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A critical evaluation of

the Mt Everest garbage

deposit scheme

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Waste on Mt Everest is often treated as 'out of sight, out of mind' – discarded into the nearest receptacle and promptly forgotten. The accumulation of solid waste on the world's highest mountain's camping sites (Base Camp and high camps) has been a chronic problem since mountaineering first became popular in 1951 and has further intensified with the steady acceleration of mountaineering in the past four decades. The implementation of the Garbage Deposit Scheme (GDS) was a government intervention aimed at solving waste management issues on Mt Everest. The evaluation of the GDS is important to understanding whether the results achieved correspond to the policy goals and to identifying obstacles to and outlining strategies for any necessary improvements. Such a study has not been conducted. This study assesses the effectiveness of the GDS. Empirical analysis was carried out to evaluate whether waste management on Mt Everest has improved. The findings suggest that the GDS has not accomplished the desired objectives in waste management, particularly because of its low level of acceptance among stakeholders and low level of government support. This study highlights major obstacles to the GDS's implementation. The study concludes with recommendations that could improve the scheme.

Keywords: Garbage deposit scheme, Nepal, Mount Everest, environmental policy, waste management

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Chapter 1

Introduction

1.1 Research Background

In 1924 George Leigh Mallory stated, "*the highest of the world's mountains, it seems, has to make but a single gesture of magnificence to be the lord of all, vast in unchallenged and isolated supremacy*" (National Geographic, 2016, April 25, p. 3). In 1953, after making the first successful ascent of Mount Everest with Tenzing Norgay Sherpa, Sir Edmund Hillary expressed his view, pride, and relief by saying: "*Well, we knocked the bastard off*" (Ives, 2013, p. 65). Much later, in 1969, Barry Bishop famously stated, "*South Col is the world's highest junk yard*" (Bishop & Naumann, 1996, p. 323).

It is in this context of magnificence and junk yard that this study seeks to explore the issue of waste[1] management on Mt Everest[2]. With these three quotes, the perception of Mount Everest, and other high mountains, has changed radically. Today, waste on Mt Everest has become a long-standing problem; both biodegradable and non-biodegradable waste have contributed to the notoriety of the whole mountain as 'the highest trash dump in the world' (Byers, 2008, p. 12; Byers et al., 2020; McConnell, 1991). As Stevens (1996, p. 398) put it *"Nowhere in the Great Himalaya is a concern for the environment more intense than in the Khumbu area".* In response to the growing issue of waste, the Nepal government introduced an environmental garbage deposit scheme (GDS)[3] of US$4,000 per climber (Bishop & Naumann, 1996). Despite the GDS, abandonment of waste still occurs on a regular basis. In 2019, for example, the Nepal government cleared 9,979 kg of waste from Mt Everest (The Himalayan Database, 2021).

The actual problem is not that expeditions bring in huge amounts of supplies and gear, but rather what they do with the used material when they are on the mountain (Aridi, 2020, November 20; Bishop & Naumann, 1996; Byers et al., 2020; McConnell, 1991). Mountaineers have traditionally been cavalier with their waste. Bishop and Naumann (1996) noted, 'an out of sight, out of mind' mentality has long dominated the waste scenario on Everest since waste produced on the mountain is out of sight to the public, it is out of the mind to the climbers that produce it. Further exacerbating the problem is the

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[1] The issue that is the focus of this study is variously known in the literature as: garbage, junk, rubbish, trash, and waste. To avoid confusion, in this thesis the single term 'waste' will be used except in direct quotes from other studies.
[2] Mt Everest (English name) is also known as 'Sagarmatha' in Nepali and 'Chomolungma' in Tibetan Languages. For the purpose pf this study, Mt Everest will be used to avoid confusion.
[3] See section 2.2 for more information on the GDS.

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sheer number of current expeditions (Faulon & Sacareau, 2020). In 2018, there were 800 summits, surpassing the previous record of 667 summits in 2013, followed by 660 in 2019 (Arnette, 2021; Ministry of Culture, 2020). Mount Everest had been climbed by 6,554 people as of August 2020 (Huey et al., 2020; The Himalayan Database, 2021).

1.1.1 The Response to the Problem:

In 1993, the Nepal government introduced an environmental GDS of U.S. $4,000 per climber as an incentive for groups to repatriate their waste (Bishop & Naumann, 1996; SPCC, 2020; Windridge, 2019, May 20). By internalizing an environmental cost, the U.S. $4,000 environmental deposit created an incentive for climbers to remove their waste (Bishop & Naumann, 1996).

Under the GDS, expeditions have to submit a list of food and equipment being taken to the mountain to the Sagarmatha Pollution Control Committee (SPCC)[4] along with the U.S.$4,000 deposit per climber to the Ministry of Culture, Tourism and Civil Aviation (MOCTCA)[5] (SPCC, 2020). Eight kilos is the amount of waste estimated to be produced by one climber (Mandal, 2019). The scheme relies on the requirement that each expedition group must remove at least 8 kg of waste per expedition, comprising the following types of waste (and see Appendix A):

   a) Disposable (burnable and biodegradable): papers, packets, cloths, food waste, etc.
   b) Non-disposable: climbing gear, accessories, tents, cans, bottles, flasks, EPI gas cylinders, batteries, etc.

Oxygen cylinders[6] and human waste are not included in the GDS as they are handled by SPCC separately (Kelliher, 2014). Oxygen cylinders have to be submitted to the SPCC check post, whereas human waste must be collected in portable plastic drums or barrels that are brought down the mountain by SPCC (SPCC, 2020).

On submitting their waste to the SPCC check post, climbers are provided with a garbage clearance certificate (see Appendix A) that authorizes their deposit refund. However, if they submit less than the

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[4] SPCC (Sagarmatha Pollution Control Committee) – see https://spcc.org.np/about-spcc
[5] Ministry of Culture, Tourism and Civil Aviation (MOCTCA) – see https://www.tourism.gov.np/
[6] Oxygen cylinders are no longer considered a waste. Every oxygen cylinder used for Everest is reusable. Cylinders used in the beginning were not made for mountaineering, they came from fighter planes or firefighting systems. Previously, Nepal did not have any refilling ability; it didn't have the machinery. It had only medical oxygen refilling that had a working pressure up to only 150 bars, but oxygen for Everest needed up to 300 bars. Even India was equipped with only a few places that could re-fill cylinders up to 300 bars (or more). Since the early 2000s, there are Nepalese companies that provide re-filling up to 300 bars. One oxygen cylinder can be worth around US$500, so the value of oxygen cylinders went up suddenly from being garbage to hundreds of dollars. More info at: https://www.alanarnette.com/blog/2013/08/19/oxygen-on-everest-reviewing-the-options/

8 kg per expedition for a full deposit return, climbers are entitled to a partial refund depending on the weight of garbage submitted.

In summary the GDS's key attributes are:

- Each expedition must leave a copy of its food and equipment list at the SPCC office before its departure to Base Camp.
- A US$4,000 deposit per climber must be paid to the NMA or MOCTCA.
- At least 8 kg of waste per expedition must be presented by each expedition group after their ascent to get the full refund.
- The garbage deposit is refunded by the MOCTCA or NMA office in Kathmandu upon submission of a garbage clearance certificate issued by SPCC.

1.1.2 Rationale for Policy Evaluation:

Despite the GDS, abandoned waste is still regularly found (Byers et al., 2020; Huey et al., 2020; Napper et al., 2020). The GDS has been criticized by some climbers, e.g., "*Efforts are limited, and waste-management rules aren't well-enforced*" (Hickock, 2018, July 16, p. 1). The GDS has also been criticized for 'lacking clear instructions' and 'lack of effective enforcement' (Brändlin, 2014, March 19). Considering a 'guided climb' to Mt Everest can cost as much as $100,000 per climber, a US$4,000 garbage deposit may feel like 'tip money' (Jovanovic, 2019,May 2). In addition, some large, financially well-off expeditions (i.e., sponsored ones), or expeditions from nations with poor environmental considerations (i.e., Eastern Europe and Asia), may view the deposit as a sunk cost of climbing the mountain - a fee to leave materials behind (Bishop & Naumann, 1996).

For several years, there have been calls for the government to intervene with a GDS implementation on Mt Everest (Apollo, 2017; Bishop & Naumann, 1996; Byers et al., 2020). Hence, I seek to address this knowledge gap through the following research aim and objectives.

1.2 Research Aim, Objectives and the Study's Significance

1.2.1 Aim and Objectives

The study's aim is to evaluate the GDS by applying an integrated environmental management (IEM) approach. The specific objectives to achieve this aim are to:

- Provide a clear definition of the problem of waste on Mt Everest;
- Review and conceptualize IEM theory and develop criteria to evaluate the GDS;
- Evaluate the GDS; and
- Identify potential options for improving the management of waste on Mt Everest.

1.2.2 The Study's Significance

The contribution of this study is twofold:

- First, it evaluates the existing environmental policy on waste management on Mt Everest – the GDS. This is the first study to evaluate the effectiveness of GDS.
- Second, the study aims to identify the strengths and weaknesses of the GDS and analyse potential options to improve waste management on Mt Everest.

1.3 Organization of the Thesis

The thesis is divided into six chapters as follows:

Chapter 1. Introduction: This chapter introduces the general research interest and backgrounds the study. The research aim and objectives and study significance are provided followed by a description of the thesis's structure.

Chapter 2. Garbage Deposit System (GDS) on Mt Everest: Provides background information on the GDS and the Mt Everest waste issue. This chapter also outlines the essential components of the GDS, such as the stakeholders associated with its operation.

Chapter 3. Literature review: The theoretical background of the GDS evaluation is reviewed using both academic and scientific journals. The rationale for using IEM for GDS evaluation is presented.

Chapter 4. Methods and Methodology: This chapter explains the research methods and reasoning for the chosen data collection method (semi-structured interview). This chapter also describes data collection and presents the development of each criterion used to analyse GDS.

Chapter 5. Results: This chapter presents the findings of the empirical data collected through semi-structured interviews. It also presents the analysis of the empirical data against the evaluation criteria.

Chapter 6. Discussion and Conclusion: This chapter discusses the empirical findings and the implication of findings to answer how well the GDS achieves its stated objectives and the role of GDS to address the waste issue on Mt Everest. The key findings related to the GDS are summarized, and are related to the research objectives. The study's limitations and suggestions for further research are also presented.

Chapter 2

Garbage Deposit System (GDS) on Mt Everest

2.1 Introduction

This chapter assesses the historical perspective and background information on how mountaineering on Mt Everest has caused environmental deterioration. The chapter provides in-depth information on the waste issue and introduces the response to the issue, the Garbage Deposit Scheme (GDS), and describes stakeholder involvement in the functioning of the GDS.

2.2 Mountaineering on Mt Everest

Initially, mountaineering on Mt Everest was an international, ambitious and audacious pursuit that commenced in the 1920s and saw more effort to reach the summit after the 1950s. Everest mountaineering was a niche sport in the late 1950s, practised by only a few nationalities: French, English, Americans and Swiss (Lemal, 2009). The authorities in Nepal and China permitted only a single expedition per year, sometimes only one permit in several years (Ives, 2013). Hence, only a handful of climbers were granted permission to access Mt Everest and, because of this constraint, the environmental impact was limited and environmental consideration of the mountain was non-existent (Bishop & Naumann, 1996). To reiterate Sir Edmund Hillary's quote, the single purpose was to "*knock the bastard off*" (Ives, 2013). Abandoning equipment, food, empty food packaging, and various other items on the mountain during and after the expedition was, in former days, 'an acceptable and common practice' (Bishop & Naumann, 1996; Nepal & Mu, 2015). Nobody could have foreseen how the seemingly insignificant act of abandoning litter on the mountain would later escalate to a pressing environmental issue. Bishop and Naumann (1996, p. 323) expression that the "*South Col is the world's highest junkyard*" emphasizes the extent to which the problem grew.

Mountaineering on Mt Everest today has transitioned from an 'elite activity' and 'niche sport' to 'mass tourism' and 'a worldwide sensation' catering to more than just the elite. A century has passed since mountaineers began mounting full-scale attempts in 1922 to climb Mt Everest. Since the first successful ascent in 1953[7], there have been over 4000 summits (Kharel & Badal, 2019), with 67 summits during spring 2021 (Arnette, 2021). With advances in mountaineering equipment and an increasing number of experienced climbers (Huey et al., 2020), summiting Everest is no longer an

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[7] The first ascent of Mt Everest was made by Tenzing Norgay Sherpa and Sir Edmund Hillary on 29 May 1953.

exclusive achievement but many mountaineers still view Mt Everest as the ultimate testing ground for high-elevation adventure (Huey et al., 2020; Nyaupane, 2015; Sacareau, 2009).

Mountaineering tourism in Nepal, undeterred by the COVID-19 outbreak, continued at a normal pace in 2021 as Nepal issued a record 408 permits, worth about US$4.2 million, to ascend Everest, (Arnette, 2021). Scaling Everest has turned into a lucrative business, with westerners spending anywhere between US$11,000 and $100,000 for permits to climb the mountain (Windridge, 2019, May 20). Figure 1 shows how scaling the mountain has increased in popularity (The Himalayan Database, 2021).

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Figure 1. Estimated number of successful Everest ascents per year from 1953 to 2020

(Source: Statista[8] through the Himalayan Database)

2.3 Environmental Impacts of Mountaineering on Mt Everest

The accelerated and largely uncontrolled development of mountaineering in Khumbu, exacerbated by the increasing number of climbers on Mt Everest has resulted in the accumulation of tonnes of waste (Nepal & Mu, 2015). The size of the problem is evident when one considers the amount of waste that has been retrieved through several cleaning expeditions on Mt Everest: 2.2. tonnes in 2020 (Andrei, 2021, April 2) and 11 tonnes in 2019 (Mandal, 2019). Officials have not been able to estimate exactly how much waste is on Everest because most of it is covered by snow.

The impacts on water sources include changes in drainage patterns because of water extraction at campsites, changes in the physio-chemical properties of water bodies because of wastewater discharges and the direct contamination of snow and glaciers by human waste (Miner et al., 2021; Napper et al., 2020). The impact of the improper disposal of human waste in mountains can be very problematic, particularly at high altitudes where such waste takes a long time to break down and can

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[8] https://www.statista.com/chart/1157/successful-mount-everest-ascents-per-year/

contaminate otherwise pristine water sources (Caravello et al., 2007). Increasing levels of nitrate and phosphorus contaminate high altitude lakes along the main route to Mt Everest in Sagarmatha National Park in the Himalayas (Ghimire et al., 2013).

According to Byers et al. (2020), nowhere in the high mountainous regions of Nepal is the landfill problem more severe than in the Khumbu Valley. As a repercussion of increasing tourism, unsightly and unhealthy landfills have increased, making them a common sight along trekking routes and in close vicinity to villages and lodges. Byers et al. (2020) report 58 active open landfill pits in the Sagarmatha National Park and Buffer Zone (SNPBZ). As the number of climbers increases, so does the amount of waste nearly all of which ends up in landfills (Byers et al., 2020).

