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Lucia Buscemi March 24, 2023

Footprints on the Roof of the World: Navigating Anthropogenic Impacts in the Everest Region

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2023

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Abstract

Footprints on the Roof of the World: Navigating Anthropogenic Impacts in the Everest Region

By Lucia Buscemi

The Solukhumbu district of Nepal is a region in constant environmental, socioeconomic, and cultural transition. Communities that once mostly consisted of traders, farmers, and Buddhist monastics now primarily occupy new livelihoods— working as porters and guides on some of the world's highest mountain peaks, or running lodges and shops that cater to the massive influx of foreign tourists. Through engaging in the mountaineering industry in Khumbu, local communities, primarily those of Sherpa ethnic identity, have been able to quickly move up the socioeconomic ladder and therefore "transform and remake their own society at least partly in terms of their own agendas." However, despite bringing economic prosperity to the Mt. Everest region, the negative effects of mountaineering, such as the loss of porters' and guides' lives, are rapidly becoming embedded into the Khumbu Valley way of life.

The ecological impacts of mountain tourism in Khumbu have been especially prominent in recent decades, especially as globalization has led to an increase in the number of packaged, processed goods imported to the area. Additionally, climate change is posing a serious threat to these mountain communities- historical climate evidence in some regions of the eastern Himalayas has shown remarkable warming trends, and average annual precipitation is increasing. These climatic shifts increase the frequency of environmental threats such as avalanches, rock falls, flooding, and glacial crevasses. Rural mountain communities at high altitudes are also especially vulnerable to climate change because of their exposure to the early symptoms of global weather pattern shifts such as the melting ice cover; lack of access to contemporary healthcare, infrastructure, and education systems; and economic reliance on the fragile industries of mountain tourism and subsistence farming.

This thesis explores how an explosion in the number of tourists in the Everest region allowed Himalayan communities to gain greater economic autonomy, while also creating a niche market that limits job opportunities outside of adventure tourism. Additionally, I will discuss the past few decades of ecological decline of the Everest region brought about by climate change and poor waste management practices, and assess possible sustainable long-term solutions. I will also contextualize my research within discussions of Indigenous knowledge, environmental colonialism, political histories, and relationships between local people and foreigners. The primary research questions I address in my thesis are: "In what ways do the effects of foreign climbers and climate change on Mount Everest benefit and harm Himalayan communities?" And, "What possible solutions to the issue of tourism-generated garbage and climate change in Khumbu work well and are sustainable for the environment and Sherpa culture / economic autonomy?"

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I do not wish to patronize the residents of Khumbu Valley as being overly amicable because of their reliance on the tourism industry and the money that I brought in. However, I do believe that a level of hospitality was extended to me that was perhaps unusual or extraordinary, primarily because of my presence in Khumbu during the off-season / monsoon season as well as how long I stayed in the region. There was no reason for the household that I stayed with, nor their friends and family, to invite me into their lives in the ways that they did, but they still did.

Thank you to Dr. Bruce Knauft, Dr. Anna Grimshaw, and Dr. Robert Paul for your essential roles in supporting my Honors Thesis and for your invaluable guidance throughout the process. I am deeply grateful for your trust and faith in me, even when I could not make up my mind about changing my major or in continuing with my Thesis. I could not have made it to the finish line without your constant encouragement and confidence in my abilities.

I additionally do not want to convey throughout this paper that I am quantifying or ranking the knowledge from any of my interlocutors in any way. Each individual that I spoke to provided valuable and thoughtful perspective, and all of their viewpoints are independently and equally valid. As anthropological research consistently concludes, there is never one objective answer to how a culture is created, experienced, or perceived. In this paper, I am not attempting to generalize about the lived experiences of Khumbu Valley residents, and I hope that the variation in interlocutors' viewpoints and opinions effectively communicates this.

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Map of Khumbu Valley and Sagarmatha National Park and Border Zone[1]

[1] "RAOnline Nepal- Nepal Maps - National Parks - Sagarmatha National Park."

"It's all bullshit on Everest these days"- Sir Edmund Hillary (2006), one of the first two climbers to reach the summit of Mount Everest.

0.0: Residents of the Everest Region

On May 21st, 2017, at the peak of the spring climbing season, Dawa Sange Sherpa, a local guide, and Abdul Jabbar Bhatti, his client from Pakistan, were on their way to the summit of Mount Everest when things started to go wrong. Over the 18-hour ascent from Camp 4, they trudged through deadly weather where wind and snow froze their masks, goggles, water, and oxygen supply. Sange maintained contact with some of the older, more experienced mountain guides, who advised him to turn back. He relayed the message to Bhatti, but Bhatti refused to quit the summit push and justified his defiance with the large amount of money he was spending on the expedition. Conditions got so serious that the other Sherpa guides told Sange to turn back and save himself, leaving Bhatti who was still not cooperating. Sange, who understood the necessity of his presence in order for his client to stay alive, continued the ascent with Bhatti. They reached the summit of Everest at 3 pm, three hours after the cut-off time to summit as determined by expert alpinists. As Sange and Bhatti started their descent, the weather turned worse, and Sange, who had been saving his supplemental oxygen for the descent, gave his last bottle to Bhatti. Slightly below the summit, both climbers slipped into unconscious states and were fortunately rescued by guides from another expedition team. Sange and Bhatti were transported via helicopter to Kathmandu and received immediate medical attention for life-threatening injuries, but both survived.[2]

[2] "Sherpa Climber Recounts How They Got Second Lease of Life on Mt Everest."

This story is just one of many where foreign climbers risk the lives of local porters and guides in order to achieve their personal goal of proving themselves as superior human beings. The rapid commercialization of mountaineering in the Khumbu region began on May 29, 1953, when Tenzing Norgay Sherpa and Edmund Hillary became the first people to stand on the summit of Mount Everest— the tallest mountain peak in the world. Mount Everest, known as Chomolungma in Tibetan, and Sagarmatha in Nepali, has long been recognized as a symbol of supreme human achievement. The 1953 summit would not have been possible without revolutionary technology, superior athletic abilities, and, perhaps most importantly, the blessing of the Buddhist Goddess Miyolangsangma of Chomolungma. In recent years, however, the connotation of summiting Everest has changed drastically. With the Nepalese government charging $11,000 for climbing permits, and mountaineering tour agencies charging tens of thousands of dollars for trips including luxuries such as movie theaters at Base Camp, many believe the mountain has become an "easy" achievement only accessible to rich foreigners. The Mount Everest discourse has become centrally focused on Sherpas- while many use the term *Sherpa* to refer to people who work on the Nepali mountains, especially Everest, for clarity I will be using this term to refer to the ethnic group, language, caste, or last name. Other prominent ethnic groups that work as high-altitude porters and guides in the Everest region include the Rai, Tamang, Magar, and Gurung.

The term *Sherpa* is derived from the Tibetan word "shar-pa", which translates to "people from the East". Sherpa refers to an ethnic group that migrated from Tibet to northeastern Nepal about 450-600 years ago, and the term is additionally used as a surname, a word for the language

they speak, and it signifies their caste.[3] One of the main reasons that Sherpas have risen to popularity in the Nepalese mountaineering industry is that they possess unique genetic characteristics that allow them to better adapt to higher altitudes. These traits include a lower capacity for fatty acid oxidation in skeletal muscle biopsies, along with enhanced efficiency of oxygen utilization, improved muscle energetics, and protection against oxidative stress.[4] Sherpas primarily live in the Solukhumbu district of the Himalayas, one of seventy-five districts that make up Nepal. This district consists of the Solu, Pharak, and Khumbu sub-regions; it covers an area of 3,312 km and has a population of about 105,886 residents.[5] The Khumbu Valley region, more specifically, contains Sagarmatha National Park and its buffer zone, along with towns such as Namche Bazaar, Tengboche, Lobuche, and Pangboche.

Dr. Alexander Kellas is credited with being the first foreigner in the Himalayan explorations to recognize the superior abilities that Sherpas possessed, and he began working with them in the 1920s.[6] In 1953, when Tenzing Norgay Sherpa was the first to reach the summit of Everest, alongside Edmund Hillary, the Sherpa identity was exposed to the world. Thus began decades of the commodification of Sherpa bodies as vessels for foreign achievement, and the global infatuation with Sherpa culture.[7] As displayed by the countless research projects that have taken place in the Nepalese Himalayas over many decades, the pre-existing anthropological literature on Sherpa and Khumbu Valley culture is extensive. I will not construct my own theories

[3] Ortner, *Life and Death on Mt. Everest: Sherpas and Himalayan Mountaineering*.
[4] Horscroft et al., "Metabolic Basis to Sherpa Altitude Adaptation."
[5] Miller, "An Exploration of Sherpas' Narratives of Living and Dying in Mountaineering."
[6] West, *A.M. Kellas - Pioneer Himalayan, Physiologist and Mountaineer.*, 209.
[7] That sentence is meant to be somewhat ironic ('vessels').

on the Himalayan cultural landscape, rather I will analyze how the identity of these groups has changed and will continue to change as the environment around them rapidly shifts.

Throughout this paper, I frequently use the word *culture*, a term that is at the core of anthropological practice and theory. For many decades, anthropologists generally saw culture as equivalent to human behavior that was acquired by learning and then transmitted to another individual or group by mechanisms of social inheritance. However, Leslie White in "The Concept of Culture", argues that culture forms "When things and events dependent on symboling are considered and interpreted in an extrasomatic context".[8] The ethics of the study of culture have long been debated, as anthropological work tends to exoticize groups of people and classify them as some primitive and homogenous 'other'. It is not my intention to do this. I use the term *culture* to signify manifestations of human abilities— such as language, religion, arts, and social institutions—that are constantly changing due to external and internal shifts within communities. The term *ethnicity* also appears in this paper, and the definition that I am using is from Timothy Baumann's "Defining Ethnicity" in which he cites six main features of an ethnic group. These include a common proper name, a myth of common ancestry, shared historical memories, one or more elements of a common culture, a link with a homeland, and a sense of solidarity.[9] The word *Sherpa* fits this definition of ethnicity, as Sherpa communities typically possess these characteristics. I am using an ethnic classification of study participants to find how issues affect the specific population, not within an explanatory model as an independent variable.

[8] White, "The Concept of Culture."
[9] Baumann, "Defining Ethnicity."

The Solukhumbu district is a region in transition— residents that were once traders, farmers, and Buddhist monastics now primarily occupy a new livelihood— mountaineering. Prior to World War II, Sherpa towns such as Namche Bazaar, where I conducted my fieldwork, were hubs of trading. Khumbu Valley Sherpas and their Tibetan neighbors would exchange products such as yak milk, wool, salt, rice, tea, and grain. However, after China gained control over Tibet and closed its border with Nepal in 1961, Sherpas in Khumbu increasingly had to rely on agricultural production and work in mountain tourism. The money that tourism generates has provided increased economic autonomy for porters, guides, lodge and restaurant owners, and trekking agencies in Solukhumbu. Through engaging in the mountaineering industry in Khumbu, Sherpas have been able to quickly move up the socioeconomic ladder and therefore "transform and remake their own society at least partly in terms of their own agendas."[10] In 2014, at a time when Nepal's national GNI per capita was $880[11], the comparable value solely in the Solukhumbu district was $1,140 (USD).[12] This means that the average worker in Solukhumbu was making about 30% more than the average Nepalese citizen.

0.1: Sagarmatha National Park and Border Zone (SNPBZ)

Sagarmatha National Park was established in 1976 in the Khumbu Valley of Nepal in response to concerns regarding the conservation of the Everest region. This has led to rapid tourism growth and globalization, which strengthens the relationships between social-ecological change in this area and national, regional, and global drivers of change. These shifting relationships have

[10] Ortner, *Life and Death on Mt. Everest: Sherpas and Himalayan Mountaineering*, 7.
[11] "GNI per Capita, Atlas Method (Current US$) - Nepal."
[12] United Nations Development Program in Nepal, "District Wise Per Capita Gross National Income (2014) - Solukhumbu | OpenData."

resulted in intensified resource use; loss of resource management options; and weakened traditional, institutional, and social controls and feedback loops. The Nepalese government's first Park Management Plan allowed local people to continue to live in the park (as it should), but it also strengthened state control over local resources at the expense of traditional resource management and tourism revenues. Adopted in 2002, the Buffer Zone Policy called for closer involvement by local people in management processes and allocated 30–50% of park revenues for investment in the development of local communities. The newest Park Management Plan[13] has further devolved decision-making authority to local representatives, which signals that the Nepalese government is heading in the right direction. It works to facilitate both local economic development and environmental conservation through the growth of a self-regulated tourism industry, local natural resource production systems, local stewardship of natural resources, and the establishment of local grassroots organizations and a multistakeholder governance system.

> *The plan also attempts to manage the park in the face of likely impacts of climate change in order to safeguard the Outstanding Universal Value (OUV) of the Park as well as to enhance the resilience of the local communities living in the BZ. The major programmes outlined in the management plan include park protection, habitat management, basic physical infrastructure construction, tourism promotion, community development, public awareness, monitoring, research and capacity building.*[14]

Locals attribute much of their socioeconomic success to tourism but also believe that quality education and community spirit in the region are significant factors. Outside of mountaineering or agricultural production jobs, there are few career opportunities in Nepal. Many

[13] The most recent Sagarmatha National Park Management Plan at this time is from 2016-2020.
[14] Sagarmatha National Park Office, "Sagarmatha National Park and Its Buffer Zone Management Plan 2016-2020."

Nepalese people become migrant workers in other parts of Asia or the Middle East, but the lifestyle is difficult and their rights are often violated.[15] This creates an unfortunate situation for Nepalese people and forces many Solukhumbu residents to decide between leaving home for limited job opportunities or working in the dangerous mountaineering industry. I do want to make note that economic issues are not always the primary motivation for residents of Himalayan communities to begin working in the mountains, and these individuals have more agency than the common misconception of their "exploitation" allows for. Many of the Nepalese climbers I spoke to expressed a deep reverence for the mountains and felt that because they are the most capable group of humans to climb these tall peaks, they should employ their abilities to ensure the safety of foreigners while also benefiting economically. As professional international alpinists claim that they have a transcendent calling to the mountains, many Sherpas and Himalayan climbers also feel this way- One of my interlocutors, who is a famed Himalayan climber, expressed to me in an interview, "[mountaineering] is a game of life and death, but we like it… we need it."

0.2: Negative Effects of Mountaineering

Despite bringing economic prosperity to the Solukhumbu district, the negative effects of mountaineering are becoming embedded into the Himalayan way of life. The loss of porters' and guides' lives, the disappearance of Himalayan culture, and disastrous environmental effects are all very real issues that the residents of the Solukhumbu district face. In the climbing season of 2014, on what is known as the deadliest day in Everest history, an avalanche took the lives of sixteen Sherpas. A year later, in 2015, another massive avalanche on Everest, this time triggered by a

[15] A very contemporary example of the mistreatment of Nepalese migrant workers is in Qatar for the building of the World Cup stadium.

magnitude 7.8 earthquake, caused seventeen deaths, seven of which were Sherpas working as porters and guides. According to the Himalayan Database, between the years 1990-2019, there were 168 "hired" deaths, and 418 "member" deaths in the Nepalese Himalayas. This means that 28.7% of mountaineering deaths were porters and guides (Sherpa and others), while 71.3% were foreign climbers.[16] Although death rates have dropped significantly since the improvement of weather technology and mountaineering gear in the 1990s, almost 30% of lives lost on these mountains is still too high of a percentage for those who are just doing their jobs.

Recent biophysical shifts are additionally posing a deep threat to the communities of Khumbu Valley- an extremely climate-vulnerable region due to its mountainous topography and fragile ecology. About 20% of the global population, 1.2 billion people, reside in mountain areas, and around half of humankind depends on the resources that these mountains provide.[17] One of the most important mountain regions in the world, the Himalayan mountain range (known as "Asia's water tower"), stretches 2,400 km through six nations- Bhutan, India, China, Nepal, Pakistan, & Afghanistan. It is the largest cryosphere region and freshwater source aside from the North and South poles.[18] The peaks and valleys of the Eastern Himalayas consist of the world's most diverse mountain forests, as rapid changes in altitude over relatively short horizontal distances have resulted in rich biodiversity.[19] However, this environmental stability and prosperity have been threatened in recent years by the effects of the commercialization of tourism on Mount Everest, as well as anthropogenic global climate change.

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[16] Salisbury, Hawley, and Bierling, "The Himalaya by the Numbers."
[17] Rai et al., "Assessing Climate Change Trends and Their Relationships with Alpine Vegetation and Surface Water Dynamics in the Everest Region, Nepal."
[18] "Himalayas – ICCI – International Cryosphere Climate Initiative."
[19] Tse-ring et al., "Climate Change Vulnerability of Mountain Ecosystems in the Eastern Himalayas."

In 2010 a group of scientists, using the Scenario Planning technique, conducted a household questionnaire survey throughout Sagarmatha National Park. They concluded that solid waste was perceived by the majority of interviewed local people (more than 65%) as the key environmental challenge for Sagarmatha National Park and Buffer Zone.[20] The study additionally discovered that tourists in this region on average produce around 0.109 kg/day−1 to 0.123 kg/day−1 of solid waste per capita. Compared with visitors, the amount of waste generated by local people living in the park and its buffer zones is 15%–20% less. The effects of waste in the water sources of the Everest region are increasingly becoming pronounced. A heavy metal analysis of the river water samples taken from 11 locations near waste dump sites showed elevated concentrations of lead in all samples (0.09–0.34 mg l−1) and elevated iron in 60% of the samples. Additionally, researchers found that elevated potassium concentrations in the first and second lakes of Gokyo (popular tourist attractions) are most likely caused by anthropic pressure caused by the nearby presence of touristic lodges.[21]

Some of the most important changes that tourists brought to the Everest region were recognized by my interlocutors to be environmental, cultural, socio-economic, and religious. Residents of the Khumbu Valley for hundreds of years have primarily been Tibetan Buddhists, but globalization and international interference have introduced Christianity to the region. One of the respondents directly mentioned Christianity as an important recent shift in Khumbu; and another practiced Christianity himself, though he is Rai, a group that typically follows Hinduism or the

[20] Manfredi et al., "Solid Waste and Water Quality Management Models for Sagarmatha National Park and Buffer Zone, Nepal."
[21] Tartari, Tartari, and Mosello, "Water Chemistry of High Altitude Lakes in the Khumbu and Imja Kola Valleys (Nepalese Himalayas). Limnology of High Altitude Lakes in the Mt Everest Region (Nepal)."

animistic religion Kirat. While trekking with this respondent, I listened to the Youtube videos he played and although the man at the podium was speaking in Nepali or Tibetan, I still recognized the linguistic patterns and vocalizations to be reminiscent of my childhood experiences attending a Christian church and listening to the sermons.

One interview participant said that he perceived no negative side effects of tourism in Khumbu Valley and that he enjoyed his career as a guide for trekkers to Everest Base Camp. He expressed value in the shared connection that trekkers, guides, and locals have with the natural environment- the Everest region "is a very beautiful natural place, all around we can see mountains… because everybody wants to see the mountains, everybody is happy." One interlocutor pointed out some of the positive effects of tourism in the Everest region, such as when tourists come to the mountains many want to learn about the culture there- "the commercialization of the Sherpa identity all over the world shows it is important to learn about and preserve." The majority of participants additionally spoke about the positive effects tourism has had on the Everest region in terms of elevating the socio-economic status of those living there and providing new economic opportunities and livelihoods. It hasn't always been this way, but right now tourism sustains a significant portion of Khumbu Valley communities.

Environmental harm on both the local (garbage generated by tourism) and global (climate change) levels threatens Himalayan communities' reliance on the mountaineering industry. Growing water, food, and energy demands have modified agro-pastoral practices and local resource management. The massive influx of tourists has also created new patterns in the movement of goods, people, and animals in the Everest region. Rural mountain communities at

high altitudes are especially vulnerable to climate change because of their exposure to the early symptoms of global weather pattern shifts such as the melting ice cover; lack of access to contemporary healthcare, infrastructure, and education systems; and economic reliance on the fragile industries of mountain tourism and subsistence farming.[22] This paper explores how ecological changes in Khumbu brought about by climate change and the commercialization of mountaineering transformed the social, economic, and environmental landscapes of Himalayan communities. The rich natural and social systems that initially allowed for the development of Khumbu Valley culture and civilization now pose risks to the residents' future agency and livelihoods.

0.3: Introduction to My Research

In this paper, I will discuss how an explosion in the number of tourists in the Everest region allowed Himalayan communities to gain greater economic autonomy, while also creating a niche market that limits job opportunities outside of adventure tourism. Additionally, I will discuss the past few decades of ecological decline of the Everest region brought about by climate change and poor waste management practices, and assess possible sustainable long-term solutions. I will also contextualize my research within discussions of Indigenous knowledge, environmental colonialism, political histories, and relationships between local people and foreigners. The primary research questions I address in my thesis are: "In what ways do the effects of foreign climbers and climate change on Mount Everest benefit and harm Himalayan communities?" And, "What

[22] Poudyal et al., "Climate Change, Risk Perception, and Protection Motivation among High-Altitude Residents of the Mt. Everest Region in Nepal."

possible solutions to the issue of tourism-generated garbage and climate change in Khumbu work well and are sustainable for the environment and Sherpa culture / economic autonomy?"

