after the landfill's closure, which might explain the significant extension of its lifespan. The

establishment of a new landfill just 2 km from Sisdol will not improve the living conditions for the residents. And the issue is major because there is a higher incidence of illness around Sisdol (Ojha, 2022a). It is easy for the residents to block the road, disrupting the entire system. The government must fulfill the residents' demands. Otherwise, Nepwaste will not be able to successfully implement its project.

During negotiations, the government wanted to leave the responsibility of constructing the BLS to Nepwaste, which was refused by Nepwaste. Another problem is that initially, Banchare Danda was the responsibility of SWMRMC, which was later dissolved, leaving the responsibility to MoUD. Once again, instability within the government has caused delays and complications. BLS was supposed to be ready many years before.

Another significant issue for this project, as well as for the current situation, is the road leading to the landfill site. There is only one road, and it is in extremely poor condition, as seen in Figure 22 and 23. The Ministry of Urban Development (MoUD) is responsible for roads and must improve its quality since it deteriorates daily and is sometimes unusable during the monsoon season. When the road is impassable, garbage accumulates in the valley, and residents outside the Valley are blocked at home, suffering the consequences of a situation they are not responsible for. The road's severe degradation is caused by hundreds of trucks using it daily to reach the landfill. Nepwaste has asked the government to improve the road quality, as it is essential for a functional waste management system. It seems that the Government of Nepal and KMC are in conflict over each institution's role in constructing the road, which might explain the complete lack of action in this area. Even if the Nepwaste project does not come to life, rebuilding the road remains an absolute priority to maintain a functional system. In 2020, rainfall damaged the road, rendering it unusable. This situation caused waste to accumulate in the valley and worsened sanitation conditions during a period when COVID-19 was already infecting many people and filling hospitals (Ojha, 2020b). This lack of planning put additional pressure on the medical system. This example demonstrates the impact a poorly maintained road can have when the waste management of over 3 million individuals depends on it. The same situation happened in 2022 and was a significant reason explaining the rise of cholera in the Valley (Khadka, et al., 2022).

The involvement of the private sector already working in waste management presents a significant complexity in this project. However, this issue has been well managed throughout the project. Indeed, since the initial call for proposals in 2009, it was mentioned that the company taking over the sector would be required to work with the existing private sector. Nepwaste is a company specifically created for this project, and in this sense, it is impossible for them to employ the necessary workforce for such a task as waste management in a city like Kathmandu. The existing actors have a superior understanding of their work environment, and the umbrella system, where Nepwaste is responsible for the existing sector, has not been questioned. The financial distribution between Nepwaste and the current private companies could be an issue. During interviews, it seems that the actors do not share the same vision in this area. According to Nepwaste, the household fees will be for them, and then they will pay the companies through fixed compensation. According to SWMAN, this is still under discussion, and they would prefer earning a percentage of the household fees. According to Nepwaste, they are legally not allowed to discuss these issues together until the project is about to begin, and the lack of communication creates ambiguity in this area. Nepwaste representative said: *"First we need to sign and then talk. We first need to be legally in this project."* Nevertheless, this does not appear to be a major issue, and the employment of the existing private sector is guaranteed, which is the most important aspect at this stage. Problems could arise later in determining the payments to the various companies, as well as the conditions requested by Nepwaste which may not be in line with the companies. This has not yet been discussed and SWMAN seems confident the agreement will be good for them.

Other labor forces, such as informal workers, as well as employees hired by KMC, seem to be more problematic.

Informal workers do not seem to be really considered in this project. SaSaJa has not had any discussions on this matter with any entity, and Nepwaste does not truly consider them in their project, explaining that they aim to put an end to informal work, particularly due to the terrible working conditions these workers face. Some stakeholders have suggested that there would be a priority for employing these workers in the new system, but nothing seems to be officially documented. During the discussion with Nepwaste, they implied that it was not their responsibility but that of the government, arguing that their project was already financially challenging and that they could not additionally address all social aspects. Nevertheless, they



seemed open to the idea of working with informal workers, highlighting the fact that they know the system well and work hard to make a living, which is what Nepwaste is looking for. It is mentioned in the PDA that the concessionaire must conduct a study to assess the extent of informal work in the city. Their priority is to make informal work unnecessary, particularly at the landfill, which they want to manage well enough so that no recyclable materials end up there, eliminating informal work at the landfill site. This could become an issue during the project's implementation, and these workers might want to defend their rights by blocking the system if nothing is put in place for them. However, the system can only eliminate them when it is fully efficient, and this will take time, leaving some flexibility for these workers, who will have time before they no longer have access to recyclable materials. The two systems will need to coexist, at least in the beginning.

The last major issue is the formal workers employed by KMC. According to many stakeholders, it seems to be the biggest issue because there are around 700 people employed by KMC, receiving high salaries and favorable working conditions. The quality of their work is not satisfactory enough for Nepwaste to consider hiring them. They also have a union that defends their rights and protects them. On the positive side, KMC has not hired new staff for the past 10 years, and many employees are approaching retirement. Nepwaste is not open to accommodate them under their current conditions: *"We have our own policy, so if the people want to come and work with us, then they need to reapply for a job. We can consider maybe 30-40% can be useful with their experience, but they must come under us. If you pay them a salary, I cannot hire them, but if they come over us, we are happy to incorporate them."* Sarita Rai from KMC Environment Department said regarding employees: *"If they want to stay in a private company, they can or they will be given a golden handshake. Around 700 employees are there in KMC. Most of them are near to retirement."* According to these statements, it seems that this problem is no longer an issue, and they have finally accepted the idea of paying a severance pay to employees who would not accept working in a private company. For employees far from retirement, she suggested keeping them, as there will still be a need for employees for certain tasks, particularly during the transition period, or for other departments, and these people would be assigned to other jobs within KMC. This has been an issue for a long time, but it seems to be resolved. In an interview granted to Republica (2017), Gyanendra Karki, the spokesperson for KMC at that time, said: *"We are holding discussion and*

*consultation on the PDA documents. Our trade unions have opposed the proposal, fearing that workers involved in waste management were at the risk of losing their jobs."* The article mentions 1,200 employees at that time. Another article from Republica (2019) mentions 988 workers, while Sarita Rai mentions only 700 in 2022. This also makes it easier to implement solutions, and as time goes by, there will be fewer employees who need to be accommodated. KMC Workers Union was not very enthusiastic about this project but seemed ready to move forward, having received assurances from KMC that these employees would either be re-employed or receive sufficient financial compensation. However, it seems to have been a battle over several years to ensure their rights were respected. It is very likely that this issue contributed significantly to slowing down the project, with KMC potentially wanting to wait for their staff size to reduce, and negotiations for their future took time.

There are also other issues, less documented but that have been or are currently under discussion during the process. These include the monitoring process, the management of hazardous and medical waste, the recovery of vehicles and assets already present and the conditions for this recovery, the handover of technologies at the end of the project, the definition of a household, the tipping fee at the landfill, the licenses and tax exemptions requested by Nepwaste, the distribution of fees among entities, the consequences in case of mismanagement by Nepwaste, and numerous other issues. They seem less significant than those mentioned here or too secret to access but could be major in the future. My research didn't yield to get enough information on those issues.

The technology used for this project is still under discussion. It will be explained in chapter 4.6.

#### 4.5 Investment Board Nepal exit

The resolution of these issues has followed a long process and remains incomplete. The initial PDA including those issues was submitted in March 2018, and the process to resolve them started in September 2018 when the IBN requested Nepwaste to submit a detailed implementation plan. From September 2018 to December 2019, no document or information were accessible to elucidate the nature of the discussions at that time. However, this period concluded with IBN transferring all documents and responsibilities to the KMC. According to Online Khabar (2019), the lack of coordination between entities is one of the reasons that explains the IBN's withdrawal from the project. The IBN justifies its exit by stating that the law

has evolved, and the project implementation should be carried out directly by the municipalities responsible for waste management.