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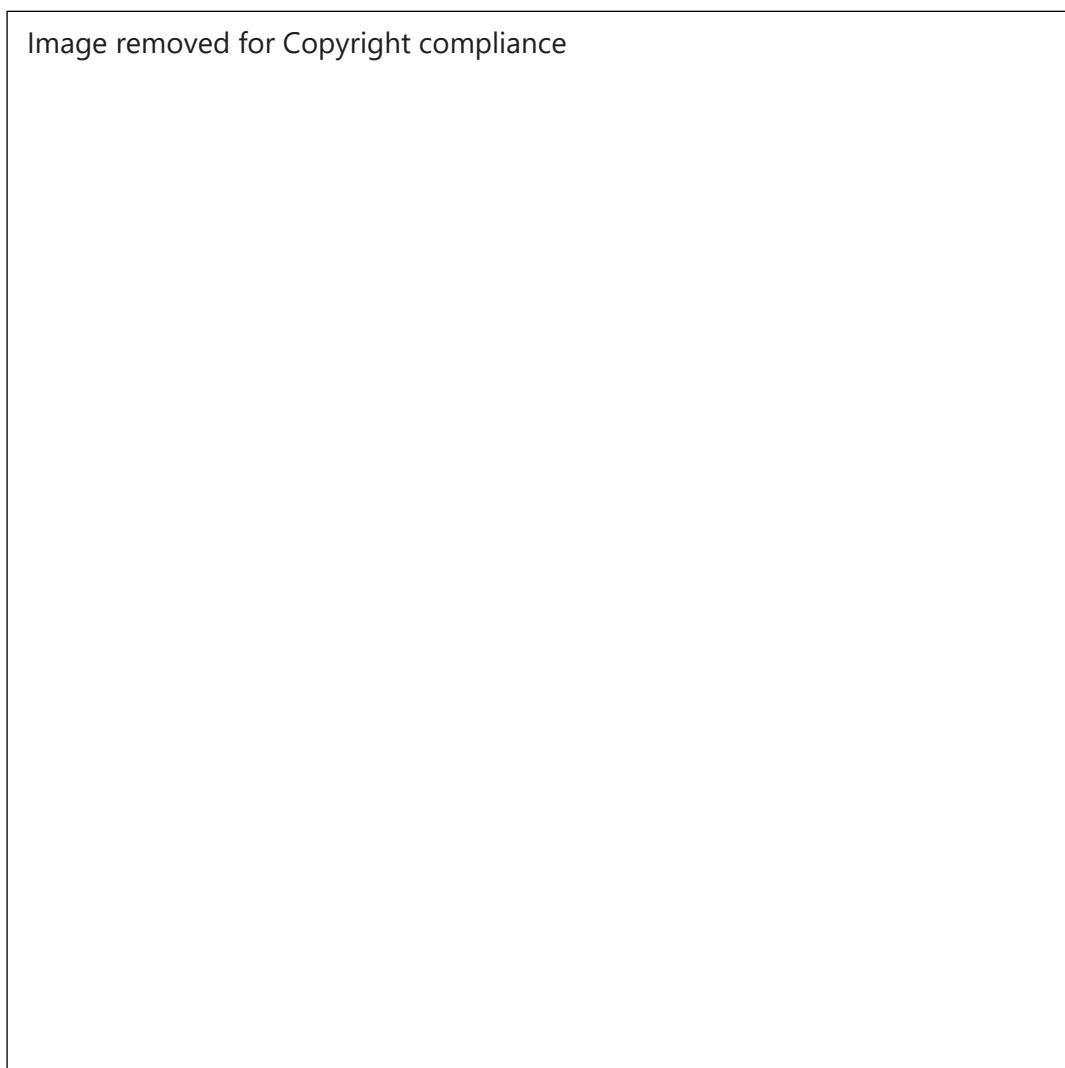
Figure 2. Map of Sagarmatha (Mount Everest) National Park and Buffer Zone. Trekking route to Mount Everest Base Camp. Image Source: (Spoon, 2011)

Landfills and the routine burning and burying of their contents have become the new norm in waste management in the Khumbu Valley, with negative ramifications on the health and safety of humans and livestock (Ghimire et al., 2013; Posch et al., 2015). Burning waste (Byers et al., 2020) can pose severe health risks and environmental hazards because of the release of toxic chemicals to the air. Burning can also contaminate local and downstream groundwater supplies (Manfredi et al., 2010; Posch et al., 2015). Landfills are also visually unattractive.

2.3.1 Origin of the problem

Waste has accumulated around Mt Everest as a result of the proliferation of mountaineering over several decades. Bishop and Naumann (1996) mention two primary reasons:

- the historic climbing style and ethics that emphasized summiting with no regard for environmental concerns; and
- the sheer volume of climber days at Base Camp and higher camps on the mountain.

As explained by Bishop and Naumann (1996), expeditions to Mount Everest have predominantly used 'traditional siege tactics' during their ascent. This entails creating a logistic pyramid on the mountain comprising a large number of support staff, high altitude Sherpas, a significant number of climbers, and a tremendous amount of equipment. The Base Camp is at 5300 metres, followed by five higher camps where the expedition team spends about a month acclimatizing. It is typical for an expedition to spend 30-50 days erecting these camps, acclimatizing to the altitude, establishing routes and ferrying supplies to the higher camps before the ascent (Windridge, 2019, May 20). During this time, the expedition uses hundreds of kilograms of gear and supplies. Such 'siege tactics' require large numbers of people with an adequate number of climbers and supplies to coordinate effectively (Bishop & Naumann, 1996).

The problem on Mt Everest is not that expeditions ferry in huge amounts of supplies and gear, but rather it is what they do with the supplies once they are on the mountain (Bishop & Naumann, 1996; McConnell, 1991). Historically, the dominance of 'an out of sight, out of mind' mentality has contributed to the accumulation of waste on the mountain. Exacerbating the problem on Mt Everest is the sheer number of expeditions and trekkers as shown in Figure.1 (Bishop & Naumann, 1996; Faulon & Sacareau, 2020).

2.4 Garbage Deposit System (GDS)

By the early 1990s, it was evident the mounting waste at Base Camp was leading to an environmental disaster (Bishop & Naumann, 1996). In 1993, the Nepal government initiated a policy to "*restrict the number of climbing permits to one route per expedition*" (Bishop & Naumann, 1996, p. 7) and lifted the

peak season fee to US$50,000 per expedition to limit the growing traffic on Mt Everest. The government of Nepal also introduced an environmental garbage deposit under the 'Mountaineering Expeditions Rules' of US$4,000 per expedition as an incentive to repatriate waste in the same year (Bishop & Naumann, 1996; Windridge, 2019, May 20).

The 'Tourism Act 2035 (1978)[9] prohibits climbing mountains without a permit from the Ministry of Culture, Tourism and Civil Aviation (MOCTCA) (Government of Nepal, 2007). The expedition team is obligated to take a 'Liaison Officer'[10], who has duties to control, manage conflicts, and act according to the government's orders. In reference to the GDS, the responsibility of the liaison officer is 'to carry out supervisory work relating to environmental cleanness and garbage management' (Government of Nepal, 2007).

According to the 'Mountaineering Expedition Rules[11]' (Government of Nepal, 2007):

- *The deposit pursuant to the sub-section (1) shall be returned to the concerned mountaineering expedition team after such team deposits the prescribed goods in the place determined by the government of Nepal upon completion of such expedition.*

- *The deposit amount shall be transferred to the government account; if the concerned mountaineering expedition does not deposit the goods pursuant to sub-section (2) in the determined place and such goods may be sent back to concerned place.*

Effectiveness of the GDS relies on every expedition bringing back at least 8 kg of waste, comprising the types of waste mentioned in the section 1.1.1. and appendix-A. In the beginning when GDS was introduced, expeditions were required to manage their own waste. They were required to submit disposable waste to SPCC and take back all non-disposable waste. Retrieving all non-disposable waste, packing it to Lukla, and flying it back to Kathmandu was more expensive than the $4000 deposit (Bishop & Naumann, 1996) and 'not practical' (SPCC, 2020). As a result, there were frequent incidents of expeditions disposing of vast quantities of litter along the trail while descending. Hence the Everest Base Camp became to be known as the 'garbage' or 'toilet paper trail' (Byers, 2008; Byers et al., 2020). Consequently, the rule allocating 8 kg per expedition and requiring them to submit their waste to the SPCC office near the Base Camp was implemented from 2014 .

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[9] The Tourism Act is a regulation about common tourism and its development in Nepal. One aim of the act is to position Nepal in the international tourism arena as an attractive, attainable destination. Besides creating as much employment as possible in the tourism industry, cultural and environmental protection is also promoted.
[10] Liaison officers are government officers deputized by the Nepal government pursuant to the section 20 to accompany a mountaineering team.
[11] Mountaineering Expedition Rules can be downloaded from
https://nepaltradeportal.gov.np/resources/docs/mountaineering-expedition-rules-2059-2002.pdf

After submitting their waste to the SPCC check post, climbers are provided with a garbage clearance certificate (See Appendix A) that authorizes their deposit refund. However, in the case of submission of less than the 8 kg of waste required for a full deposit return, climbers are entitled to a partial refund or no refund at all, depending upon the negotiations with liaison officers.

2.5 Stakeholders responsible for the GDS

Several stakeholders across different government and non-government agencies and the behaviours of mountaineers, expedition operators and guides are responsible for the operation and outcomes of the GDS (Figure 2).
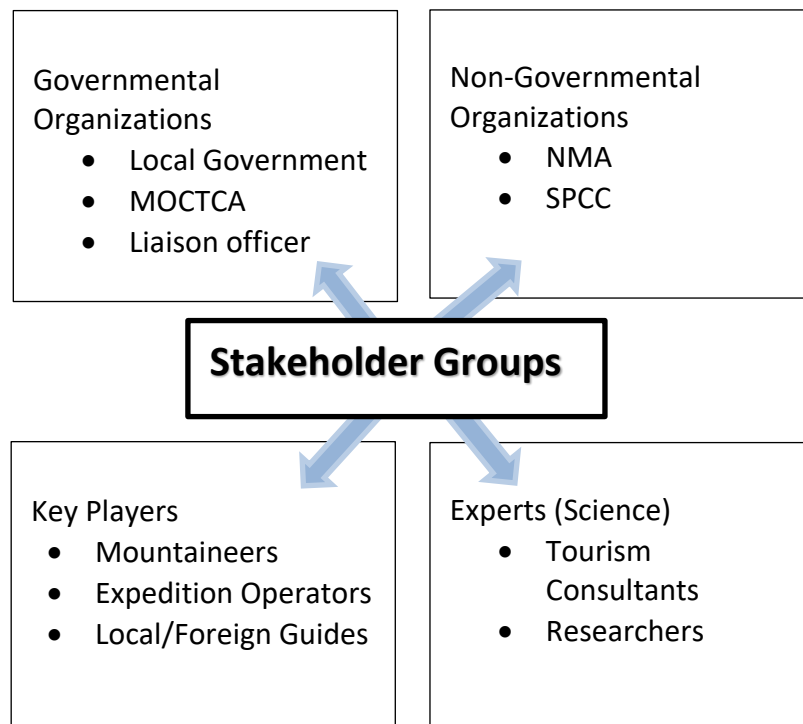
Figure 3. Stakeholder groups associated with the operation of the Garbage Deposit Scheme

2.5.1 Government Organizations

1. **Ministry of Culture Tourism and Civil Aviation (MOCTCA)**

MOCTCA issues mountaineering permits and is responsible for collecting the royalty for climbing Mt Everest and the garbage deposit. It is deeply involved in decision-making and policy implementation with regard to monitoring and regulating the environmental impact of expedition teams.

2. Liasion Officer

Under the 'Mountaineering Expedition Rules, 2059', the Ministry appoints a 'Liaison Officer' to accompany every expedition. The functions, duties and rights of the liaison officer in relation to garbage management are (Government of Nepal, 2007, pp. 6-8):

a) *To try to solve problems which may be caused to the mountaineering expedition team.*
b) *To inspect or monitor the weight of load which may be carried out by the mountaineering expedition team and finalize the clearance certificate provided by SPCC.*
c) *To stay in the Base Camp during the mountaineering expedition programme.*
d) *To carry out or initiate the necessary work relating to environmental cleanness and garbage management.*
e) *To prohibit the team or its members from indulging in any unauthorized mountaineering expedition and to notify such incident to the Ministry immediately.*

3. Khumbu Pasang Lhamu Rural Municipality (Local Government)

The Khumbu Pasang Lhamu Rural Municipality (local government[12]) has major responsibilities in ensuring safe climbing permits and overseeing the overall environmental protection of Mt Everest, including the operation of the GDS.

2.5.2 Non-government Organizations (NGOs)

1. **Sagarmatha Pollution Control Committee (SPCC)**

The SPCC, a local, non-profit committee in Khumbu, was established in 1991 as 'the authorized local organization' responsible for monitoring garbage in the permit required for climbing mountains and peaks (Byers et al., 2020) that 'works with local communities to manage garbage in major settlements and along trekking trails' . SPCC is the local implementing partner of MOCTCA and monitors the implementation of the GDS.

2. **Nepal Mountaineering Association (NMA)**

NMA[13] is a non-government, non-profit, non-political organization that promotes mountain tourism and climbing sports, protection of the mountain environment, and preservation and promotion of the cultural heritage of mountain people. NMA is a financier of the SPC.

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[12] The Constitution of Nepal 2015 that replaced the Interim Constitution of 2007, defines Nepal as a federal democratic republic with provision for three tiers of government: local, provincial, and federal. Since the last democratic election in November 2017, Nepal has had 753 local governments, 7 provincial governments, and one federal/central government. Khumbu Pasang Lhamu Rural Municipality, covering the entire Khumbu area, is the local government of the Everest region. It holds a variety of political, fiscal and administrative powers; there are also concurrent powers with the federal government.
[13] For more information see: https://nepalmountaineering.org/

2.5.3 Key Players: Expedition Operators, Mountaineers and Guides

Operators who run mountaineering expeditions to Mt Everest, along with mountaineers and guides, are major stakeholders in the operation of the GDS because their compliance and behaviour contributes to the successful implementation of the scheme. Operators handle the overall organization of planning the expedition along with overlooking the legal, administrative and logistical aspects of the GDS. This includes applying for the climbing permits, filling out the GDS form, submitting the gear list to SPCC and depositing the garbage fee.

Mountaineers, mostly referred to as clients, have the responsibility of ensuring full compliance with GDS as well as being aware of their waste behaviours on the mountain. Climbing guides, predominantly make decisions to keep client safe and healthy and overlook the management of waste at campsites. They are also responsible for dealing with SPCC regarding the garbage deposit and gear list submission.

2.5.4 Experts (Science)

A few experts on waste management, such as researchers on waste policy, and tourism/environmental consultants for the mountain environment have also been approached for data collection, as they have been involved with designing of GDS as well as working as advisors to other relevant stakeholders such as SPCC or MOCTCA.

2.6 Summary

This chapter provides background information on the GDS and the Mt Everest waste issue. The chapter broadly outlines mountaineering on Mt Everest, associated environmental repercussions of mountaineering and attributes the 'traditional siege tactics' and the growing number of expeditions as the origin of the problem. Particularly, the chapter outlines the GDS, the essential components of the GDS and presents the list of stakeholders associated with the implementation of the GDS. The stakeholders have been divided into government, non-government and key players, and broadly points out their connection with the GDS. The next chapter provides the background to the theoretical framework to evaluate the GDS.

Chapter 3

Integrated Environmental Management (IEM)

This chapter outlines IEM theory, its application to environmental management and justifies its use for evaluating the GDS.

3.1 Introduction to Integrated Environmental Management

IEM is an holistic, inter-connected and effective approach to tackle complex, multi-faceted and interconnected environmental issues (Makisa, 2016). Very simply, IEM has been defined as a '*way of thinking about the environment as a whole*' encompassing the natural, social, cultural and economic environment of everyday life (Frieder, 1997, p. 17). "*Environmental problems are rarely the responsibility of any one agency, organizational unit or individual; the problems usually require a collaborative effort among numerous entities, to achieve collective goals*" (Margerum & Born, 2000, p. 6). IEM aims to coordinate interested and affected parties, bringing diversity of perspectives, disciplines and practices to achieve and balance the broadest possible range of short and long-term objectives (Cairns & Crawford, 1991). IEM is a comprehensive, systematic effort to understand, through interpretation and analysis, the linkages between ecosystems, resources and people (Bührs, 2009), considering social, political, economic and institutional factors operating within the ecosystems to achieve specific societal objectives (Mitchell, 2008).