Throughout the summer of 2022, I conducted ethnographic fieldwork in Namche Bazaar, the closest mostly-developed town to the base camp of Mount Everest, and Kathmandu, the capital of Nepal, where I utilized the research methods of interviewing (semi-structured and informal), taking photographs, and engaging in participant observation. I visited the organizations Sagarmatha Pollution Control Committee and Sagarmatha Next and spoke to representatives who shared with me the larger story of waste management practices in the Khumbu region. In Namche, I also was able to look through the Sherpa Culture Museum, the Everest Photo-Journalism Gallery, and the Sagarmatha National Park Museum and Headquarters. In order to gain a more personal perspective on the culture of mountaineering and the dangers of the job, I interviewed ten Nepalese mountaineers who work as porters and guides on Everest. One of the most important aspects of my fieldwork was participant observation, which was possible through my homestay living situation with a Sherpa family. Through these local ties, I was able to gain an extensive understanding of what it means to be a member of Himalayan communities in the past, present, and perceived future. Living with a local family also allowed me access to engage in important traditions of Himalayan life, such as festivals and Buddhist ceremonies, that are not as accessible to other foreigners.

One of the most unexpected yet helpful methods of finding interlocutors was my use of social media outlets, mainly Instagram and TikTok. When I first arrived in Khumbu, I quickly found out that there were not as many mountaineers there as I had originally expected. Whereas I

had originally believed the guides that had worked on Everest during the spring climbing season would be taking a break or engaging in other modes of economic production in Khumbu throughout the monsoon months, I discovered that the majority of them were working on other mountains. Many of the mountaineers that I ended up speaking to had been working on K2, the world's second highest mountain, in Pakistan, by the time I had arrived in their hometown. Although there were still plenty of porters, farmers, and store owners in SNPBZ, the majority of them were not fluent in English, and many lacked expert knowledge about extreme high-altitude mountain conditions. I do regret not engaging as much with the local community as I could have, however, as more perspectives of local people directly affected by tourism and climate change would have strengthened the research project. Additionally, I found the lack of female mountaineers and trekking guides to be a barrier, as all of the people that I ended up interviewing were men. Incorporating the opinions of women was initially a significant goal of my thesis, but none of the female mountaineers that I reached out to on Instagram replied, and I could not find any female porters or guides in Khumbu. The language barrier was also intensified with gender, as I discovered that the majority of the women in Khumbu had little knowledge of English.

In order to locate and reach out to mountaineers from the Khumbu Valley region, I used social media platforms and traced complex pathways of relationships between foreign and local mountaineers, Khumbu residents, and trekking agencies. This task was quite difficult, however, as there is a small pool of first names that Sherpas tend to choose from, and all of them share the same surname.[23] Using social media as a way to connect with my interlocutors has also provided

[23] Sherpas traditionally name their children after the day of the week, regardless of gender. Sunday is Nima, Monday is Dawa, Tuesday is Mingma, Wednesday is Lhakpa, Thursday is Phurba, Friday is Pasang, and Saturday is Pemba. However, I was told by someone born on a Sunday that some people

me with the benefit of being able to keep in contact with them and stay updated on their other climbing expeditions. Because of the nature of climbing seasons being so specific for each mountain, the majority of the mountaineers that I met in Nepal end up on the same mountain at the same time as each other. For example, in the fall I was able to see the progress of Manaslu expeditions from varying perspectives through conversations on Instagram with different Sherpa mountaineer acquaintances, and by viewing their stories and posts.[24] Many of these climbers work for different expedition agencies which has additionally provided me with a basis for comparison of the way that these companies navigate relationships with each other and the environment.

Dr. Alton Byers,[25] an alpine ecologist and glaciologist who works primarily in the Nepalese Himalayas, published a book *Khumbu Since 1950*, which displays photographs of towns and landscapes in the Mount Everest region. Prior to departing for Khumbu Valley I looked through this book and picked out photos from areas that I knew I was heading to so that I could capture my own images to compare. This aspect of my ethnographic project was designed to provide photographic evidence of climate change that supports factual data on shifting weather patterns and global warming. However, as I was conducting research during the monsoon season in the Himalayas, I was not able to see many of the mountains from the photos in the book, as large clouds blocked my view of the higher-altitude areas. For this reason, I shifted my focus to rely more on recent empirical evidence of environmental degradation that has been generated by climate change scientists and backed up this data with the observations of my interlocutors.

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are starting to stray from tradition. I met a lot of young children named Tenzing, which I noticed is not a name of th

[24] There is sometimes surprisingly good cell service on the top of mountains.

[25] I have been in contact with Dr. Byers since before I traveled to Nepal, and we met up in Kathmandu in August. We spoke about the observational climate data collection process, and he sent me a copy of this book so that I had a foundation to build my personal project on.

Chapter 1, *Mount Everest as a Symbol*, discusses the way that Everest is perceived at the local, national, and global scales. In this chapter, I examine how the mountain has been glorified in Western society as the pinnacle of human achievement, and thus co-opted into assertions of political power. In Chapter 2, *The Commercialization of Mountaineering*, I touch upon how Himalayan mountaineers, particularly Sherpas, have been commodified by Western climbers and media as ways in which foreigners are able to achieve something they couldn't on their own. I will explore why communities in Khumbu rely on adventure tourism in the first place, and how the industry of mountaineering has changed over the past few decades. In Chapter 3, *Climate Change in the Himalayas,* I draw on scientific literature concerning the environmental impacts of global warming and climate change in the Himalayan region. I argue for the importance of further scientific research on how climate change will affect Himalayan communities in the near future in order to prevent severe ecological disasters, while also taking into consideration the ways in which these communities have historically interacted with scientists. Although some may claim there is anti-researcher sentiment in Khumbu, I believe that through partnering with community members and engaging with local organizations, foreign and local scientists can work together and continue climate change research in the Himalayas while maintaining the agency of Khumbu residents.

Chapter 4, *High Altitude Waste Management* discusses the history of waste management practices in the Solukhumbu area. In this chapter, I will draw comparisons between what is happening in SNPBZ and how other countries and international organizations deal with the same issues. Here I mainly focus on the practices of the SPCC, Sagarmatha Next, and the Nepalese government's Ministry of Culture, Tourism, and Civil Aviation. I will discuss the challenges faced

by NGOs in Nepal, and how the relationship between these organizations and the Nepalese government impacts their ability to generate progress. I dispute the Western idea that Everest is "the world's highest garbage dump"[26] by displaying the hard work and passion of the local Sherpa people in maintaining this sacred space. Throughout Chapter 5, *Suggestions for a More Sustainable Future,* I discuss ways that Himalayan guides and porters can collaborate with the Nepalese government and external NGOs to create a world where those working in the mountaineering industry will still be able to generate sufficient income without risking their lives or losing agency. Further, I will introduce the ideas presented by various interlocutors I spoke to on creating this sustainable future and discuss their overall feasibility.

Within the empirical domain of climate change science, the field of anthropology is essential to understanding the humanistic aspects of how communities interact with their environments. Commonly referred to as a *soft science*, anthropology straddles the line between institutional applications of public policy and data-driven, production-focused scientific research. However, by uplifting the opinions and experiences of those facing the direct effects of climate change, anthropology is well-positioned to further the global discourse on the science and policy of climate change. Through conducting ethnographic research over long periods of time and building trust with the studied communities, anthropologists can offer human-centered insight into how different cultural identities observe shifts in climate patterns. Additionally, within the conversation of resource management, anthropology offers much-needed insight into the linkages, interactions, and interrelationships of conflicting resource users. Better identification and

[26] Apollo, "The Good, the Bad and the Ugly - Three Approaches to Management of Human Waste in a High-Mountain Environment."

understanding of how different stakeholders perceive, use, and preserve natural resources is necessary to generate sustainable solutions to human-induced environmental degradation issues.

In the article "Contribution of Anthropology to the Study of Climate Change", author Jessica Barnes outlines three ways in which the field of anthropology can contribute to the study of climate change. First, through in-depth ethnographic research, anthropology brings awareness to how climate-related knowledge is created and interpreted through cultural, social, and political lenses. Second, through the work of archeologists and environmental anthropologists, the discipline draws attention to the historical context of contemporary climate debates. The third contribution of anthropology to the study of climate change is its "broad, holistic view of human and natural systems, which highlights the multiple cultural, social, political and economic changes that take place in our societies."[27] Anthropology plays a fundamental role in deepening our understanding of the intimate relationships between humans and their environment. By grounding climate mitigation, adaptation, and development policy in foundational cultural beliefs and practices, anthropologists have the opportunity to effectively implement scientifically informed public policies.

By applying anthropology's explanatory and interpretive practices to the positivistic approach of climate science, I analyzed the ways Khumbu Valley culture mediates climate change. My research displays that Himalayan communities cannot ignore the negative effects of anthropogenic activities at both the local tourism and global climate levels. To address the remediable aspects of these issues, cooperation between stakeholders at all levels- Khumbu Valley

[27] Barnes et al., "Contribution of Anthropology to the Study of Climate Change."

communities, climate scientists, Nepalese government institutions, and international organizations- is necessary. Further research is also needed to uncover the severity of the irreversible effects of anthropogenic change that are already in motion, such as glacial lake outburst floods. My ethnographic research, as well as other human-centered climate science findings, can help uncover the performative aspects of the knowledge that science produces, and facilitate multidisciplinary collaborations that include those inside and outside the world of science.[28] I place the needs of local farmers, pastoralists, and mountaineers in the foreground of my analysis of environmental issues in Khumbu to assess the commonly misconstrued dynamic between those creating environmental issues, and those who face the consequences of those actions.

This thesis paper is crafted in conjunction with a visual ethnographic project, which is in the form of an exhibit in the Anthropology building. Throughout three display cases, I use photos and art to chronicle the story of garbage and climate change on Mount Everest. I transformed litter that I collected while on trek in the Khumbu Valley region into an artistic representation of Mount Everest and displayed large photographs of the Khumbu landscape that I captured alongside photos taken of the same region years previous. Through this project, I tell a story of climate change and human-induced ecological destruction in Khumbu and express the urgency of addressing the ways in which humans are harming the planet. *Trash Mountain*, the sculpture in the display case, is a representation of the common discourse and perception of Mount Everest as the "world's highest garbage dump." When Western media portrays Everest, the images that are chosen are sensationalized depictions of the negative consequences of foreign tourism. Mount Everest,

[28] Verma, "The Role of Anthropology in Climate Change Research and Policy in Bhutan."

because of its status as the pinnacle of human achievement, is a central site of political consciousness where all activities on the mountain are under intense international scrutiny.

I chose not to include any photographs of litter in the Mount Everest region in the display cases primarily because the number of times the landscape was pristine and untouched far outweighs the times the trail was dirty, but also because I did not want those images to be the ones that are eternalized in the minds of people viewing the display (humans tend to remember negative information with a greater sense of vividness than positive information[29]). Throughout these display cases, I aim to tell a story- a story of how the commercialization of mountaineering in Khumbu, an industry now threatened by climate change and rapid global warming, has led to increased social and economic agency for Himalayan communities while simultaneously causing cultural and environmental harm. I show how an unprecedented human obsession with Everest and the glory that summiting it brings has caused rapid shifts in Himalayan landscapes.

0.4: Positionality & Decolonizing Systems of Epistemic Power

Anthropologists as non-native knowledge producers is a controversy so embedded into the discipline's discourse that it seems almost redundant to touch upon. However, as power dynamics will always be at play in relationships between foreigners and locals, I felt it was necessary to discuss my positionality in the context of conducting anthropological research in Nepal. As a white person coming from a wealthy Western country, and who is tied to an esteemed academic institution that supported my very existence in that space, I recognize that to some people in Nepal,

[29] Kensinger, "Remembering the Details."

I portrayed a specific idea about the United States. The amount of money that I received as a grant from the Halle Institute to travel to Nepal and conduct research was about the same as what some icefall doctors and assistant guides make in the Everest climbing season, and the more time I spent in Khumbu the more uncomfortable with this fact I became. Additionally, before traveling to Nepal, I was told that some Khumbu locals have feelings of animosity toward foreign scientists. However, I never felt any hostility or resentment. It was possible that these feelings did exist, but just were not outwardly expressed in front of me. I also do think that I did a good job of keeping to myself and engaging in natural participation and conversation, rather than focusing on pure data collection.

Language barriers were of greater significance throughout my time in Nepal than I had originally anticipated. In Namche during the monsoon season when the lodges, shops, and restaurants catering to the tens of thousands of tourists that flood there in the peak months close down, I found there were few fluent English speakers. Additionally, the mountaineers and guides that I interviewed, along with other Khumbu residents who had spent substantial amounts of time in Kathmandu seemed to have a much better average English level than the typical person that I met in Khumbu. I also observed that younger people were more likely to speak English, and of the older populations, the men typically had better English skills than the women. The Shree Himalaya primary school in Namche teaches students only English and Nepalese, but I observed that children were also being taught Sherpa and sometimes Tibetan (although very similar languages) by family at home. I became aware of the high value of education that Khumbu communities upheld while walking by myself through the streets of Namche. Children of all ages, sometimes alone and sometimes in small groups, frequently approached me and made conversation. The children mainly

asked me the same three questions in English- where are you from, what is your name, and how old are you? Even while sitting in the Namche Tibetan Buddhist Monastery during the Dumji festival, I was inundated with children in school uniforms asking me questions and practicing the English it appeared they had learned together in class.

When addressing the environmental effects of anthropogenic activities in the Khumbu Valley region, it is important to make note of the embedded social-ecological systems (SES) of knowledge production. One of the fundamental problems for establishing equitable management practices of natural resources is that the resources can be understood differently by different stakeholders depending on their temporal and spatial scales of observation, as the observation scale is never neutral.[30] These scales of knowledge not only construct the narrative of power construction and legitimization but also ecological change when considered in SES. An example of this is forest usage in Khumbu, as access to the resources provided by the forest varies for people of different socio-economic statuses, gender, religions, jobs, etc. These stakeholders' perceptions and understandings of the forest as a site of resource production are inherently different because of their different knowledge systems. This scenario also applies within a larger context in SNPBZ, as Nepalese governmental regulations have historically hindered local communities' abilities to harvest lumber from the park. The disconnect between local temporal and spatial scales of knowledge and government actions based on "expert" knowledge has been highly evident throughout the years, as communities within SNPBZ have been forced to consider other methods of obtaining materials for the construction of necessary structures.

[30] Ahlborg and Nightingale, "Mismatch Between Scales of Knowledge in Nepalese Forestry."

In 2000, Berkes et al. defined traditional ecological knowledge as: "a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment."[31] Traditional knowledge, as a knowledge-practice-belief complex,[32] is rendered through temporal and spatial scales of observation. These scales are inherently political because of differences in the perceived objectiveness of various types of knowledge. This political context can therefore be utilized by communities to link Western science and traditional ecological knowledge and shift environmental policy.[33] Traditional and scientific knowledge are complementary,[34] and they should be integrated with equal importance into contemporary resource, land, and environmental management policies.

My positionality and bias in no way can be negated while I form ideas about cultures that are not my own. So in order to most accurately speak about a culture that I have no part in, I wanted to be able to include in this paper as much literature as possible written by Nepali people. It was a challenge, however, to find extensive research on this region that was conducted by the very people experiencing the realities of the effects of anthropogenic activities- this is a theme I discuss more in-depth throughout this paper. I also argue that sustainable solutions to address the long-term effects of anthropogenic activities in Khumbu must include a deep analysis of how scientific and local knowledge systems are valued and validated in different ways. To overcome this, there needs to be investment (grants, not loans) in pre-existing community structures that have been navigating

[31] Berkes, Colding, and Folke, "Rediscovery of Traditional Ecological Knowledge as Adaptive Management."
[32] Berkes, *Sacred Ecology*.
[33] Diver, "Negotiating Indigenous Knowledge at the Science-Policy Interface."
[34] Gagnon and Berteaux, "Integrating Traditional Ecological Knowledge and Ecological Science."

the balance between production and destruction for centuries. The embedded socio-ecological dynamics of community waste management directly affect the way that communities perceive, preserve, and use resources. This relationship between scales of knowledge and management approaches must be considered within any discussion of sustainability. Additionally, as structures of imperialism are often embedded in American academic institutions, decolonizing pedagogies became a core part of my thesis.

1.0: Mount Everest as a Symbol

Mount Everest has long represented the final challenge of mortal achievement- if humans can transcend the limits of the self and stand at the top of the world, they can therefore accomplish anything. In the mid-20th century, the international race to be the first to summit Everest became an important political objective for countries wishing to assert their dominance as global imperialistic systems began to crumble. *Beyond the Edge*, a documentary about the 1953 ascent, refers to this attempt by Tenzing Norgay Sherpa and Sir Edmund Hillary as Britain's "last great colonial project." As their former colony India gained independence in 1947, the British Empire felt as if they had one last chance to prove their superiority on the world stage- by achieving the pinnacle of human ability.

The 1953 summit was especially interesting in the greater political context because of the nationalities of the expedition team. Although it was a British operation led by John Hunt, Edmund Hillary was from New Zealand, and Tenzing Norgay, although born in Nepal, spent most of his life in India. To much of the outside world, it appeared as if the two represented one last colonial struggle for superiority, even if it was not meant to seem this way. John Hunt formulated a plan of three assaults on the Everest summit. First, he sent British climbers Tom Bourdillon and Charles Evans on a mission to the top, but they ran out of oxygen and were only able to make it within 300 feet of the summit. The second assault group, the successful one, was Norgay and Hillary, the strongest climbing pair of the expedition. They reached the summit on May 29th and were able to

send news back to England about their success on June 2nd, the day of Queen Elizabeth II's coronation.[35]

Once the whole world found out that the first people to summit the tallest mountain in the world were a Nepali and New Zealander on a British expedition, there was an outburst of reactions. In their official report of the summit, the British ambassador to Nepal, Christopher Summerhayes, and John Hunt allegedly doctored the account to conceal who physically stepped foot on the summit first. This was an attempt to defuse any anti-colonial backlash in India and Nepal, as anti-imperialist attitudes were growing in the region. However, a memo written by Hillary found in the archives of the Royal Geographic Society claims that he was the first to reach the summit- "[I] stepped on top of Everest… I quickly brought up Tensing beside me."[36] Expedition leader John Hunt insisted on the revised version "due to a desire not to cause offense to Nepalese nationalists and smooth over the debate as to who got there first." The Sunday Times, a British newspaper, stated: "By the time the version was released the issue had already escalated into a political row, with the press in Nepal and India lionising Tenzing as a means of whipping up post-colonial antagonism against Britain."[37]

According to an ancient Sherpa legend, the initial reason that many Tibetans migrated to the Nepalese Himalayas in the 13th and 14th centuries, especially to the southern side of Mount Everest, was that they believed the region was a *beyul* or a supreme hidden valley.[38] The legend claims that in this valley were *termas*- treasures of sacred texts and precious objects that were

[35] Hansen, "Confetti of Empire: The Conquest of Everest in Nepal, India, Britain, and New Zealand."
[36] Conefrey, *Everest 1953*.
[37] Hellen, "Hillary Colluded in Cover up over Who Conquered Everest."
[38] Skog, "Beyul Khumbu."

hidden by Guru Rinpoche, the one who blessed the land. To the Sherpa people, Chomolungma is the "palace and playground" of Jomo Miyolangsangma, the Tibetan Buddhist goddess whose virtue is inexhaustible giving.[39] Miyolangsangma began her life as a malevolent demon but was converted by a great Buddhist. She rides a golden tigress and hands out the jewels of wishes to those deserving. It is said that Tenzing Norgay followed her up to Chomolungma and that she allowed him to be the first to successfully summit.[40] The Sherpas generally believe that Miyolangsangma provides them with wealth and good fortune, as Mount Everest expeditions have brought enormous prosperity to Khumbu Valley Sherpa communities. It is also widely accepted in Sherpa tradition that Everest and its surrounding valley are imbued with the spiritual energy of Miyolangsangma, and because of that, anyone passing through the sacred landscape should behave with reverence. In this region, the karmic effects of one's lifetime of actions are amplified and one should even restrain from impure thinking in order to prevent climbing accidents. Everest to the majority of the world is a symbol of adventure and achievement, but to many Khumbu Valley residents, the mountain instead represents a spiritual and sacred place that has brought them much prosperity- a livelihood only made possible by Western whim.