The SWMAN representative provides an explanation too: *"IBN is a facilitator and is not authorized to sign contracts. That is why they delegated the final decision to KMC, which has not yet been able to make a decision, particularly due to land issues. It appears that numerous issues could not be resolved by the KMC at this stage, and the IBN attempted to serve as facilitators. However, due to the inability to resolve issues involving the municipality, they finally gave up »*. Hari Kumar Shrestha, the head of the KMC's Environmental Management Department at that time, said, *"After the board's exit, we have to find some option. But nothing is decided yet. We are holding discussions."* (Online Khabar, 2019).

#### 4.6 Process Implemented by KMC's Environment Management Department

Documents were transferred at the end of 2019. The initial months of 2020 did not seem to bring significant progress, and the project did not appear to be a priority for KMC. In June 2020, the vice-chairman of the City Planning Commission, asked information from IBN regarding the current situation, and according to them, no progress had been made at that time. The City Planning Commission is a separate unit from KMC with the objective of providing technical guidance and support to the mayor and the municipalities. This means they serve as advisors with expertise in various topics but are not considered KMC staff members.

The commission began analyzing the documents and all the reports that had been produced over the last ten years. After analysis, they concluded that the project was beneficial and should be implemented. They presented their findings to the Mayor of Kathmandu, recommending moving forward. From that point on, the commission became the major actor involved in the project and attempted to resolve the remaining issues.

In October 2020, the KMC board constituted a 5-member committee under the deputy mayor, comprising members of the City Planning Commission. The committee was tasked with studying all the documents, interacting with Nepwaste, negotiating, exploring unresolved issues, and proposing solutions within a month. Numerous meetings took place during this

period, and they eventually managed to reduce the number of issues from 22 to just 7. The remaining issues were beyond KMC and involved other municipalities, other KMC departments, or the national level.

In November 2020, a document was presented to the mayor, who responded positively and appeared enthusiastic about completing the project. Several meetings took place during this time with Nepwaste, and the City Planning Commission asked Nepwaste to create a new PDA, this time in KMC's name rather than IBN's, while keeping the original structure, as KMC was now the actor in charge of bringing this project to life.

Another problem emerged at that time. Nepwaste wanted to bring in another partner, a Chinese company, to handle the technological aspect of the project. The Finnish partner seemed to have withdrawn from the project because it had taken too long. When asked about the new Chinese partner, the Nepwaste representative stated: *"We want a partner who is part of the game and who doesn't only sell us the technology."*

This development created a conflict between Nepwaste and the City Planning Commission, as it added further complexity to an already endless project. Initially, they wanted to produce biogas, composting, and CNG, but at that moment, they introduced the idea of generating electricity by burning waste with the Chinese partner. The Nepwaste representative explained that initially, the plan involved anaerobic digestion, but the trials in smaller-scale pilot projects have not shown promising results. He also mentioned that there has been no trial on such a large scale. Implementing a project of this magnitude requires assurances, and this technology lacks sufficient references to guarantee its proper functioning. He further explained that the smaller projects received financial support from the government, and still faced difficulties. In contrast, their project will not receive any aid and will also have to pay royalties. For these reasons, they decided to make the change.

The City Planning Commission wanted to sign the PDA as it was with the Finnish company and then discuss, but Nepwaste refused to sign without the Chinese company's involvement. The City Planning Commission did not agree to this arrangement. This created tension, as Nepwaste believed the PDA had already been signed, while the commission regarded the agreement as not legally binding and only as a gentleman's agreement between Nepwaste and IBN since no other actor had signed it, and many issues were still unresolved.

No agreement was reached at that time, and their relationship became conflictual. This was followed by several months without contact due to the tense relationship between the entities following the change in the technological partner.

#### 4.7 Recent developments

The project resumed in August 2021, as meetings between Nepwaste and the 5-member committee in charge of the project restarted. A solution was reached to incorporate the Chinese company under the name of Organic Village, allowing for the original PDA to be kept and for both parties to go forward accordingly. In September 2021, a four-day meeting took place, involving Nepwaste, KMC, and the nine other municipalities involved in the project. The goal was to find solutions to the remaining issues. The most significant challenges at that time were land allocation for transfer stations inside the valley, infrastructure in the transfer stations, and the access road to the landfill site. While the meeting did not resolve all the issues, it was the first time the project was clearly presented to the municipalities.

Following this, the committee visited each municipality to discuss their individual concerns. This led to a crucial agreement among the municipalities. They all signed a document granting KMC full authority to manage the project and ensure its completion. However, they reserved the right to refuse to sign the final agreement if it did not meet their satisfaction.

At this point, most issues between Nepwaste and the municipalities were settled. However, matters also needed to be resolved at the government level, primarily the land issues, as land belongs to the federal government in Nepal, and the road to the landfill sites. Consequently, the approval of the Prime Minister of Nepal was required. The Prime Minister at the time was Sher Bahadur Deuba, who took office on July 13, 2021, and was not the same person who signed the first PDA agreement with Nepwaste.

In January 2022, the committee requested a meeting with the Prime Minister's office, which was organized a week later, involving the Prime Minister and representatives of the concerned ministries, as well as IBN, who was asked to prepare an implementation matrix for the following year, outlining the tasks for each ministry and municipality.

Progress accelerated at this point, and after a few meetings between IBN, KMC, and Nepwaste, the matrix was ready and sent to the Prime Minister's office, which forwarded it to the concerned departments for feedback.

This was the situation in March 2022. According to the representative of the City Planning Commission, if the ministries all agree with the project, it should move forward, and the project should be realized.

In an interview with a Nepwaste representative in April 2022, it was mentioned that there were only two days left to sign the agreement before a month-long pre-election period during which agreements could not be signed. They were hoping to sign in the next two days as almost everything was settled according to him.

It didn't happen, and by the beginning of 2023, no significant progress seemed to have occurred, and no agreement had been signed. The new mayor of Kathmandu since May 2022, Balendra Shah, stated that waste management was his priority, but no articles or reports mentioned the Nepwaste project. In April 2023, an interesting event took place: the mayor ordered companies to stop collecting garbage in Singha Durbar, where government members and the Prime Minister reside, and which produces about five tons of daily waste (Sharma, 2023). This demand followed a conflict between local and governmental authorities over policies for managing illegal settlements. The mayor of Kathmandu believes that the government authorities are not doing enough to support his policies (Sharma, 2023). The relationship between KMC and Central Government seems to be conflictual and that could be a dead-end for the project, or at least creating another delay.

#### 4.8 Stakeholders' perceptions on the project

The first observation that applies to all stakeholders is the limited information available about the project. Some actors, despite being involved in the sector for several years, were only aware of the project's existence but without any details. This situation was shared by most of the institutional actors interviewed. Consequently, it was challenging for them to form an opinion on the project without understanding its specifics. A lack of transparency was a concern raised by all actors, as highlighted by an institutional actor interviewed: "*The actual biggest problem now is they are not being transparent [...] It's not coming outside, it's inside.*"

*They must be open, transparent and a lot of people are not doing right because of their interests."* Many stakeholders are very concerned about the current situation and the social and environmental impact of the current system, and they all hope that this project will be able to provide solutions, although they are not totally convinced. The lack of transparency is one of the biggest problems, as it reduces the trust they have in the decision-makers. In addition, they have some experience in this sector with foreign investors, which raises several issues, including the risk of bringing in inappropriate infrastructure or the dependency that this could create. From their experience, this kind of project does not generally work in Nepal.

There is a shared desire for change and innovation in the sector, and many stakeholders see the project as an opportunity to achieve this. This is a shared point of view between the stakeholders and the following part will detail it.