Margerum and Born (1995, p. 2) summarize IEM as:

> *… an inclusive approach that takes into account the scope and scale of an environmental and human issues and their interconnections. A strategic and interactive process is used to identify key elements and goals at which to direct attention, which in turn becomes the focus of an inter-organizational and coordinated approach to understanding environmental management.*

IEM entails a systematic approach where attention is given to both natural and human systems; it is a strategic approach where the key issue is identified through stakeholder participation; and it is a stakeholder approach where non-government entities and the public participate (Mitchell, 2008).

Several scholars conceptualize IEM into the 'what' and the 'how' (Born & Sonzogni, 1995; Cairns & Crawford, 1991; Margerum & Born, 2000; Mitchell, 2008). The 'what' comprises an integrated approach, characterized by inclusivity, interconnectivity, strategy and being goal focused. IEM also

considers institutional and policy integration (Bührs, 2009). Similarly, the 'how' is accomplished through an 'interactive' and 'coordinated' approach (Born & Sonzogni, 1995; Margerum & Born, 1995).

The following section elaborates the elements of IEM.

3.1.1 Inclusivity

The IEM concept of 'inclusivity' incorporates the scope, scale and context of an issue from multiple perspectives (Margerum & Born, 1995). IEM must take into account all the critical ecological, economic and social dimensions of a particular system (Born & Sonzogni, 1995). IEM must address the delineation of boundaries in relation to time and space, physical features and political jurisdiction. Contextually, inclusivity involves an understanding of the past, present and future directions of the issue (Cairns & Crawford, 1991). Being inclusive also involves analysis of institutions and policies that impact the resource management issue being analysed (Margerum, 1999).

3.1.2 Inter-Connectivity

IEM involves the identification and understanding of physical, cultural, political and economic interactions, interrelationships and linkages that exist between and within the elements identified within the scope, scale and context of the issue (Born & Sonzogni, 1995). Specifically, the interconnective dimension of IEM addresses "*interrelationships and linkages - among multiple, cross-cutting, and often conflicting resource users; among the many entities that collectively comprises the community of interest*" (Born & Sonzogni, 1995, p. 170).

3.1.3 Integrating Institutions

Integrating institutions refers to 'the combination of political structures and processes, along with key stakeholders and traditional customs and historical values, as well as administrative, economic, financial structures and arrangements' (Mitchell, 2008). Institutions, both formal and informal, refer to a wide range of things that play a major role in guiding or channelling the development of decisions and policies (Bührs, 2015, November 30-December 2), including "*formal and informal rules, traditions and conventions, constitutions, processes and procedures, organizations, the allocation of responsibilities and powers, mandate, and guidelines*" (Bührs, 2009, p. 8). In short, institutions are the relatively stable and entrenched structures and processes through which management (including policy development) occurs, both procedurally (the processes by which policies are developed) and substantively (by holding up certain values, norms and principles) (Bührs, 2009, 2015, November 30-December 2).

3.1.4   Policy Integration

Policy integration is essential because it allows "*the incorporation of environmental objectives into all stages of policymaking in non-environmental policy sectors*" (Lafferty & Hovden, 2003, p. 9) and allows the cooperation of actors from different policy domains or policy sectors (Bührs, 2015, November 30-December 2; Persson, 2004; Tosun & Lang, 2017). Policy integration can be manifested in different ways, but is always characterized by the cooperation of actors from different policy domains or policy sectors (Tosun & Lang, 2017) to develop policies in a way that their substance (principles, goals, objectives) aligns (Bührs, 2009).

3.1.5   Thinking Politically, Practically and Strategically

Thinking politically requires identifying who is involved in or affected by an issue. It demands 'consultation, participation, and collective deliberation' to build up a 'realistic' political picture around an environmental issue or policy (Bührs, 2009, p. 15). Thinking practically and strategically requires thinking about the position of an implementing organization, the constraints related to responsibilities, available time, expertise, human capabilities and what can be achieved within the various barriers and constraints that exist. It is a skill based on experience, political instinct and attitude (Bührs, 2009). Strategic thinking is integral in identifying the best starting points for delivering a management approach within the scope of available means and constraints.

3.2   The 'How' Question: Towards an Operational Model of IEM

Although there are numerous frameworks showing what IEM entails (e.g., (Born & Sonzogni, 1995; Margerum, 1999; Margerum & Born, 1995, 2000; Margerum & Hooper, 2001), there has been less elaboration on the operationalization of IEM (how IEM is put into practice). Margerum and Hooper (2001) note that, intuitively, most people can comprehend the idea [of IEM], but the critical aspect is how to put IEM into operation. Several authors allude to the role of interaction and coordination in IEM (Born & Sonzogni, 1995; Bührs, 2009; Margerum & Born, 1995; Margerum & Hooper, 2001; Mitchell, 2008; Persson, 2004), arguing that the key to operationalization is an 'interactive approach', citing interaction/coordination as 'the key operational component'.

3.2.1   Co-ordination and Interaction

Coordination entails the exchange of information and solutions among agencies and stakeholders to achieve 'mutually desired objectives' through communication, conflict management and change management (e.g., cultural and organizational change) among others (Born & Sonzogni, 1995). Mitchell (2008) emphasizes the intent of IEM being manifest in sharing and coordinating values and

inputs of broad ranges of agencies and interests when designing, implementing and assessing policies, programmes and projects.

Interaction among the participants is imperative in exchanging information, analysis, goals and objectives (Margerum & Hooper, 2001). Boileau et al. (2019) notes exchange of information is what enables an environmental management plan to operate; multiple participants bring together multiple ideas, perspectives and biases. As such, conflict is inevitable and conflict resolution is imperative for coordination (Margerum & Born, 1995).

Stakeholders are "*individuals who hold some vested interest system being addressed, such as agencies, governments, interest groups and affected parties*" (Margerum & Born, 1995, p. 378). The public also has a stake in the system – although often less well-defined. The public is often not involved in day-to-day decision making, but the public's perspectives and views must be considered to build a broader consensus. Interaction among stakeholders helps to accomplish the substantive objectives of IEM by including a diverse array of information, knowledge and perspectives (Buhagiar, 2003). Secondly, consensus generated among the stakeholders through coordination can create better understanding of ecological, socio-economic and political systems (Margerum & Born, 2000; Margerum & Hooper, 2001) and produce political will, mutual understanding and shared capital that stakeholders can use to facilitate implementation of IEM (Boileau et al., 2019).

Thus, at its core, IEM requires participants to take a more inclusive view that considers the scopes of environmental and human systems, examines interconnections, identifies common goals and selectively identifies the key elements on which to focus attention. Operationalization of IEM involves the stakeholder group, its relationship with an array of institutions, government and nongovernment decision makers and with the public.

3.3 Justification for Using Integrated Environmental Management to Evaluate the Garbage Deposit System

IEM is a suitable approach for evaluating the GDS for following reasons:

1. The GDS operation has many complexities because it involves a diverse range of players with different perspectives and objectives (Kelliher, 2014), including national and local government, expedition agencies, civil organizations and the climbers who are responsible for the production, transport and treatment of waste (Bulkeley et al., 2005; Davies, 2008). Policymakers, government officials, mountaineers and operators require '*credible evidence of relevance to their settings and populations*' (Paparini et al., 2020, p. 4), to identify robust evidence for understanding complex causal pathways by coordinating multiple management agencies, removing redundancies,

consolidating information, improving communication and promoting a holistic understanding of the environment (Davies, 2008; Day, 2015; Frieder, 1997). Other evaluation approaches, as mentioned by Thokala and Madhavan (2018), have critiqued Multi-criteria Analysis (MCA) for ignoring the fundamental requirement of working with stakeholders. Examples include determining the criteria, performing the scoring and weighting independently from the stakeholders/decision-makers (Thokala & Madhavan, 2018). IEM on the other hand, provides a framework for identifying and evaluating complex resource problems through the integration of multiple stakeholders who are essential to identifying the most critical issues. For example, in an empirical case study of assessing waste management on 8000 m peaks in Pakistan, an IEM based evaluation identified the importance of integrating stakeholders to produce robust evidence for the observed effects, thus providing useful, actionable evidence for decision-makers in other contexts (Lemal, 2009).

2. GDS on Mt Everest is characterized by a complex environment: remoteness, limited access to civic infrastructure, lack of capacity, vulnerability to natural disasters and topographical and temperature variations that complicate waste management on Mt Everest (Miner et al., 2021; World Bank, 2021). These characteristics make the GDS very context specific (Byers et al., 2020). IEM is a tool for designing the most appropriate management option for a specific context as IEM incorporates the scope, scale and context of an issue from multiple perspectives (Margerum & Born, 1995) integrating the components of sustainable development (social, economic, environmental and cultural) as criteria, including trade-offs between economic output and environmental protection (Solomon & Hughey, 2007). Policy evaluation approaches such as a (quasi-) experiment takes no account of the scope, scale and context of an issue and does not suffice to a ascertain a causal relationship (Crabb & Leroy, 2012) (Table-1). In studying effectiveness, one needs to understand actual causes. These causes, which are often situated in the context, are beyond the reach of the experiment approach (Crabb & Leroy, 2012). IEM has been used to investigate a 'contemporary phenomenon in depth and within its real-life context', as evident from previous studies; evaluating district council policy related to seal extension of roads (McConnell, 2003) or assessing waste management in Pakistan (Lemal, 2009).

3. Unlike many policy evaluation approaches such as needs analysis, formative/developmental evaluation, Multi Criteria Analysis (MCA) or environmental impacts assessments (EIAs) that are *ex ante* (Crabb & Leroy, 2012) (Table-1), IEM can be run *ex post* to evaluate the success of GDS by identification of the criteria and then evaluating their achievement and, specifically, the mechanisms that led to their non-achievement. Ex-ante evaluations as mentioned in Table -1 evaluate policies before implementation (Crabb & Leroy, 2012), with emphasis on relevance of the

policy through the viewpoint of necessity, priority and adequacy of project as a means of achieving the target objectives. However, when evaluating the effectiveness or impact of a policy, an evaluation study is based on the performance and implementation process (Stephen, 2005), rather than 'forecasts and prospects' used for *ex ante* evaluation (Crabb & Leroy, 2012). GDS has been implemented for the last three decades and, using IEM, can aid in identifying the effectiveness of GDS, and highlighting the strength and mechanisms that contributed to its ineffectiveness. For example, McConnell (2003) evaluated district road seal extension policies after the implementation of the policy using IEM criteria.

4. IEM provides a 'normative' framework (OECD, 2021) with which to assess a specific interventions. This includes providing complementary perspectives from all stakeholders, giving a holistic picture of the intervention (Margerum & Born, 2000; Margerum & Hooper, 2001; Stephen, 2005). Unlike other evaluative approaches, e.g., formative/developmental evaluation only assessing the contextual aspect of policy implementation rather than the overall GDS or LFA stressing more on 'problems of an issue' rather than overall policy (Crabb & Leroy, 2012), evaluation through IEM encourages "*deeper thinking about the nature of an intervention, its context, implementation, process, and results*" (OECD, 2021, p. 18) (Table-1). Evaluation through IEM criteria aids in describing the desired attributes of interventions covering the entire policy cycle, making assumptions explicit and providing norms for evaluation; interventions should be relevant to the context, problems and achieve overall results to have positive, lasting impacts for sustainable development (Hanna & Slocombe, 2007).

Table 1 presents some other key evaluation tools and summarizes why GDS evaluation can be challenging with the mentioned evaluation approaches. Based on the limitations identified, IEM, which is more holistic in terms of scope and other advantages, is the approach used for this study.

Table 1. A comparative table illustrating key evaluation approaches with GDS evaluation.

Policy Evaluation Approach	Brief Summary	Challenges with GDS Evaluation
1. Needs Analysis	Needs analysis focuses on the identification and evaluation of needs and emphasizes on the reasons for a policy. This approach helps to assess policy in the lights of society's policy requirements.	Need analysis is the first step in the 'policy cycle: policy formation and determination of policy goals' to successfully develop an effective policy program, however with the GDS evaluation, the approach is irrelevant as the GDS has been implemented for the last three decades.
2. Experiment and Quasi-Experiment	A (quasi-) experiment is conducted to explore the effect of a particular intervention on a certain variable. This approach is intended to provide insight into the effects of the policy so obviously experimentation is ex post approach.	A (quasi-) experiment takes no account of the context and does not suffice to a ascertain a causal relationship. The GDS is a very contextual issue and for studying its effectiveness, one needs to understand the actual causes. These causes, which are often situated in the context, are beyond the reach of the experiment approach.
3. Multi-Criteria Analysis (MCA)	MCA is a method for weighing up alternative policy action against each other to arrive at the best alternative. MCA is an *ex-ante* evaluation to compare various alternative during planning phase.	The lack of clear definition and lack transparency in the assignments of weights to criteria, opening room for manipulation and misinterpretation for the results of the GDS's effectiveness. Moreover, MCA researchers and practitioners work independently from the key stakeholders when conducting the MCA: determining the criteria and performing the scoring and weighting independently from the stakeholders.
4. Formative/Developmental Evaluation	Studies the operationalization and implementation of policy, and makes an assessment of the quality of policy-making, the organizational context, the policy implementers, policy organization and policy processes to formulate recommendations on the basis of which policy can be adjusted.	Using this evaluation for GDS can only assess the contextual aspect of GDS implementation rather than the overall GDS as the result of the formative/developmental evaluation is based on the context of the policy implementation rather than a complete policy assessment result.
5. Environmental Impact Assessment (EIAs	EIA evaluates the expected effects of a policy program to allow preventive adjustment. EIA not only predict future effects, but also outline possible alternatives. Consequently, EIAs are also tool that policymaker can use to weigh up policy alternatives.	An EIA is conducted ex ante. Since it aims to predict effects and anticipate these predictions, the approach is applied before policy is put into practice. In the GDS evaluation, this can be irrelevant.
6. Logframe Method/Logical Framework Approach (LFA)	LFA assist policymakers in the following task: project development by analysing the existing situation; determining the logical coherence between objectives and means deployed; identifying potential risk, specifying how policy output and outcome should be monitored and evaluated, monitoring and following up of project implementation.	LFA is mostly conducted during the initial policy design phases which can be irrelevant with the GDS evaluation. Moreover, LFA also stresses more on 'problems of an issue' rather than overall policy and leaves a little room for debate on opportunities and possibilities of policy.

3.4 IEM criteria for evaluating the GDS

The purpose of IEM criteria is linked to the purpose of evaluation. Namely, to enable the assessment of the 'merit, worth or significance of an intervention' (OECD, 2021). The term 'intervention' is used throughout this document to mean the subject of the evaluation, i.e., the GDS. Each criterion is a different lens or perspective through which the intervention can be viewed and evaluated. Together, they provide a more comprehensive picture of the intervention, the process of implementation, and the results (Persson, 2004).

The criteria play a normative role. Together they describe the desired attributes of intervention relevant to the context, coherent with other intervention, achieve their objectives, deliver results in an efficient way, and have positive impacts that last.

The criteria for GDS evaluation are outlined in Chapter 4: Methods and Methodology, section 4.3.

3.5 Summary

The main rationale for using IEM is the inescapable fact of ecological, social and economic interdependence, combined with a recognition that IEM is: 1) comprehensive and inclusive; 2) recognizes system interconnections and policy integration; and 3) is operationalized through coordination. The criteria to evaluate the GDS have been derived from these components of IEM. The potential for IEM to evaluate GDS is attributed to its principal characteristics: integration of stakeholders, a tool for designing the most appropriate management option for specific-context, ex post evaluation and the ability to incorporate context, implementation, process, and results of policy while conducting evaluation. The following chapter outlines methods and methodology for how the IEM framework is used to evaluate the GDS.