Upon arriving at the Base Camp of Mount Everest, expedition groups set up a *lhap-so*, a makeshift shrine. It is here, prior to attempting the summit of Everest, that locals and foreigners alike request blessings from Sherpa Buddhist monks to appease Miyolangsangma and be granted her favor. This is known as Puja- "a special ceremony in which prayers are offered to the Buddhas to request their blessings or invoke their help. The power of prayers derives from the sincere motivation of the person asking for prayers, as well as the pure mind of the persons performing

[39] "Miyolangsangma, the Goddess of Inexhaustible Giving | Tsem Rinpoche."
[40] Gautam, "Mountain Literature."

the prayers… making offerings to the different manifestations of enlightened beings, and to the sangha community generates and increases merit, our positive potential. Merit is needed to have success in all activities."[41] It is only after this ceremony that many Sherpas feel comfortable entering the Khumbu Icefall, one of the most dangerous parts of the mountain. One mountaineer that I spoke to explained that Miyolangsangma knows when people are praying from their hearts or not, and can assess the character of those attempting the summit. Additionally, because Everest is seen as the body of this goddess in Tibetan Buddhism, part of Puja includes mountaineers expressing remorse for using their crampons while walking on her. One respondent expressed to me that a crucial aspect of the ceremony is to tell Miyolangsangma "We are sorry we are climbing up your body like that."

Mount Everest has also acted as a symbol of hope and peace during times of conflict. In 1990, an American mountaineer Jim Whittaker organized the Mount Everest International Peace Climb, an expedition that brought together climbers from the United States, the Soviet Union (at the time), and China. Besides bringing political harmony, the effort had the goal to bring climate change into global mountaineering discourse and address issues of sustainability through transnational cooperation and knowledge sharing. As the chairman of a group of Chinese companies that financially supported the climb explained- "we feel the duty of global citizenry to pursue peace and sustainability."[42] The pure strength, unwavering devotion, and determination that mountaineering requires is something that can be universally admired, as it links peoples' humanistic conceptions of beauty, mystery, and majesty. Jamling Tenzing Norgay, son of famed mountaineer Tenzing Norgay, wrote in his book *Touching My Father's Soul*- "One reason why

[41] "What Is a Puja? - Kopan Monastery, Kathmandu Nepal."
[42] Whittaker, "Everest: A Symbol of Peace and Hope."

people go into the mountain is to experience the purity of these elements- these goddesses- in their unobstructed form. In the mountains, worldly attachments are left behind, and in the absence of material distractions, we are opened up to spiritual thought."[43]

1.1: Masculinity, Whiteness, and Identity in the Death Zone

The death zone is the area on a mountain above 8,000 m (26,247 feet), in which the conditions are so extreme that human life cannot be sustained. The low barometric pressure at high elevations decreases the availability of oxygen and the resulting tissue hypoxia causes serious physiological, sensory, neurobehavioral, and medical issues.[44] In 2001, Huey and Eguskitz found that as mountaineers gain altitude, the probability of their individual success decreases, and the overall death rate increases.[45] Because of the precarious conditions on the mountain, one wrong move for a mountaineer could be fatal. These deaths are typically unceremonious and oftentimes alone- such as falling into a crevasse, running out of oxygen, having a heart attack or stroke, or getting sucked into an avalanche. The intensity of the death zone exacerbates this stark contrast between potential outcomes of expeditions- a ceremonious success, a personal failure, or a dignified death. In Sherpa tradition, although different groups have different customs, the body of the deceased is typically kept at home for three days. Throughout this time Buddhist lamas and the family perform rituals that help guide the deceased's soul to the afterlife. Then, the body is taken to a place to be cremated, and it is followed by a procession of lamas, religious music, flags, umbrellas, banners, and incense.[46]

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[43] Norgay and Coburn, *Touching My Father's Soul*.
[44] Zafren and Honigman, "High-Altitude Medicine."
[45] Huey and Eguskitza, "Limits to Human Performance."
[46] Puig, "THE SHERPA WHEEL OF LIFE – SHERPA LIFE PROJECT."

In the article "Thick Resistance: Death and the Cultural Construction of Agency in Himalayan Mountaineering" author Sherry Ortner proposed, through applying Geertz's framework regarding systems of meaning and power, that the risk of death in mountaineering provides pay off in terms of gained insight about the meaning of "the moral fiber of the inner self, about the nature of bonding and friendship, about the peace and calm of high cold places against the noise and bustle of modern society."[47] To the foreign climbers, Everest expeditions act as a form of "deep play"- what Jeremy Bentham considered to be games in which the stakes are so high that it does not appear worthwhile to play, yet some people play regardless. Here, death plays an entirely different role in the experiences and perceptions of outsiders who come to climb in Khumbu, and in those of the local people that work in the mountaineering industry. For many foreign mountaineers, the risk of death is what gives the audacious pursuit meaning and glory. For many Sherpas and other ethnic groups that work in the mountains, there is no glamorization of death, it is only a risk that must be constantly considered and negotiated.

The language that has been used by many Westerners to speak about successful Everest summit attempts, that they "conquered" the mountain, can be attributed to colonialist attitudes and ideals. One example of this is found in the 1929 German expedition of Kanchenjunga which was documented using military metaphors and the language of struggle, or "kampf." This language conveyed a sense of national destiny and racial superiority (Hitler's *Mein Kampf* was published four years earlier).[48] The conception of conquering the mountains is especially problematic in the context of colonial histories in South Asia. However, Peter Hanes, in *Tenzing's Two Wrist-*

[47] Ortner, "Thick Resistance."
[48] Westaway, "Mountain of Destiny."

Watches, argues that imperial identities and notions of white superiority did not play as much of a role in the Everest expeditions of the British as their other imperial neighbors. At the beginning of their summit attempt history, British expeditions up Everest were large and military-style. However, around 1938 climbers recognized the necessity of shifting to smaller-scale enterprises, which signified the diminishing importance of earlier imperial associations.[49] A 1954 article published in the New Yorker that focused on Tenzing Norgay's life after his successful ascent explains his role in the conversation of colonialism and racial superiority in the mountains- "Over the years, the try at the ascent was a test promoted largely by men who believed in white superiority. In the end, Tenzing, a nonwhite, passed it. Inevitably, this made him a hero to Indian nationalists. Tenzing is a Cinderella who has shown them that they, too, can be belles."[50]

In "White Masculinity in the Death Zone: Transformations of Colonial Identities in the Himalayas", author Patricia Purtschert outlines the relationship between the death zone and identities of whiteness and manhood. Through applying the context of the Swiss Everest expeditions of 1952, she argues that the death zone challenges elements of hegemonic Western masculinity, and constructs postcolonial relationships between white and non-white people.[51] Purtschert begins by structuring Western reports on Himalayan mountaineering throughout the mid-20th century in three parts: the colorful and adventurous portrayal of the journey to base camp, which exoticizes the expedition by describing *foreign* food and drinks, *unknown* rituals, and the culture of the *natives* (specifically focusing on the women and children); a description of the ascent using technical vocabulary that centers men as the protagonists battling their own limits, and a

[49] Norgay and Coburn, *Touching My Father's Soul*.
[50] Rand, "The Story of the First Sherpa to Climb to the Top of Mt. Everest."
[51] Purtschert, "White Masculinity in the Death Zone."

sacral language that expresses both reverence of and agitation for the power of nature; finally, situated in the death zone, there is a dramatic close to the ascent in which the protagonists fiercely battle the elements and push their human abilities to the maximum- this results in either a victory of reaching the summit or the defeat of death or having to turn back.

The traits that are typically associated with mountaineering and summit attempts - courage, physical and mental strength, and determination - are often portrayed as being masculine. In Purtschert's narrative of Himalayan mountain expeditions, men depart from the human world so that they can confront the fundamental experience of humanity. Through that journey three conceptions are reversed: emotionally stable and apathetic men become emotional and therefore inferior to the masculine resilience of the mountains (a reversal of gender roles); secular Christians are haunted by pagan beliefs in ghosts and superstition (a reversal of faith); and rational, grounded men submit to their mountain-induced madness (a reversal of control). However, as these men independently contend with the elementary power of nature, they remain physically tied to the people whose subjugation is at the foundation of their very existence as members of colonial society. Here we see that the death zone not only threatens the life of a human body but also the existence of white bourgeois masculinity through the necessitation of mutual dependence between the postcolonial and colonized.

> *That the dissolution of intimate and hierarchic boundaries between the men took place in the death zone, in a state of hallucination and near madness, shows the disorientation of an imperial subject that has to reinvent itself in the face of a decolonised other on whose devaluation his self-image has been based for centuries.* (Purtschert, pg. 40)

1.2: Physical and Mental Effects of High-Altitude Conditions

The genetic basis of Tibetan and Sherpa polygenic adaptation to high altitude has been intensively studied over the past decade. Their residence at extreme elevations introduced strong selective evolutionary pressures for hundreds of years that were inflicted by cold temperatures, patchy landscapes, arid soil, high UV radiation, and hypobaric hypoxia (low levels of oxygen in body tissue). Gnecchi-Ruscone et al. tested for the occurrence of physiological adaptation in these high-altitude Himalayan populations, and found that Tibetans and Sherpa maintain lower hemoglobin concentration than people originally from low altitudes who live at high altitudes for extended periods of time.[52] Other biological modifications that enable these populations to tolerate extreme high-altitude conditions include: cellular adjustments, increased concentration of exhaled nitric oxide, augmented blood flow, and modified physiological functions such as larger lung volumes and resting pulmonary ventilation to favor oxygen absorption.[53] Several genes have also been identified that may contribute to their ability to tolerate high-altitude environments, including the EPAS1 and EGLN1 genes that regulate hemoglobin levels.[54]

At altitudes above 3,000, humans' physical performance is impaired - becoming slower and increasingly miscalculated - but complex tasks are affected more than simple ones.[55] High elevation environments also induce cognitive dysfunction, not just physical challenges. A 2014 study found that populations that had migrated to high altitude areas (above 4,500 m) reported higher levels of anxiety, anger, and fatigue, as well as lower rates of positive mood and energy

[52] Gnecchi-Ruscone et al., "Evidence of Polygenic Adaptation to High Altitude from Tibetan and Sherpa Genomes."
[53] Moore, "Human Genetic Adaptation to High Altitude."
[54] Moore.
[55] "Effects of High Terrestrial Altitude on Military Performance."

than populations that remained at sea level. Exacerbated mood disorders, decreased visual memory capacity, and impaired perceptual-motor skill and motion stability were also observed in the high-altitude migrants.[56] It has additionally been demonstrated that rates of depression and suicide tend to be higher in individuals living at high elevations, even when researchers considered socioeconomic factors. The demographic and psychiatric characteristics of those who experienced mental health crises also were found to change with elevation.[57] Researchers have also proven that high altitude conditions impact emotion recognition and risk-taking behavior. An example of this is that subjects in one study were found to be significantly better at identifying happy facial expressions of others at sea level than at higher elevations.[58] Altitudes above 3,000 m also have been proven to cause impaired performance in individuals.

The majority of the mountaineers that I spoke to, when asked about their relationships with tourists and foreign climbers, expressed that long-term expeditions such as the two months it takes to climb Everest build strong family-like relations between guides, porters, and clients. This has also occasionally led to a pipeline of financial support from satisfied clients to the people that guided them, and many times the guides' families as well, which I will discuss more in Chapter 6. However, many respondents also noted that the high altitude can cause conflicts that may not have happened at lower elevations, due to the cognitive stress of the intense environmental conditions. When extreme weather is compounded by physiological disturbances in the face of death, this

[56] Gao et al., "Psychological and Cognitive Impairment of Long-Term Migrators to High Altitudes and the Relationship to Physiological and Biochemical Changes."
[57] Betz et al., "Elevated Suicide Rates at High Altitude."
[58] Heinrich et al., "Cognitive Function and Mood at High Altitude Following Acclimatization and Use of Supplemental Oxygen and Adaptive Servoventilation Sleep Treatments."

facilitates strong emotional reactions in both western and local mountaineers who many times may struggle to maintain rational minds.

One interlocutor cited a situation he saw in 2013 at Camp 2 on Everest in which European mountaineers, insisting upon climbing "alpine style" (self-sufficient and many times without supplemental oxygen), came into conflict with the Sherpas that were setting routes for their clients. The foreigners had not hired a trekking agency but attempted to continue ahead using the ropes that had already been set by Sherpas for their paying clients. They were held back, which made them angry and they began insulting the Sherpas, inciting a verbal argument that eventually turned physical with rocks and punches being thrown. Situations like these are not new,[59] and can oftentimes be attributed to a failure of Westerners to respect cultural and environmental norms. This conflict was portrayed vastly graver by Western media sources- a Youtube video posted by the UK company Channel 4 News imparted the narrative "three top European climbers have had to flee for their lives from Mount Everest under assault from dozens of Sherpas hurling rocks and threatening to kill them."[60] The video interviewed the involved European mountaineers who claimed that the Sherpas were "waiting for us to come back down so they could attack us… we were at the mercy of the mob in front of us… we couldn't call the police for help." However, other accounts of this interaction say that several Sherpas were injured instead.

The new channel also interviewed Alan Hinkes, a British mountaineer who explained why the conflict may have happened- "I think there was some ego involved, testosterone, and a lot of misunderstanding… these two Europeans are out to make quite a bit of money and fame from this

[59] "Tension between Foreign Climbers and Sherpas Began over 200 Years Ago."
[60] *Sherpas Fight Westerners on Everest*.

climb and the Sherpas are doing their job fixing ropes for their clients… they should have developed a relationship with these Sherpas, because I mean they're great guys. If they had a relationship with them, if they knew their names they could have chatted over it, they might have had a little argument but that would have been it." As one of my interlocutors framed this discrepancy between local mountaineers with expert knowledge of the mountain, and tourists who sometimes push the boundaries of their positionality- "tourists need to be tourists, guides need to be guides… there needs to be a gap."

Besides the direct physical and mental effects of low oxygen levels at higher altitudes, other factors such as physical exertion, which increases oxygen demand, and poor sleep quality increase the length and intensity of cognitive dysfunction. These changes in mood states at high altitudes, however, have a distinct and measurable duration.[61] A common theme found among people that I spoke to in Nepal regarding mountaineering and trekking, in general, is that mental strength is of key importance when facing difficult conditions that require laborious exertion- and sometimes it is even more important than physical strength. In *Life and Death on Mt. Everest*, Sherry Ortner examines the concept of death within a Tibetan Buddhist context. When climbers on Everest are confronted by death, many strong emotions arise. In order to hide and in some regards master these reactions, many Sherpa mountaineers employ the kinds of emotional discipline emphasized by monks.[62] Almost every person that I spoke to in Nepal had lost at least one family member or close friend to a mountaineering accident, which displays how deeply embedded the dangers of climbing careers are in Khumbu communities.

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[61] Research, Marriott, and Carlson, *The Effect of Altitude on Cognitive Performance and Mood States*.
[62] Ortner, *Life and Death on Mt. Everest: Sherpas and Himalayan Mountaineering*, 126.

The extent to which strong emotions of lust, obsession, and enchantment affect the cognitive functions and decision-making processes of mountaineers is noteworthy. Although the most basic rule in mountaineering is that the top is only halfway, and there is a strict cut-off time[63] for Everest summit attempts, many mountaineers who have already gotten so close to reaching their goal ignore the indisputable signs and continue on. A report from the British Medical Journal found that between the years 1921 and 2006, more people have died descending from the summit of Everest than on the way up. About 56% of mountaineers who climbed over 8,000m died during the descent from the summit, 17% died after turning back, 10% died during the ascent, 5% died before leaving the final camp, and for 13% the stage of the summit bid at the time of death was unknown.[64]

One of the main themes that I focused on throughout my interviews was the interlocutors' perception of the dangers of mountaineering as a career- if they considered it a dangerous or safe profession, how proportionate they felt the burden of the danger was between those working in the mountains and those paying to climb, and how they thought the professionalization of mountaineering in Khumbu could improve. Three respondents said that mountaineering in Khumbu was not a safe profession, but all of them followed that statement by saying that it is necessary for many people to be able to make money. One world-renowned Sherpa mountaineer expressed to me that mountaineering as a career is "not safe… each and every time is a risk… it is a game of life and death, but we like it… we need it." Another mountaineer added that he felt there was no possible good future for those working in the mountains, as there is no support from the

[63] The time determined by expert mountaineers at which if you haven't reached the summit yet, you have to turn around. This has to do with weather conditions on the mountain.
[64] Firth et al., "Mortality on Mount Everest, 1921-2006."

government for those who get too old to work, and no climbing agencies offer retirement plans for their employees. However, sometimes when wealthy clients are happy with the services provided to them, they take on some sort of financial support for the guides who helped them to summit. A common example of this is clients who pay for the college education of the children of the guide that brought them to the top of Everest.

Five interlocutors said that mountaineering in Khumbu was generally a safe profession; one of them said that it is safe with the proper medicinal and mountain training; and one told me that it used to be a dangerous profession but with advanced technology and equipment it has become safe. This statement is somewhat supported by facts- over the past three decades, while the success rate of summiting Everest has doubled, the death rate for climbers, about 1%, has not changed since 1990.[65] One interlocutor said that because it pays better than any other job available to people in Khumbu, and because only a small percentage of porters and guides perish, it can be considered safe- "if there is no education and no jobs… the government cannot stop people from working… it is not exploitation in the end, it is a market transaction, both parties know 'this is what we are doing'." He cited the necessity of the job within the broader socio-economic context of Nepal and Khumbu, where the men typically are the breadwinners and have to make money for their families to survive and put their kids through school.

Two respondents did not seem sure of one answer or the other, and were reluctant to assert an opinion although one of these respondents added "For us climbing Everest is nothing, it is just a job." Additionally, one interlocutor explained that the majority of people who die on Everest,

[65] Huey et al., "Mountaineers on Mount Everest."

besides in freak accidents like the 2014 avalanche, are not usually Sherpas and are either foreign clients or solo climbers who do not employ Sherpas to assist them. He also compared death rates on Everest to the risks of everyday life- “some people say you go to [the] mountain you can die, but some people die in the city, there are car accidents, motorcycle accidents… [mountaineering as a profession] is not risky.”

2.0: The Commercialization of Mountaineering

Although British surveyors recorded Everest as the tallest peak in the world in their Great Trigonometrical Survey of the Indian subcontinent in 1856, the first serious attempts to climb Everest occurred between 1921 and 1924. Members of the Alpine Club, which was established in 1857 by British mountaineers who climbed mostly in the European Alps, proposed these expeditions. They formed an Everest committee alongside the Royal Geographic Society, which allowed them to gain funding and permits for the expedition.[66] But this funding was extremely hard to obtain- each attempt up Everest cost the modern-day equivalent of millions of dollars, and one critic of the Himalayan expeditions said "You'll deserve a medal just for raising the dough."[67] After decades of Everest expeditions having to scramble for funding through voluntary contributions from foundations, wealthy patrons, media outlets, government agencies, and equipment suppliers; a new method of funding came into popularity- inviting well-endowed clients to pay. By the 1990s, a sufficient number of clients were willing to exchange large amounts of money for the glory and experience of climbing the world's highest mountain. In 1996, Adventure Consultants, an expert New Zealand firm, set the price of an Everest climb at $65,000 (the equivalent of $122,850 in 2022). As more groups entered the market and competition increased, the expedition prices fell. Rainier Mountaineering dropped its price to $59,000, and Peak Freaks began charging $48,500. SummitClimb offered a north-side ascent from China for $27,450.[68] In 2021 Nepal's Department of Tourism issued a record 408 permits, worth about US$4.1 million.[69]

[66] McCurdy, "Reaching for Higher Altitudes."
[67] Unsworth, *Everest*.
[68] McCurdy, "Reaching for Higher Altitudes."
[69] "Everest 2022," 30.

In 1954, Christopher Rand, a reporter with the New Yorker, traveled to Darjeeling to speak with Tenzing Norgay just one year after his monumental summit success. His description of the Western perception of Sherpas at the beginning of the commercialization of their bodies and identities seems almost timeless- "In the view of some Western climbers, the Sherpa is a likable chap, hardy, loyal to the death, and sagacious about problems like frostbite, but childish (there are tales of Sherpas' hiding rocks in each other's packs, and blowing their pay on chang, the Tibetan beer), much in need of outside leadership, and mercenary."[70] Rand additionally spoke about an organization called the Himalayan Club which advised climbing expeditions and contracted out more than a hundred Sherpas. They also kept a log of the Sherpas' vital levels, good and/or bad characteristics, and working history. In the past almost seventy years, the number of Sherpas and members of other ethnic groups working on Everest has grown drastically. Between 350-450 Sherpas are hired above the base camp throughout the spring climbing season.[71] (!!!)