#### 4.8.1 Private companies

As mentioned, the interviewed private companies lacked information. They were aware of the project's existence and that SWMAN was responsible for handling it. All interviewed companies had full confidence in the association to lead the process. They all seemed positive about the project and had no fear because they felt protected by SWMAN and considered themselves too big and important to be left out. The CEO of one company summarized the majority opinion: *"It's good for everyone because now the government has no plan [...] If they try to bypass, we will organize ourselves to fight [...] With SWMAN, we are bigger than Nepwaste."*

SWMAN's opinion is quite positive too. It has been clear from the beginning that they would work in partnership. Current companies have invested heavily in equipment, particularly vehicles, and Nepwaste needs these vehicles to succeed in this project. It was agreed from the beginning that the investments would be made available to Nepwaste in exchange for employing the current private sector workforce. This is why SWMAN is confident. They received guarantees early in the project. Additionally, they have repeatedly emphasized their inability to improve the current management, as they lack resources to invest in technologies and infrastructures and hope that Nepwaste will be able to do so. Despite not being entirely convinced by the project, they appear to desire change due to the current system's inefficiency. The Nepwaste project is set for 22 years and would bring stability to a sector that

has been unstable for years. SWMAN represents more than 3,000 employees, which also makes them confident that, if Nepwaste tries to bypass them, they are powerful enough to organize and resist. Most importantly, the various project documents mention that they will be considered, which is a significant assurance for them. SWMAN representatives had one concern: giving the management of all KMC waste to a single company, fearing that the system might be blocked if they are inefficient. They also trust in their power to address any problems that may arise. The following statement from a SWMAN representative summarizes their position: *"This is very good for us. If they take responsibility, we will be very happy to work together with them, so we can collectively make our city clean."*

I was unable to conduct interviews with very small companies, comprising fewer than 10 employees. It is possible that they may have a different opinion. Moreover, they likely lack sufficient information to form an opinion on the project and its implications.

#### 4.8.2 Innovative private companies

This category includes companies that don't just collect and drop off waste but participate in recovery and recycling. Once again, they lacked information about the project but were also open to the idea of the project coming in and changing the current system. The CEO of one company summarized his opinion as follows: *"I think that now if it's happening it's a good thing for the industry overall. It can bring a structure and a formalization of the sector, that is missing right now. But I hope this doesn't become just another project where we are losing out on this network of informal sector. Like I said in the beginning, we are so attracted by what's happening in the developed world, and we want to bring all the machines and the infrastructures. I hope it doesn't become just a project where they pick the waste in one spot to bring it to another, because this is not waste management, but waste transport. At least it can be good to encourage investment in the industry. [...] Even if they come with the best recycling plant, if it won't have the kind of waste that fits with that kind of infrastructure, it won't be used at his full capacity, that's another question. I think that's the issue overall. Recycling is a more popular topic to talk, it's more tangible and it's easier to work on. But setting this supply chain, logistics and all, that requires a lot more work, and it's more tangible. The benefits will not come out as quickly or as easily as in the recycling."* To sum up this quote, any innovation is welcome in the current system, but it is important not to focus only on one part of the value chain, for example by adding only waste-to-energy infrastructure or simply



adding a new player to the system, but it is the whole value chain that needs to be taken into account and improved.

Overall, the same concerns found at SWMAN are present. The idea of such a project seems satisfactory as it brings resources and infrastructures to a sector that lacks it, but questions arise about Nepwaste's ability to accomplish this task, as well as their ability to separate waste sufficiently to make their recycling infrastructure efficient. These companies are also aware that Nepwaste will seek to recover recyclable materials and could potentially replace them, but they still welcome the project, especially since they know it will take a long time before the project is efficient enough to eliminate their businesses. Two interviewees highlighted that they felt they would be working in collaboration with Nepwaste rather than in competition.

#### 4.8.3 Kathmandu Metropolitan City

KMC is the stakeholder whose opinion is the most difficult to assess. As seen previously, this project does not appear to have been a priority for KMC, or at least not for many years. The interview with Sarita Rai provided a few pieces of information on the situation. The topic is highly sensitive within KMC, and they were not particularly motivated to explain the various stages of the process. The complexity of the initial project seems to have slowed KMC's desire to implement it quickly, as well as the number of issues to be addressed, including the future of KMC's workers. Sarita Rai was new to the position of responsible for KMC's environmental office, and the other stakeholders interviewed were not even aware that the responsibility had changed, which also contributed to the lack of a clear position and added to the uncertainty surrounding the project. However, it appears that they became more receptive once the committee formed with the City Planning Commission members took over the project and made progress. In March 2022, Sarita Rai suggested that the documents were no longer in KMC's hands but had been transferred to the central government, indicating that KMC had fulfilled its part of the project. This seems to demonstrate KMC's willingness at that time to implement the project, as well as the formation of the committee which included members of the City Planning Commission.

#### 4.8.4 Other Municipalities

All municipal representatives interviewed stated that they lack information about the project. The deputy mayor of one of the involved municipalities stated that he was not aware of the

project's existence, despite the municipality having received a presentation several months earlier. He was a new appointee and had not been informed about this project. Everyone lacks information and has given KMC full responsibility to manage the project. When asked if they trusted KMC, they all responded affirmatively but with certain concerns, including one interviewee who said: *"We have to trust them, but we can't even trust our government."* Santosh Chalise, the mayor of Gokarneshwor Municipality, said, back in 2017, that they were ready to accept the IBN proposal, but he was skeptical over the private company's capacity to implement the project (Republica, 2017).

Most of the municipalities surrounding KMC are young and lack expertise in this sector, allowing private companies to carry out their work, often without an agreement with them. Such a project would legally regularize this sector, which is the main advantage highlighted. One municipality representative interviewed, who had almost no information about the project, said: *"Even if it's a nasty project, at least it does something."* and another one said: *"We can't know if it will be good, but at least something happens."* They also share the risk of giving all the power to a single company: *"If that party stops, it's a big problem."* Overall, the same opinion is found among other stakeholders. This project may be good or not, but at least something is happening, and the lack of information is problematic. This would also allow the municipalities to comply with the law and clarify their legal status.

#### 4.8.5 Informal workers

Although the informal workers are aware of the project's existence, they expressed during the group interview that they had not been provided with enough information about it, nor had any direct contact with Nepwaste. Despite this, there is a strong motivation among them to transition into formal employment under the new system, with one worker even stating that she would be *"in heaven [if she could work in the formal sector]"*. While they support the project in the hope of improved working conditions, there is a palpable skepticism about the willingness or ability of the key actors to consider the interests of informal workers: *"Local Government, KMC, and central government are not doing anything for the informal waste workers."* For instance, their cited example of Sisdol, where efforts to improve working conditions have been inconsistent and unfulfilled, fuels fears of potential exclusion from the new system. They gave an interesting example: *"They are trying to make small rooms in Sisdol, at least they can keep their food far from the waste and have a room for change, for meetings,*

*and for keeping their stuff. KMC says it's ok, but they don't do anything, and every 1-2 years the chief of the environment of KMC is changing. One chief gives permission, and after 2 months, another comes and says they can't do this anymore."*

Despite these fears and their lack of trust in decision-makers, they hold onto hope that the new system might bring positive changes. The cooperative SaSaJa, which represents the informal workers, echoes these sentiments but has yet to be included in any discussions regarding the Nepwaste project. While expressing regret over this lack of consultation, SaSaJa remains open to future dialogues with the project leaders. The prospect of formalization is generally welcomed by the cooperative, though it raises concerns, particularly for older and non-citizen workers from India who might face legal barriers to formal employment. Amidst these uncertainties, there's a prevailing sentiment of optimism for a management entity other than KMC to take charge, reflecting the workers' and SaSaJa's dissatisfaction with KMC's perceived lack of interest in the welfare of informal workers.

#### 4.8.6 KMC Workers Union

As previously mentioned, this union represents the formal workers. The union does not seem to be overly enthusiastic about the project, yet it still has confidence in KMC to protect these employees' interests. They demand that workers who are not interested in working with Nepwaste receive an end-of-service bonus, while those who are interested should be allowed to work in the new system. If these demands are met, they will support the new system. They have communicated these conditions to KMC and trust that they will be respected, given their collaborative relationship with KMC. While they had previously been against the project, during the 2022 interview, they appeared to have received sufficient assurances from KMC to accept the change. They also underscore that they represent many individuals, and if these individuals' rights are not respected, they are prepared to protest and have enough influence to assert their rights. Their viewpoint is interesting because while all other stakeholders express a desire to see KMC hand over waste management responsibility to another entity due to a lack of confidence in KMC, the Union seems to have more faith in KMC than in Nepwaste. This is due to the assurances received and their ongoing collaboration with KMC.