Chapter 4

Methods and Methodology

4.1 Introduction

The research methods and methodology comprise three stages: a literature review comprising IEM literature and literature on the waste issue on Everest, semi-structured interviews, and an analysis of the collected data (Figure 3). The literature review had three purposes: to review IEM literature, develop evaluation criteria, and to understand the waste issue on Mt Everest to evaluate the GDS. Analysis of the relevant literature on Everest presented a foundation for understanding the waste issue on Everest and aided in formulating questions for semi-structured interviews (see Section 4.3.3). The semi-structured interviews provide information and knowledge specific to the GDS and about the existing waste management challenges in the region that helped provide potential options for improvement.
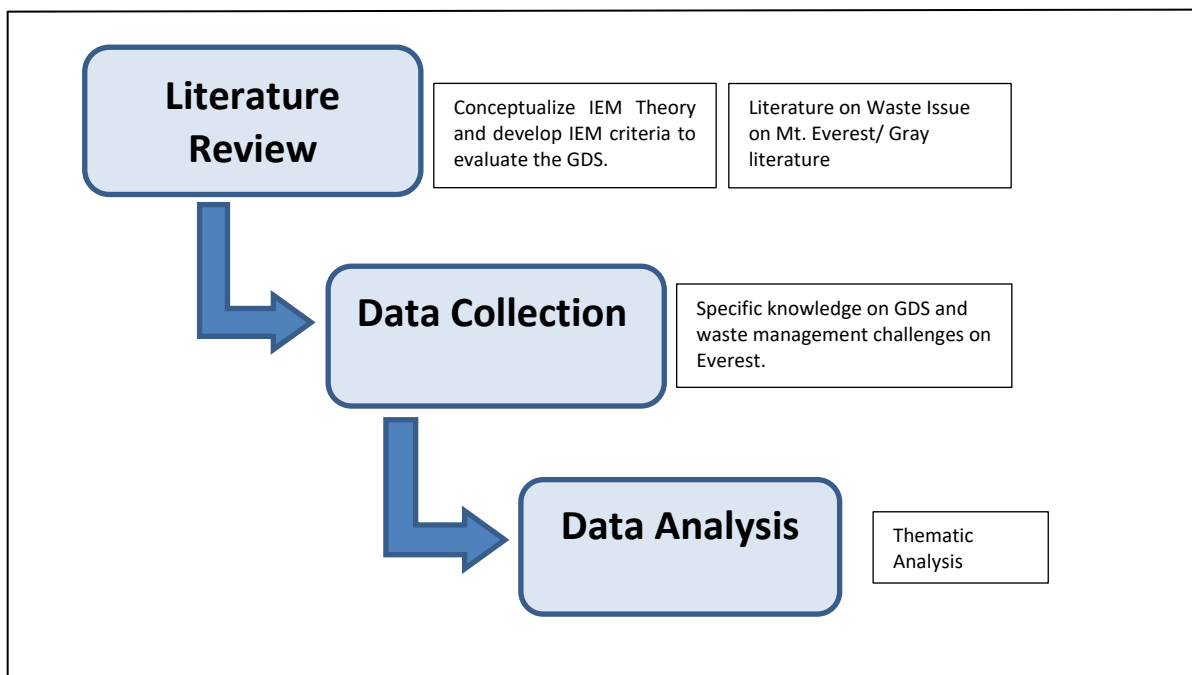
Figure 4.The research method

The following subsections describes each component.

4.2   Literature Review of the Waste Issue on Mt Everest

Mt Everest, for obvious reasons (i.e., the highest mountain in the world, most famous, most visited, most polluted) has been heavily investigated both for exploration and academic purposes, as Stevens (1996, p. 398) put it: *"Nowhere in the Great Himalaya is a concern for the environment more intense than in the Khumbu area".* However, this stage proved to be challenging because there is no evaluation literature on the GDS the available literature on Mt Everest focusses on the areas below Base Camp. Nevertheless, the available literature has been useful in setting the scene and presenting the initial context of the problem. Scientific papers covering topics on 'waste research on Everest', 'mountaineering', 'policy in mountains' have been used to support the data collected from the semi-structured interviews and for the identification of IEM criteria appropriate to the waste issue on Mt Everest.

There is an extensive grey literature (annual reports, environmental reports, policy literature, mountaineering in Nepal, yearly reports published by expedition operators and organizations, mountaineering books, blogs and documentaries on Mt Everest) that provides details and notes on ascents, compiled amount of garbage, abandoned materials and existing rules. This literature is explored to collate additional information on the mountain's waste context. Most contemporary expeditions share their stories on ascents and issues surrounding waste on the Mt Everest via websites or blogs. I have examined and reviewed websites such as www.explorersweb.com and *The Himalayan Database[14]* searching for information about abandoned waste, garbage deposits and/or climber behaviour related to waste. I could thus access pictures, reports, news or even discussions related to abandoned waste on Mt Everest.

From historical facts, I moved to contemporary data using the internet and, secondly, I enriched my study with an empirical examination of the Mt Everest waste situation. The next section will present the methods used for the empirical component of the study.

4.3   Establishing IEM criteria for evaluating the GDS

Evaluation is, by nature, normative so criteria on which to base normative judgements must be used (Mickwitz, 2003). The criteria are viewed as a set of lenses through which to understand and analyse an intervention. Analysing and evaluating policy effectiveness depends, however, on context, purpose, intervention (evaluand)[15], and evaluation criteria (OECD, 2021). What is being evaluated depends on

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[14] The Himalayan Database - This a compilation of records of all expeditions that have climbed in the Nepal Himalaya: https://www.himalayandatabase.com/
[15] Intervention is being evaluated (a project, policy, strategy, sector) -Scope and nature?

why and how the policy has been conceived, developed and effected (Persson, 2004). The objective of this study is to study the effectiveness of the GDS against the stated objectives. Hence, the question centres on GDS implementation and particularly how the GDS has influenced the behaviours of targeted groups - climbers, guides and operators.

The criterion of 'effectiveness' originates from the aim of this study. Effectiveness indicates "*to what extent has the GDS achieved its principal objective*" (Mickwitz, 2003, p. 26). Effectiveness is a measure of whether the GDS has attained its planned results, the process by which this was done, which factors were decisive in this process and whether there were any unintended effects. Though evaluating the effectiveness of GDS is necessary, it is not sufficient to assess only effectiveness; a broader perspective based on several other criteria and considering side-effects is required.

Support for using multiple criteria (see Table 2) to evaluate the GDS is based on two major factors: first using more than a single criterion, be it 'Effectiveness', 'Acceptability' or 'Sustainability', is more comprehensive "*in terms of inclusiveness of space, time, actors and issues*" (Persson, 2004, p. 12). Secondly, to suggest criteria that can evaluate context-specific case study such as with the GDS.

Acceptability of the GDS is vital for successful implementation. Acceptability assesses the extent to which GDS has been accepted by the stakeholders. This involves assessing acceptance by key stakeholders such as mountaineers, operators and guides, government officials and non-government organizations. Identifying how information on GDS measures can be improved may increase support and generate a more positive attitude towards the policy (Stephen, 2005).

Assessing sustainability requires evaluators to determine if the GDS benefits continue, or are likely to continue. This includes examining financial, social, environmental and institutional capacities (Persson, 2004) and interaction between these elements to sustain benefits over time (OECD, 2021).

Because environmental problems (such as waste on Everest) are often characterized by conflicting goals of different groups and by huge uncertainties, a 'comprehensive' treatment of the GDS is particularly important. There are many, continually changing, contextual factors that affect GDS outcomes. The feasibility of the GDS to deal with this changing context is evaluated against three main domains: socio/cultural, technical and administrative feasibility.

The criterion 'Efficiency' evaluates the conversion of inputs (funds, expertise, natural resources, or time) into GDS outputs, outcomes and impacts. It is recognised that analysing the entire results chain, and, in particular, looking at the efficiency of inputs to impacts, 'is methodologically challenging' (OECD, 2021). However, this is an inquiry of interest for GDS evaluation. The efficiency criterion will

allow the flexibility to focus the analysis of efficiency on the part of the results chain that is most relevant for the GDS evaluation.

Table 2. Criteria used in the evaluation of the Garbage Deposit Scheme and their interpretation.

Criterion	Related Question/Intervention
Acceptability	To what extent do individuals and organizations accept the environmental policy?
Effectiveness	To what degree do the experienced outcomes correspond to the intended goals of the policy? The extent to which the intervention achieved, or is expected to achieve, its objectives and its results.
Feasibility	• Social/cultural feasibility is the GDS consistent with national/local traditions, policies, and institutions; and is it acceptable to the local population. • Technical feasibility: availability and reliability of technological resources and competencies. • Administrative feasibility: degree of ease of implementation, financial/managerial factors.
Sustainability	The extent to which the net benefits of the intervention continue, or are likely to continue
Efficiency	The extent to which the GDS delivers, or is likely to deliver, results in an economic and timely way. How well are resource being used?

4.4 Data Collection

The interview is a widely used method for gathering data in social science research. Interviews, compared with other data collection methods, can potentially create deep, rich data to gain diverse details and insights, such as opinions or experiences. They allow interviewees to "*speak in their own voice and express their own thoughts and feelings*" (Alshenqeeti, 2014, p. 40). Interviews, unlike surveys and set questionnaires, which are generally superficial, allow the interviewer to respond to and probe responses, tailoring the interview to what they hear (Ellis, 2016; Mirick & Wladkowski, 2019). There are three different styles of interview: structured, semi-structured and unstructured (Alshenqeeti, 2014; Ellis, 2016; Robson, 2016).

Structured interviews are based on a fixed set of pre-determined questions (Alshenqeeti, 2014; Ellis, 2016; Young et al., 2018). In a structured interview, the same questions are asked in each interview,

allowing "*close comparison between different transcripts, but does not allow interviewees to shape the discussion*" (Young et al., 2018, p. 12). Unstructured interviews are not based on an interview script. In these interviews, the flow and direction the interview may take is not known at the start because interviewers often use topic guides, rather than questions (Ellis, 2016) and the course of the conversation relies entirely on the responses; questions are asked based on interviewees' responses (Young et al., 2018). Though this does allow an "*in-depth analysis of issue*" (Young et al., 2018, p. 12), such interviews tend to be time-consuming, less reliable and offer little assurance that all relevant issues are covered with a high chance of diverting from the study's subject (Alshenqeeti, 2014).

A semi-structured interview fits between structured and unstructured interviews and combines both interview styles, offering the advantages of both (Robson, 2016). A semi-structured interview relies on a pre-determined question guide, which means that standard questions are asked, allowing comparison and the maintenance of data quality (Young et al., 2018). Crucially, however, semi-structured interviews allow the interviewer to freely modify the questions or the order of the interview and add unplanned follow-up questions if an interesting or new line of enquiry develops during the interview (Ellis, 2016). This flexibility is important in assessing the GDS because it facilitates analysis of a diversity of experiences, perspectives, knowledge and roles of key informants in relation to waste on Mt Everest. Hence, a semi-structured interview is used as the primary data collection method.

4.4.1 Data Collection Procedure

The semi-structured interviews were conducted from 9 September to 9 October, 2021. The objective was to interview 15 different stakeholders from the mountaineering fraternity (see Section 2.5 for more information about this group). Participants were first contacted by telephone then with a follow-up email exchange to share the information sheet on the research and consent form (see Appendix B, B1 and B2). The first phone conversation was useful to discuss the information sheet and consent form with interviewees and for the participants to ask any questions freely as in a face-to-face interview. Before beginning each interview, participants were asked for their consent to participate in the study.

All interviews were conducted through Zoom/Skype/WhatsApp and Phone from New Zealand. Because some stakeholders are in remote areas, high bandwidth communication might not be possible or appropriate. In such cases, phone interviews were conducted. Interviewees were given the opportunity to withdraw their interview before the commencement of data analysis.

With the participants' consent, all interviews were audio-recorded and then later transcribed to allow me to focus on the details required for the study. Interviews were conducted for about an hour in

either English or Nepalese (interviews in Nepalese were later translated to English). Participants were asked to suggest additional contacts that they considered relevant to the study (snowball sampling).

4.4.2 The List of Participants

The literature review and preliminary interviews conducted during the research proposal development phase facilitated the selection of organizations from which to collect data. More interviewees, through snowball sampling, were recruited as needed for the study. The stakeholder organizations contacted for an interview are given below.

- Ministry of Culture, Tourism, and Civil Aviation (MOCTA)[16]
- Sagarmatha Pollution Control Committee (SPCC)[17]
- Nepal Mountaineering Association (NMA) [18]
- Expedition Operators
- Tourism Entrepreneur and mountain researcher
- Climbers
- Guides

4.4.3 Interview Questions

Figure 4 shows the interview outline by topic. The interview began with a discussion on general aspects of mountaineering in Nepal and the Everest waste issue (see Appendix C). This was followed by questions specific to the GDS, including:

- Interviewee
  - o Role and familiarity with the GDS
  - o Involvement in previous/ongoing waste projects or programmes
- Interviewee opinions about
  - o The GDS's effectiveness in influencing behaviour
  - o GDS induced behavioural changes
  - o Barriers to effective implementation
  - o Potential future improvements to Everest waste management
  - o Difficulties around cooperation with other stakeholders

The overall interview framework is depicted in Figure 4.

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[16] MOCTCA - Besides issuing permits for these peaks, MOTCA also are in charge of collecting and then reimbursing garbage deposit fees for expeditions - https://www.tourism.gov.np/
[17] SPCC-The first nongovernmental organization in the region to initiate waste management programmes, and arguably the most prominent in the region - https://www.spcc.org.np/
[18] NMA -The only national alpine Club authorizes to issue permits for 27 national mountain peaks in Nepal, is an NGO working to promote mountain tourism, climbing sports, protect mountain environment - https://nepalmountaineering.org/

Figure 5. Interview questions grouped by content

Since all interviews were semi-structured (see Appendix C), the content and number of interview questions varied by respondent.

4.4.4 Data Analysis

Thematic analysis, the most widely used approach for analysing textual interview data, was used to create representative codes/themes (Barnett-Page & Thomas, 2009). This method is appropriate for assessing questions related to effectiveness, need and evaluation of an intervention (Barnett-Page & Thomas, 2009). Baptiste (2017) used thematic analysis to evaluate water policy in Guyana and Schirmer et al. (2013) used it to assess the role of Australia's natural resource management programmes in terms of farmers' wellbeing. Using NVivo[19], a qualitative analysis software program, interview responses were coded according to the Braun and Clarke (2006) thematic analysis framework. This framework categorized textual information into themes and sub-themes based on the IEM evaluative criteria, enabling assessment of the extent to which the GDS met the criteria.

The Braun and Clarke (2006) framework enabled 'identification, analysis, and reporting of patterns (themes) within the data' through six-stages: familiarization; generating initial codes; searching for themes; reviewing themes; defining and naming themes; and data reporting. Although these stages

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[19] NVivo is computer-assisted qualitative data analysis software (CAQDAS) developed by QSR International (Melbourne, Australia), the world's largest qualitative research software developer.

are depicted as sequential with each building on the previous phase, analysis was typically recursive (Braun & Clarke, 2006), with movement back and forth between different stages.

The stages are as follows:

1. **Familiarization with the data:** The first step in any qualitative analysis is reading and re-reading the transcripts to become immersed in and familiar with the entire body of data (i.e., all interviews and any other data you may be using) (Braun & Clarke, 2019).