One aspect of the successful 1953 summit expedition that was seen as rather unique at the time was that Tenzing Norgay demonstrated great interest in and fascination with Everest- in January 1953 he vowed at a dinner that he would climb Everest or die. Norgay claimed that his lifelong goal began when he learned from the monks at Thangboche Monastery that "the Buddha God" lived on the mountain, and he left an offering of a chocolate bar, biscuits, and candy on the summit.[72] However, after the ascent Norgay shifted the way he spoke about his motives and de-

[70] Rand, "The Story of the First Sherpa to Climb to the Top of Mt. Everest."
[71] Salisbury, Hawley, and Bierling, "The Himalaya by the Numbers."
[72] "The Low-Profile Pair Who Conquered Everest."

emphasized his Buddhist faith, instead explaining that he wanted to climb Everest because he heard stories about climbing parties in boyhood.[73]

When I asked interlocutors if it had been a long-time dream of theirs to work in the mountaineering industry, there were many mixed responses. Three respondents said that a career in the mountains had been a goal of theirs since they were little, and one respondent added on that he was inspired by his father who had climbed Everest nine times. One respondent said that he wanted to be a pilot when he was younger but because of financial reasons he ended up working in the Khumbu mountains, and another respondent told me that he wanted to be a Buddhist Lama when he was younger, but for similar reasons was not able to. I recently spoke over the phone to one of the initial interlocutors that I met in Nepal, who is now getting ready for the spring 2023 Everest climbing season. I asked him if he was excited to climb Everest again,[74] and he replied "I am not especially excited, this is my job… I'll play with god."

Three respondents said that it was not the career they wanted as children, but because of limited educational and economic opportunities, working in the mountains was the only way they could maintain their livelihoods. As one respondent from Thame explained, when he was growing up the closest school to him only taught up to grade 4. If children wanted to continue their education, they would have to walk three hours in each direction to get to the closest secondary school in Khumjung, starting in the early morning and coming back around 8 or 9 pm. This was a difficult barrier for the respondent, so instead at age 12 began to join his father on treks. When I was in Namche I noticed that there was a hostel for children - "Home Away from Home" - that

[73] Rand, "The Story of the First Sherpa to Climb to the Top of Mt. Everest."
[74] This interlocutor has submitted Everest more than 20 times.

acted as a place for students from far away towns to board during the weekdays so that they could attend the school there. One student told me that on weekends and school holidays, the children typically walk back to their homes to see their families.

2.1: Trans-Himalayan Trade

For centuries, Sherpas and other Himalayan communities relied on trade between Tibet and northern India as their livelihood- an adaptation to the limitations of their environmental conditions such as the limited local repertoire of crop types and highly variable high-altitude crop yields. The region where this trade has historically taken place is hostile to those who aren't properly equipped for snow and cold or knowledgeable about mountain weather and glacier crossings, so local Sherpas are the ideal middlemen. This trans-Himalayan trade led to a decrease in the risk of food shortages, it permitted a larger population in higher altitude areas to be supported than local resources alone would allow, and it allowed for communities to specialize in the crops and livestock that are most suited to local environmental conditions.[75] In 1828 the Nepal government banned non-Khumbu Nepalis from trading across the Nangpa La, a high mountain pass, essentially granting a monopoly on this region of trade. In Khumbu, goods from the south were carried by Rais and by Khumbu, Shorung, and Pharak Sherpas, and were exchanged here for goods from Tibet carried south by Tibetan and Khumbu traders. Many Sherpas of Khumbu also traded southwards, exchanging Tibetan salt and wool in lower-altitude regions of Nepal for grain

[75] Fisher, *Sherpas*.

to be consumed back in Khumbu.[76] The house that I stayed in, in Namche, was over 100 years old and had been bought by its current owners from Khumjung people that used it for trading.

During the 1950 and 60s, geo-political and economic disruptions in Tibet, China, and India took place due to war, civil unrest, border politics, and new trade and transit regulations. These shifts affected the supply of trade goods and transport in Tibet, Tibetan demand for imports, Sherpas' freedom of movement within Tibet, and Sherpa traders' ability to maintain contacts and contracts with their Tibetan trade partners- causing this vast international trade network to become severely disrupted.[77] Some Sherpa traders suffered considerable business losses at this time when their goods were confiscated by Chinese soldiers or their Tibetan trading partners fled without fulfilling their contracts. Additionally, as many as 5,000 Tibetan refugees poured into Khumbu with their livestock, and for the next few years salt, sheep, and wool were so cheap in the region that there was no need for Sherpas to engage in trade with Tibet.[78] Khumbu Sherpas were forced to quickly embrace new opportunities in the tourist industry by the mid-1970s, establishing a new regional and household economy in which the former role of trade had been almost entirely transferred to tourism. However, many traders were able to survive this shift in dominant economic industries in Khumbu by adjusting their scale of trade, primary products, and routes to the new conditions.[79]

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[76] Stevens, *Claiming the High Ground Sherpas, Subsistence, and Environmental Change in the Highest Himalaya*.
[77] Bjønness, "External Economic Dependency and Changing Human Adjustment to Marginal Environment in the High Himalaya, Nepal."
[78] Stevens, *Claiming the High Ground Sherpas, Subsistence, and Environmental Change in the Highest Himalaya*.
[79] van Spengen, "The Geo-History of Long-Distance Trade in Tibet 1850-1950."

Khumbu's transition of primary economic production method from transregional trade supplemented by subsistence agriculture and animal husbandry to a tourist-driven economy is supported by the information I collected during my interview process. Many respondents said that while their parents engaged in the agricultural or tourism industries, their grandparents or great-grandparents were primarily traders, with some agricultural production to supplement their livelihoods. One of my interlocutors told me that his mother's main duty was to look after the children and sometimes work on the farm growing wheat, and his father was a trekking guide for Everest Base Camp and Annapurna until his retirement at 65 years of age. Now, because of this mountaineer's engagement in the adventure tourism sector, he is able to support his elderly parents and provide a place for them to live in Kathmandu during the winter when their home in Thame gets too cold. This respondent's grandparents, however, lived in their hometown of Thame from birth until death. Their livelihoods were supported by bilateral trade of primarily salt, wheat, and clothing with Tibet (now China). It took them about seven days with yaks to make the journey from Thame to Tibet, or about three days of walking. This mountaineer also told me that about seven years ago, the border between China and his home region of Thame in Khumbu closed, which has prevented people from crossing. However, I could not find any information online to support his statement. This could indicate either that this is a specific and localized issue that may not be projected on a global stage, or that there was some level of miscommunication between us.

2.2: Everest Mountaineering Today

One study respondent outlined the process that many people from Khumbu go through to become a mountain guide. He started at age 12 as a porter, carrying a load of about 30 kg from Jiri

to Everest Base Camp (185 km), and after a few years was able to work as a yak driver. Next, he began trekking and worked as an assistant guide for local trekking agencies to EBC and Annapurna Base Camp. At 18 years of age, he became a full guide for those base camp treks and additionally started working as an assistant guide on some of the 6,000-meter peaks in SNPBZ such as Island Peak and Lobuche. Again, he moved up the ranks to be a lead guide for those more "approachable" mountains, and at 22 years old in 1992, he began working at high altitudes. After two years of training he was allowed to join his group on their summit attempts and at 24 years old he summited Everest for the first time. Now, he works as a lead guide on many of the world's highest mountains and typically oversees about 7 assistant guides. For typical summit attempts on Everest in particular, he does not guide clients himself but leads a group of 15 people total (7 guides, 7 clients, and himself) to the top.

The amount of money Khumbu porters and guides make from mountaineering expeditions varies based on many factors- number of years of experience; extensiveness of official training; tour agency employer; and for porters, the weight of the load and altitude of the job. One of my study respondents delineated the pay scale for porters on Mount Everest expeditions, explaining that they typically make more money for the more weight they carry and more money for the higher the altitude that they are working at. For example, a porter transporting goods between Camp 3 and Camp 4 on Everest will make more than a porter who carries a load of the same weight between Camp 1 and Camp 2. And a porter carrying a load heavier than their colleague but between the same two camps will make more. As for the guides, a world-renowned Sherpa mountaineer that I spoke to explained that typically guides make around USD$7,000 - 8,000 per summit, but that luxury expeditions can pay between $10,000 - 12,000. The "luxuries" that these $130,000+

expeditions provide include two or three Sherpa guides per client (the normal is one guide for one client), and fresh meat and vegetables that are directly flown in from Kathmandu.[80] This mountaineer in particular has guided members of the royal families of Bahrain and Qatar, and he told me that in 2020 due to Covid, Manaslu (8,163m) was open only to the prince of Bahrain, and the expedition that guided him.

For Everest expeditions offered in 2023, the average price is estimated to be $58,069, which increased by over $3,000 in one year. The average cost to climb Everest in 2022 was $54,972, with a median price of $46,995.[81] Not built into the expedition prices includes extra tips for the guides and porters, as well as a summit bonus if the group is successful. My interlocutors explained that this bonus could be up to $3,000, which can cause Sherpa guides to be more encouraging and even sometimes push their clients' limits. For the climbing agency 8K Expeditions, a $1,500 summit bonus is required from all successful clients, though they can choose to go beyond that amount. Additionally, many respondents expressed that foreign guides tend to make a lot more money than local guides. Multiple online sources claim that Western guides can make up to $50,000 per Everest expedition,[82] but there is no clear estimation of their average salary available.

The commercialization of mountaineering in the Everest region has facilitated some positive changes, besides providing the mountain communities with increased socio-economic

[80] Whereas shelf-stable foods and expedition equipment are typically flown by helicopter to lower-elevation towns and then carried by porter or yak to EBC over the course of a few day walk, fresh meats and vegetables are taken directly by helicopter from Kathmandu to EBC to avoid spoilage.
[81] "Expedreview - How Much Does It Cost to Climb Mt Everest in 2023?"
[82] "How Much Do Sherpas Get Paid To Climb Mt Everest?"

agency. Infrastructure development has been an integral part of these changes, as many schools, roads, and hospitals have been constructed in recent years. In 1961 Edmund Hillary, after completing the first successful summit of Everest alongside Tenzing Norgay, sponsored the construction of the Khumjung school.[83] The boom of Everest tourism also brought medical services to the region, but the hospitals that have been built in Khumbu primarily cater to illnesses induced by high altitude conditions. This displays how the healthcare development of Khumbu continues to center tourists' needs, even though the peak tourism season is only a small portion of the year, and thousands of local people who rarely face high altitude sickness continue to occupy this region year-round.

The construction of roads in the Everest region has had the goal of improving high-elevation mountain communities' access to goods that they would otherwise have a hard time getting to. However, of course, the primary focus of this infrastructure development has been to provide for the large quantities of tourists who seek Western amenities and comforts. I also partook in this pipeline of processed and globalized goods that have been transported from Kathmandu to Khumbu. I arrived in Namche on my 21st birthday (June 12) and went to the only open bakery in the town to treat myself to some chocolate cake. However, the brother-in-law of the woman that I was staying with saw me come out of the bakery, and warned me against eating there, as those baked goods had been sitting there for weeks or months due to the lack of tourists and their inability to import food. Unfortunately, I had already enjoyed an entire slice of cake and spent the rest of my birthday in the bathroom. Additionally, although staying with a host family meant that I was eating large quantities of the most nutritious, fresh, and tasty food every day, I still craved artificial

[83] Puig, "3 VILLAGES, 3 SCHOOLS AND THE CONVICTION OF A MOTHER – SHERPA LIFE PROJECT."

snacks that reminded me of home. Throughout my two months in Khumbu, again due to the lack of imported goods during the monsoon season, I pretty much sold out every store of their cheese balls and spent way too much money on expensive chocolate (a Cadbury chocolate bar that would cost $2-3 in America cost $7-8 in Namche Bazaar). The only store that had cheese balls left by the time I departed Namche knew me well, and when I stopped by with the man who was guiding me to Everest Base Camp, he had a conversation with them (I only understood the words "cheese balls") and commented to me after- "everybody knows you, you are a Namche local!"

Because I spent time in Khumbu during the summer monsoon months, I was not able to see the region during peak tourist season, and I could only extrapolate what Khumbu would look like filled with tens of thousands of people. However, being there during the off-season allowed me to see how Khumbu communities live when they don't have to cater to the needs of foreigners. Many of the shops, lodges, and restaurants were closed and people instead spent time socializing, playing volleyball next to the town Stupa, working in their gardens, and cooking delicious meals. I was able to help the family that I was staying with in the garden, do laundry, paint, and I occasionally looked after children while their mothers chatted. I was also able to observe and participate in a lot of celebrations and fun that Khumbu communities engaged in during the slower monsoon season. Dumji is an eight-day festival during June or July in which rituals and dances are performed by monks, and townspeople celebrate with food, drinks, and dance to honor the anniversary of Guru Rinpoche's birth. Another activity that I was able to participate in that I do not think would have been possible if I had been there during peak tourism season was a town tradition rooted in Tibetan Buddhist culture where dozens of men and women from Namche walked a few miles to Theshyo Khola river. The men and women separated when we arrived at

the river so that we were out of sight of each other, and many of the women stripped down and bathed in the freezing cold river. I joined them with a very quick dip and after the women engaged in a singing competition while sharing snacks and hot tea.

Many mountaineers and trekking guides that I spoke to discussed the difficulties of their jobs before the tourism industry in Khumbu took off. There were minimal teahouses, lodges, and restaurants, so trekking groups would have to carry their own tents, kerosene, and food. The guides would also have to cut down or carry wood in order to cook hot meals for trekkers. But the growth in services accommodating to tourists has been mostly positive as an interlocutor expressed- "These days trekking is very easy, people like easy, everything is fine, we have teahouse and hotel, we don't need sleeping bag or mat, don't take food." This demonstrates that the introduction of adventure tourism in the Everest region does not just benefit local mountaineers, guides, and porters, but it also promotes the local economy of those who do not directly engage with mountaineering or trekking. However, while the local economies and lifestyles of Khumbu are integrated into global markets through the influx of tourists in the region,[84] the necessitated increase in production has significantly exacerbated resource insecurity.[85]

[84] Spoon and Sherpa, "Beyul Khumbu."
[85] Aubriot et al., "Reconfiguration of the Water–Energy–Food Nexus in the Everest Tourist Region of Solukhumbu, Nepal."

3.0: Climate Change in the Himalayas

For the 6,000 years of human civilization prior to the Industrial Revolution, carbon dioxide levels hovered around an average of 280 parts per million. However, since the start of global industrialization, human activities have generated an estimated 1.5 trillion tons of CO2 pollution. In May of 2022, the National Oceanic and Atmospheric Administration (NOAA) measured carbon dioxide rates that peaked for the year at 421 parts per million, levels comparable to those during the Pliocene Climatic Optimum, which occurred between 4.1 and 4.5 million years ago. During that time, ocean levels were between 5 and 25 meters higher than today. If the seas rose to those levels in the near future, it would mean that many of the world's largest modern cities would be submerged underwater.[86] By 2100, ecosystems will be exposed to atmospheric CO2 levels substantially higher than in the past 650,000 years, and global temperatures at least among the highest of those experienced in the past 740,000 years.[87] This will alter the structure, reduce biodiversity and perturb the functioning of most ecosystems, and compromise the services they currently provide.

About 20% of the world's population, 1.2 billion people, reside in mountain areas, and around half of humankind depends on the resources that these mountains provide.[88] Rural mountain communities are especially susceptible to the early effects of global climate change, due

[86] "Carbon Dioxide Now More than 50% Higher than Pre-Industrial Levels."
[87] Masson-Delmotte et al., "An IPCC Special Report on the Impacts of Global Warming of 1.5°C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty."
[88] Rai et al., "Assessing Climate Change Trends and Their Relationships with Alpine Vegetation and Surface Water Dynamics in the Everest Region, Nepal."

to their reliance on sustenance practices and the fragility of their environment. Landslides and flooding caused by excessive melting of the glaciers threaten agricultural productivity, the ability to rely on safe transportation, stable water supply, and even human survival. Additionally, historical climate evidence in some regions of the eastern Himalayas has shown remarkable warming trends at a rate of 0.06 C per year, and average precipitation has increased by 6.52 mm per year.[89] This warming is due to rising concentrations of greenhouse gasses that are emitted by anthropogenic activities such as large-scale agriculture and transportation systems.[90]

There is significant evidence that the rate of temperature increase is amplified with elevation, meaning that high-altitude mountain environments are warming more rapidly than low-altitude environments- a theory known as elevation-dependent warming (EDW).[91] In a study conducted between 1981-2010, it was found that average annual temperature trends on the Tibetan Plateau increased by about .1°C for every 1,000m increase in station elevation.[92] EDW can accelerate the rate of change in mountain ecology and hydrological/cryospheric systems. In 2015, Pepin et al. identified the mechanisms that contribute to EDW: snow albedo and surface-based feedbacks; water vapor changes and latent heat release; surface water vapor and radiative flux changes; surface heat loss and temperature change; and aerosols.[93]

[89] Shrestha, Gautam, and Bawa, "Widespread Climate Change in the Himalayas and Associated Changes in Local Ecosystems."
[90] US EPA, "Sources of Greenhouse Gas Emissions."
[91] Wang, Fan, and Wang, "Evidence of High-Elevation Amplification versus Arctic Amplification."
[92] "Surface Air Temperature Variability and Its Relationship with Altitude & Latitude over the Tibetan Plateau in 1981-2010."
[93] Pepin et al., "Elevation-Dependent Warming in Mountain Regions of the World."

80% of annual rainfall in the Everest region occurs between the monsoon months of June to September, but warming temperatures affect cryospheric processes and the related hydrological cycles, which can potentially delay and/or weaken the monsoon. This will reduce snow and ice accumulation on local glaciers, and increase the rate of development of glacial ponds and lakes.[94] To predict the effects of these environmental changes and protect local communities, extensive research has been/is being conducted on shifting climate and ecological patterns in the Himalayas. Between 2012 - 2014, a group of climber scientists, through the High Mountains Adaptation Partnership, conducted research on high-mountain glacial watersheds in Nepal and analyzed the potential impacts and dangers of climate change. They identified six priority climate-induced hazards in Khumbu which are, in order of importance: GLOFs, landslides, heavy snowfall, windstorms, forest fires, and floods. In the three Khumbu Village Development Committee regions, a total of 1284 households were found to likely be affected by Glacial Lake Outburst Floods and 927 by landslides.[95]

The Everest region is characterized by glaciers that are heavily debris-covered from rock fall avalanches and moraine ridge collapses. The first study of glaciers in the region was conducted by Fritz Müller in 1956, and about 50 years later Bajracharya et al. mapped 3,808 glaciers across Nepal. They concluded that glaciers below 5,800m in elevation are retreating, but in general, the number of individual glaciers in Nepal is increasing as larger ones break up.[96] The hydrological processes of these glaciers feed the Indus, Ganges, Brahmaputra, Yangtze, and Yellow Rivers, and

[94] Wagnon et al., "Seasonal and Annual Mass Balances of Mera and Pokalde Glaciers (Nepal Himalaya) since 2007."
[95] Byers et al., "Promoting Science-Based, Community-Driven Approaches to Climate Change Adaptation in Glaciated Mountain Ranges."
[96] Bajracharya, Maharjan, and Shrestha, "Glaciers Shrinking in Nepal Himalaya."

the distribution of these natural systems has the potential to impact the water supply of over 1.4 billion people.[97] As temperatures warm, ice underneath the debris is slowly melting which causes the formation of supraglacial lakes. This could have short-term positive impacts, such as bringing a freshwater supply for irrigation and drinking to the lowland, downstream populations. However, most glacial lakes are formed by blockades of ice, and glacier/landslide debris, which are inherently unstable and make these lakes especially susceptible to glacial lake outburst floods (GLOFS).[98] Additionally, a significant decreasing trend in average annual streamflow and minimum annual streamflow in the Everest region has been shown.

Watson et al. examined nine glaciers in the Nepali / Tibet region throughout 16 time periods using fine-resolution imagery from Google Earth, WorldView, GeoEye, and QuickBird. They conducted object-based image analysis (OBIA) to find the boundaries of supraglacial ponds. The results from this study include: Ngozumpa Glacier, the largest glacier in the Himalayas, displayed a net loss in the area of its supraglacial ponds of 29,864 m² between Nov. 2009 - Dec. 2012; Rongbuk Glacier gained 1,664 m² between Oct. 2011 - Feb. 2015; and the Khumbu Glacier (Everest's glacier) gained 99,889 m² between Nov. 2009 - Feb. 2015. Researchers also found that there were more ponds evident during summer periods than during the preceding winter, and an exceptional increase in ponded area was found on Khumbu and Ama Dablam glaciers in May 2009. Spillway Lake, the most well-known supraglacial lake on Ngozumpa Glacier, expanded over

[97] Wood et al., "Melting Himalayan Glaciers Threaten Domestic Water Resources in the Mount Everest Region, Nepal."
[98] Rai et al., "Assessing Climate Change Trends and Their Relationships with Alpine Vegetation and Surface Water Dynamics in the Everest Region, Nepal."

the period Nov. 2009 - June 2010, but displayed an overall net loss of 34,566 m² from Nov. 2009 - Dec. 2012.[99]

In 1979 the World Bank predicted that as Nepal had lost half of its forest cover within a 30-year period (1950-1980), by the year 2000 no accessible forest would remain.[100] This was one of the first declarations to begin the conversation on issues in conservation in the Himalayas, but scientific research at these altitudes has proven to be extremely challenging, as it is hard to get to and transport materials to the mountain regions, and the conditions at high elevations are not favorable to human life. However, in 1992 at the Rio de Janeiro Earth Summit (also known as the United Nations Conference on Environment and Development, UNCED), mountainous regions began to receive worldwide attention for their fragile environments and susceptibility to climate change. Soon, mountain ecosystems were getting the same level of concern as the hot topics of rainforests and oceans, and the global conversation concerning rapid environmental changes in mountainous landscapes intensified. In 2007 The International Center for Integrated Mountain Development (ICIMOD), motivated by extreme concern about climate change, conducted research aimed at establishing a correlation between biodiversity, ecosystem functioning, and ecosystem services for human wellbeing.