## 5. Discussion

### 5.1 A critical look at the Nepwaste project's process

#### 5.1.1 Context of the project

The Nepwaste project was developed during a period of significant instability in Nepal. The legal framework underwent constant changes during the project's implementation, marked by many new laws and the introduction of a new constitution in 2015. These changes, coupled with Nepal's status as an emerging democracy, complicated the situation. The vague and evolving legal framework intensified the challenges faced by project leaders, primarily due to the uncertainty in roles and responsibilities among stakeholders. One of the entities most affected was the newly created Investment Board Nepal (IBN), tasked with implementing this project but lacking the necessary legal power without cooperation from the legally accountable municipalities. The situation is further complicated by the fact that most companies in the valley lack formal contracts with the municipalities, leading to increased legal ambiguity.

Frequent changes and turnover in leadership positions create an unstable political climate, hindering long-term planning and fostering unpredictability—conditions not ideal for a project spanning over 20 years. The mayor of KMC has maintained stability in office for five years, but other departments, such as the KMC Environment Office, have seen frequent changes. The consequence is a disruption in collaboration and a need for project objectives to be reiterated. Furthermore, changes in the Prime Minister position between 2009 and 2022, and additional changes in all the municipalities involved, make it difficult to maintain consistent leadership and focus on the project. Collaboration between the KMC and the national government can be further complicated by different interests, particularly if they belong to opposing political parties.

In addition, the entities with which Nepwaste had to negotiate also underwent changes due to these legal modifications, complicating the negotiation process. A key example of this instability was the dissolution of the Solid Waste Management Technical Support Centre (SWMTSC), which provided expert insights and focused solely on waste management, raises questions about the current capacity and willingness to handle this complex matter at the

federal level. In a context like Kathmandu, where waste management is a priority due to its significant impacts on the city and its inhabitants, the subject cannot be overlooked amidst other concerns. It requires dedicated actors who are fully committed to creating solutions.

The 2015 earthquake added to the existing complications, necessitating immediate action in waste management. The crisis redirected the focus of decision-makers towards urgent response activities rather than long-term projects such as Nepwaste. Despite these complexities not being directly linked to the project, they contribute to its overall challenge.

### 5.1.2 Key roles of the actors

Figure 39 shows the timeline of the project and highlight the involved actors at each step.

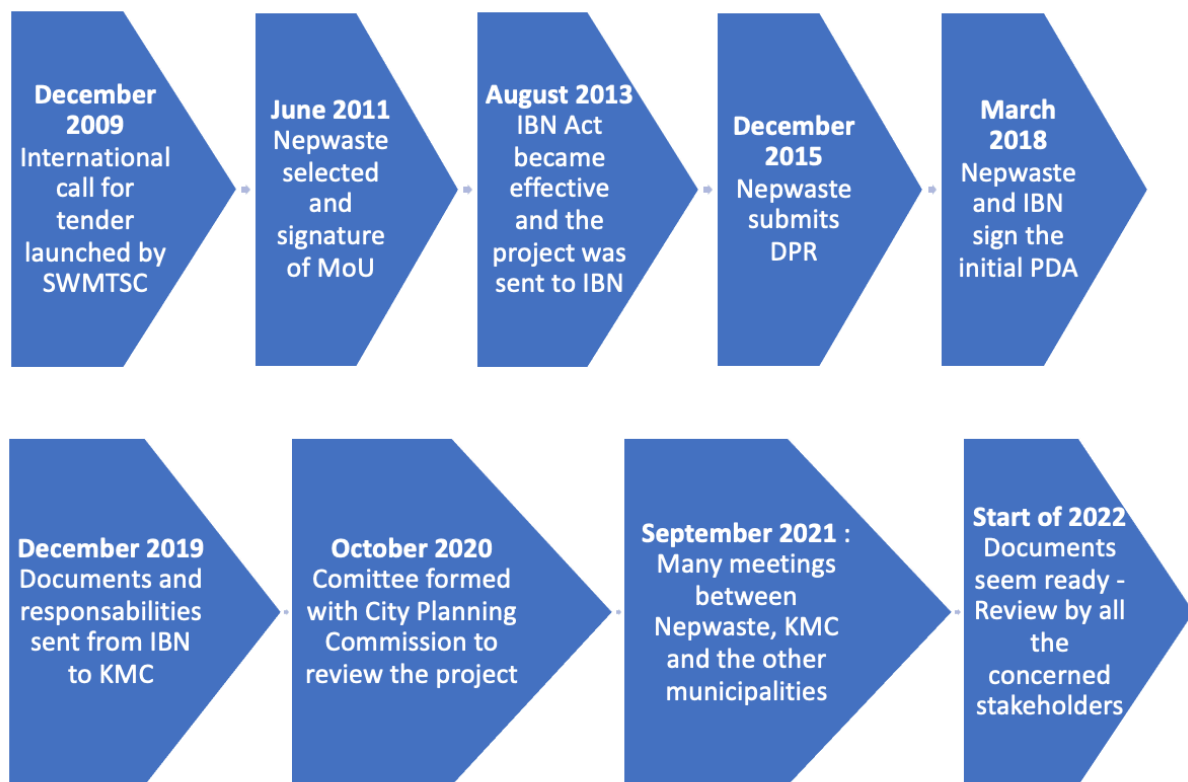


Figure 39 Nepwaste Project Timelines

The actors in charge of implementing the project have changed several times during the process, starting with SWMTSC from 2009 to 2013, then IBN from 2013 to 2019, and finally KMC, through a committee formed with members of the City Planning Commission. This shows a lack of stability and the complexity for Nepwaste of constantly having to negotiate with a different actor. There is always a single actor in charge, and no collaboration between

entities to implement the project. For example, when transferring documents from IBN to KMC, there is a lack of cooperation between the two entities, but only one entity handing over its responsibilities to another. SWMTSC no longer exists, and IBN did not collaborate with KMC, complicating the continuity of the project and its management by Nepwaste. This example demonstrates how political instability within the country affects the effective progression of the project.

During the period when the SWMTSC was in charge of the project, there appears to have been no progress. The IBN Act dates back to 2011, but it only assigned responsibilities to the IBN starting from 2013. This might explain the lack of activities between 2011 and 2013, as the project may have been waiting for IBN to take charge. The six years during which IBN was responsible for the project seem to have allowed it to move forward and become better defined, transitioning from a conceptual project to a fully formed project, as evidenced by the signing of the initial PDA. Nevertheless, IBN was unable to implement it, and it was only in 2019, a full decade after the project began, that it transitioned from the federal level (SWMTSC and IBN) to the local level, which is legally responsible.

KMC did not become directly involved in this project when they were given responsibility for it. It seems that a turning point came with the involvement of the City Planning Commission. They succeeded in resolving many local issues, engaging all relevant municipalities, and for the first time, presented them with a comprehensive overview of the project - a decade after the project was initially proposed. This is problematic as these bodies are responsible for managing solid waste in their jurisdictions. Literature has emphasized the importance of involving all concerned stakeholders from the project's inception, but in this case, even the responsible municipalities were left out of initial discussions. It took nearly ten years before the federal authorities shared the project with the local authorities, who are charged with the project's implementation and will be responsible for collaborating with Nepwaste throughout the project's lifespan. IBN's participation in this project seems to reflect the federal authorities' intent to manage the project at their level without involving the local level. Only when they realized this wasn't feasible did they finally involve the local authorities. The corruption within the Nepalese elites appears to be a significant and problematic issue for many stakeholders, who emphasize this factor as one of the key elements that needs to be addressed to improve the overall Solid Waste Management (SWM) system. While it is beyond

my capacity to define its exact impact on the Nepwaste project, the consensus suggests the presence of corruption among decision-makers, contributing to a decline in public trust.