2. **Coding:** Codes are short captions that identify features of the raw data (Braun & Clarke, 2019). This stage involves generating succinct labels (codes) that identify important features of the data. They are organized into meaningful groups that might be relevant to answering the research question. The coded data differ from the units of analysis (themes) that are often broader (Braun & Clarke, 2006). This phase involves "*coding the entire dataset and, after that, collating all codes and all relevant data extracts*" (Braun & Clarke, 2006, p. 89) together for later analysis.

3. **Generating initial themes:** This phase involves examining the codes and collated data to identify significant broader patterns of meaning (potential themes). A theme is a pattern of "*shared meaning underpinned by a central concept or idea*" (Braun & Clarke, 2006, p. 89) that captures something significant or interesting about the data and/or research question, e.g., several codes reflecting the perceptions of the waste problem on Mt Everest were collated into one theme entitled 'Problem definition' .

4. **Reviewing themes:** This phase involved checking, reviewing, modifying, and developing the preliminary themes identified in earlier stages to determine if they tell a convincing story about the data that answers the research question.

5. **Defining and naming themes:** This phase involved a detailed analysis of each theme, working out the scope and focus of each theme and determining the 'story' of each. It also involves deciding an informative name for each theme. The themes were defined and named on the basis of the research objectives (Ryan & Bernard, 2003).

6. **Writing up:** This phase involved "*weaving together the analytic narrative and data extracts and contextualizing the analysis in relation to existing literature*" (Braun & Clarke, 2019, p. 3).

4.4.5   Data Interpretation

The final stage involved interpretation. This stage involved examining the findings, identifying problems or issues (if they exist), drawing conclusions, and proposing potential solutions to provide a "*concise, coherent, logical, and interesting account of the story the data tell*" within and across themes against the criteria to answer the research objectives and make the research findings ready for dissemination (Brooks et al., 2015, p. 205). This stage defined the problem context, assessed the GDS

and made suggestions for improvements using the IEM framework. Interpretation also provided potential options for improvements by assessing all the recommended options based on IEM criteria.

4.4.6   Reliability and validity of data

Creswell and Poth (2018) illustrated that reliability and validity are imperative to check the accuracy of the research finding in qualitative research. To ensure reliability in qualitative research, examination of trustworthiness is crucial. (Seale, 1999, p. 266) states that the 'trustworthiness of a research report lies at the heart of issues conventionally discussed as validity and reliability'. Many researchers (Creswell & Poth, 2018; Leung, 2015; Seale, 1999) agreed that triangulation is typically a strategy for improving the validity and reliability of research or evaluation of findings.

Given the nature of this study, I repeatedly triangulated the data by crosschecking the findings from multiple methods. The use of coding details is the key for data triangulation in this study. The frequency of themes and patterns identified through the use of multiple data sources: semi-structured interviews, informal conversations and secondary data also facilitated triangulation. Writing notes during and immediately after each interview also contributed to gathering homogenous data by enabling me to compare inferences about the previous interviews with the data obtained during the interview.

Transferability is another important aspect to make the data reliable and valid (Creswell & Poth, 2018). The maximum variation in the sample through diverse participants allow the possibility of greater range of findings. In this study, transferability is maintained through the use of a diversity of participants including foreign-based expeditions, mountaineers and guides, women, local mountaineers and organizations at the local level.

4.5   Human Research Ethics

Complying with human ethics (HE) is a basic requirement for research involving human participants (Lofland et al., 2006). Before conducting any research with participants, approval was obtained from the Lincoln University Human Ethics Committee. Approval was granted on 26 August, 2021 (see Appendix B2). I clearly explained the purpose of the study and the participants' rights to all the participating stakeholders. Both the consent form and an information sheet were emailed to the participants. All interviewees were requested to electronically sign a consent form that allowed the interview to be audio recorded and the data to be used in the proposed study. All participants consented to recording their interview and for that data to be used. The signed consent forms and data are kept securely; only the researcher and supervisors have access to the data. At the end of each interview, participants were given a chance to ask questions.

All participants requested anonymity. Hence, no data that allow identification of specific individuals is included in any written or oral presentation from this study; participants' descriptions are generalized as climber, expedition operator, or guide to prevent identification. On the other hand, agency representatives will be referred to as government official, local operator, or foreign expedition group.

4.6 Summary

The research methods and methodology comprise of analysis of the relevant IEM literature, criteria development, data collection through semi-structured interviews, data analysis by thematic analysis, and interpretation through IEM criteria. Data triangulation and transferability have been applied to assess the reliability and validity of the findings. These processes, in combination, will define the problem, evaluate the GDS and provide potential options for improvement. The next chapter presents the findings generated through these methods.

Chapter 5

Results and Analysis

This chapter presents and discusses the results of the study's semi-structured interviews[20], broadly divided into two sections. The first section presents findings from key informant interviews and the second section analyses key findings against the criteria.

5.1 Key Informant Interviews Findings

Analysis is principally based on the semi-structured interviews with key informants from the stakeholder groups. Information gathered through the literature review of the diverse grey literature and informal interviews of people with various occupational and individual backgrounds associated with the mountaineering industry is incorporated throughout the analysis. The analysis begins with a profile of the interviewed key informants. This is followed by the findings related to the stakeholders' understanding of the GDS and their perceptions of the performance and impacts of the GDS.

5.1.1 Interviewees' Profiles

Fifteen people participated in the interviews (see Table 3). An effort was made to broaden the representation of all stakeholder groups involved with the GDS. Four interviewees were with 'famous' climbers with multiple summits of Everest. Three interviewees were involved in government agencies dealing with mountain environment protection and waste management, logistics, and policy. One interviewee was science stakeholder from environmental and tourism management consultancy firms. Three interviewees were conservation stakeholders, including people affiliated with NGOs and tourism entrepreneurs. In an effort to corroborate some of the views provided by locally-based, Nepali stakeholders and to provide an international perspective on the issue of waste management and the GDS, two interviews were carried out with prominent international stakeholders: a renowned climber and an expeditions agency that runs regular trips to Mt Everest.

5.1.2 Interviewees' Experience of Everest Issues

All interviewees were active in their role related to Mt Everest and the GDS and had been working on or been affiliated with Mt Everest through expeditions, waste management, and environmental and policy advocacy. The person with the least experience had been involved in Everest matters for 7 years; the person with most experience had 47 years of experience in Everest's sphere, ranging from

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mountain tourism consultancy to working as a sustainable tourism specialist advisor for Nepal's government. On average, interviewees had about 15 years of experience in Everest affairs (see Table 3).

All interviewees had visited the Everest area, with most having first-hand experience dealing with the GDS, such as climbing the mountain or working directly with the government to advise, propose ideas and on programmes on waste management. All interviewees who had visited Everest had been more than once; six had scaled the summit and had lived in different campsites for more than one season.

Four interviewees had participated in various government-led meetings and discussions on improving the waste situation on Mt Everest, including meeting with Chinese officials to control the waste issue on the Chinese side of the mountain. Attendance at, and involvement in, these meetings varied among interviewees from an interviewee who had attended one meeting for a day as part of a delegation, to an interviewee who had attended seven government-led meetings since the establishment of the GDS in 1993. The following table summarizes interviewees profile and their experience of Mt Everest waste issues (Table 3).

Table 3. Summary of interviewee profiles and their experience of Mt Everest Issues

Stakeholder Group	Number of informants interviewed	Gender		Interviewees' experience of Mt Everest issues
		Male	Female	
MOCTCA	1		1	7 years
SPCC	2	1	1	13 years and 7 years
NMA	1	1		9 years
Expedition Operator	2	2		13 years and 9 years
Climbers	3	2	1	13 years, 9 years and 8 years
Guides	3	3		22 years, 14 years and 7 years
Tourism Entrepreneur	2		2	47 years and 23 years
Researcher	1	1		14 years and 9 years

5.2 Interviewees' Views about the Mt Everest Waste Issue

This section outlines the views expressed by interviewees on the waste issue on Mt Everest in relation to the GDS. Since half of the interviewees had first-hand experience with climbing and successfully summiting Mt Everest, and the other half through visiting campsites and working on the waste issue on Mt Everest, the following informed views and opinions represent a true reflection of their

expeditions and life experiences. None of those interviewed expected the Mt Everest, or any other 8000 m mountain, to be clean or free of abandoned materials. Even stakeholders without climbing experience were adamant in their answers about the current state of the mountain covered with waste: historical waste and new addition of waste from recent expeditions.

Of the 12 interviewees with climbing experience, all had witnessed waste at Base Camp and camps above Base Camp on their previous expeditions. One climber mentioned: "*Sighting waste at the Base Camp and at higher camps, unfortunately, has become part of the experience*". Another climber described the mountain as being 'phenomenally dirty'. These comments were typical and lend weight to the need to consider in detail the 'deliberate' or 'forced abandonment of material'.

5.2.1 Deliberate or Forced Abandonment of Materials

Because mountaineers are left by themselves high up on mountains, it comes down to personal and moral values, as well as ethics, when deciding to take down equipment and waste or leave it behind. As a North American climber said, *"It is an issue of values and culture nowadays".* Two reasons for leaving waste are considered in this discussion: the deliberate abandonment or dumping of material because it has been the historical practice since the early days and is still occurring; and second, the forced abandonment because of recurring meteorological events.

Deliberate abandonment of materials

The deliberate abandonment of materials started in the early days of mountaineering including by Sir Edmund Hillary. He once said, "*I must admit when we went to Everest in 1953, we heaved our waste around with the best of them*" (Bishop & Naumann, 1996, p. 323). Today, though environmental concerns and mountaineering ethics have changed, the practice is continued by most climbers. Several interviewed climbers reported witnessing deliberate dumping of waste and equipment. A locally based operator said, "*I witnessed an expedition team dumping a bag of physical waste into a crevasse at Camp 1; another team leaving their unconsumed food (with packaging) at Camp 1, which was partially used by other climbers, but the rest was left behind*".

Forced abandonment of materials

In the nature of mountaineering, as experienced by most of the interviewees, it was mentioned that the process of climbing heavily contributes to waste accumulation on Everest. The first factor is 'the remarkably low oxygen levels. At 5,500 m at Everest Base Camp, the amount of oxygen available is reduced to around 50% of the sea-level value. On Everest's summit at 8,848 m, there is only 30% compared with sea level (Matthews et al., 2020). An interviewed mountaineer said, "*It's almost impossible to breathe at that extreme altitude, and the human body literally begins to die. It's a big struggle for most people to get up to the summit and there's an even bigger struggle to make sure they*

get down safely and alive". In high-stake situations, as expressed by one interviewee, "*getting down safe and sound become the utmost priority*" and, in that process, "*of course, some waste or stuff is left behind, as they become secondary*". "*That's always going to be a problem with this very high-altitude mountain*", said one government official.

Extreme meteorological events such as strong winds accompanied by snowstorms, or mountaineering events such as avalanches, are very common on higher mountains. Climbers are highly exposed to these events and must accept them and bear their costs. However, climbers should *"do their best"* to avoid equipment becoming waste on the mountain, especially today where "*technological advances and weather forecasts provide helpful information on incoming storms or snowfalls*", said a government official. Mt Everest has encountered two recent major disasters - the 2014 avalanche and the 2015 earthquake. Because of these events, most tents and equipment were left behind.

5.3   Interviewees' Views about the GDS

Stakeholders were asked about their understanding, awareness and perceptions of the performance of the GDS. Most of those interviewed were well aware of the GDS and had mixed perceptions of its performance. Opinion on the GDS is divided. First, except for two, all appreciated the existence of the GDS and highlighted the fact that, unlike other large mountains, Mt Everest has a system that is legislated. As said by one stakeholder, "*Whether it's working or not, it's a different story, but we got to feel good for at least having a rule that's put in place to stop the waste issue on Everest*". The interviewees also acknowledged that the system was built with 'very good intentions', 'with a very clear idea' to combat the growing issue of waste on the mountain.

However, interviewees also criticized the GDS and highlighted major issues with it that are outlined in Section 5.5. Most issues connected with the GDS mentioned by the interviewees were associated with the 'titular nature' of the waste management plan, followed by inefficiency manifested by the stakeholders and non-compliance by climbers and operators. The overall responses obtained on the issue of performance were coded on the basis of the strengths and weaknesses of the GDS. The following table summarizes aspects of the GDS's strength and weakness, followed by an explanation on each of the listed sub-aspect (Table 4)

Table 4. Stakeholders' perceived views on strengths and weaknesses of performance of the Garbage Deposit Scheme.

Themes	Sub-Themes
Strengths of the GDS	Binding factor to keep mountaineers responsible
	Public awareness
	Motivation for clean-up initiative
Weaknesses of the GDS	Lack of competent decision-makers
	Inconsistency with 8 kg
	Organizational inefficiency
	Lack of efficient stakeholder/accountability
	Lack of funding
	Loopholes in mountaineering rules

5.4 Strengths of the Garbage Deposit Scheme

Most stakeholders began by saying, "*GDS is a good system*". According to the interviewees, the major strengths of the GDS include: raising public awareness, binding factors to keep mountaineers responsible, and motivation for clean-up initiatives.

5.4.1 Binding factor to keep mountaineers responsible

Stakeholders responded to the GDS as a 'positive action' because it forces climbers to bring back their waste because the deposit is refundable and because it's within the mountaineering rules, climbers are more aware of it. Since one prerequisite for getting a climbing permit is the GDS deposit of U.S.$4,000, there is a binding factor that keeps climbers and operators responsible for the waste they generate. One stakeholder claimed, "*If there was no system like that, then there would be more chances of climbers just being more carefree and leaving their waste behind. It's one way of making trekking operators more responsible. I don't see any negative*".

5.4.2 Climber awareness

Seven stakeholders, including mountaineers, expedition operators and government officials, mentioned raising public and climbers' awareness about protection of the mountain as one strength of the GDS. All expedition members are required to attend the 'government briefing' before their departure where important issues on safety on the mountain and the GDS are discussed. Such discussion, as per one climber, allows: "*climbers to understand the existing system such as GDS since it is an administrative task that is entirely handled by operators*".

A Mexican climber emphasized 'public awareness' throughout his response:

I have attended government briefing that has made me aware of system such as GDS. Normally, when I talk to other foreign climbers, they have no idea about GDS but now with the briefing, they are getting familiarized with the existing garbage policy.

5.4.3 Motivation for the clean-up initiative

The behaviour of climbers, guides and operators towards cleanliness at Mt Everest depends highly on personal, ethical and moral values, especially of the expedition leaders. Some nations and a handful of climbers have been known for maintaining the historical practices of deliberately abandoning waste and equipment on the mountain. Other nations and most climbers have evolved and incorporate environmental concerns in their mountaineering practices through the clean-up initiative.

All the climber and operator interviews identified several 'cleaning efforts' as part of their own expedition's programme. In addition to the GDS, they perceived a clean-up effort as 'beneficial' and 'necessary'. Especially because "*In the early days of mountaineering environmental concerns were non-existent*", but over the last few years, "*Waste has been accumulating and should be cleaned up*".

One local operator has been running a cleaning programme, named 'cash for trash', in which the operator invites expedition members and local guides to take as much as they can and rewards them with $1 per kilo of waste. "*Through this way, we're using people and resources that are already present*", and "*we follow the - leave no trace - concept, which includes not leaving any human waste behind. Human waste is one of the most hazardous things on the mountain*", said a Nepali climber.

Climbers and operators unanimously applauded the various cleaning efforts that are being done at the mountain. "*A clean-up effort is highly welcome*", said one operator. However, few interviewees mentioned the inconsistency of cleaning efforts. From time to time, international cleaning expeditions come to the mountain for a season, but "*there is a lack of continuity*"; they have recommended "*a year in, year out*", more sustainable approach. There were several other questions raised regarding clean-up efforts such as 'Who is going to do it?' 'Who has the energy?' 'Who would finance it?'. Most stakeholders pointed to weaknesses in the scheme's implementation citing lack of stakeholder accountability, funding, organizational inefficiency, and a lack of competent decision-makers and experts.