When asked about local environmental changes and global warming in the Himalayas, many Khumbu residents that I spoke to expressed that they have noticed drastic developments in weather patterns in recent years. A lodge owner in Pheriche told me how it used to snow there between 2 - 3 meters when he was a kid, but now it rarely snows anymore. After I crossed Cho La,

[99] Watson et al., "The Dynamics of Supraglacial Ponds in the Everest Region, Central Himalaya."
[100] Ives, *Sustainable Mountain Development*.

a mountain pass west of Everest, the man guiding me who has led more than 100 treks to Everest Base Camp, told me that when he first started guiding (~30 years previous) the large icefield we had walked up was once about 50 meters taller than it currently was. He also observed that the ice falls at EBC have been changing in shape and form in recent years- the peaks have been getting shorter and the bases smaller. One interlocutor that I spoke to, who is relatively new to the Everest mountaineering industry, noted that throughout his stay at the Base Camp in the spring climbing season of 2022, he noticed that temperatures were substantially warmer than the few years previous. Another respondent expressed that although the start of the climbing season has remained very cold throughout the years, by the end of the season in recent years there have been more visible pools of glacial meltwater. He additionally observed that some of the glaciers in the Everest region have been moving down about 40-50 feet per year, and that entire glaciers have disappeared throughout his lifetime. The connection between climate change and garbage on Everest was made by one of my interlocutors, who said that most of the trash on the mountain is from before climbing regulations were imposed in 1996. Much of this garbage has been buried under ice for decades, but because of global warming, the litter is starting to show.

One respondent, who has guided two successful summits of Everest and been to Base Camp "countless times," explained that when he first started working in the mountaineering industry, the use of crampons was essential for basically all of the trek to Everest's summit. Now, climbers only have to wear crampons much closer to the summit because of the lack of snow at the lower elevations of the mountain. Another interlocutor who contributed his perspective on climate change in Khumbu said "This year [2022] the glacier moved very quickly, we used to have glacier melt in the second or third week in May, but in April the glacier was melting very quickly… when

an icefall doctor is fixing a glacier, it changes quickly… I have to send more icefall doctors [to fix ropes]."

When asked about the effects of climate change in Khumbu, one respondent contextualized warming in Khumbu within the conversation of global climate change- "climate change [is] not only [in] Khumbu, but in the whole world… not only melting in Khumbu icefall on Everest, global warming [is] affecting the whole world." He explained that as he has traveled the world and climbed mountains on almost every continent, he has noticed melting on many other peaks such as Kilimanjaro and Elbrus. Additionally, he noted the effects of climate change on other ecosystems in Nepal, such as the jungle. Because the jungle is drying out, the grass is not growing as quickly and abundantly which means that the jungle animals are increasingly encroaching on human territories and eating the food growing on their farms. This mountaineer also expressed that although many people are meeting to discuss the effects of climate change in the Himalayas, "what can they do?" to fix the issue.

The conclusions I reached through conducting interviews about attitudes towards climate change in Khumbu reflect claims found in relevant literature. In "Climate Change, Risk Perception, and Protection Motivation among High-Altitude Residents of the Mt. Everest Region in Nepal", author Neelam Poudyal, when asking about changes in various measures of climatic conditions, found the vast majority of respondents (more than 70%) reported witnessing increases in temperature and drought in the Khumbu region. Additionally, more than 75% of respondents reported noticeable decreases in both the intensity and frequency of snowfall and increases in temperature and drought. About 76% of participants stated that there have been more extreme

weather events recently, and over 80% agreed that weather conditions in the region have been less reliable over the years and will continue to be so in the future. Around 58% of respondents reported that changing weather patterns had already begun to harm their farms, and 72% expressed that changing weather patterns in Khumbu can / will hurt tourism.[101]

One interlocutor expressed to me that he has seen rapid glacial melt in the Everest region, specifically of Imja Glacier whose meltwater created one of the fastest-growing glacial lakes currently being studied. Imja has been of high interest to scientists for years because of its rapid growth and capacity for monumental devastation if it were to burst. Over 51 years, Imja Lake grew at a rate of 0.026 ± 0.001 km^2 per year, expanding from its 1962 area of 0.03 ± 0.01 km^2 to 1.35 ± 0.05 km^2 in 2013.[102] If this rapid melting continues, as one respondent put it, "Khumbu won't be safe." As global warming causes an increase in the number of avalanches and crevasses opening on the world's highest mountains, summit attempts become even more dangerous.

[101] Poudyal et al., "Climate Change, Risk Perception, and Protection Motivation among High-Altitude Residents of the Mt. Everest Region in Nepal."
[102] Thakuri et al., "Factors Controlling the Accelerated Expansion of Imja Lake, Mount Everest Region, Nepal."

Figure 1: 1956 Photo by Fritz Müller

Figure 2: Alton Byers' 2007 Photo of Pheriche Valley

Figure 4: Mountains in Pheriche in 2022

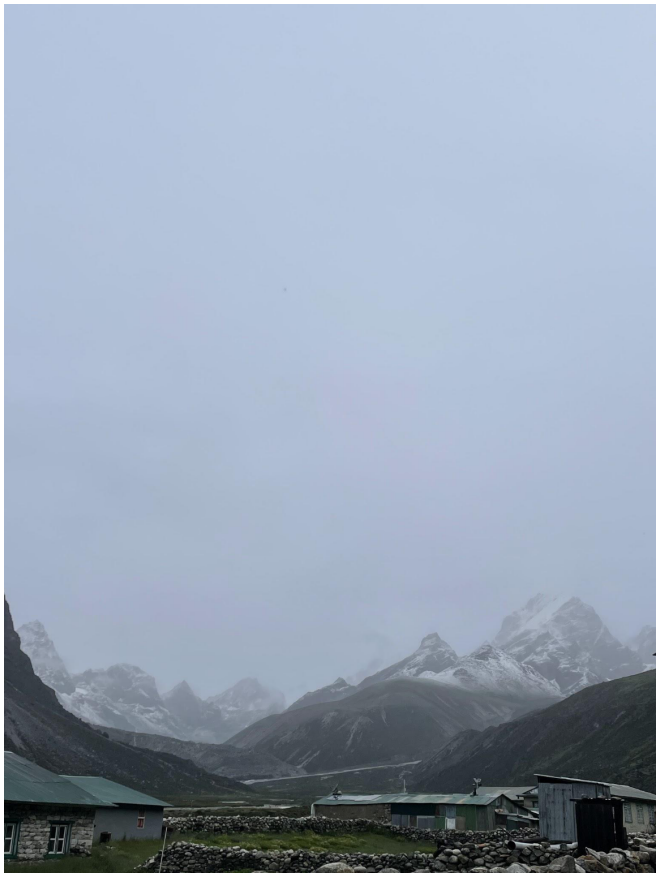


Figure 3: Mountains in Pheriche in July 2022

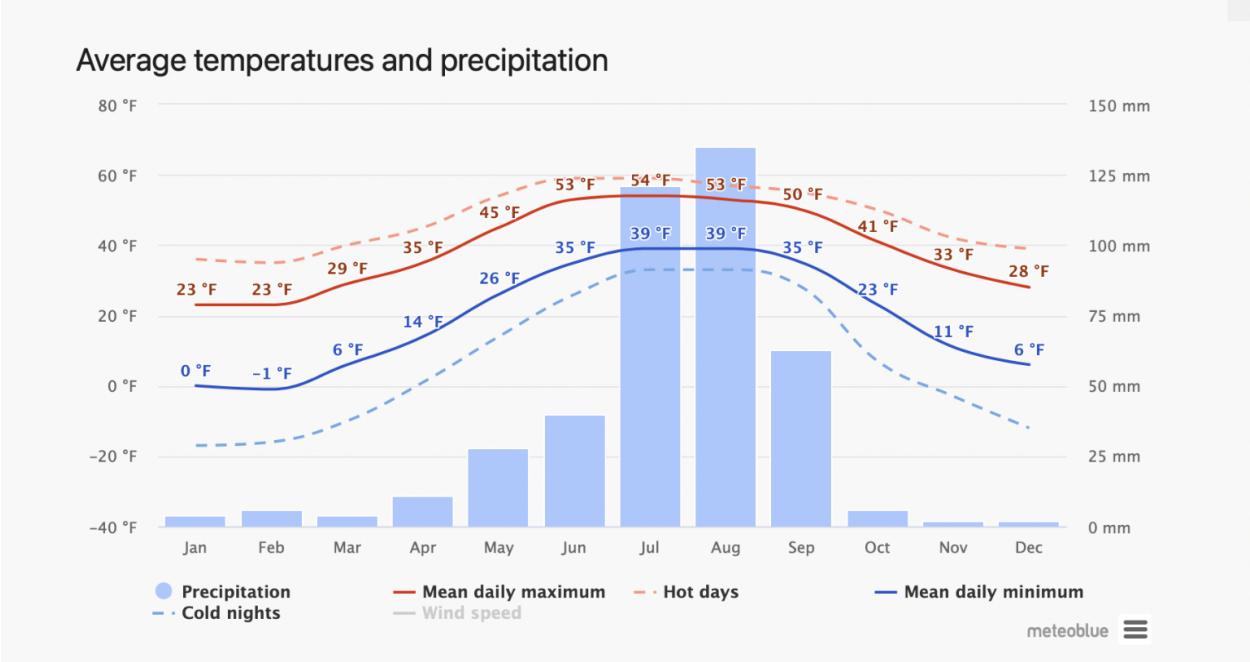
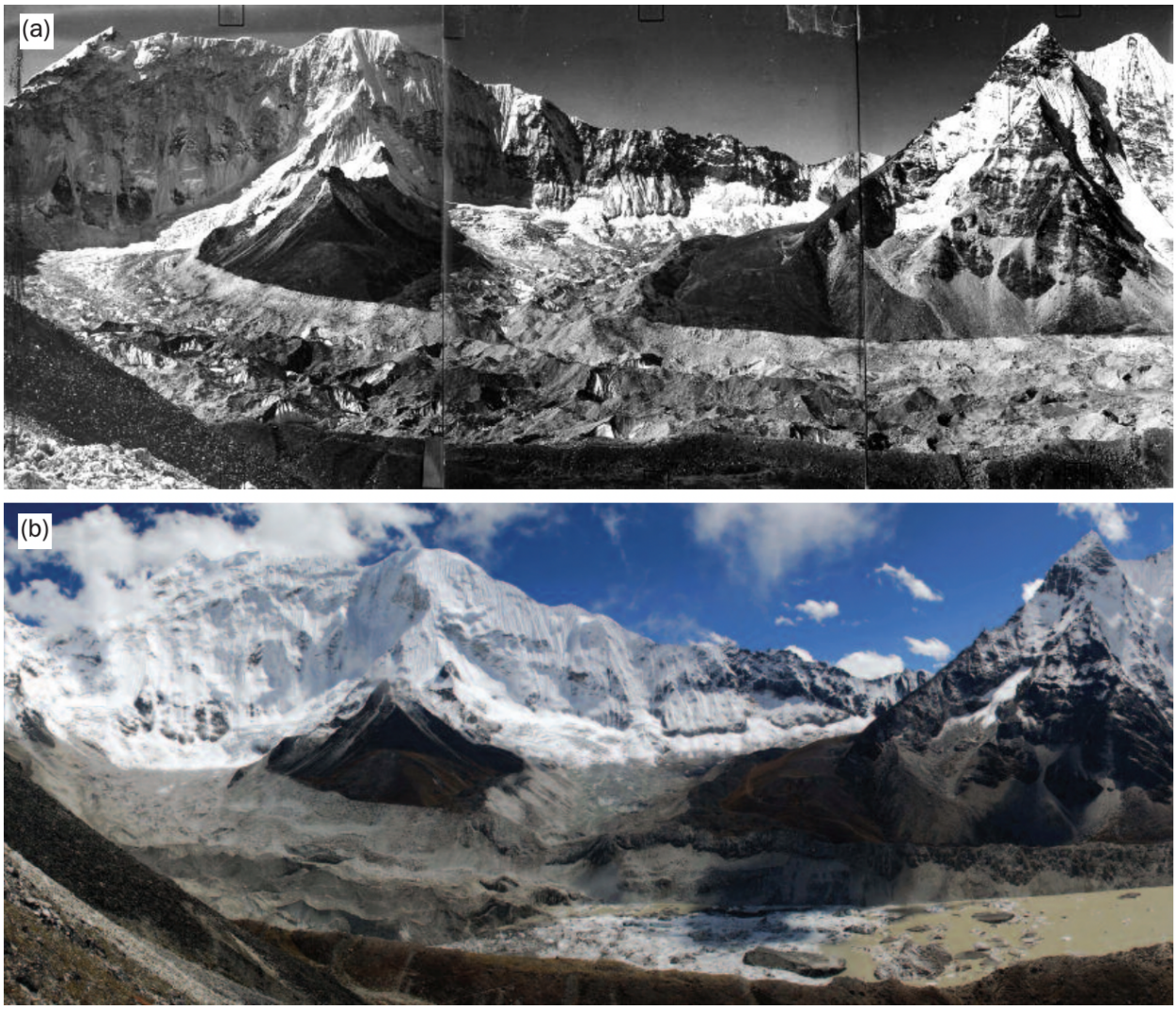


Figure 5: Average Temperatures and Precipitation on the Khumbu Glacier

These photos depict the valley surrounding Pheriche, a village in Khumbu that lies at an elevation of 4,371 m (14,340 ft). In the 1956 photo taken by Swiss glaciologist Fritz Müller (figure 1), it can be easily seen that the three peaks circled are covered in a substantial amount of snow and ice. In contrast, the 2007 photo captured by National Geographic researcher Dr. Alton Byers (figure 2) shows a significant decrease in the amount of snow. Further, the photos I took this past summer (figures 3 & 4) reveal that even more of the ice cover is melted. In 1956, Fritz Müller was on a trek to Everest as part of a mission to be the second group ever to summit, so I estimate that he captured the photo of Pheriche between the months of March and May.

As displayed in the graph "Average Temperatures and Precipitation of the Khumbu Glacier" (figure 5), there is little precipitation in these months, and the average temperature stays relatively low. Alton Byers took his 2007 photo in October, which has similar average temperature and precipitation rates as April. On the other hand, I took photos of Pheriche in July, during the monsoon season that brings high rates of precipitation which manifests as snow at these high altitudes. Many tall mountains in Khumbu such as Everest and Lobuche are inaccessible to climbers during the summer months because of the heavy snow. Although the peaks in the photos are not as high in altitude, their height of about 5,700 m or 18,700 ft is still enough that rain in the valley means snow on top of the peaks. In this sense, a photo taken in July should mean that the snow cover on top of the mountains above Pheriche should be more than in October. This indicates that climate change and global warming have already had a significant impact on the Himalayan mountains.



Imja Glacier: Photo A was taken in 1956 by Erwin Schneider, and photo B was taken in 2012 by Alton Byers.[103]

[103] Byers et al., "Promoting Science-Based, Community-Driven Approaches to Climate Change Adaptation in Glaciated Mountain Ranges."

3.1: Climate Knowledge Production

The process of producing knowledge manifests through cultural beliefs, social contexts, and lived experiences at the individual, community, and institutional levels. In many regions of the world, these ways of understanding and interacting with the world are often produced and shared within a community, rather than by individuals on their own.[104] Traditional natural resource management systems are based on an ecological understanding of the varying resource users' direct and crucial dependence on, and control over, local resources. Communities' close proximity to and functional knowledge of the resources also provides an important foundation for management policies.[105] Vine Deloria, in 2001 argued that Western knowledge systems determine what can be regarded as scientific "facts" through the preservation of rigid and allegedly objective boundaries. As a result of this structural barrier, humans' connection with nature has been compromised.[106] There is a long history of marginalization of Indigenous communities through erasure, devaluation, and exploitation that is continuing today. However, preserving, revitalizing, and incorporating Indigenous knowledge into Western knowledge systems through the respect and inclusion of Indigenous voices, can be a powerful tool for decolonization.

To address how climate knowledge is produced, represented, and sometimes weaponized, I employ the example of Imja Lake, which is located about 9 km south of Mount Everest and is categorized as one of the most dangerous glacial lakes in the Himalayas. The lake has been of high

[104] Odeku and Meyer, "Knowledge Production, Community Engagement/Development and Global Climate Change."
[105] Berkes and Folke, "Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience."
[106] Deloria, Jr, and Wildcat, *Power and Place*.

interest to foreign and Nepali scientists since the late 1980s,[107] but recently residents of Dingboche, the most populated town closest to Imja, have expressed exasperation with these scientists due to their lack of communication and reluctance to share results. Some scientists have exaggerated Imja's GLOF potential and damage to downstream populations, infrastructure, and agricultural land - warning that a catastrophic flood was imminent - while others have downplayed the dangers of potential flooding. [108] This has generated much uncertainty and confusion, and a group of researchers' conversations with local inhabitants between the years of 2009-2011 found that the inconsistency in study conclusions regarding flooding dangers has had detrimental effects on the emotional well-being of local populations. One group in particular, scientists from Japan, deeply frightened these local communities by exaggerating the dangers of a GLOF.[109] Scientific studies have a distinct and limited timeline where researchers are only present in an area for a given amount of time, so when they state their findings, scare local communities, and then leave, Khumbu residents are left to deal with the turmoil left behind.

Indigenous knowledge is commonly seen as the product of generations of direct engagement with the natural world through ongoing observations, experimentation, and collective learning. This knowledge is usually localized to a specific ecosystem and because of that it varies widely on the individual, community, and regional scales. When discussing the effects of climate change, the way that communities perceive these shifts is grounded in their spatial, temporal, and ecological knowledge. For example, the presence of spirits at high-altitude lakes and other natural

[107] International Centre for Integrated Mountain Development et al., *Glacial Lakes and Glacial Lake Outburst Floods in Nepal*.
[108] Ives, *Sustainable Mountain Development*.
[109] Watanabe et al., "The Need for Community Involvement in Glacial Lake Field Research."

features is a common belief among many communities in the Himalayas.[110] When the Nangama glacial lake burst, one of the local interpretations of the events leading to the GLOF is that the lake had been inhabited by a local deity who became angry with humans whose activities disrupted/defiled it- "modern people have become wicked, so bad things happen." This combination of Indigenous knowledge and traditional spiritual and religious beliefs links greed, the erosion of traditional practices, and lack of respect for gods, deities, and spirits with negative social and environmental consequences.[111]

One of the most important factors contributing to how climate knowledge is produced is the accessibility of study locations to researchers. The more vulnerable environments are to extreme weather events and conditions, the more difficult they will be to access. For this reason, there is a bias regarding where to establish systems used for gathering meteorological and climatic data, even if the location is not the most effective. For example, in the High Mountain Asia (HMA) region, Automatic Weather Stations (AWS) are more likely to be constructed at lower elevations and more convenient locations, so long-term meteorological stations at high altitudes are sparse.[112] However, as technology and science advance, researchers are finding ways to adapt to extreme environments to collect increasingly important climate data. Establishing research sites at high altitudes allows for better, more direct, and continuous monitoring of the jet stream winds, a very important facet of climate change. The winds' circulation patterns are globally significant in that they change in strength and location as the climate warms due to anthropogenic activities.[113]

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[110] Ortner, *High Religion*.
[111] Byers et al., "Reconstructing the History of Glacial Lake Outburst Floods (GLOF) in the Kanchenjunga Conservation Area, East Nepal."
[112] "Going to Extremes: Installing the World's Highest Weather Stations on Mount Everest in: Bulletin of the American Meteorological Society Volume 101 Issue 11 (2020)."
[113] Abish, Joseph, and Johannessen, "Climate Change in the Subtropical Jetstream during 1950–2009."