Other key stakeholders were also neglected in the discussions. Although private companies were taken into account during the project design, they were not involved in discussions and had no role in the project before its implementation. Currently, SWMAN's responsibilities include monitoring these existing companies. Given this, it would have made sense to involve them from the project's inception, particularly for technical aspects. This is especially relevant because, since the dissolution of SWMTSC, no entities are responsible for this aspect. They engaged a Canadian company and didn't use the local knowledge. Most companies have minimal information about the project, which raises questions, these companies being central to Nepwaste's proposed project that will use the existing workforce. It would have been wise to involve them from the design phase to avoid any conflicts that might arise once the project begins, especially considering the number of workers involved and SWMAN's presence, which allows companies to defend their interests in case of disputes. With the organization of these companies under its entity, SWMAN could potentially be the strongest actor in the sector. If the companies are not satisfied with Nepwaste's conditions, it won't be difficult for them to protest by simply stopping waste collection and the valley will be filled with waste in just a few days.

Informal waste workers were also not considered, neither by the project leaders nor by the authorities responsible for its implementation. Although their exact number is unknown, according to SaSaJa, there are around 10,000 IWW in the Valley, who get a livelihood from waste and who will be impacted if the project is implemented. As shown in Cairo and Buenos Aires (Fahmi and Sutton, 2010; Parizeau, 2015), failing to involve them in the project may lead to their opposition if they no longer have access to recyclable materials. The example of Lucknow in India where IWW had access to recyclable materials before the biomethanation allowed the project to function by avoiding popular disputes (Forsyth, 2005). Furthermore, it enabled informal workers to maintain their activity, providing them with a livelihood and contributing to the increase in recycling rates. A representative of Nepwaste clearly stated that it was not their task to take care of them, and KMC did not involve them at any time, as stated by members of SaSaJa who did not have any discussion with KMC.

The valley's population has also been largely neglected; even worse, they were scarcely informed about the existence of this project. Only a few articles mention the Nepwaste project, mainly focusing on the agreement between Nepwaste and IBN in 2018, but no details were presented to the public. This lack of transparency adds a layer of confusion to the project, making it opaque not only to the local population but also to the stakeholders. Most stakeholders involved in the SWM in the Valley lack precise information about this project and are merely aware of its existence. This situation is a perfect example of policymakers ignoring public opinion by prioritizing global technological innovation over local community initiatives. Such an approach can lead to discontent and protests.

As reported by Plaza Cabrera (2018, p.22): "*As usual in Nepal, the central problem is the lack of coordination, in this case between the municipality, the national government, and trans-district jurisdictions. The problem has been aggravated by the confusion of how much responsibility each of the three levels of government (national, provincial, and local) has.*" This highlights the need for improved communication and collaboration among the various stakeholders to ensure that waste management solutions can be effectively implemented. In such a project, which involves a very large number of stakeholders, constant collaboration between entities is essential if efficiency is to be achieved. This project is the opposite, with an extremely limited amount of information available and almost no collaboration between entities.

In conclusion regarding the various stakeholders, it's important to highlight those federal authorities monopolizing this project for a decade. As previously explained, the "elites" are the actors who possess the power to control and influence the distribution and use of resources in urban areas. This is exactly what the federal authorities have been doing for 10 years by maintaining control over the project. In addition, they didn't demonstrate a real intent to drive this project to its implementation. This can also be extended to KMC, who, despite being given the documents and responsibility late, wasn't very active until the involvement of the City Planning Commission. The issue with KMC's workers could explain their lack of involvement, as the longer time passes, the fewer workers they have in the waste sector due to no recruitment being made in the last 10 years.



### 5.1.3 Other issues

The issues outlined previously may explain why the federal authorities didn't show the willingness to see this project to completion. Most issues were linked with the lack of space in the Valley. Establishing transfer stations, landfill sites, and infrastructure for waste treatment isn't politically beneficial for the elites, as examples have shown that such initiatives are often poorly received by the population, for example the case of the waste-to-energy infrastructure in Delhi (Demaria & Schindler, 2016). Furthermore, the remaining space is very limited, and any new construction will be near residential areas, increasing the risk of a negative response from the population.

Lohri et al. (2014) also underscore the importance of a project being financially viable. If the company goes bankrupt, all progress made up until that point would be lost, and everything would need to start from scratch, as demonstrated by the example in Bahir Dar, Ethiopia (Ibid.). It's challenging to determine the economic viability of this project, but as noted by a Nepwaste representative, it could become an issue. The project includes paying substantial royalties to local authorities and this could increase financial difficulty. The fact that the project has been ongoing for such a long time adds to Nepwaste's financial complexity, as they have been paying staff since the beginning for a project that hasn't yet yielded any return on investment.

The extreme duration of the project has also created difficulties for Nepwaste in its relationship with its partners, who appear to want to distance themselves from the project. Notably, the Finnish technology partners appear to be replaced by Chinese counterparts in the most recent form of the project. This seems to coincide with a technological shift, with more likely an incineration infrastructure instead of producing biogas, composting, and CNG. The incinerator raises the problem of potential air quality degradation and its relevance in a context where nearly half of the waste is organic and therefore not suited to such technology, as demonstrated by the failure of implementing such an infrastructure in Delhi in 1984 (Forsyth, 2005).

This project offers a case study of Urban Political Ecology, providing insight into how power dynamics and resource control intersect with urban development. The persistent centralization of decision-making authority and the evident monopolization of the project by

federal authorities over a decade demonstrate an ongoing process of power accumulation within the urban elites. It underscores the way in which resource control and distribution are managed from the top, with limited inclusion or engagement from other stakeholders, such as local municipalities, private companies, and informal waste workers.

## 5.2 Impact on the current system

The indefinite continuation of the Nepwaste process and its impacts have resulted in a blockage in the waste management system of the Kathmandu Valley. The project agreement has put KMC in a difficult situation as they must either execute the project or cancel it and risk potential legal repercussions or financial compensation, which could lead to a considerable loss of time and resources.

Ever since its inception in 2009, the system has been on hold, reducing the authorities' willingness to invest in the sector. Sisdol, which was inaugurated in 2005 and initially intended to last two years, became the only solution for all waste in the valley for 17 years, despite recurrent protests from the locals. The condition of the road to Sisdol worsens daily due to truck traffic, and there has been no initiative to improve it since the project started. Karki (2021) describes the situation at the end of August, during the rainy season: "*It was not possible to drive any kind of vehicle, big or small. Garbage trucks were stuck in the mud and garbage of the road.*" In such conditions, a system relying only on this road cannot be effective, and as long as the system depends exclusively on the landfill, improving this road is the most pressing issue, and as long as it's not done, the system will remain ineffective. While I lack concrete information to claim that this lack of initiative and action from the authorities is tied to this project, it might provide a plausible explanation. They could be waiting for a solid project to be implemented where these investments would be justified.

Simultaneously, the local authorities, represented here by KMC, have ceased all investments, whether in infrastructure or in the hiring of new employees over the last decade, anticipating the system to be taken over by someone else. In addition, municipalities are reluctant to enter into legal contracts with current waste management firms, fearful that it may conflict with the Nepwaste project. This impasse has stunted the innovation and proper operation of the existing system. Companies operating in the valley might also be discouraged from investing in the sector, knowing a higher authority might soon intervene. One interviewee summarizes

the situation as follows: *"The government's interest in global tenders has created a deadlock situation, preventing both the government and the private sector from making necessary investments. Here in KMC, because of this issue with global tender coming up, the government doesn't want to have a concrete agreement contract with the private companies here because it's contradictory to the interests of the government to have this global company coming. [...]* Currently, the government has not invested in that. The existing private sector is not able to invest in this and Nepwaste has not come, so it's a deadlock." Adding to these issues is the dissolution of the SWMTSC, the only body specialized in SWM. It's hypothesized that this organization might have been terminated to make way for a new entity responsible for monitoring Nepwaste. No official reasons exist to explain the closure, but what is certain is that the motivations behind this action extend beyond the welfare of the sector itself. Partly responsible to provide statistics, its closure risks further reducing the authorities' ability to produce data.