5.4.4 A lack of competent experts/decision-makers

"*The regulation around mountaineering which involves waste management and GDS, really in an ideal world would be managed by experts,*" said one interviewee, highlighting the paucity of experts and

technocrats at the decision-making table. Another interviewee responded that the ministers or officials representing the tourism department are often not the ones who have experience or knowledge regarding mountaineering-related subjects and don't have any background related to mountaineering. Not having an experts or competent decision makers at the department has led to the "*failure of GDS as there hasn't been any monitoring over the past years*" as mentioned by a local operator. Furthermore, the focus of tourism department is on 'economic development', hence, "*the last few updates on mountaineering in Nepal, has only been on amending rules regarding the climbing rather than policies such as GDS*" said a North American climber referring to incompetency in experts and decision-makers in the tourism department that has the responsibility to promote mountain of Nepal along with its environmental protection.

5.4.5 Inconsistency with 8 kg

The 8 kg of waste quantity was added to the GDS after SPCC recommended it to the Nepal government. As per the SPCC, "*we proposed a government to add this new policy of bringing back 8 kg of waste since 2014. We forced to add this rule, because even if we allocate 8 kg of waste, small volume of waste will at least come down*". Furthermore, according to them, "*8 kg is what we roughly estimated but it's not necessary that 8 kg of waste is produced by climbers. It's very hard for us to predict how many days one climber spends in each camp, we decided to go with 8 kg looking into the average number*".

The confusion around the rough estimation of 8kg had been further expressed by other climbers:

> *The average estimation for the entire expedition would be around at least 30 kg. In high camps a climber produces around 3 kg per climber, and rest would be on base camps and other camps such as 1, 2, and 3 where they normally produce more as they stay there a bit longer.* [Climber 1]

> *Without talking about human waste, it's sort of hard to say, but I would say around 15 kg.* [Climber 2]

> *The SPCC ask you to take down what you brought up, so obviously depend upon the expedition size, number of years, it can be very different. But I would say, if we are lucky maybe half of it is brought down.* [Climber 3]

5.4.6 Organizational inefficiency

There is organizational conflict in the Khumbu region according to the interviewees. Ever since the 2015 general election, there has been a local government – the Pasang Lhamu Municipality. The entire

Khumbu region is situated inside a national park which is overseen by the Department of National Parks (DNPWC) with a Buffer Zone Committee. Most big peaks such as Mt Everest (8848.80 m) and Mt Ama Dablam (6812 m) are overseen by the Ministry of Tourism and Civil Aviation (MOCTCA); small peaks (< 6000 m) are overseen by the Nepal Mountaineering Association (NMA), an entirely separate body.

The deposit for the smaller peaks is taken by the NMA but for the big mountains, such as Mt Everest, it is taken by MOCTCA. The National Park and Buffer Zone have different entry fees and the local municipality also has an entry fee. MOCTCA and NMA have been working with SPCC to implement GDS. Apart from these three, collaboration among these organizations is described as "non-existent". One local stakeholder said: "*While working, there's always a conflict in terms of who's responsibility is what, who's more authoritative figure and as a result of this, there's no balance among these institutions, which I think is very challenging while working on issues like waste management in mountains and implementing GDS successfully*". As expressed by a local based operator, "*as an operator, we sometimes feel confused as to whom to listen and carry forward our concerns when it comes to complying with GDS or making suggestions as organizational capacities surrounding GDS and Mt Everest is all messed up*".

So, there are few organizations involved and they are not "*very well-coordinated*". The interviewees highlighted the need for all these organizations to be equally responsible for the waste issue and the proper implementation of the GDS, citing that "*all organizations should be a part of stakeholders having a responsibility*". Interviewees also expressed that since the garbage deposit for Mt Everest is taken by MOCTCA, it should take the responsibility for proper functioning of GDS and, with Mt Everest being inside the national park, DNPWC also should come on board with the GDS responsibility.

5.4.7   A lack of stakeholder accountability

As mentioned in Chapter 2, the GDS requires each climbing team to have a government employee as a liaison officer. The liaison officer, appointed by MOCTCA, has a major responsibility to ensure the GDS is well implemented (see Section 2.5.1). The liaison officers are also responsible for ensuring the expedition members handle themselves properly, which means 'don't leave waste behind'.

There was widespread criticism from most interviewees that designated liaison officers often "*do not even leave Kathmandu*" and "*there is no one to regulate expedition teams on the mountain*". Interviewees further added: "*And even when the liaison officers rarely went to the field, they were accountable to expedition teams only and not to the GDS system*". This comment was made in reference to the negotiations that occur between expedition teams and liaison officers where, according to climbers:

The whole system is wrong because the government should say this is the fee of liaison officer and you give them this amount. So, there's no negotiation. But what happens is that a company can just say that we will give you this amount of money, just don't cause us any trouble, then liaison officers will be more than happy to serve the company. So, the system is made so that it's flexible.

Liaison officers have also been criticized for their "i*ncompetency*", and "*lack of necessary skills*" to do the designated task. According to operators and climbers, liaison officers are, "i*nexperienced, and especially very new to the alpine environment. Therefore, they hardly visit the campsites and supervise the campsites*".

5.4.8   A lack of rules and regulations

Several interviewees mentioned the loopholes in the mountaineering regulations as one reason for the increasing waste issue. The loopholes in the mountaineering regulations can be attributed to both the waste management rules, such as the GDS, and rules related to climbing permits. One interviewee responded: "*Every year since 2013, something goes wrong, and they (*the Nepal government*) announce all these new rules and never implement them*". This comment was made in reference to the new climbing permit rules that the Nepal government proposed in 2019:

· Climbers must submit proof of having scaled at least one 6,500 m peak in Nepal

· Climbers must produce a certificate of good health.

· Guides must have at least three years of experience organizing high-altitude climbs.

Furthermore, the regulations around mountaineering involve waste management, as an interviewee stated: "*In an ideal world would be managed by experts*". "*The lack of expert knowledge*" in advising on proper waste management rules to the government has contributed to the "*existing waste issue on Mt Everest*", claimed one mountaineer.

5.4.9   Lack of funding

SPCC, in addition to mountaineers, has responded to geographical challenges that demand huge financial resources to build infrastructure, collection and transport, as well as human resources to work in difficult conditions. SPCC, the implementing local partner of the GDS, was described by many interviewees as being: 'Under-staffed, under-resourced and under-funded' to be able to allocate enough projects and programmes to ensure proper implementation of the GDS, such as employing more staff for garbage supervision at camp sites.

5.5 Stakeholders' Perceptions of the Future of the Garbage Deposit Scheme

Respondents were asked about their ideas on how to ensure the future of the GDS. Responses were coded and analysed under two headings as shown in Table 5.

Table 5. Themes mentioned by stakeholders about the future of the Garbage Deposit Scheme

Themes	Sub-Themes
Cancellation of refundable deposit	Separate fund for government to invest in the GDS operations
	Long-term fund for local bodies such as SPCC
Local leadership	Willingness of local leadership for the long run of the project
	Use of local human resource – liaison officer
	Willingness of local mountaineers to participate in effective implementation of the GDS

Most stakeholders considered that cancellation of the refundable deposits, i.e., making them non-refundable, could help ensure the future of the GDS. Other stakeholders pinpointed the issue of local responsibility and making the use of local human resources to ensure the future of the GDS. As a probing question, stakeholders were asked why the 'cancellation of the refundable deposit' was the best option to ensure the longevity of the GDS. Of interviewed stakeholders, 11 suggested making the GDS non-refundable. Some responses by stakeholders in support of that suggestion include:

> *The better way could be to collect a garbage fee, which the government can charge per head, that I can also, as an agency, can put into my clients, charge to my clients for that, it's a garbage fee.* [Person 1]

> *If the government has that garbage deposit fee, then they can do their own cleaning campaigns/expeditions, they do not have to rely on others like myself for doing these cleaning programmes on the mountain. The government can also use that money to do the monitoring of the expeditions.* [Person 2]

Conversely, most GDS officials and a few local people argued that strengthening 'Local responsibility and leadership' is the key for the future of the GDS and the mountain overall. According to them, the willingness to sustain long-term local leadership and local people's volunteer participation is crucially important to continue the GDS in Khumbu. Some responses pinpointing this point are:

In our country, we cannot expect anything from the government side, they generally don't start any sort of work, if started is never continued. Thus, collecting a non-refundable garbage deposit by a local-based organization such as SPCC is the best option, as it empowers them, it gives self-determination into the hands of the locals, so it's by the locals for the locals especially with the local government (gaupalika) now. [Person 1]

Waste management is very much a local issue, people living and staying in Kathmandu don't really care about the waste that is being generated in Khumbu, Taplejung, or some remote corners of the mountain. Local people have a vested interest to keep their environment clean, so I think more power and more authority have to be given to local people, secondly, a bigger percentage of the revenue that is generated through permits has to go to the local government bodies. [Person 2]

Instead of having liaison officers appointed by the bureaucrats back in Kathmandu, it should be climbing Sherpas and it could be their second job, the second career maybe after 15 or 20 years of climbing, these people would be perfect for the job because they would both understand the issues areas around mountain and climbing, and they can go up to the mountain not just stay in the Base Camp but also up in the higher camps. The liaison officer even if they accompany the expedition group up to the Waste, that's where they stop, they have no idea what happens up above the Base Camp in camps 1, 2, 3, 4. So, I would say that the system could be very effective and it can also offer a developed kind of plan for mountaineers, guides to keep working within this system. Those people are also local they also have another incentive to actually take it seriously. [Person 3]

5.6 Garbage Deposit Scheme Criteria Analysis

This section reports the analysis of the GDS as described in the preceding section, based on the criteria outlined in Chapter 4. The analysis is structured according to the criteria and the GDS is discussed concurrently.

5.6.1 Effectiveness

The primary focus in assessing effectiveness remains on establishing whether the GDS has achieved its intended results at different levels of the results chain (usually outputs and outcomes but, in some cases, also impacts). The GDS was established with the sole reason to combat waste accumulation on Mt Everest by establishing garbage deposit of U.S. $4,000 for each expedition. The goal was to create an incentive for expeditions to retrieve their own waste (8 kg per expedition). Although few expedition groups comply with the GDS rule, the process of monitoring the system is not transparent. This has

been further complicated by stakeholders not being accountable for their responsibilities such as the lack of cooperation from liaison officers and the presence of corruption that takes place openly between liaison officers and operators to get the refund.

In addition to the GDS, climbers and operators have been organizing their personally-led cleaning campaigns and programmes (e.g., cash for trash as mentioned in section 5.3.1.3). Though it is unclear whether this has been motivated by the GDS, few climbers have suggested the concept of the GDS to be an influencing agent in initiating their own clean-up programmes.

The GDS was designed in the 1990s and has never been reviewed or revised. The system was praised in its initial concept, however, over the years, the importance of the GDS has been lessened because of factors such as: "*it only accounted for waste in the Base Camp and ignored the increasing waste in the other camps*" as commented on by several interviewees. Furthermore, poor morale and incentives among government employees to perform their duties have also negatively impacted the effectiveness of the GDS. This could be attributed to the fact that their financial compensation is relatively low compared with their counterparts in the private sector.

Though the GDS was praised and the 'intention' behind its establishment was appreciated, the intended objectives of GDS have not been achieved, citing factors as mentioned above that have obstructed its proper functioning. Hence, the GDS is ineffective.

5.6.2   Acceptability

Views about whether the GDS can and does mitigate the waste issues on Mt Everest vary across stakeholders and their behavioural domain. Acceptability also varies with background of the respondents. Those engaged in mountaineering activities were less supportive of the GDS than others, and more likely to endorse other measures for waste management. The first part of assessing acceptability was to identify relevant stakeholders as presented in Chapter 2. Most stakeholders accept the 'intention' behind the establishment of the GDS. Since the GDS is under the legislation as a 'Mountaineering Rule' and is an integral part of the 'Mountaineering Permit' that is needed to scale mountain in Nepal, operators and mountaineers accept and respond to the GDS by fulfilling the administration related work of depositing the allocated amount.

However, the process around the acceptance and implementation of the GDS is limited to fulfilling only the pre-requisite legal paper work that is required to get a climbing permit. Acceptance of the GDS, however, is not translated into the behaviour of climbers and mountaineers. Furthermore, stakeholders with mountaineering backgrounds and affiliations are less supportive of the system; the common response on the performance of the GDS was that it "*yields no effective results to meet the objectives of GDS*". Stakeholders involved in mountaineering unanimously used words such as

'unacceptable', and 'ineffective' to describe the GDS. Stakeholders involved in collecting the deposit, such as the NMA, were hesitant about accepting the GDS as an effective system and recommended cancellation of the refundable deposit system.

While accessing political acceptability of the GDS via the Government's commitment to combating the issue of the GDS, factors such as:

· the designation of an incompetent authority – liaison officers;

· a lack of financial support; and

· a lack of technical equipment, services, and material support,

mentioned above, collated through data collection and review of grey literature testifies to the low level of political acceptability. Though public acknowledgment by ministries of the importance of the waste issue on Mt Everest and efforts to strengthen the GDS are high, there is less political 'trust in' and 'acceptability of' the government's support to address the issue of waste on Mt Everest. There are higher expectations of the government acting strictly on the issues surrounding mountain safety and environmental preservation, but no effective trust in its actions because the government's focus has always been on the issues concerning 'climbing' and 'increasing climbing permits' rather than environmental preservation of the mountains.

5.6.3   Feasibility

5.6.3.1 Social and cultural feasibility

Waste in the Everest region is not only a physical matter generated via mountaineering (Manfredi et al., 2010), but is equally a social construct created within a broader cultural context and with stakeholders with varied socio-cultural images, associations and perceptions of waste. The waste issue in the mountains is often reduced "*to a lack of awareness (i.e., ignorance) of climbers, operators and local guides*" as expressed by one interviewee. The majority of interviewees agreed that low environmental awareness or knowledge of mountaineers, guides and porters often translates into their behaviour associated with waste in the mountains and on the trails. The low environmental awareness of expedition operators and their behaviour have been identified through instances "*where a handful of tents are left behind, with the logo of the company cut out neatly to avoid public shame*". There is also a 'culture shift' where Sherpa climbers from outside the Khumbu area have been caught throwing waste on the mountain since they have an extremely low 'sense of ownership', unlike Sherpa climbers from the Khumbu area.

The increasing number of expeditions has also brought a new culture of trashing. One stakeholder said: "*I think most of the new companies have guides that are new, and untrained who are just not conscious and don't really bother to give a thought about their actions. They're just trashing away, and I have*

seen them doing that". Another interviewee raised questions about the attitude of local guides when it comes to keeping mountains clean, citing their behaviour of trashing their garbage

5.6.3.2. *Technical feasibility*

Most interviewees identified the challenging geography of Khumbu as one contributor to the waste issue on Mt Everest, because the remoteness of Khumbu and its difficult topography often poses challenges to the cleaning or the building of GDS infrastructure for waste management. The Everest Base Camp, situated at an elevation of 5,545 m above sea level and a few other camps at higher elevations render major challenges to existing organizations such as SPCC to conduct cleaning programmes and for MOCTCA to supervise campsites. One interviewee responded to the challenging topography by stating: "*I have realized that its topography and remoteness have challenged us a lot. It has caused us major challenges in building waste management infrastructure…. ".* The accumulation of waste at higher camps: 2 and 3 and South Col as stated by climbers who said: "*Piles of waste under the rocks or crevasses have been solidified over the years*", as GDS still relies on human resources to carry them down when they are left behind by the mountaineers. As explained by them: "*For example, in the case of Everest, in camp 2, camp 3 and south col, in terms of accessibility, it's really hard and working in such areas almost becomes impossible due to the high altitude, severe climatic conditions, and dangerous nature.*"

The nature of mountaineering on Mt Everest entails great danger because the place is remote and is characterized by frequent, unpredictable extreme weather. Within the same difficulties lies the operation of the GDS so, often, the challenging location of Everest can be a huge barrier to the effective implementation of the GDS. Furthermore, the locally-based SPCC has a temporary office both in the Base Camp and camp 2 to patrol nearby campsites, but the challenging weather can obstruct the SPCC's programmes.