Another barrier to climate knowledge production is that there has been a historic lack of consistency in the methods and data used to quantify the rate and patterns of warming- including differences in the time periods examined, the stations compared, the elevational range selected, and the temporality of the data.[114] This limitation is further intensified within systems of structural inequality that gatekeep metrics and practices to purposefully restrict access to "objective science" from those without formal education. In 2021, a study published in Nature found that despite countries in the Global South facing the most pronounced impacts of climate change, research investigating the impacts of climate change are more likely to be focused on the Global North.[115] The theme of exclusion is clearly evident when analyzing the membership and policies of the Intergovernmental Panel on Climate Change. In 2021, Chakraborty and Sherpa exposed the IPCC for maintaining "... organizational and functional biases which include a geographical bias favoring experts from the global north, a gender bias in favor of men, a disciplinary bias in favor of the natural sciences over the social sciences and humanities, and finally, a cosmological bias favoring western science over indigenous knowledges."[116]

3.2: Environmental Colonialism

Participation in the global capitalist market is what has allowed foreign tourists to visit Khumbu, but these systems are inherently intertwined with structures of colonial rule and marginalization. Further, deep histories of settler colonialism are what underlie many

[114] Pepin et al., "Elevation-Dependent Warming in Mountain Regions of the World."
[115] Callaghan et al., "Machine-Learning-Based Evidence and Attribution Mapping of 100,000 Climate Impact Studies."
[116] Chakraborty and Sherpa, "From Climate Adaptation to Climate Justice."

environmental issues in the Global South. An understanding of how these inequalities are produced and maintained is generally missing from conservation development initiatives' frameworks:[117]

> *Rather than problematising the environmental histories of settler colonialism and white supremacy, contemporary practices of environmental governance offer specific forms of recognition that are inscribed from the outset, narrowly defining the field of regulatory interventions in ways that leave intact the broader relations underlying environmental disparity.*

As demonstrated frequently throughout an array of disciplines, legacies of colonialism have led to substantial ecological devastation in many parts of the world.[118] Environmental colonialism began as embedded within imperial systems of market generation, development, and power. Direct destruction of local habitats occurred through the exploitation of natural resources, as well as military campaigns to establish legitimacy. One example is found in the colonization of New Zealand, where European settlers confiscated land from Māori tribes and took over most of the country so that they could extract as much timber as possible from the forests. Present-day New Zealand has at least 60% fewer forests than before European colonization, and dozens of endemic bird species have gone extinct.[119] After causing direct destruction of habitats, the subsequent manifestation of environmental colonialism can be seen in the policies of governing bodies that restrict Indigenous use and control of, and reliance on their land. I will more deeply explore this concept within the context of Sagarmatha National Park in Chapter 5.

[117] McCreary and Milligan, "The Limits of Liberal Recognition."
[118] Pouchepadass, "Colonialism and Environment in India."
[119] "Deforestation and Colonization of Aotearoa/New Zealand – The Decolonial Atlas."

The third form of environmental colonialism has been made possible through globalization, which has constructed a reality where small actions in one area can adversely impact regions on the other side of the world. Through this, environmental colonialism has become its own entity that no longer relies on institutions of direct (and often physical) subjugation. The disparity between many countries' emission rates and level of vulnerability to the negative effects of climate change is one example of how environmental colonialism has shifted in practice and scope. Now, the discussion of the effects of settler colonialism on local and global ecosystems includes concepts of vulnerability, adaptation, and adaptive capacity. The 2001 Intergovernmental Panel on Climate Change (IPCC) report on climate change impacts, adaptation, and vulnerability established these key definitions:[120]

> Vulnerability: *"the degree to which a system is susceptible to, or unable to cope with, the adverse effects of climate change, including climate variability and extremes"*
> Adaptation: *"adjustments in ecological, social or economic systems in response to actual or expected stimuli and their effects or impacts. This term refers to changes in processes, practices and structures to moderate potential damages or to benefit from opportunities associated with climate change"*
> Adaptive Capacity: *"the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences."*

The Notre Dame Global Adaptation Initiative uses data-driven methods to identify the areas of the world most vulnerable to the effects of climate change with the goal of preventing large-scale disasters. They calculated the vulnerability of Nepal to be 0.521 (the closer to 0, the

[120] McCarthy and Intergovernmental Panel on Climate Change, *Climate Change 2001*.

less at risk a country is), and their readiness to be 0.356 (the closer to 1, the more prepared a country is). In comparison, the vulnerability of the United States was found to be 0.296, and their readiness 0.683. Switzerland at the #1 spot for vulnerability to preparedness ratio has a vulnerability score of 0.255 and readiness score of 0.694; and Niger at the last spot, #182, was found to have a vulnerability score of 0.675 and readiness score of 0.333. On this list, Nepal's vulnerability to preparedness ratio was identified as #139, a substantially low ranking.[121] These measurements of vulnerability appear to have a negative association with global rates of greenhouse gas emissions. In 2020, researchers calculated countries' greenhouse gas emissions per capita. They found that the United States emits an estimated 17.1 tonnes of CO2 per person, and Canada, which is rated as the #8 least vulnerable to climate change, emits about 18.8 tonnes per person. On the other hand, Nepal's estimated greenhouse gas emissions per capita were found to be 0.47, and India's was calculated as 2.5 tonnes per person.[122]

3.3: Water Governance and the Agricultural Sector

Agriculture is a key concern within the climate change discourse, as predictable and reliable food production is at the foundation of human welfare.[123] In Nepal, the climate is an especially important determinant of agricultural productivity as the country lacks many of the resources that are essential to controlling the natural environment. In general, Khumbu residents seem to be more concerned about the seasonal variability of precipitation, which significantly influences their agricultural productivity, than about the melting of glaciers. Nepal heavily relies

[121] Dame, "Rankings // Notre Dame Global Adaptation Initiative // University of Notre Dame."
[122] Olivier, "TRENDS IN GLOBAL CO2 AND TOTAL GREENHOUSE GAS EMISSIONS."
[123] "Global Food Security under Climate Change | PNAS."

on the agricultural sector- it employs around 66% of the total population and contributes one-third of the nation's GDP.[124] It is contested that GDP growth in the agriculture sector is about four times more effective in alleviating poverty than GDP growth in non-agriculture sectors,[125] which means that climatic threats to agricultural productivity affect a much larger scale than just smallholder farmers. Despite this, engagement with the agricultural sector has been on the decline since the mid-20th century.[126] International out-migration to mainly Gulf countries and Malaysia is causing a decrease in the rural labor force throughout Nepal, which in turn is reducing agricultural production and increasing food scarcity and poverty.[127]

Although agricultural productivity is especially sensitive to shifts in weather patterns such as irregular precipitation and extreme temperatures, climate change may sometimes positively affect crop yields. In a study conducted on crop production in Nepal between 1978 and 2008, researchers found that the yield of winter crops, namely wheat, and barley, increased. About 23% of the yield increase for wheat and about 50% of the yield increase for barley can be attributed to the current climate trend of increased winter temperatures.[128] Additionally, scientists found that over the 25-year period between 1982 and 2006, the average start of the growing season (SOS) in the Himalayas significantly advanced by about 4.7 days.[129] The rising temperatures and emissions of CO2 to some extent help increase agricultural production by enhancing photosynthetic processes, water use efficiency, and soil microbial activities.[130] However, if average temperatures

[124] "Nepal at a Glance | FAO in Nepal | Food and Agriculture Organization of the United Nations."
[125] *World Development Report 2008*.
[126] Ensor et al., "Asking the Right Questions in Adaptation Research and Practice."
[127] Ghimire, Axinn, and Bhandari, "Social Change, Out-Migration, and Exit from Farming in Nepal."
[128] Joshi, Maharjan, and Piya, "Effect of Climate Variables on Yield of Major Food-Crops in Nepal."
[129] Shrestha, Gautam, and Bawa, "Widespread Climate Change in the Himalayas and Associated Changes in Local Ecosystems."
[130] Malla, "Climate Change and Its Impact on Nepalese Agriculture."

continue to rise past 4 degrees Celsius, it is predicted that there will be severe yield reductions for all crops.[131] Potential agricultural yield loss from climate change compounded with the amount of labor and productivity lost to out-migration pose a great threat to the well-being of an immeasurable number of people.

The tourist economy of the Khumbu region directly depends on the availability of freshwater from the tributaries of the Dudh Kosi[132] river, which drains the Everest massif.[133] Although Nepal has large quantities of annual rainfall, the country still faces water insecurity issues that range in severity location-to-location. This is due to spatial and temporal differences between where / when water is available versus where / when it is needed.[134] Because of this variability, issues of long-term management of water resources in the Himalayan region of Nepal become increasingly important. Solutions must be found to regulate glacial meltwater so that it can provide essential freshwater supplies to local populations without compromising their safety. The water-energy-food nexus, which treats water, energy, and food equally and evaluates their interdependence, offers a framework for dealing with these questions of management. By considering the interrelated nature of global resource systems, the model works to support food security and sustainable agriculture worldwide.[135] While Nepal lacks fossil fuel resources and the potential for developing large-scale solar or wind energy, it does have the capability for harnessing hydropower. Although the current drivers of water insecurity in Nepal are both physical (climate

[131] Wang, Lee, and Son, "An Assessment of Climate Change Impacts and Adaptation in South Asian Agriculture."
[132] Dudh means milk in Tibetan, as the river is named after its milky color that results from dirt and other debris running through it.
[133] Negi, *Himalayan Rivers, Lakes, and Glaciers*.
[134] Nepal et al., "Achieving Water Security in Nepal through Unravelling the Water-Energy-Agriculture Nexus."
[135] "Nepal at a Glance | FAO in Nepal | Food and Agriculture Organization of the United Nations."

change and disaster risk) and socio-economic (population growth and competing water uses); economic and institutional factors are the biggest impediments to ensuring water security in the country, rather than physical water scarcity itself. Through the encouragement of the generation of hydropower to provide affordable energy for pumping groundwater to support agriculture, new pathways to water security are possible.

In 2016 and 2017, a research group collected samples throughout the Khumbu Valley in the spring pre-monsoon season and analyzed the samples for δ 18O and δ 2H isotope values. Their results indicate that between 34-90% of water in the Khumbu Valley comes from the glacial melt during the dry, pre-monsoon season, with an average meltwater contribution of 65%, meaning that the other estimated 35% comes from rain. The scientists also identified a strong positive correlation between altitude and meltwater contribution. They estimate that the meltwater contribution from glaciers, ice, and snow to pre-monsoon domestic water resources in Khumbu Valley will increase in the short-term, but that water scarcity will follow when the sources are all melted and unreplenishable.[136] These findings indicated the need for a bridge between physical and social science research to best address the socio-economic and cultural effects of climate change and shifts in water availability. Hydrological modeling is a useful tool in this, as it enables the understanding of physical processes to be linked to the actual perception of change by local communities and to the development of adaptation strategies that work to protect the livelihoods of Khumbu Valley residents.[137]

[136] Wood et al., "Melting Himalayan Glaciers Threaten Domestic Water Resources in the Mount Everest Region, Nepal."
[137] Aubriot et al., "The Impact of Climate Change on Water Availability in Eastern Nepal."

In Khumbu socio-economic activities, particularly a rapid increase in locals' participation in the tourism sector, have reduced clean water availability, leaving a significant portion of the population forced to use contaminated water.[138] To study, Chapagain et al. used the Soil and Water Assessment Tool (SWAT) hydrological model, which can simulate a long period consisting of varying watershed sizes. They concluded that freshwater demand within the agricultural sector accounts for about 90.8% of the total water use in the Kaski District, a region in Nepal known for the tourist-filled city of Pokhara. However, the agriculture and livestock sector was found to be a major biological oxygen demand (BOD) polluter, accounting for about 99.6% of the total BOD discharge.[139] Despite decades of development efforts, Nepal's attempts to manage water resources have not been effective. These failures are primarily due to a lack of integrated and coordinated approaches that arise from fragmented and weakened institutions with overlapping scopes.[140] In 2020, Nepal enacted the National Water Resources Policy, which emphasizes Integrated Water Resource Management (IWRM) through coordinated and holistic approaches to overcome the failure of earlier water resources management plans.[141] Through this policy, there is hope for more comprehensive policies that sustain a balance between socioeconomic growth and environmental protection.

[138] Küpper et al., "Analysis of Local Drinking Water for Fecal Contamination in Solu-Khumbu / Mt. Everest Region, Nepal."
[139] Chapagain et al., "Analysis of the Climate Change Impact on Water Availability and the Links between Water Pollution and Economy for Sustainable Water Resource Management in Kaski District, Nepal."
[140] "(17) (PDF) Water Resources Development in Nepal: Myths and Realities."
[141] "Climate Adaptation and Resilience (CARE) for South Asia Project: Water Sector Policies and Guidelines of Nepal."

4.0: High Altitude Waste Management

The issue of garbage in the Everest Base Camp on the mountain itself has been a part of global discourse and media headlines for decades.[142] Expedition agencies typically use hundreds of kilograms of gear and supplies throughout the course of the climbing season, but in the first few decades of Everest mountaineering, climbing groups employed the "out of sight out of mind" mentality regarding the large amounts of trash they generated[143]. Abandoning no longer necessary equipment such as empty oxygen tanks and broken tents, food packaging, and various other items on the mountain during and after the expedition was a common practice that was seen as acceptable and justifiable.[144] However, the accumulation of garbage on Everest due to extreme weather conditions that make trash hard to remove, and the recent exponential influx of tourists to the Khumbu Valley region, has put significant pressure on the fragile ecosystem, generating concerns about the long-term sustainability of Everest tourism. In 1993 Barry Bishop, an American mountaineer, claimed that South Col on Everest was "the world's highest junkyard"[145] and in the decades since that statement, despite cleanup crew efforts that have cleared dozens of tonnes of trash off Everest, the global hysteria has not resolved.

The growing number of landfills and waste disposal pits in the vicinity of the towns along the popular trekking route of Lukla to EBC has many current/potential future negative impacts due

[142] "Solid Waste Pollution versus Sustainable Development in High Mountain Environment: A Case Study of Sagarmatha National Park of Khumbu Region, Nepal | HimalDoc."
[143] Nepal and Mu, "Mountaineering, Commodification and Risk Perceptions in Nepal's Mt. Everest Region."
[144] Bishop and Naumann, "Mount Everest."
[145] Bishop and Naumann.

to the associated burning of plastic, the release of toxic chemicals, and contamination of groundwater. In 2017 a study identified 58 of these open garbage pits,[146] and in 2019 that number jumped to 75.[147] These waste structures pose serious public health issues and threaten local ecology. Additionally, because waste takes a longer time to break down at high altitudes, scientists have already found significant changes in the physio-chemical properties of bodies of water in Khumbu. In 2013, Ghimire et al. found increasing levels of nitrate and phosphorus contaminating high-altitude lakes along the main trekking route to Everest.[148] In high-altitude waste management, there are trade-offs between economic output, environmental conservation, and even human life that must be contended with. The complex environment of Everest - characterized by remoteness, limited infrastructure, vulnerability to natural disasters/climate change, and extreme variation in topography and weather conditions - means that waste management strategies must be developed specifically for this region.

Besides the large quantities of garbage on Everest, the human bodies that have been left on the mountain have also gained worldwide attention. One interlocutor claimed that there were about four visible bodies on Everest, and one told me that there are two or three bodies, but that number varies widely across different media sources, climber's personal stories, and research findings. As one mountaineer explained, before 2006 and 2007 there were many more visible bodies on Everest, but the Nepalese government through the efforts of their army have taken many of those corpses off the mountain. He reported that currently there is one body at Hillary Step (8,790m) and one

[146] Manandhar et al., "Environmental Observations of Solid Waste Management at High Altitude in Nepal."
[147] Byers et al., "A Sustainable Solid Waste Management Plan for Sagarmatha (Mt Everest) National Park and Buffer Zone, Nepal."
[148] Ghimire, Jha, and Caravello, "Physico-Chemical Parameters of High-Altitude Rivers in the Sagarmatha (Everest) National Park, Nepal."

body at “The Balcony” (8,400m). Another mountaineer told me that seeing a human corpse while climbing is “scary for beginner climbers, my first time seeing a dead body was really scary.” The question here to be posed is “Are human bodies worth the risk of other people’s lives being taken off the mountain and returned to their loved ones?” As helicopters cannot fly much above Camp 3 at 7,300m, efforts to remove bodies above that altitude rely on mountaineers with already low levels of oxygen and energy to take on the extra weight. Although there have been no reported incidents of people perishing during efforts to retrieve bodies from Everest, this is a very real possibility that must be considered.

It is of great concern that the issue of waste management in the Everest region has been presented in a way that reinforces negative stereotypes about countries in the Global South and their inability to manage their local environment. One interlocutor, when asked about garbage management on Everest, argued that the conversation of trash in Khumbu should be redirected to instead discuss how global industrial cities are polluting the world, as the effects of their emissions are directly affecting Everest more significantly (as he argued) than the actual garbage disposed of on the mountain. He also expressed that the mountaineers who “exposed” the issue of garbage on Everest and who have been complaining about it in the first place are all foreigners reporting for foreign news channels. Again, we see here how the disparity of access to processes of knowledge creation directly affects the way that the majority of the world views Everest. The claim that populations are unable to effectively govern themselves has been a justification for colonial and imperialist practices for centuries,[149] and applying that rationale to discussions of waste management systems in places like Nepal and India is just as harmful.

[149] Kleingeld, “Kant’s Second Thoughts on Colonialism.”

An unfortunate truth that creates challenges in addressing sustainable solutions for the mountaineering industry in Khumbu is that at extremely high elevations, only mountaineers of Sherpa ethnicity are capable of carrying weight while guiding. One respondent, a mountain guide from Pangboche in Khumbu, conveyed that "over 8,000 meters only Sherpas can carry 30-35 kilograms without [supplemental] oxygen." Base Camp (5,364m) and Camp 1 (6,065) are basically free of trash, but as the elevation increases, the garbage becomes more difficult to remove. The consensus among the mountaineers I interviewed was that although the waste disposal issue has gotten substantially better in recent years, the problem persists at the top of the mountain. One of my interlocutors, a mountaineer from Phortse, explained that Camp 4, at an elevation of 7,925m, to this day contains trash from past expeditions, and although "the [Nepalese] government is trying to clean it up, it is not possible." When garbage, most commonly oxygen tanks, is disposed of in a harsh landscape where people are only (and rightfully) concerned with their own survival, how can we justify high-altitude "clean-up" efforts?

Understanding the imperative necessity of generating sustainable solutions to these environmental shifts, many residents of Mount Everest communities have been expressing a two-fold response. First, they dispute the sensationalized depiction of the region's waste management issue, as that representation is not only untrue for the vast majority of the region, but also discourages people from traveling to the area and supporting the local economy. Second, they point out the ways Sherpas and other community members have been painted in a bad light as being unable to care for their land and bring to the forefront of contemporary discourse the global pressures on Everest porters and guides to be the ones to actually remove the trash that foreign

tourism has generated. For example, one frustration that an interlocutor brought up was that when trekking agencies and NGOs get credit for conducting successful litter removal initiatives, there is a systematic failure to recognize the important role of those who actually carried the garbage down the mountain. The media sensationalization also perpetuates negative stereotypes about the behaviors of both foreign and local climbers, portraying them as acting irresponsibly and disregarding care for the environment. In this multifaceted conversation, my research on the cultural and equity implications of climate change is perfectly situated in the larger climate framework to ground science in human experience.

4.1: Past, Present, and Future Cleanup Efforts

The ecological impacts of mountain tourism in Khumbu have been prominent in recent decades, especially as globalization has led to an increase in the number of packaged, processed goods imported to the area. However, there have been many efforts to combat some of the negative human-induced environmental effects of adventure tourism in Khumbu. In 1993 the Nepalese government adopted measures to require an environmental deposit of $4,000 per Everest expedition and to restrict the number of climbing permits issued.[150] These policies were refined in 2013, and now require that each member of an Everest expedition has to pay a $4,000 deposit that will be returned to them only if they bring back 8 kg (18 lbs) of garbage- the estimated average weight of trash that each climber generates during their climb of Everest.[151] Some of the key attributes of this program include:[152]

[150] "As Interest in Adventure Sports Peaks, Mountaineers Queue up for a Shot at Mount Everest."
[151] France-Presse, "Mount Everest Litter Targeted by Nepalese Authorities."
[152] Sherpa, "A Critical Evaluation of the Mt Everest Garbage Deposit Scheme."

- *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.*

However, critics of the garbage deposit system claim that these efforts are limited in scope and lack clear instructions, and that waste management rules are not effectively enforced.[153] When this scheme was first introduced on Everest, expeditions were required to manage their own waste, but that strategy soon proved to be ineffective. Retrieving all their non-disposable waste from the mountain, carrying it back to the airport at Lukla, and flying the trash back to Kathmandu ended up costing more than the $4,000 deposit.[154] As one interlocutor explained, the climbing agencies are responsible for paying porters about 100-200 rupees per kilogram to bring their garbage from EBC to Namche. Therefore, many expedition groups have been incentivized to give up the deposit, a small amount of money in the context of the tens of thousands of dollars these expeditions cost. By viewing the deposit as a sunk cost of climbing, a fee to leave items that were no longer necessary behind, mountaineers were able to shake off the responsibility for their garbage. As a consequence of the government's lack of foresight regarding the practicality of this initiative, many mountaineers/climbing agencies began to deposit their trash throughout the trail from

[153] Pallathadka, "The Impact Of Excessive Tourism In Mount Everest."
[154] Sherpa, "A Critical Evaluation of the Mt Everest Garbage Deposit Scheme."