In financial terms, the challenges of sustaining such a long process for Nepwaste have already been highlighted. However, various authorities have also expended funds over the project's duration to cover salaries and necessary investments for its planning - whether it's hiring a company to assess the project or paying individuals involved in the project across various responsible entities. The City Planning Commission estimates that approximately 200 million NPR (about 1.5 million USD) have been expended by different authorities towards salaries and investments. All the money used for this project is money that the population will not benefit from through investments but has only served to pay individuals for a project that may never be implemented.

The lack of investment in a system plagued with numerous flaws has exacerbated the struggles of the local population: in Sisdol, where the neighboring population and informal landfill workers endure terrible living conditions, between Kathmandu and Sisdol, where the poor state of the road often prevents people from getting around, particularly during the rainy season, and in Kathmandu, where the entire population bears the brunt of poor waste management, often confronted with the issue, especially when the road to Sisdol is blocked by protests. In general, the most disadvantaged communities bear the brunt of this mismanagement, regardless of location. The system, as it stands, doesn't truly benefit anyone. However, the overall mismanagement of waste by the responsible authorities

disproportionately affects the poorest populations. The opaque nature of this project risks further eroding public trust in decision-makers, as they realize their inefficiency, and a possible lack of commitment to their needs and welfare.

A prime example of this lack of trust is the issue of waste segregation. Despite the Mayor's explicit instructions for the public to segregate their waste, this separated waste end up getting mixed again in the collection trucks (Ojha, 2022d). This not only fuels skepticism towards the authorities but also highlights the system's operational inefficiencies. Politically, it is easier for elites to send waste out of sight of voters, leaving the people outside the valley to bear the most disastrous consequences. This situation is quite similar to other cases where waste from wealthy neighborhoods end up in underprivileged areas, such as in Accra, causing extreme local pollution and social issues (Baabereyir et al., 2012). The case is different here, as the waste does not remain within the city, but the pattern is similar, with waste being extracted from city center and dumped in locations inhabited by disadvantaged populations.

This situation is an illustration of a case where historical-geographical process created inequalities, as depicted by UPE. The elites hold decision-making power but act inefficiently, whether it's with the Nepwaste project or due to poor historical territorial planning of the valley. These poor or lack of choices predominantly impact the disadvantaged population, who endure the poor management of decision-makers. In the case of Nepwaste, it's mainly the inefficiency that creates a problem, and the absence of choices creates a complicated situation for the stakeholders involved in Solid Waste Management, who work daily in an unstable field with an uncertain future. This situation more broadly impacts all actors who suffer from the current manner of waste management in the Kathmandu Valley. The situation in Sisdol stands as a poignant example of how waste is removed from the centers of consumption and the public view, particularly the eyes of tourists and elites, and relegated to peripheral areas inhabited by disadvantaged populations. This illustration underscores the socio-environmental disparity propelled by the current waste management practices and the subsequent inequalities they spawn.

### 5.3 Project content: between hope and neglect

To conclude the discussion, this section will focus on the strengths, weaknesses, opportunities, and challenges of this project if it ever reaches the implementation phase. For this purpose, the SWOT matrix tool will be used, as it highlights these various points within the context of evaluating a PPP project (figure 40) (Roumboutsos & Chiara, 2010).

<ul style="list-style-type: none"> <li>• <b>STRENGTHS (+)</b></li> <li>• Involvement of the private sector from the beginning of the project</li> <li>• Involved actors are motivated by the project</li> <li>• Brings innovation and new infrastructure</li> <li>• Provides continuity with a 20-year project duration</li> <li>• Project aims to have only 20% of waste in landfill, which would be a significant improvement</li> <li>• Project proponents are from Kathmandu, reducing risks of having actors unfamiliar with the local context</li> <li>• Capacity to collect data</li> <li>• Increase collection reliability as there will be fines if it's not respected</li> </ul>	<ul style="list-style-type: none"> <li>• <b>WEAKNESSES (-)</b></li> <li>• Lack of public participation in the creation of the project (Devkota &amp; Watanabe, 2006; Ahmed &amp; Ali, 2006)</li> <li>• Failure to consider informal workers (Fahmi &amp; Sutton, 2010)</li> <li>• 13 years of project planning in a changing context with an increasing population and growing waste quantities</li> <li>• E-waste has significantly increased in 13 years; the project lacks solutions for e-waste management, which could quickly become a serious problem (Giri &amp; Adhikari, 2020)</li> <li>• Questions about the project's Financial viability (Lohri et al., 2014)</li> <li>• Waste-to-energy initiatives remove livelihoods of informal waste workers (Demaria &amp; Schindler, 2016)</li> <li>• Predominantly technical approach may overlook important social factors (Devkota &amp; Watanabe, 2006)</li> </ul>
<ul style="list-style-type: none"> <li>• <b>OPPORTUNITIES (+)</b></li> <li>• Stops the current deadlock</li> <li>• System no longer only relies on landfills with the new infrastructures</li> <li>• External actors with better expertise in the field, in a sector where current actors have shown inefficiency and incompetence</li> <li>• New actors may trigger a change in the population's behavior, who were unwilling to act for their elites, but might be more tempted in this case</li> <li>• Generation of electricity in a context where power outages are frequent, and energy is scarce (Khatiwada, 2014)</li> <li>• Creation of a healthier and better-managed urban environment</li> <li>• Compliance with the law regarding tenders - formalization of the sector</li> <li>• Increased resources for local authorities through royalties</li> <li>• Improvement of public health and sanitation</li> <li>• Potential job creation</li> </ul>	<ul style="list-style-type: none"> <li>• <b>THREATS (-)</b></li> <li>• Ineffective management of Banchara Danda</li> <li>• Ineffective management of Sisdol's closure</li> <li>• Collaboration with numerous actors, who have divergent interests - significant risk in case of conflict</li> <li>• Population doesn't improve source segregation</li> <li>• Infrastructure proves unsuitable for the context</li> <li>• Lack of space to accommodate the infrastructures</li> <li>• Lack of space to add more transfer stations in the valley</li> <li>• Population, informal workers, or other groups opposing the project - blockages or unwillingness to pay household fee</li> <li>• Only one actor to handle the entire system – problematic if not efficient or in conflict with local authorities</li> <li>• Ineffective monitoring</li> <li>• Difficulties to handle the transition period</li> <li>• Unexpected resistance from some actors of the current system</li> </ul>

Figure 40 SWOT Matrix

### 5.3.1 Strengths

The biggest strength is the involvement of the private sector from the beginning of the project, and the motivation of the involved actors about this project. Moreover, the project proponents are from Kathmandu, reducing risks of having actors unfamiliar with the local context and increasing the trust of other involved stakeholders. The addition of infrastructure and technological innovation in this system brings a different solution and prevents sending all waste to the landfill. During the call for projects, it was requested that only 20% of the waste goes to the landfill. If successful, this would represent a significant improvement and could drastically reduce the amount of waste ending up in the landfill, extending Banchara Danda's lifespan and improving the landfill situation. To achieve this, it means that source segregation has drastically improved, and materials are well separated. The project has a 20-year project duration - 22 years with the first two-years implementation phase – and that can bring continuity to a sector that desperately lacks it. Nepwaste will also be able to collect data that can enhance knowledge of the sector in Kathmandu and improve data collection to find contextually appropriate solutions. Nepwaste will serve as a monitoring body and can sanction companies that perform poorly, raising collection criteria and potentially improving the population's perception of the project. This project can have great outputs, but only through a change in behavior within the population can the project's strengths be implemented. Without source segregation, and despite all the good intentions of the project proponents, the system will not be able to achieve its objectives.

### 5.3.2 Weaknesses

The process is lacking the involvement of key actors in the system as shown before. As several examples have shown, a lack of public participation in the creation of the project is a factor that increases the risk of the project not being accepted by the population (Devkota & Watanabe, 2006; Ahmed & Ali, 2006). This is also the case for informal workers, and failing to consider their interests and opinions is risky for the success of a system. To improve the conditions of informal workers, it is necessary to address their conditions and integrate those workers to the future system, as they will always need to earn an income. Failing to offer any alternative risks maintaining a level of informality in the system that the project has not planned for (Fahmi & Sutton, 2010). As explained by Forsyth (2005), the city of Lucknow in India experienced a successful PPP that included the addition of an incineration infrastructure.