5.6.3.3. *Administrative feasibility*

The implementation of the GDS has been frequently disrupted by the "*lack of funding allocated to the stakeholder*" based on the mountain to carry out the programme efficiently. The lack of appropriate funding for environmental protection activities, monitoring and deterrence, despite external donations, has obstructed the implementation of the GDS operation. Also, "*the donation being received from few organizations have been very scarce and not provided regularly*".

In addition, organizations such as SPCC that are in the mountains "*lack competent, skilled human resources that can alleviate the programmes of the organizations, especially from the traditional method of running programmes and cleaning operations in the mountains*". Government representatives, such as liaison officers, are not qualified for the task they have been allocated.

5.6.4   Efficiency

The GDS mandates that every expedition group deposits U.S. $4,000 per expedition. However, the processes to get a refund are in stages that are "*not very transparent*". Examples mentioned by interviewees are: "*the garbage clearance form that is quietly signed by liaison officers*", and "*corruption between liaison officers and operators*".

From the interviewees, there are no associated economic benefits from the GDS, because the money is returned with 'no gains or losses' for the government or stakeholders. If the money is not returned because of a failure to retrieve mandated garbage, the money is kept in the government accounts to be used for mountaineering purposes. However, there's no transparency as no clear record of money usage has been shown or released by the government. SPCC, with major responsibilities to supervise the GDS operation in the mountains, always lacks resources and does not benefit from the GDS as the deposit is often returned to the expedition

A 'disturbing pattern' over the past several years with mountaineering in Nepal, as related by several interviewees, has been the surge in 'inexperienced' clients with 'unqualified' guides. The extensive commercialization of Mt Everest expeditions has led to many, new, irresponsible companies, running expeditions with a cost-cutting mechanism[21]. The biggest problem, according to interviewees about Mt Everest in general, is that local companies are taking 'inexperienced people', 'incompetent people' and 'pulling them up the mountain' at a low cost. It is a 'sensitive issue', said one interviewee, because the lucrative climbing industry in Nepal has long been dominated by Western guides and "*only in the past decade or so have Nepali-owned companies begun to make significant inroads*", largely by charging far less than their foreign counterparts and hence a low budget for employing staff to overlook the waste management of their expedition.

5.6.5   Sustainability

Sustainability – or the likelihood that results will persist beyond the life of the GDS – is a principle of good policy practice and a standard criterion used in evaluation. With deep-seated governance challenges, there isn't much hope for the GDS to be financially, socially and environmentally sustainable in the long run.

The degree to which the GDS is sustainable depends very strongly on social and cultural factors that are often not directly visible. Studying stakeholders GDS perceptions have provided insight into the

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[21] Cost-cutting refers to measures implemented by a company to reduce its expenses and improve profitability. Cost-cutting measures are typically implemented during times of financial distress for a company or during economic downturns. They can also be enacted if a company's management expects profitability issues in the future, where cost-cutting can then become part of the business strategy.

social dimension of sustainability that GDS is perceived well by stakeholders. However, they have generated concern on its low efficacy. The institutional capacity of the GDS that has been so far led by locals, have been recognized. Nonetheless, the local institutional capacity (i.e., SPCC) has suffered from a paucity of resources, both technical and human, for GDS operations on the mountain. This has also impacted financial sustainability to continue and maintain the smooth operation of GDS in future because there is no guarantee that GDS activities can continue.

The GDS's impact on the environment because of non-compliance has escalated into the mountain being covered with rubbish. Though short-term effects are usually envisaged, prevented or mitigated through clean-up campaigns, it is especially important to incorporate long-term environmental effects in the GDS, as the growing waste on the Mt Everest can have harmful consequences.

Sustainability is very challenging in a difficult operating environment such as Mt Everest. The GDS experienced interruptions to its implementation. The disasters in 2014[22] and 2015[23] caused massive waste accumulation on Mt Everest as climbers and expeditions had to flee leaving their equipment behind. Furthermore, cleaning expeditions that have resulted from the GDS are not consistent because they are organized without any transparent strategy.

5.7   Summary

The interview results and the analysis of the GDS against IEM criteria highlight the ineffective, low efficacy and difficulties among the administrative, social and technical feasibility, and sustainability of the GDS. Despite few strengths, the list of weaknesses outweigh the strength of GDS. In addition to the challenging weather pattern, the GDS has met several challenges to its smooth operation and management, such as a lack of funding, organizational inefficiency and low stakeholder accountability. The next chapter discusses the meaning, importance and relevance of these results. Recommendations are then given to improve the GDS.

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[22] In 2014, disaster struck Mt Everest. A major avalanche in which 16 Nepalese guides died occurred on April 18, 2014. The collapse of seracs (ridges of ice) on Mount Everest's western spur triggered the disaster.
[23] The deadliest disaster on Mt Everest happened on April 25, 2015. A powerful earthquake struck Nepal in the afternoon and that triggered an avalanche.

Chapter 6

Discussion and Conclusions

6.1 Introduction

This chapter briefly revisits the research problem and provides a broad overview of the study. The chapter then considers the study's findings, showing their relationships with the literature and the research objectives. Specifically, the chapter outlines the implications of findings to answer: How well does the GDS achieve its stated objectives, and how well does the GDS contribute to resolution of waste issue on Mt Everest? The chapter also outlines potential options for GDS improvement and finally reports on the study's limitations.

6.2 Research Problem and Overview of the Study

Interest in climbing Mt Everest, both in terms of participation and spectatorship (through consumption in the mass media), with each apparently fuelling the other, has increased tremendously over the last few decades (Apollo, 2021; Musa et al., 2015). Recently, discussion themes in the literature have evolved from conversation on what motivates such a daring pursuit to the environmental impact of mountaineering (Apollo & Andreychouk, 2020). Literature on the environmental issues on Mt Everest (see Chapter 2) drew attention to the persistence of problem and policy approaches such as the GDS and its implementation (Byers et al., 2020; Kelliher, 2014). Though the GDS has been in place for the last three decades, there have been no studies evaluating its effectiveness. Most informants' perceptions of the GDS were limited to the intention behind the establishment of the GDS; they repeatedly raised questions about its efficacy.

Accordingly, I applied an Integrated Environmental Management (IEM) approach to develop criteria for GDS evaluation that would consider the overall performance and the cumulative impacts of the GDS in the area. I used input from semi-structured interviews of 15 key informants. The semi-structured interviews were designed to obtain perceptions of the GDS, its impacts and the existing condition of the scheme; further informal interviews collected broader information from heterogeneous informants.

Concern about the GDS's effectiveness raised in the literature (Apollo & Andreychouk, 2020; Bishop & Naumann, 1996; Brändlin, 2014, March 19; Byers, 2008; Byers et al., 2020; Ives, 2013; Windridge, 2019, May 20) documented in chapter 2 reinforces the empirical data collected in this study emphasizing the need to evaluate the effectiveness of the GDS.

Stakeholders' perceptions of the GDS identified important implications for future planning and the management of the GDS and waste on Mt Everest. The findings indicate a high degree of heterogeneity in informants' responses regarding the GDS. Qualitative analysis revealed that several sociodemographic characteristics and professional affiliations were influential in determining stakeholders' responses. For instance, key informants from the Khumbu area, and informants with extensive experience of mountaineering such as climbing guides, expedition operators and climbers, made critical comments regarding the performance and impact of the GDS, whereas informants from outside Khumbu and with a low level of mountaineering experience, responded with basic GDS information such as how it operates and who's involved in the implementation.

The findings gathered about the GDS reflect the concerns of all stakeholders involved in mountaineering as reported in Chapter 5. At its foundation level, the GDS is a waste management scheme, but its smooth operation relies on factors that are more than just filling in paper work and submitting the garbage deposit. As outlined by Semernya (2017), there are environmental, cultural and economic challenges to the waste issue on Mt Everest. The GDS findings in this study have reinforced the challenges and concerns expressed in the literature (Apollo, 2021; Byers, 2008; Byers et al., 2020).

Hence, the following section provides insights into the GDS's characteristics and discusses how well the GDS achieves its stated objectives, and how well it contributes to resolution of the waste issue on Mt Everest.

6.3 Evaluation of the Garbage Deposit Scheme

The results suggest that the GDS has not delivered the expected outcome for waste management on Mt Everest. Barriers that contribute to the failure of the GDS have appeared in the literature including the technical competency of policy makers, stakeholder non-compliance, organizational inefficiency and loopholes in mountaineering rules (Apollo, 2016, 2021; Bishop & Naumann, 1996; Byers, 2008; Byers et al., 2020). Barriers identified in this study include resource and funding constraints.

The study's findings highlight the challenges associated with the GDS's transition from a high-level aspiration to actual management and implementation. Though many have praised the rationality of the GDS, implementation has proved a significant challenge. As criticized by Byers et al. (2020), Huey et al. (2020) and Nepal and Mu (2015) most interviewed stakeholders were concerned about the management and implementation of the GDS. The following section provides an in-depth evaluation of the GDS's characteristics in terms of three issues: 1. Goal and objectives; 2. Management; and 3. Implementation.

6.3.1   Goal and objectives

With development of the GDS, it was the government's environmental aim to develop and operate a waste management system on Mt Everest. As one government representative emphasized, the goal and objective was "t*o implement a waste management system, to ensure that our environmental performance is regularly reviewed and publicised and to demonstrate our commitment to continual environmental improvement in our Himalayas".* This study has revealed that the GDS was the result of an 'incomplete contextual understanding of waste problems on Everest', predominantly contributed to by two factors: a lack of research into the problem context; and incomplete or low levels of understanding of the anticipated impacts of the policy. For instance, the rule requiring 8kg of waste needing to be brought back was not based on any empirical assessment, but rather on a rough estimate (see section 5.5.2). This finding agrees with Tiwari et al. (2021) who claimed a 'lack of initial contextual research' and 'poor credibility of information' are barriers to effective policymaking in Nepal.

The study indicates that the goal and objectives of the GDS were not 'revised', 'updated' or 'publicized' among the mountaineering fraternity. It is essential to have the GDS revised because, as Fairclough (2013) commented, revising the goals of environmental policy is beneficial in identifying the activities that need closer attention to minimise damage to the environment, continually to improve environmental performance and positively enhance the environment. Devkota (2005) discovered that environmental management in Nepal lacks policy revision, reinforcing this study's findings. Bacchi (2009) added that an environmental policy must be a working document, able to be reviewed and amended as the system evolves and circumstances change.

As defined in the IEM literature (see Chapter 3), policy needs to be 'Inclusive', incorporating the scope, scale and context of the issue covered. Informants, for example, commented that the GDS covers only Base Camp and ignores higher camps where expeditions spend a few days. As a repercussion, while waste management at Base Camp is improving, higher camps have been suffering from piles of waste left behind. The policy makers have also been criticized for failing to consider or take account of frequent disasters and unpredictable weather conditions that affect implementation of the GDS. As mentioned by multiple informants and documented in the literature (Apollo, 2016, 2017, 2021; Aridi, 2020, November 20; Tiwari et al., 2021), challenging weather conditions in mountain areas need to be integrated into the policy to "*unpack the issues in the utility of weather and climate information for decision-making*" (Singh et al., 2018, p. 390) for effective policy formulation.

6.3.2   Management

Most informants touched on the issues of accountability, organizational inefficiency, and a lack of cooperation from all sectors; political will among local mountaineering sections is a requirement for

effective management of the GDS. Research in other developing countries has found barriers to effective waste management that resonate with the GDS: corruption; lack of consequences for non-compliance with the rules; poor governance; insufficient information on regulations; and a lack of clear targets in the strategic framework (Cetrulo et al., 2018; Dangi et al., 2017; Hing & Gunggut, 2012; Periathamby et al., 2009).

As mentioned by one climber, "*just attaching GDS with the mountaineering rules alone does not result in effective management*". Ongoing political will and support from the mountaineering fraternity is essential. At the highest level, political support for the GDS is crucial for setting the strategic direction, securing planning resources, championing environmental requirements with stakeholders, and enforcing effective management. However, political challenges can be monumental (Nyaupane et al., 2014); Nepal's historical problem of political instability and the government changing every few years (Nepal & Mu, 2015) have only obstructed the management of policies such as the GDS. This finding resonates with the Tiwari et al. (2021) study that emphasizes the underlying political instability over the last seven decades as a formidable barrier to effective policy management. It is even more so in the past three decades, paralleling the GDS's initiation in 1993; policy interventions such as the GDS have largely been ineffective in terms of delivering their intended outcome because of poor management.

A lack of cooperation among stakeholders associated with the GDS, especially between government and the mountaineering fraternity (climbers, expedition operators and guides) has contributed to the GDS's ineffectiveness. This is evident through informants' responses such as: "*I think Liaison officers are huge part of the problem in this whole process, because they are supposed to be the liaison between expedition and the government.*" As mentioned in Chapter 3, 'coordination among stakeholders is paramount for the proper operation of policy' (Boileau et al., 2019; Bührs, 2009; Margerum & Born, 2000; Margerum & Hooper, 2001). The lack of a government partnership in working with local stakeholders, especially through liaison officers' non-compliance in fulfilling their duties, represents the ineffective coordination by the Nepali government in implementing the GDS. Coulthard et al. (2019) listed 'corruption in Nepal's politics and government officials' as a major factor for failed policy in the country, reinforcing the finding that liaison officers, representing the government, have been found to be corrupt.

Furthermore, climbers, expedition operators, guides and the public sector (SNPBZ, NMA, MOCTCA), and community-based organizations like SPCC, are responsible for effective implementation of the GDS. As mentioned by the majority of informants, SPCC is the most active because it is a community-based organization established and run by the local Khumbu community. A study by Blanchard and Matthews (2006), for example, finds that a high degree of local ownership improves a community's

'collective efficacy' — the capacity to act together for mutual benefit, to solve problems, and to further local goals. According to the informants interviewed, SPCC, within its available resources, has continued to build initiatives such as expanding its temporary office to camp 2 for GDS operations and building infrastructure that fosters proper implementation of GDS and creates more awareness among climbers. However, SPCC has also been subject to several constraints: insufficient resources, funding and capacity. As per Devkota (2005), the GDS's implementation cannot be achieved "*without strong institutions with sufficient resources and capacity to carry it out*".

Since 2015, under the new federal system in Nepal, local level government - Khumbu Pasang Lhamu Rural Municipality - has the ultimate responsibility for waste management in the Khumbu region. This includes the effective implementation of the GDS. Though stakeholders are hopeful that the country's transition to a federal democratic republic through this new governance might aid in strengthening local policy such as the GDS on Mt Everest, local government is surrounded by challenges that will very likely persist and even intensify unless central government acts effectively through communication and coordination among the three tiers of government (local, provincial and federal) regarding the functional division of power and authorities to ensure full compliance by stakeholders such as liaison officers. Nepal's federal government decentralization strategy is not sufficient to implement and monitor the GDS for two reasons: first, the country has just been introduced to this new federal system and is 'still struggling to fully grasp the new model of governance' and, secondly, local government's priority has been more towards other issues such as fighting COVID-19, road expansion and tourism growth.