Everest Base Camp to Lukla. Soon after, this trekking route became known as the "garbage" or "toilet paper trail."[155]

Under Nepal's 2002 'Mountaineering Expedition Rules, 2059', the Ministry of Culture Tourism and Civil Aviation deputes a liaison officer to accompany each expedition who oversees their garbage management practices. These officials must be trained in basic mountaineering principles, possess a Bachelor's degree, be fluent in English, and be medically approved to visit Everest Base Camp. The liaison officers work to ensure that expeditions run smoothly and follow the rules, and to facilitate relationships with local communities. Some of the functions, duties, and rights of the liaison officers are outlined below:[156]

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 worker involved with the Mountaineering expedition team.*
c) *To stay in the base camp during the mountaineering expedition programme.*
d) *To try to settle down the conflict or any other undesirable incident between any member of the mountaineering expedition team and local people or headman (Sardar), guide or worker as well as to initiate for necessary action with the help of nearest Police post, District Administration Office or Local Bodies if it is not possible to settle down the case by him/herself.*
e) *To carry out or initiate to carry the necessary work relating to environmental cleanness and garbage management.*
f) *To prohibit the team or its members from indulging in any unauthorized mountaineering expedition and to notify such incident to the Ministry immediately.*
g) *To send its report to the Ministry as soon as possible in the event of loss of walkie-talkies, wireless sets, and other equipment used by the mountaineering expedition team or in the*

[155] Byers et al., "A Sustainable Solid Waste Management Plan for Sagarmatha (Mt Everest) National Park and Buffer Zone, Nepal."
[156] "Mountaineering Expedition Rules, 2059 (2002) – Nepal Law Commission."

event of death or disabilities cause to a member of the mountaineering expedition team, headman, guide, or worker due to an accident or in the event of commission or likely to commission any serious crime.

h) *To advise the leader of the mountaineering expedition team about the selection of place for mountaineering camp.*

There have been claims, however, that many liaison officers are notorious for pocketing their pay and staying in Kathmandu, with an occasional trip to EBC to take photos and admire the view.[157]

Another example of efforts to manage litter in the Everest region is the Sagarmatha Pollution Control Committee (SPCC), Khumbu Valley's most prominent waste management organization. The SPCC is a community-based NGO that was established by local Sherpa people in 1991, and it works tirelessly to keep Khumbu clean through the development of sustainable waste management infrastructures and practices. Since its establishment, the SPCC has integrated a waste segregation system in Sagarmatha National Park and Buffer Zone (SNPBZ), strengthened community participation, educated the public about trash issues, and has worked on increasing opportunities for waste recycling and reuse. The organization also checks mountaineering permits and monitors illegal climbing activity. While in Kathmandu, I spoke to the Base Camp Manager at the SPCC. He not only monitors trash disposal at EBC, but he also manages the Everest icefall doctors- "high altitude workers who make a pathway for mountaineers in the treacherous terrain through the most dangerous portion of the ascent, the Khumbu Icefall in case of Everest. They carve out a path using ropes and ladders to lift mountaineers up and over icy valleys."[158]

[157] "The New Everest Base Camp Police Force."
[158] "The Man Who Made It Possible for Hundreds of Foreigners to Climb Everest Is Finally Retiring."

In the spring 2022 climbing season, the SPCC oversaw the management of 44,713 kg of waste, primarily from expeditions on Everest, Lhotse, and Nuptse. This garbage consists of human excrement, burnable products, compostable kitchen remnants, and non-burnable trash. The waste that was picked up from the camps on the mountains mostly consists of broken tents and empty oxygen canisters, while throughout the hiking trails in SNPBZ, the litter is most commonly packaging from imported foods.[159] The SPCC has a goal to ban plastics from being imported into Khumbu, as many food items required at base camp can be transported in sustainable packaging (like rice in a barrel rather than a bag). Much of the non-mountaineering waste generated in Khumbu is from processed and packaged snacks that have been transported into Khumbu solely for foreign tourists. In an ideal world, according to an employee of the SPCC, their organization would also have the funding to be able to convert cooking systems at EBC that rely on gas to instead use solar, wind, or water power.

The Department of National Parks and Wildlife Conservation (DNPWC) was established in 1980 with the goal to conserve the rich biodiversity of Nepal by managing the country's protected areas- 12 National Parks, 1 Wildlife Reserve, 1 Hunting Reserve, 6 Conservation Areas, and 13 Buffer Zones. Currently, there are no members of Sherpa ethnicity on the DNPWC council, which indicates a major discrepancy between those who are knowledgeable of their land and directly affected by regional environmental changes; and those who have the power to control that land. During my fieldwork, when I spoke to Khumbu Valley community members about efforts to mitigate the negative effects of climate change and tourism activities, many of them mentioned this disparity in Nepalese government institutions. Many of them also told me that although there

[159] Online, "Sagarmatha Pollution Control Committee Collects 45 Metric Ton Waste from Everest."

are many efforts to control waste in Khumbu, it is generally a very difficult thing to manage and enforce regulations. When asked about the past and current efforts of the SPCC, many interlocutors said that although the board members have good intentions and solid plans, a severe lack of funding for the SPCC and the large area that the organization manages pose big challenges to its overall success.

One respondent gave an example of this issue that has been happening recently on Lobuche, a mountain of 6,145m in Khumbu that is popular with those training to climb nearby 8,000ers. After spending a season on the mountain as a guide, he told me that disposal of waste, especially human excrement, has been a severe issue at the base camp of Lobuche. This respondent spoke to a member of the SPCC about the lack of toilets and other proper waste disposal facilities at the Lobuche base camp. However, he was told that although they recognize that specific issue, the SPCC does not have the funding necessary to address the issue, especially since Lobuche does not attract nearly as much global attention as Everest. Some of the other issues with the SPCC that various interlocutors mentioned were that their waste disposal facilities were outdated and faulty and that their garbage incinerator in Lukla is too close to a school.

A few of the study participants praised the SPCC for its successes- the man that guided me on trek in Khumbu explained "There is not much pollution now… [there was] more pollution before the SPCC." Another respondent, when asked about the performance of the SPCC, said "They did a good job, they are cleaning every part in Khumbu… they appoint committees to clean up the trail every month." I also had the unplanned opportunity of speaking with some of the founding members of the SPCC, and they told me stories of some of the first trash removal

initiatives in Khumbu. Before the year 2000, there were large amounts of trash all over the trails in Sagarmatha National Park. However, an SPCC member that I spoke to described one of the first projects undertaken by Khumbu community members that brought about the start of the conversation on trash in the area- “picking up trash isn’t just for tourists, it’s also for us.”. He told me that in the 90s a group of 20-30 people from Namche Bazaar began making their way downhill (towards the airport at Lukla, a few day's walk away), and over the course of 5-6 days hundreds of locals had joined in and they picked up hundreds of pounds of trash.

5.0: Suggestions for a More Sustainable Future

In the Global South, the limitations of households in adapting to changing environmental conditions are twofold. Abiotic constraints such as droughts, extreme temperatures, and soil fertility depletion are major biophysical factors that directly influence adaptive capacity, but embedded structural systems often play a less discernible role. These include systematic financial, institutional, and technological barriers, as well as a lack of production of and/or access to information on climate change attributes;[160] along with social and normative barriers such as caste, gender, and class.[161] One example is a study involving a group of smallholder farmers in South Asia, where researchers found that socio-economic constraints account for more than 22% of rice yield losses.[162] In 2007 the IPCC noted that "social and cultural limits to adaptation are not well researched",[163] but recent interdisciplinary initiatives that integrate social scientists into positive science discourse and research are beginning to shed light on these limitations. Climatic drivers of change are deeply ingrained in vast, complex structures with constant social, cultural, economic, political, and biophysical change.

At the foundation of many management policies regarding resource management, there is the idea that common resources need to be privatized and collectively regulated. However, participatory approaches to development are increasingly becoming recognized as essential to the success of environmental adaptation and resource management efforts.[164] Sustainable solutions

[160] Antwi-Agyei, Dougill, and Stringer, "Barriers to Climate Change Adaptation."
[161] Jones and Boyd, "Exploring Social Barriers to Adaptation."
[162] John and Fielding, "Rice Production Constraints and 'New' Challenges for South Asian Smallholders."
[163] Solomon, Intergovernmental Panel on Climate Change, and Intergovernmental Panel on Climate Change, *Climate Change 2007*.
[164] Ensor et al., "Asking the Right Questions in Adaptation Research and Practice."

must also make sure that the economic benefits from tourism are shared equally among all stakeholders. Almost all of the mountaineers that I spoke to, when asked what they would change about the way that tourism is run on Everest, expressed their desire for no change in the number of permits issued, as more climbers bring more money. As one interlocutor put it simply, "I do not want [permit] limitations, if limited that is not good for tourism, I want unlimited permits [for Everest]."

Sherpas and other people that work in the Everest mountaineering industry must constantly be negotiating and renegotiating the boundaries of their agency within the context of tourism. Some of the key stakeholders in establishing this balance are the Khumbu Pasang Lhamu Rural Municipality (local government), trekking and climbing agencies, national Nepalese governmental bodies, porters and guides themselves, international organizations, and tourists. Through ecosystem-based adaptation approaches that integrate and center the lived experiences and opinions of Khumbu Valley residents, a more harmonious and mutually beneficial relationship between key actors is possible. Ongoing attention and action are needed to address sustainability concerns in the Himalayas and ensure that the region is protected for future generations. To promote responsible practices going forward, it is imperative that there is a concerted effort from all stakeholders, including foreign and local climbers, trekking tourists, local and national authorities, and the media.

A common theme that I observed through conversations with people in Khumbu was that there was remarkable faith in the sustainability of the Everest tourism industry. There can only be one mountain that is the tallest in the world, and that fact itself is enough to ensure that there will

always be people with enough yearning, money, and resources to want to climb it. Although environmental degradation and climate change threaten the long-term viability of the Everest climbing industry, as of right now those imminent threats do not seem to be of too much concern. However, one interlocutor explained that drinking water on Everest will become a concern in the long term- "it is becoming [a] big problem… I think in fifty to one hundred years people will not [be able to] get water." When I asked why, he said that this is because the glaciers in the area are melting and once they melt all the way, there will be no more water supply.

Daconto and Sherpa, through using scenario planning as a tool to strategically assess the roles of various stakeholders in the tourism and park management issues in Sagarmatha National Park, found a vast range of opinions among participants, as well as inconsistencies relating to the conflict between the desire to improve tourism access and cultural/environmental conservation. Researchers concluded that in theory, the local people of Sagarmatha National Park and the Buffer Zone strongly supported park management devolution and local self-governance. However, those viewpoints wavered in the discussion of "autonomous Khumbu" (the scenario that Khumbu Valley could be completely run by its internal communities), revealing that participants did not have full confidence in local people's ability to build on self-governance due to their lack of experience.[165]

Because of Khumbu residents' generally unwavering trust in the fact that people will always want to climb Everest, until climate change poses a big enough issue, increasing the price and decreasing the number of permits issued is one possible way to mitigate overcrowding and

[165] Daconto and Sherpa, "Applying Scenario Planning to Park and Tourism Management in Sagarmatha National Park, Khumbu, Nepal."

excessive trash at the top of the world. With permits more expensive,[166] a portion of the costs can be set aside by the MOCTCA to funds that assist families of Sherpas who perish on the mountain, aid clean-up efforts on Everest (in the way that the US Oil Spill Liability Trust Fund is paid for by taxes on oil), and provide retirement and healthcare support to climbing Sherpas so that their future is more secure- a restitution fund of sorts. This flexibility of excess funds could also facilitate a sliding scale for permit costs, as many people interested in climbing Everest want to do so to raise money for various charitable causes.

Integrated environmental management (IEM) is defined as "a process of formulating and implementing a course of action involving natural and human resources in an ecosystem, taking into account the social, political, economic, and institutional factors operating within the ecosystem to achieve specific societal objectives"[167] This operational model of ecosystem management takes into account the variety of environmental components, functions, and entities involved in stewardship, and the resulting interconnections, complexities, multiple perspectives, multiple uses of the land itself.[168] The incorporation of environmental objectives into the process of policymaking, or environmental policy integration (EPI), is a very important aspect of IEM, especially within non-environmental policy sectors. Van Oosten et al. frame resource or landscape governance as manifestations of EPI, as they aim "to balance agricultural production, nature

[166] I honestly do not think that there is an amount of money that would be too much to dissuade people from climbing Everest, even increasing permit costs from $11,000 to $50,000 seems appropriate within the context of the ultra-wealthy who pay tens of thousands of dollars for 'luxury' expeditions.
[167] Dixon and Easter, "CHAPTER 1. Integrated Watershed Management."
[168] Margerum and Born, "Integrated Environmental Management."

conservation and livelihood needs at the landscape level through multi-stakeholder decision making."[169]

Integrated environmental management also requires cooperation between stakeholders of different policy domains or sectors. Their varying principles, goals, and objectives must be understood independently, and then synthesized to develop collaborative, intersectoral, and comprehensive policies.[170] Communication in the form of shared information and solutions among mountaineers, climbing agencies, local administrative bodies, and national governmental institutions is also essential to achieving their collective goals. However, standardized models that utilize comprehensive databases and comparable metrics must be constructed for this information to be successfully collaborative. As I discussed in Chapter 3, climate change knowledge production in particular is especially susceptible to the negative effects of a lack of shared information, inconsistent methods and data, and limited community participation. Additionally, through incorporating the expertise of different stakeholders, IEM must consider that there is no objective solution to climate change and that due to variance in ecological factors, climate adaptation initiatives must be site-specific.

Just recently, on March 3rd, 2023, the Nepalese government made it mandatory for all tourists (non-Nepalis) who go trekking in the Himalayan region to hire a local guide through a registered company. This is due to the fact that every year the Nepal Tourism Board receives about 40 to 50 cases of missing hikers. Tracking and rescuing these individuals is a very difficult task,

[169] van Oosten, Uzamukunda, and Runhaar, "Strategies for Achieving Environmental Policy Integration at the Landscape Level. A Framework Illustrated with an Analysis of Landscape Governance in Rwanda."
[170] Howlett and Saguin, "Policy Capacity for Policy Integration."

and many times trekkers go unfound. The president of the Trekking Agencies Association of Nepal, Nilhari Bastola, claims that the new regulation is for the benefit of tourists- "the majority of individuals who perish or disappear while trekking are those who go alone without a guide or an understanding of the terrain. These tragedies could have been avoided if they had a local guide."[171] Bastola also said that this new legislation could generate jobs and bring employment to about 40,000 Nepalis, but there are concerns that the increased cost of trekking in Nepal will deter some tourists away from the country.[172] Trekkers are the only group affected by this recent law, as mountaineers who ascend past base camps are regarded as their own entity with a different set of policies and rules to follow.

The large number of solo trekkers in the Nepalese Himalayas is something that I observed as well. While I was staying in Namche, I met many foreign trekkers who were passing through by themselves or in small groups without guides, and some of them even tried to convince me that it was okay for me to go trekking on my own. One man from India that I spoke to, who was on his way back from EBC, told me that although he got lost multiple times, he still recommended going without a guide. I did not take his advice, as all of the residents of Namche that I spoke to expressed that it was a bad idea to go alone, as many hikers have disappeared recently. Throughout my time in Khumbu, search parties for missing trekkers (a woman from South Korea and a man from India) were deployed, and multiple people told me that the sister of the man from India had been in the

[171] "Nepal Says Tourists Trekking in Himalayas Must Hire Local Guides."
[172] irosario, "Nepal's New Law Requires All Foreign Trekkers to Hire a Guide."

region for weeks looking for him. There were also many missing posters for these two individuals around SNPBZ, but by the time I left Khumbu, hardly anybody had hope that they would be found.

One example of a waste management project that considers its environmental effects is the solar-powered human-waste biogas system built by The Mount Everest Biogas Project. This initiative is a volunteer-run, non-profit organization that works to generate sustainable solutions to the issue of human waste on Everest. Their goals are to reduce the risk of water contamination by fecal coliform, decrease reliance on burning wood or yak dung for heating (as those practices come with health / environmental risks), create local jobs, and convert human waste into a renewable natural gas fuel that will be made available to the local community for cooking and lighting.[173] Another promising initiative is the "Scaling up Climate Resilient Agriculture for Sustainable Livelihood of Smallholder Farmers in Nepal" program of Nepali NGO Local Initiatives for Biodiversity (LI-BIRD). Through promoting the conservation and sustainable use of agricultural biodiversity and agroecological farming practices, this project aims to contribute to sustainable livelihoods and build the resilience of smallholder and women farmers in Nepal. Some of the agroecological farming mechanisms of this initiative include utilizing and promoting crop diversity, improving soil health, conserving and

[173] "UIAA | Mount Everest Biogas Project (MEBP)."

sustainably utilizing water and other natural resources, and empowering women, Indigenous communities, and smallholder farmers.[174]

Some other environmentally sustainable solutions to waste management in the Everest region that have been identified include building septic tanks, improving the management of septic tanks, and checking the use of chemical fertilizers.[175] Researchers also suggest that dung should instead be used as organic manure, decreasing the need for local farmers to use chemical fertilizers. Biomass briquettes, such as beehive briquettes, could be used instead for heating purposes. Traditional practices of using forest litter in toilets for composting organic manure should be additionally respected and upheld, as this practice helps to sustain agricultural productivity while also keeping human fecal waste out of surface water and groundwater bodies.

Hydropower is additionally increasingly being investigated as an important possible solution to environmental degradation and socio-economic development in Khumbu. An increase in tourism compounded with a ban on woodcutting in the area has led to a diversification of the energy sector, with the first hydropower plant inside Sagarmatha National Park being built in 1980.[176] The construction of micro hydropower plants has provided Khumbu inhabitants with more comfortable living conditions and has enabled lodges to improve their facilities for tourists, such as battery-charging services or internet access. However, this has driven competition between lodges which in turn increases reliance on water resources to provide these "Western comforts" to

[174] "Scaling up Climate Resilient Agriculture for Sustainable Livelihood of Smallholder Farmers in Nepal (CRA)."
[175] Salerno et al., *Management-Oriented Environmental Research in Sagarmatha National Park and Buffer Zone*.
[176] Sacareau et al., "Hydro-Energy Systems and Tourism in a Context of Global Change."

tourists. There is already seasonal tension in late spring for domestic and agricultural water uses, when there is both a period of low flow in streams and a high tourist season with a greater water demand (a villager's daily domestic consumption of water is about 20 L while a tourist's is double). This water tension within the context of climate change rapidly affecting these high-altitude regions poses a great threat to the long-term sustainability of the livelihoods of those living in the region, as well as to the environment itself.[177]

In Everest communities that are already susceptible to water scarcity issues brought about by climate change, tourism acts in competition with domestic and agricultural needs for water resources- and hydroelectricity is an example of one of these pressures. Fulton and Sacareau hypothesize that the difficulties in water scarcity issues in the Everest region are currently less likely the result of the effects of climate change, and more likely to blame on social water management policies/practices.[178] The state government does not provide much support in bringing water and electricity to the Khumbu Valley, so local people have to organize themselves collectively or individually. Generating micro-hydro-electricity requires significant financing and technical assistance, so these systems often require the help of international organizations, NGOs, and foreign state governments. This causes local actors to engage in sometimes fierce competition with each other to attract financiers to their village. Within towns, many times the inhabitants have set up a collective network managed by a water committee, but also wealthy lodge owners have been able to construct and manage their own water systems. Researchers also found that while ministers were in office, they would focus leadership on initiating as many as possible 'new'

[177] Aubriot et al., "Reconfiguration of the Water–Energy–Food Nexus in the Everest Tourist Region of Solukhumbu, Nepal."
[178] Faulon and Sacareau, "Tourism, Social Management of Water and Climate Change in an Area of High Altitude."

development initiatives and projects to secure political leverage, and most of the time these projects were focused around their home region. Politicians as well widely ignored issues in planning logistics and failed to ask the question if the project met the local communities' development needs and desires.[179]

5.1: Governmentality and Unequal Power

Besides environmental conservation issues within the Nepalese government, many interlocutors in Khumbu additionally felt frustrated at the way that The Nepalese Ministry of Culture, Tourism and Civil Aviation (MoCTCA) manages the trekking and mountaineering industries. The MoCTCA is deeply involved in the decision-making and policy implementation processes that regulate the environmental impact of expedition teams,[180] but the Nepalese government offers little recognition, involvement, and/or protection of those who actually work in the mountains, especially on Everest. Each climbing season the MoCTCA generally issues more permits to climb Everest than the previous year, leading to more congestion on the mountain. 379 member permits for Everest were issued in 2019 and in 2021, a record 408 permits were distributed, which was seen as a response to the lack of money generated the previous year from Everest expeditions due to Covid-19. In 2022, the number of permits regained some normalcy as only 292 were issued.[181]

[179] Suhardiman, Karki, and Bastakoti, "Putting Power and Politics Central in Nepal's Water Governance."
[180] Dhakal, "Overview of Tourism Development Prospects in Nepal."
[181] Dreier, "Mount Everest Permits Down Drastically After Historic 2021."

Nepalese government institutions additionally don't enforce regulations on trekking agencies. This allows foreign climbers and entrepreneurs to set up their own companies that exclude the locals who already have intimate relations with and expert knowledge of Everest. As one interlocutor expressed to me, "Foreign climbers' money is staying in foreign companies." Additionally, because of this lack of regulations, mountaineering tour companies in the Everest area now compete with each other to offer the lowest expedition prices. Trekking agencies with long histories of safe and successful summits now must decrease their price to contend with newer companies whose staff are more likely to be untrained and inexperienced. Not only does this create a frustrating scenario for Khumbu residents who directly engage in the mountaineering industry, but it also creates more dangerous conditions for summiting Everest.