This success can be attributed to the integration of informal workers who were allowed to keep the recyclable materials before the waste was burned. This approach enabled them to maintain their livelihoods and incorporated technology into the system, effectively reducing the volume of waste ending up in the landfill sites.

Another crucial weakness is the project's duration. Since 2009, the situation has evolved significantly, laws have changed, actors in charge have also changed, the amount of waste to manage has drastically increased, and Nepwaste has incurred expenses without any income, complicating the project's financial situation, which already seems to be tough. Royalties represent a large amount of money, and the initial investment required to set up the infrastructure will put even more pressure on the project's financial viability. I do not have enough information on this subject to say whether this project will be profitable or not, but the situation could become critical if profitability was not sufficient and the project could not last the planned 20 years, deleting all the work and investments made in recent years, as shown by other project examples (Lohri et al., 2014). Another significant change is the increase in e-waste production. Data are lacking about this, but the on-ground situation is clear; most people have smartphones and electronic devices at home, which could become a serious problem without e-waste treatment solutions, as highlighted by Giri & Adhikari (2020), who emphasize the need for e-waste management solutions in Nepal.

Another weakness is the approach chosen for this project, which is mainly technical and could lack the involvement of social factors. As highlighted by Devkota & Watanabe (2006), there is a significant lack of community-based approach in Nepal, and their study shows that the population is more inclined to get involved in improving SWM at the community level but not much at the municipal/city level. This project fails to consider this aspect. The choice of technology is also questionable. The latest information seems to indicate that the chosen technology will be an incinerator, which poses two main problems. First, waste-to-energy initiatives remove livelihoods of informal waste workers by burning what feeds them (Demaria & Schindler, 2016). Moreover, Morris (1996) shows that for 24 of the 25 solid waste materials, more energy is saved by recycling than by incinerating solid waste in an energy-from-waste facility. Incineration allows for easy energy creation but eliminates a significant amount of material that could be reused. As highlighted by Deuja et al. (2021), it would be necessary to implement improvements in infrastructure, combined with the addition of an incinerator for

non-recyclable waste, which allows keeping recyclable materials in the system while also reducing the amount of waste ending up in the landfill. For such a system to be effective it will need an improvement in waste segregation, coupled with better recovery of recyclable materials (Ibid.).

Finally, keeping the project at federal authority level for so long is the major weakness that explains its ineffectiveness, as largely discussed during the former parts.

### 5.3.3 Opportunities

The first thing to say about the opportunities that this project brings is the ability to break the current deadlock and introduce something new in a situation without much improvement in recent years. It also introduces a new actor in a system that needs fresh decision-makers, as the current ones have demonstrated their inability to manage the system. More than that, it will add some external actors with expertise in the field. New actors may trigger a change in the population's behavior, who is unwilling to act for its elites, but might be more tempted in this case. The population's response to this project is difficult to evaluate at this moment but could be better than the current situation. In fact, segregation at the source is low, and people don't seem to care about waste management in their city, throwing waste everywhere. The new system will no longer solely rely on landfills, and the new infrastructures can reduce the amount of waste ending up in the landfill and manage it better, with less waste ending up on the streets, in the nature, or in the rivers. The standards set by Nepwaste are intended to be stricter, and it can be imagined that open trucks spilling waste along the way will eventually be replaced by closed trucks or that other solutions will be found at this level as well. This could help create a healthier and better-managed urban environment and improve public health and sanitation. The current situation does not comply with the country's laws. This project could enable compliance with the law regarding tenders and achieve the formalization of a largely informal sector, improving working conditions and creating a segregation system efficient enough to prevent informal workers from having to search for recyclable waste at the landfill, in terrible conditions. To achieve a more efficient system, many jobs will have to be created in a country where economic opportunities are scarce, and where migrations to other countries to find work and make a living are frequent. Not everyone is ready to work in waste, but this could offer opportunities to the Dalits, a cast considered low in Nepal and regarded as the most deprived and vulnerable social group in Nepal (Bishwakarma, 2018, in



Atreya et al., 2022). This could provide them with economic opportunities within their country and prevent them from having to leave for Gulf countries in search of work in possible terrible conditions (Sunam, 2014).

Waste incineration for generating electricity is an opportunity in a context where power outages are frequent, and energy is scarce (Khatiwada, 2014). This allows for the reduction of the amount of waste to manage, in addition to creating necessary electricity for the population. Lastly, this project will increase resources for local authorities through royalties and reduce their expenses, as they will no longer be responsible for waste management, reducing the number of necessary employees and potential investments they might make, allowing them to invest their resources in other areas.

#### 5.3.4 Threats

The first threats are linked to the current sector, as the transition will be a significant challenge to overcome, given the enormity of the existing issues. Managing the closure of Sisdol will require complex technical expertise to minimize the harmful impacts on the environment and the local population, as will the management of the Banchare Danda landfill Site. This will not only require good technical management, but also social management to build trust among the Sisdol population, reducing the risk of system blockages and allowing these individuals to live a decent life while respecting the Nepalese constitution, which stipulates that "*Each person shall have the right to live in a healthy and clean environment.*" (Article 30). This should be the goal of this project for the people in Sisdol and the entire Kathmandu Valley and its surroundings. Managing these two landfills, along with the entire project, will require collaboration with local and national authorities. The project's involvement of numerous actors with divergent interests poses a significant risk in case conflicts arise between parties. The landfill road is a perfect illustration of this issue. Without a high-quality road, this project will struggle to be implemented efficiently, but to have a high-quality road, the relevant ministry must improve it, and to do that, they must work in collaboration with local authorities in the municipalities the road passes through. If all involved entities do not fully invest in the success of this project, it may struggle to be effective. This also means that the population must improve their behavior regarding segregation and reduce illegal waste dumping to allow for incineration or recycling. As several examples of blockages in Sisdol and in other contexts have shown, waste can be used as a political weapon by the population to voice their demands

and protest against social injustice. This project is not immune to protest, and if the population, informal workers, or other groups oppose the project, it could create blockades or unwillingness to pay household fees and lead to complications.

The lack of space in the valley to accommodate the infrastructures and add more transfer stations could be problematic if the project is implemented without enough space to establish everything necessary for its proper functioning. As many other situations have highlighted, infrastructure can be unsuitable for the context (Forsyth, 2005). In the case of Kathmandu, this could be due to inadequate waste segregation and a high proportion of organic matter in incinerable waste, which would hinder the incineration quality. Incineration could also reduce air quality and provoke further protests.

Lastly, it's very risky to have only one entity managing the entire system, which could be problematic if it is inefficient or in conflict with local authorities. What would happen if they decided to stop the collection in protest? Or if their work is not efficient? This leads us to the final threat, which is the risk of ineffective monitoring. KMC will be in charge of monitoring, and they lack experts in this field. Monitoring is essential in a project like this to ensure the sector's well-being. The current situation demonstrates their weak willingness to invest in this sector, and they will need to approach it differently if they wish to successfully execute this project.

## 6. Conclusion

### 6.1 Synthesis

The analysis in this paper has been organized into two sections: firstly, the examination of the current state and recent evolution of waste management (Ch.2 and 3), and secondly an in-depth analysis of the Nepwaste project (Ch.4). This structure provided the foundation for the critical evaluation in Chapter 5. Understanding the existing system is vital for interpreting the Nepwaste project, its implementation process, and its impact on the current Solid Waste Management system. The sub-questions have been answered throughout this work, and it is now possible to provide an answer to the main research question, which was: « **What is the process of implementing the Nepwaste project and how has this process impacted the current Solid Waste Management system?** ». The study revealed that despite its launch in 2009, the Nepwaste project has still not been completed, highlighting various challenges and obstacles to its implementation.