6.3.3   Implementation

Implementation of the GDS is of 'pivotal concern' (Manfredi et al., 2010) and its successful realisation relies on meeting key conditions – thus, and as informed by Limbu (2019), effective implementation of a policy such as the GDS is 'decidedly a complex endeavour'. All informants agree that effective, successful GDS implementation is imperative to solve the waste issue on Mt Everest, reinforcing the concern raised by Nyaupane (2015). As the implementation of the GDS is challenging, I conclude that two factors were responsible for the failure of GDS implementation.

First, the regulations around mountaineering that involve the GDS as stated by an informant, "*In an ideal world would be managed by experts*". "*The lack of expert knowledge*" in advising and enforcing proper waste management rules for the government has contributed to the "*existing waste issue on Mt Everest*", claimed a mountaineer. The country's available technical and management capacity is not enough to meet the implementation challenges of the GDS (SPCC, 2020). SPCC has been scrutinized for a lack of human resources for planning, implementation, management and supervision of the legal requirements. The Ministry of Tourism, which is responsible for implementation of the GDS, also lacks

relevant experts. Both Margerum and Born (1995) and Stephen (2005) emphasized the presence of expert knowledge to ensure 'effective implementation' and 'enforceability'.

Secondly, the implementation of the GDS has been hampered by the lack of inclusion of stakeholders in the decision-making table. IEM advocates the inclusion of the voices of concerned stakeholders, as Gent (2017, p. 7) outlines:

> *inclusive processes are important to give all segments of society access to government decision making in order to better reflect their needs and aspirations, both in policy making and in service delivery. ... inclusive processes increase awareness across the policy cycle and help to orient institutions in support of inclusive outcomes.*

This study revealed the exclusion of mountaineers, guides and operators from the decision-making table. As discovered by Limbu (2019, p. 78), "*in Nepali development process insurance of inclusion of concerned stakeholders are not appreciated*". This was reinforced by a mountaineer who commented:

> *As a climber, my only wish is for the country and government to take our opinions into major consideration as we have been in the mountains, and know what works and what not. We would definitely like to collaborate and share our expertise and experiences, but the problem is that we are never asked to be a part of the discussion.*

Such exclusion of concerned stakeholders as mentioned above has not only derailed the building of effective GDS implementation, but has escalated in also contributing to failure of the GDS.

6.4 Potential Reccommendations: Guidelines for Overcoming the Garbage Deposit Scheme's Challenges

One key objective of this study was to identify potential options to improve the management of waste on Mt Everest. On the basis of stakeholders' responses and in response to the GDS challenges identified in previous chapters, the following recommendations and guidelines for GDS implementation are proposed:

- Waste management on Mt Everest is very much a local issue. Local people have a vested interest in keeping their environment clean, therefore allocating more power and authority to local people might be beneficial. Local government has to acknowledge that it is elected to address everything that is needed by both the local population that has elected them and be able to tackle issues related to mountaineering and GDS implementation as the region known for Mt Everest is always going to have these problems. Local government has to acknowledge

responsibility for making plans and taking action to ensure that those two can coexist, where benefits are earned, but the side effects are handled.

- Liaison officers have been unanimously pinpointed as one problem in the failure of the GDS because of their incompetency and lack of experience, and corruption when working in the mountain environment. Instead of having liaison officers appointed by bureaucrats in Kathmandu, appointing experienced local Sherpa climbers could aid the effective functioning of the GDS. Sherpa climbers are suitable for this task. First, unlike current liaison officers, Sherpa climbers are experienced, can go up the mountain to higher camps and not just stay in Base Camp. Secondly, they would understand the issues concerning the mountain and climbing. Using local Sherpa climbers as liaison officers could be very effective and could offer a developed plan for mountaineers and guides to work within the system. Those people are local, hence have more understanding, ownership, and enthusiasm for keeping their mountain clean.

- Though few respondents acknowledged being invited to the discussion on initiating mountaineering rules, the invitation to such discussion was limited to only a few visits. Like in China, Nepal could benefit from integrating climbers and operators in the feedback loop when any waste management programmes on Mt Everest are initiated, mostly to give the Ministry information on whether the designed programme is practical and effective, and how it might be improved. A few operators expressed contentment with the way Chinese officials have handled the waste issue on their side by incorporating feedback and the experiences of operators and climbers. A renowned mountaineer said, "*I was part of the feedback loop in China when they implemented their new rules for garbage management. We have always been one of the first teams to get informed about, give them feedback on how it works, how it could be improved*". This could be done by choosing Nepal based operators or international expedition groups to test and pioneer new regulations.

- Finally, a better approach to waste management on the mountain could be to introduce 'a garbage fee' per party rather than the refundable deposit that the government can charge per head. This could have multiple benefits including providing a dedicated funding programme for a planned waste management programme. SPCC has been lauded for its efforts so far. However, it has also been under major scrutiny for lacking competent human resources and adequate funds to operate the GDS effectively at the higher camps. Strengthening SPCC's capacity to operate the GDS through a 'garbage fee' could aid infrastructure development, increase SPCC's staffing levels and help build its budget to run the waste management programme smoothly.

These options could be an avenue for future research and researchers to investigate. It was apparent during the data collection stage, just how cultural, social and local context can influence the determination of the success of the GDS. In addition to these potential options, there is space to reorient the focus of future research into understanding and investigating 'cultural shift' or 'local ownership' to examine how such constructs and relationships to the environment might help to better define waste management and approaches that might improve it on Mt Everest.

6.5   Limitations of the Study

Despite the success of the study, there are limitations in the research design. Because of limited research that specifically focuses on the GDS, there was a lack of parallel studies to inform and guide this study's design. As a result, the study analysis was limited to commenting primarily on the data collected in thesis without being able to validate or critique past research on the GDS.

Because of the limited time-frame and the capacity and nature of this research conducted during the COVID-19 pandemic, the sample was limited to 15 informants. Interviewing a larger number of climbers, operators and guides might have benefitted in defining and substantiating GDS behaviours and conceptions. The generalizability of the results is potentially also limited by the selection of relatively few stakeholders. Important stakeholders such as liaison officers did not participate in the interviews as they were hard to reach. Future studies could be strengthened by considering these factors and by expanding the method's scope through observations of operators' and mountaineers' behaviour on the mountain, visiting camp sites and incorporating all integral stakeholders.

6.6   Conclusion

The primary objectives of this study have been achieved in that I have defined the problem of waste on Mt Everest, evaluated the GDS through the application of IEM criteria and have proposed potential options for improvements to solve the identified problems. The method of semi-structured interviews of stakeholders directly impacted by the GDS has been highly beneficial in this study. The interview findings, aided by the literature review, collectively helped in evaluating the GDS and providing options for future consideration. This study has demonstrated IEM can deliver practical insights into waste management on Mt Everest and potentially improve the GDS's effectiveness.

The findings indicate that though the intention behind the establishment of the GDS has been appreciated, it has failed to deliver the intended result of combating the waste issue on the mountain. Though the GDS has helped spread awareness among mountaineers and created a binding factor for mountaineers to be held responsible and accountable, the weaknesses of the GDS outweighs the strengths. The failure of the GDS has been attributed to multiple factors such as lack of experts,

competent decisionmakers, organizational inefficiency, stakeholder accountability and funding constraints.

Waste on Mt Everest is a management issue; decision-makers should consult and consider involving experts and key stakeholders in the making changes to the GDS such as introducing a non-refundable garbage fee or employing local Sherpas as liaison officers for expedition teams, and ensuring the suggestions put forward by these stakeholders are properly adopted. Involving stakeholders in this way can enhance public and local support for the GDS programme and effectively reduce the possibility of conflict in its implementation.

The study also indicates the dire need to strengthen local capacity, such as SPCC, through empowering local government, local institutions and manpower to improve Mt Everest waste management since GDS is a local issue. Political instability, a major barrier to effective GDS management, needs to be amended through honest, committed political leadership to ensure political stability to adapt to GDS for strengthening waste management on Mt Everest.

The above conditions can gain traction to overcome all hurdles in the intricate management and implementation of the GDS. Crucially, monitoring and evaluation of the management and implementation will go a long way in ensuring its success.

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Appendix A

Garbage Clearance Certificate Letter

Sagarmatha Pollution Control Committee (SPCC)

Namche Bazar, Solukhumbu, Nepal, Tel: 038-540057, Fax: 038-540457
E-mail: info@spcc.org.np, web: www.spcc.org.np

The General Secretary
Nepal Mountaineering Association
P.O Box 1435, Manakamana Marga, Naxal, Kathmandu, Nepal.

Subjects: Garbage Clearance Certificate Letter (to be filled by SPCC)

This is to certify that the under-mentioned climbing team has handed over the following amount of disposable and non-disposable garbage to SPCC office. We recommend you to kindly refund the garbage deposit.

1. Climbing Team's details:
   1. Name of the Peak: _____ 2. Climbing Permit No.: _____
   3. Climbing Period from: _____ To _____
   4. Name of the team leader:
      a. Mr./Ms _____ b. Country: _____
   5. Total number of climbers including leaderM _____
   6. Name of Sardar/Guide _____ 7. Sardar/Guide NMA Reg. No: _____
   8. Total number of Nepalese staff: _____ 9. Total number of porter: _____
   10. Climbing year _____ Season: _____
   11. Name of trekking agency in Nepal: _____

2. Garbage Description:

S.N.	Garbage	Amount (Kg.)	Number (pcs.)	Remarks
1	Disposable, papers, food scraps etc.			a. Human waste and kitchen waste disposed at SPCC designated site.
2	Non-Disposable			b. All burnable and non-burnable garbage handed over to SPCC.
	a EPI Gas Cylinder			c. Other comments:
	b Tin/Can			
	c Bottles			
3	Battery			

Signature _____ Post: _____

Certified by _____ Date: _____

Stamp

CLIMBING REPORT (Appendix - 4, To be filled by group leader)

1. Peak Climbing Date _____ 2. Duration of Climbing (Days): _____
3. Result
   a. Successful (how many members): _____
   b. If unsuccessful why?: _____
4. Any unusual occurrence or accident: _____
5. Brief report on service of the Sirdar/Guide: _____
6. Any suggestions _____
7. Trekking route or trail _____
8. Correspondence/mailing address of Team Leader _____

Appendix B

Human Ethics Information

B.1   Research Information Sheet

A Critical Evaluation of the Garbage Deposit Scheme (GDS) in the Himalayas with a focus on Mt. Everest

Information Sheet for Interviewees

Researcher: Tsewang Nuru Sherpa
Supervisors: Dr. Geoff Kerr (Geoff.kerr@lincoln.ac.nz) and
Dr. Ken Hughey (ken.hughey@lincoln.ac.nz)

My name is Tsewang Nuru Sherpa. I am a master's student in the faculty of Environment, Society and Design (ESD) at Lincoln University, Christchurch, New Zealand. This research project is a work towards my thesis for the Master of Applied Science.

The aim of this study is to evaluate the Garbage Deposit Scheme (GDS) on Mt. Everest. The research also aims at identifying potential options for improving the management of waste in Everest.

If you choose to take part in this study, your involvement in this project will involve a semi-structured interview for about 60 minutes through Zoom/Skype/Phone with me. The questions will ask you to present your opinion on GDS on Mt. Everest. Your answers will contribute to the overall understanding of the issue and GDS. The interview will be audio-recorded. Please indicate on the consent form if you wish not to have your audio recorded.

Participation is voluntary and you have the right to withdraw at any stage until 20/09/21. You may ask for your raw data to be returned to you or destroyed at any point.

The results of the project may be published, but you are assured of the complete confidentiality of data gathered in this investigation. To ensure anonymity and confidentiality, consent forms and interview transcriptions will be kept separate and stored on password protected computer owned by me.

This project has been reviewed and approved by the Lincoln University Human Ethics Committee. If you have any queries or concerns about your participation in the project, please contact me or my supervisors; we would be happy to discuss any concerns you have about participation in the project.

Thank you for your time and participation.

B.2   Research Consent Form

A Critical Evaluation of the Garbage Deposit Scheme (GDS) in the Himalayas with a focus on Mt. Everest.

Consent Form for Interviewees

Researcher: Tsewang Nuru Sherpa
Supervisors: Dr. Geoff Kerr (Geoff.kerr@lincoln.ac.nz) and
Dr. Ken Hughey (ken.hughey@lincoln.ac.nz)

This consent form will be held for 5 years after the completion of study.

I understand that:

I have been given a full explanation of this project and have had the opportunity to ask questions. I understand that I can ask further questions at any time.

I understand to what is required of me if I agree to take part in the research. I have been given a copy of the Research Information Sheet and the Consent Form to keep.

I understand that I may withdraw from the project, including withdrawal of any information I have provided, up to 20/09/21.

By ticking below, I agree to participate in this research project.

☐ I consent to participate in the project.

☐ I consent to publication of the results (which may include my anonymized information).

☐ I consent to having an audio recording made of my interview.

☐ I do not consent to having an audio recording made of my interview but agree to notes being made.

Name: Date:

Email:

Please email the complete consent form to tsewang.sherpa@lincolnuni.ac.nz after the completion

B.3   HEC Approved Letter

Research Management Office
Lincoln University   **T** 64 3 423 0583
 PO Box 85084, Lincoln 7647   **E** ethics@lincoln.ac.nz
Christchurch, New Zealand   www.lincoln.ac.nz

HUMAN ETHICS COMMITTEE

Application:HEC2021-32   26 August 2021

Title: A Critical Evaluation of the Garbage Deposit Scheme (GDS) in the Himalayas with a focus on Mt. Everest

Applicant: Tsewang Nuru Sherpa

The Lincoln University Human Ethics Committee has reviewed the above noted application and are pleased to give final approval to your project.

Please note that this approval is valid for three years from today's date at which time you will need to reapply for approval.

Once your field work has finished can you please advise the Human Ethics Secretary, Angela Milner, and confirm that you have complied with the terms of the ethical approval.

May I, on behalf of the Committee, wish you success in your research.

Yours sincerely

Grant Tavinor

Chair, Human Ethics Committee

PLEASE NOTE: The Human Ethics Committee has an audit process in place for applications. Please see 7.3 of the Human Ethics Committee Operating Procedures (ACHE) in the Lincoln University Policies and Procedures Manual for more information.

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Appendix C

Interview Question Guide

1. **Introductory questions/Background information/Views about Waste Issue on Mt Everest**

   - Please give me a brief introduction about yourself and your experience with mountaineering on Mt Everest.
   - Please tell me about your involvement in the management of waste at base camp and high camps in the Everest region?
   - What do you think is the main problem behind the waste issue on Everest? Why do you think this is the main problem?
   - Have your personal views on waste and waste management on Mt Everest changed?

     - In what way have your views changed?
     - Please elaborate more on what made you change your views?

2. **Garbage Deposit Scheme/Management practices**

   - How familiar are you with the GDS? Please briefly describe how the GDS works?
   - Do you know which organizations are responsible for management of waste in Everest? Please name them.
   - How do you rate the performance of the current organizations responsible for management of waste in Everest?
   - What is your estimate of the average weight of waste a climber generates?
   - How effective do you think the GDS is? Please explain.
   - What kind of behavioural changes have you noticed in climbers and other stakeholders (such as SPCC or NTB) that are responsible for implementing GDS? Please explain what influences those behaviours?
   - Despite the GDS, waste materials are still accumulating. Why do you think is this happening?
   - What are some strengths and drawbacks of the GDS scheme? Please explain.

3. **Future Improvements**

   - How can participation of the mountaineering fraternity in improving the waste management in Everest be strengthened?
   - Do you think the existing organizational responsibilities should change? Please explain
   - Can the problem of waste on Everest be solved or controlled? How?

Is there anything else you would like to add about the management of waste in the Everest region that I've not touched upon?