Chapter 4 explores the various stages of the project, revealing several key steps (see figure 39). Firstly, the project involves many stakeholders, but only a few of them have had decision-making power, and many of them are lacking expertise and information on the Project. The task of its implementation was initially entrusted to SWMTSC, which has since been dissolved while it was the only entity specialized in SWM. IBN had to assume responsibility for the project from 2013 and brought it to completion. IBN successfully negotiated a preliminary agreement. However, since waste management falls under the jurisdiction of local authorities, the latter are ultimately responsible for its implementation, and numerous issues still required resolution at the local level. The project then changed hands again in late 2019, falling under the jurisdiction of KMC, the body responsible for implementing the SWM policy for the municipality in question. Each municipality must familiarize itself with the project and negotiate agreements with Nepwaste for implementation, as Nepwaste has specific demands for each municipality, and many issues persisted at that time. The main issues were related to securing land within the valley for the transfer station, as well as land for the landfill site and new infrastructures in the Sisdol region. Improving the road between Kathmandu and Sisdol is also a main issue of the project. There were social issues too. Particularly, the future of KMC's employees emerged as a vital point and possibly the main issue causing most of the

delay in this project. The search for solutions for this issue appears to have taken quite a lot of time.

The data gathered from on-site interviews revealed the local and federal authorities' limited capacity and unwillingness to bring this project to completion. Lack of collaboration between different entities emerges as a significant cause for the delay in the process and the incapacity to implement it. No responsible entity exclusively handling this subject replaced SWMTSC and the analysis of this process highlights the absence of entities actively seeking to implement this project. Most actors, including companies currently operating in the sector, express a desire to implement the project, but decision-makers are not taking all necessary steps to bring it to this phase. The continuously shifting legal framework during the project's duration did not help actors in assuming their responsibilities for the project and contributed to the confusion regarding each entity's responsibilities. The history of SWM in Kathmandu demonstrates the inefficiency of international cooperation projects due to the inability of the local elites to collaborate with external actors and sustain projects after the departure of project leaders. Furthermore, there is a constant turnover of decision-makers, as emphasized by project promoters who must continuously engage with different entities and individuals. This delay increases the financial charge for the company, which must continually provide funds without returns, exacerbating an already complex process. The absence of action from authorities has already led to the departure of GTZ and JICA, who tried to make improvements to the system but did not receive sufficient support from responsible authorities. The current authorities' inability to generate data also raises doubts about their capacity to monitor a project of such technical, social, and political complexity. The final significant aspect of this project's process is the complete lack of transparency and civil society participation, which have been consistently overlooked and whose reactions are feared by project leaders and decision-making elites, making the project politically risky. On a positive note, the project has taken into account the presence of the current private companies from its conception and has involved them in its project, keeping in their project the actors with the best knowledge of the field and reducing the risks of conflict with them. It has also helped to gain the support of the existing private sector for this project, but ideally, they should have been involved in the decision-making process as well.

The existing system is inadequate, and although the project has weaknesses, change and progress are necessary. Appointing individuals with SWM expertise to be responsible for this sector can have a positive impact. The opaque nature of the project's development and process for society reveals the federal authorities' desire to maintain their power, keeping sensitive information within elite circles and avoiding informing the public, fearing its reactions. This demonstrates the decision-makers' lack of intent to act according to the needs expressed by the population, instead deciding unilaterally how the system should be improved.

This brings us to the impact of the project on the current system and its stakeholders. The main problem is that the system is at a standstill pending completion of the project. The authorities have held back investments in the sector and avoided formal contracts with the existing private sector, as they anticipate the completion of the upcoming project. Legally, the agreement cannot be terminated without a lawsuit or providing financial compensation to Nepwaste. The whole sector is waiting for the implementation of the project to bring change and innovation to the sector, but it is dependent on high-level negotiations. Rather than serving the majority's interests, the solid waste management situation in Kathmandu exemplifies injustice where the most affected populations are the urban poor, living and/or working close to waste, as well as the residents and workers of Sisdol who endure a situation imposed by inefficient decision-makers. The project and the current situation exemplify the authorities' failure to identify and implement solutions. This observation can be applied to the whole country for the federal authorities. The dissolution of the federal body responsible for this issue raises further concerns, especially since solid waste management is a significant problem for the country (ADB, 2013). The majority of the stakeholders want this project to be implemented, mainly to put an end to the current deadlock and to change the actors in charge of the management, but also because they will keep a role in the new system and this new system will come with innovation and new infrastructures that should improve the situation, or at least reduce the total amount of waste going to the landfill.

In conclusion, the solid waste management crisis in the Kathmandu valley illustrates the complex interplay between an ineffective decision-making process, a vague and shifting legal framework, a lack of collaboration between entities and the pressing need for innovative and sustainable solutions. While the Nepwaste project has the potential to bring change and

improvements, its implementation has been delayed because of bureaucratic issues, lack of concrete actions, and neglect of implicate important stakeholders from the first phase of the process. It is imperative that authorities and stakeholders recognize the urgency of addressing these issues and collaborate to create a more equitable, transparent, and effective solid waste management system. By doing so, they can create a new system that serves the interests of everyone, reducing pressure on both health and environmental concerns in the valley and its surroundings.

## 6.2 Study limitations and directions for future research

This paper presents an analysis of the waste management crisis in the Kathmandu Valley and the challenges associated with the Nepwaste project, while acknowledging certain limitations. Firstly, most of the data in this paper are derived from primary sources, specifically interviews. The sensitive nature of the subject matter limited many actors' access to information, which is a key finding but complicates access to precious information. Although the study successfully engaged with a few individuals possessing extensive information, the lack of multiple sources to verify facts remains a limitation. The interviewed actors had interests in the subject, which may have influenced their responses. Additionally, language barriers and interviews conducted in Nepali and translated post-interview could have potentially reduced the quality of the information, increasing the risk of loss of information.

The constraints of this research mainly came from the short amount of time set aside for fieldwork, which only lasted a bit more than two months. Considering the complexity of the topic and the need for a deep understanding of the situation on the ground, the initial challenge was to single out the most relevant issue to analyze. The Nepwaste Project had previously only received little attention and was briefly mentioned in a few articles. Therefore, a broader approach was taken, analyzing the entire process instead of focusing on a specific issue. The goal was to improve the understanding of a topic that, despite its scarcity of research, profoundly impacts the daily lives of millions of people.

Future research on this topic could address these limitations by incorporating more diverse sources of information and staying up to date with the rapidly evolving waste management sector. Further investigation into the potential benefits and inconveniences of alternative waste management approaches, such as community-based and decentralized systems, would

be valuable for informing policy decisions. This may also include examining successful waste management strategies in other cities, such as Lucknow, and determining their applicability to the Kathmandu Valley context.

Another area for future research would be to monitor the progress of the Nepwaste project and its eventual implementation, as this could provide valuable insights into the success and challenges of PPP efforts in waste management. The future of millions of people depends on the outcomes of the project, making continuous research and analysis essential. It would be particularly interesting to observe the system's evolution in the coming years, especially the new mayor of Kathmandu's opinion on the project, who has announced waste management as a priority but has never mentioned the project's existence in the media.

Overcoming these limitations in future research, such as the acquisition of diverse information sources and comprehensive interviews, would provide a more detailed picture of the waste management crisis and the complexity of implementing solutions like the Nepwaste project. Future research should also involve regular monitoring of the project's progress and potential implementation to better understand the practical challenges and success of waste management efforts in Kathmandu. Conducting a more extensive investigation into the potential corruption within Nepalese elites could yield interesting insights. Evaluating this influence on the Nepwaste project could present a complex yet intriguing topic for future analysis.

Lastly, it would be useful to dedicate a full study to the perspectives of informal waste workers and affected community members once the project has started, as their experiences are crucial to understanding the broader implications of waste management policies and projects like Nepwaste. An environmental justice approach could highlight the experiences of these individuals, victims of broader systemic issues, who are adversely affected by the negative externalities of capitalism and overconsumption. Plenty of research already exists regarding their conditions. However, if the project is to be implemented, they are among the most vulnerable participants. Therefore, analyzing the impact on this group will be crucial to evaluate the success of the project. The increasing production of e-waste and the closure of Sisdol Landfill Site deserve high attention too, as they will impact the future of SWM in the Valley.

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