It is well known among Khumbu residents that not only are the government officials who deal with tourism on Everest foreign to the area, but they also do not have any knowledge of mountaineering. According to an interlocutor, the person in charge of the Ministry of Tourism is never a mountaineer, but rather of a different profession such as medicine or politics. When Khumbu residents finally begin to establish an understanding with this government official, because of the volatile political system in Nepal, the official usually leaves the position or gets transferred to another department. Without incorporating an understanding of the ways cultural landscapes differ region-to-region and are constantly changing, the probability of success for institution-led environment-focused projects, such as MoCTCA's management of mountain tourism in Khumbu, is low. However, anthropological knowledge produced by combining the practices and theoretical frameworks of reflexive and positive science[182] is increasingly becoming

[182] Burawoy, "The Extended Case Method."

incorporated into discussions of international development policy. This synthesis means that there are more opportunities for successful sustainable solutions that address the disasters of anthropogenic environmental change while alleviating the social and cultural effects of these initiatives.

After the 2014 avalanche that killed 16 Sherpas and no foreign mountaineers, Nepali Sherpas packed up their tents and left EBC, staging a walkout in honor of their lost friends and colleagues. This boycott also called for climbing-related demands from the government such as more insurance money, more financial aid for victims' families, and stronger climbers' rights.[183] This sentiment was supported by many of the interlocutors that I spoke to, who expressed their desire for the future of Everest mountaineering to be put into the hands of local stakeholders and individuals. A crucial aspect of these proposed changes includes shifting the responsibility of creating and administering mountaineering regulations to trekking companies run by local Khumbu residents. If the agencies work together to establish a linear order for those attempting the summit (with more experienced people at the front as they can move faster), future traffic jams can be avoided.

5.2: Community Education & Global Conceptions of Everest

There are many misconceptions when it comes to the worldwide discourse on foreigners climbing Mount Everest and their subsequent effects on the mountain and local communities. In 2013, BBC News reported that "the summit has become as congested as a five-lane motorway

[183] "Sherpa Guides Stage Everest Base Camp Walkout."

during a bank holiday weekend."[184] In 2019, Nirmal Purja, a world-famous Nepali mountaineer, posted a photo of the queue at the summit of Everest, which quickly went viral and the topic of overcrowding on Everest once again flooded global mountaineering discourse. When speaking about this infamous photo, an interlocutor expressed that the photo only displays what happened on one single day and that it should not indicate an issue worth the global hysteria it received. He emphasized that the media portrays an image of Everest that they represent as a daily occurrence to the entire world, but the weather during Everest climbing season is so temperamental that it only allows for a 3-4 day good weather window for everyone who has been waiting on the mountain for weeks to summit. Additionally, this respondent explained that even with a few days of proper weather, the less experienced (mostly foreign) mountaineers hold out until the last possible day to attempt a summit ascent, as they wait for others to lay footprints and make trails in the fresh snow.

Another interlocutor compared the death rate on Everest to that on Annapurna, the tenth tallest mountain in the world, also located in Nepal. Annapurna has a fatality rate of about 27%, the highest fatality-to-summit ratio of any mountain over 8,000m. For comparison, K2 comes in second place with about 23%, and Everest is 10th out of the 14 mountains over 8,000m, with an about 3.3% fatality to summit ratio.[185] He cited this difference to the amount of manpower and equipment Everest has in comparison to Annapurna, and emphasized the disparity in media perceptions of the two mountains. At high altitudes, the main environmental factors that limit human performance and survival are low barometric pressure, low temperatures, and high wind speeds. These conditions compound hypoxic physiological stresses, which results in an increased

[184] "Everest Crowds."
[185] "Eight Thousanders (8000ers) - The Highest Mountains On Earth."

risk of hypothermia and frostbite for mountaineers.[186] Research findings in 2021 comparing conditions on K2 and Everest demonstrated that the most extreme weather conditions (barometric pressure, temperature, wind speed, and wind chill equivalent temperature) were experienced on Everest during winter and off-season ascents and that during the climbing season, weather extremes in the Death Zone were more severe on Everest than K2.[187] These statistics demonstrate that although weather conditions on Everest are some of the most extreme in the world, the low death rate on the mountain indicates the importance of manpower and advanced technology and equipment.

Nirmal Purja's 2019 photo and the greater global hysteria surrounding the Mount Everest issue are indicative of the familiar process of international development that massively exaggerates problems in the Global South to gain more funding for aid- the greater the problems are presented, the more money gets sent to local NGOs and government institutions. One mountaineer, who was with Nirmal Purja when he took the viral photo, explained that there is no significant difference between trash disposal methods in many major global cities and on Mount Everest. It is completely normal and unregulated for people in Kathmandu to throw trash out of their car windows, but on Everest, if members of an expedition cannot carry down their garbage from the harsh mountain environment, they are judged by the whole world. One interlocutor, who received multiple academic degrees in the United States[188], explained that tourism originally benefited Khumbu Valley communities, but now it is a disadvantageous industry. He told me that due to the

[186] Moore et al., "Environmental Conditions at the South Col of Mount Everest and Their Impact on Hypoxia and Hypothermia Experienced by Mountaineers."
[187] Szymczak et al., "Death Zone Weather Extremes Mountaineers Have Experienced in Successful Ascents."
[188] I am noting this not to quantify his knowledge as more valid than my other interlocutors, but to provide perspective as to his lived experiences with the Western narrative of Everest.

organization and lack of regulation for trekking agencies in the Everest region, foreign climbers' money increasingly stays in foreign companies' pockets, who in turn give a very small percentage to the local Nepali whose backs they depend on to offer these expeditions in the first place.

Increasing access for local communities to educational resources must be considered a fundamental part of any sustainable solution within Sagarmatha National Park. Although the effects of individual SNPBZ residents improperly disposing of their litter on trails may be very minimal, when considered within the larger context of tourism, it is essential that these local communities receive information on how to dispose of their waste properly. As one interlocutor who works for the SPCC explained- "we need to tell porters not to litter." Further, there must be a sustained effort in increasing education regarding waste management practices, as the close proximity of drinking water sources and toilets has been a recurring issue at many of the mountain settlements/camps in Khumbu Valley. Another crucial aspect of sustaining long-term, community-driven projects that is necessary to incorporate into any development initiative is an investment in local skill development. One study respondent received an education at the Nepal College of Travel and Tourism Management (NCTTM), which is part of Tribhuvan University, the most established and world-renowned academic institution in Nepal. NCTTM was founded in 1995, and is self-described as a "pioneer institution in the field of tourism and hospitality management studies of this Himalayan country [Nepal] that has tremendous potential for tourism growth." Some of the main focuses of the program include tourism product development, marketing management, tourism economics, hotel and airline operations, national parks management, tourism law, and peacebuilding.

One of the people that I spoke to, who is Rai and not Sherpa, said that while he was guiding an EBC expedition he was approached by a Dutch travel company and recruited to work for them. The company paid for his official training in mountaineering, trekking, and medical services, but local mountaineers that work on Everest typically have to pay for their own training courses, which can take years and be quite expensive. However, a few interlocutors explained to me that the more training one goes through, the better their pay typically becomes on the mountain. There are basic and advanced courses through the Nepal tourism board, and they can range from hundreds to thousands of USD. The basic training lasts 45 days, the mountain guide expedition training adds another 48 days, advanced certification requires another 48 days, and in between mountaineers continue to learn about first aid techniques, the local environment and culture, and climbing expeditions. One respondent noted that most guides on Everest are not officially qualified, they just have vast experience.

5.3: Covid-19 and Healthcare Systems

One interlocutor conveyed that during the Covid-19 pandemic in the Khumbu Valley from the towns of Lukla to Gorak Shep (the "typical" EBC trekking route), people were more concerned with their economic situation than with the disease itself. The pandemic-induced travel restrictions enacted in Nepal provided Khumbu Valley residents with a glimpse of life without the tourism industry- as one respondent said concerning Covid, "Without tourists, life in Khumbu is very tough because it is built around tourism." Additionally, I was told by multiple respondents that hardly anybody in Khumbu got Covid and that the disease caused only two or three deaths of elderly people. Time and energy were shifted from engaging in the tourism sector to upkeep their

properties in wait for the tourists' return, but until that point, many communities had to live hand-to-mouth. One respondent told me "Starvation kills quicker than Covid", which isn't necessarily true on a case-by-case basis, but it demonstrates what appears to be a dominant thought process of Khumbu communities in ensuring economic survival during pandemic times before shifting any of their focus to personal or community health. Additionally, there were many disagreements between internal mountaineering agencies concerning pandemic-related tourism regulations. This particular interlocutor also explained that the government did not provide any hand-outs during Covid which further perpetuated cycles of poverty and disease, and that "the West cannot relate" to Nepal's struggles with Covid, as the disease took a very different toll on the already poor country than it did throughout much of the Global North.

For the few people that did get Covid in Khumbu, the pandemic exacerbated pre-existing issues of healthcare access in the region. Multiple interlocutors were infected with the disease while working on Everest, and one of them got sick enough that he had to be airlifted to Kathmandu. As mentioned earlier, the issue with healthcare access for Khumbu residents is, although there is substantial medical development in the area, the services are generally geared towards tourists, as they primarily treat high altitude-induced illness or minor injuries. One Namche resident that I spoke to told me that Khumbu Pasang Lhamo Rural Municipality, the regional government, has a program that provides monetary assistance to Khumbu residents who seek medical services in Kathmandu. He explained that because there are only basic healthcare services available in Khumbu, the municipality provides the finances needed[189] for helicopter transportation to the city and the subsidiary medical bills.

[189] This interlocutor told me that the amount of money provided to Khumbu residents from their local government for healthcare services was $10,000. That amount of money seems really high in USD, but in

I could not find much information online to dig deeper into this program, but I found an ethnography on porters in SNPBZ that highlighted a similar healthcare development project.[190] This initiative was introduced at the beginning of the 2018 fall trekking season, and it aims to increase the accessibility of insurance to trekking guides and porters. The cost to join the program is minimal- 100 Rs (USD$0.75) for porters, 250 Rs for assistant guides, and 500 Rs for guides. The trekking workers bring their citizenship card to an office in Lukla and are issued an ID card that grants them access to reimbursement of up to 50,000 Rs (USD$380) in medical insurance and a 100,000 Rs life insurance package.[191] Commercial porters who do not work in the trekking agency are not eligible to sign up for the program, and the insurance must be renewed every other season.

5.4: Solutions Rooted in Indigenous Knowledge

One of the most compelling initiatives of rights-based approaches to environmental development in recent years has been the establishment of formal and informal Indigenous Peoples' and Community Conserved Territories and Areas, or ICCAS (Alcorn and Royo 2007; Campese 2009; Greiber et al. 2009; Stevens 2009, 2010; Shrumm and Campese 2010). ICCAs, ecosystems that are voluntarily conserved by indigenous and other communities through local or customary laws, have enormous potential in contributing to national and global conservation

Nepalese Rupees it is about $75, which seems too little. There could be a possible miscommunication between us, or I could have heard him wrong.

[190] Barott, "Uphill Struggle."

[191] The author said that he was unsure as to how, if the life insurance is needed, the money gets to the deceased family.

systems.[192] These protected areas embody diverse political conditions, as they are found throughout the world in varying social and bureaucratic contexts. Regions that were once colonial expressions of control over indigenous and local communities' lands, waters, and lives have since been "given back" to the original owners of the land. When national/international powers failed to protect and conserve these environments from the great harm that has already been done, many stakeholders finally began to realize the importance of indigenous people in managing the land. However, many ICCAs have failed to be officially recognized by governmental institutions, as they require political and social relationships based on respect for cultural differences, appreciation of indigenous knowledge, recognition of their stewardship responsibilities, and affirmation of their human and indigenous rights.

Indigenous knowledge structures have been commercialized and exoticized in recent years by institutions who use them for their own benefit after ignoring the value of Indigenous lives for centuries.[193] The Sherpas in Khumbu are just one example of a community recognizing the importance of conversation of their land, but ultimately failing to be recognized in official law, as displayed in Stan Stevens' article "National Parks and ICCAS in the High Himalayan Region of Nepal":

> *Sherpas have continued to maintain customary ICCAs and even to develop new ones despite lack of state recognition, respect, and coordination. The survival of these ICCAs offers Nepal an opportunity to reform existing laws, policies, and practices, both to honour UN-recognised human and indigenous rights that support ICCAs and to meet International Union for Conservation of Nature (IUCN) and Convention on Biological Diversity (CBD)*

[192] Berkes, "Community Conserved Areas."
[193] Ahlborg and Nightingale, "Mismatch Between Scales of Knowledge in Nepalese Forestry."

> *standards and guidelines for ICCA recognition and for the governance and management of protected areas established in indigenous peoples' territories. The challenge will be for Nepal to reverse long-established inter-ethnic and governmental relationships which have dispossessed and marginalised indigenous peoples and insufficiently respected their knowledge, institutions, conservation contributions, and human rights in national parks.*[194]

The author here argues that indigenous peoples, especially Sherpas' significant contributions to conservation in Nepal's national parks are undermined and threatened by inadequate recognition/respect for their ICCAs in official national legislation, lack of representation in national park management conversations, and through the policies and practices of the Department of National Park and Wildlife Conservation (DNPWC). Moreover, this withholding of human rights is especially offensive to indigenous communities after their territories were forcibly annexed into the Nepal empire in the late eighteenth and early nineteenth centuries through military conquest, and national parks were created in the 20th century at the expense of their land. By refusing to recognize the agency and expertise of Khumbu Valley residents in environmental conservation, the Nepalese government continues to perpetuate widespread discrimination and marginalization of indigenous people in Nepal. The Himalayan National Park Regulations established in 1979 prohibited many customary natural resource uses in national parks. An example of this is the bans that have been placed on customary subsistence and on long-standing, small-scale market hunting, fishing, rotational forest farming, collection of non-timber forest resources, wild foods, and medicines, and the burning of forest floors and grasslands to improve grazing. Through these bans, the Nepalese government is ignoring the

[194] Stevens, "National Parks and ICCAs in the High Himalayan Region of Nepal."

importance of subsistence activities to indigenous peoples' cultures and livelihoods, as well as their roles in maintaining cultural landscapes and ecosystems.[195]

> *Protected areas, including national parks, now constitute approximately 20 percent of the total landmass in Nepal. Often these areas were created at the expense of indigenous lands. In the Himalayas, most of the land areas of the six existing national parks cover Adivasi Janajati [indigenous peoples] traditional lands. The National Parks and Wildlife Conservation Act provides no recognition of indigenous peoples' right to consultation or to access their traditional lands and resources, while giving quasi-judicial powers to the park chief wardens.*
> – James Anaya, UN Special Rapporteur on the Rights of Indigenous Peoples (2009)

The Nepalese government has done some good in recognizing indigenous rights- in 2007 The Legislative Parliament of Nepal approved the ratification of the Convention on Indigenous and Tribal Peoples adopted by the International Labor Organization in 1989, becoming the first country in South Asia to ratify this Convention and the only second country in all of Asia to do so- "The Convention supports the principle of self-management and guarantees the right of indigenous people to consultation and participation in issues relating to their own development. It guarantees their right to equal treatment and access to state services and also includes specific provisions for protecting and promoting indigenous and tribal peoples' cultures and communities. Among other aspects, it protects the right to practice traditional economies, to traditional land and resources, and to use indigenous languages in education."[196] Another positive is the implementation of the Local Adaptation Plan of Action (LAPA), a six-step framework that has

[195] Campbell, "Nature's Discontents in Nepal."
[196] *Understanding the Indigenous and Tribal Peoples Convention, 1989 (No. 169)*.

been adopted by the Nepalese government to integrate climate change discourse into governance and the planning process.[197]

There have also been local mountaineer-driven initiatives in Khumbu focusing on conservation. In June of 2022, a group of Nepali and American climbers dubbed the "USA-Nepal Friendship team" climbed Mount Denali in Alaska. Karma Tenzing, who was one of the expedition members, explained that this political enterprise was to foster learning about the "leave no trace" initiative that has been highly successful in significantly decreasing litter in America's protected natural spaces. Additionally, the Everest Summiteers Association has recently enacted a project titled "Save Himalaya Climate & Environment." This initiative was established in Copenhagen at the 2009 COP-15 World Conference on Climate Change during the 'Summiteers' Summit to Save Himalayas' after a group of 35 Nepali summiteers and 15 famous Everest climbers from abroad organized a peaceful procession and demonstration. The Association has five goals established:

1) *To study the reality of Mount Everest, Lhotse and Nuptse mountains, research, waste management, long term planning and to ensure the damage caused by climate change.*
2) *To make the world focus on the destruction of the climate due to climate change and the protection of the mountains.*
3) *To raise public awareness for the protection of the mountain environment.*
4) *To present Nepal's mountain tourism to the world in a new way.*
5) *Under the five-year master plan, Everest, Lhotse and Nuptse along with other 8,000 meters and the mountains permitted by the Government of Nepal.*[198]

[197] "Khumbu Local Adaptation Plan for Action (LAPA)."
[198] "Save Himalaya Project – Everest Summiteers Association."

In Nepal, ancient traditional irrigation canals, medicinal springs, sacred ponds, and waterspouts are still in daily use and represent an integral part of culture, religion, and well-being. The sustainability of these ancient structures indicates that there is a strong willingness and ability of local users to contribute to their maintenance, and their longevity demonstrates how high quality these structures were initially constructed to be. One recent study found that only about 18% of public water supply and sanitation systems in Nepal were functioning well and delivering the expected services fully.[199] A new global approach to overcoming water-sectoral divides and improving sustainability is multiple-use water services (MUS), which is defined as "a participatory, integrated, and poverty-reduction focused approach in poor rural and peri-urban areas, which takes people's multiple water needs as a starting point for providing integrated services."

Van Koppen and Wagle, in "Community-Driven Multiple Use Water Services", discuss Rural Village Water Resources Management Projects (RVWRMP) implemented in Nepal, and outline the expectations of users within this participatory initiative. For example, cash and in-kind contributions are expected from people who use the water resource; users are expected to contribute one working day per household for the collection and transportation of local materials; and they additionally contribute unskilled labor for trench digging and pipe burying for the water system. The authors emphasize the importance of decentralization, participation, and empowerment in global thinking on the roles of communities, governments, NGOs, donors, and civil society in sustainable water service management.[200]

[199] Rautanen, van Koppen, and Wagle, "Community-Driven Multiple Use Water Services."
[200] Rautanen, van Koppen, and Wagle.

Agriculture is a significant part of Nepal's economy- it provides about 33% of the gross domestic product and supports the livelihoods of most of the country's population.[201] As climate change poses a risk to the predictable weather patterns that smallholder farmers rely on (increasing floods and droughts), there is a growing need to improve agricultural productivity and resilience. Public sector irrigation development took place in Nepal during the 1950s, but there had already been thousands of farmer-managed irrigation systems (FMIs) scattered in the mountains and river valleys. It is estimated that 70% of irrigated area in Nepal rely on FMIs, but it took until the 1980s for FMIs to become officially recognized by the government.[202] Nepal's Department of Irrigation has recently shifted its role from focusing solely on infrastructure development to promoting socio-economic change and gender equality by making irrigation water equitably distributed.[203] The Department has adopted a high-level multi-sector water resources management approach through inter-basin water transfer, which will allow for the expansion of irrigated areas and hydropower generation.

Indigenous water management systems (IWMS) have been an integral part of communities' livelihoods in Nepal for decades, and have inseparable ties with their cultural practices and manifestations. However, water scarcity and the ongoing depletion of resources are increasingly becoming an issue, especially for their magnified effects on Indigenous agricultural communities. Because of this, sustainable solutions to address issues of water scarcity must include Indigenous knowledge that relates to water management, irrigation system management, and

[201] "POLICY BRIEF."
[202] Pradhan and Belbase, "Institutional Reforms in Irrigation Sector for Sustainable Agriculture Water Management Including Water Users Associations in Nepal."
[203] Meinzen-Dick, Pradhan, and Zhang, "Migration and Gender Dynamics of Irrigation Governance in Nepal."

sustainable construction practices. Through helping to mitigate climate-induced strains on resources and communities themselves, IWMS has been found to be cost-effective, economically and environmentally sustainable, socially acceptable, and culturally crucial.[204]

The biggest challenge of mountain climbing in the Khumbu region is figuring out a way to maximize the benefits of tourism-economic gain and increased political and social power- while minimizing the negative effects-cultural loss, climbing death and injuries, and ecological decline. When I spoke to one of my interlocutors, who is the head of a waste-management-focused NGO in SNPBZ, he provided me with a compelling suggestion for how to make adventure tourism sustainable for Sherpas in Khumbu. He presented the idea that the Nepali government should cut the number of permits they issue for climbing Everest in half, while also doubling the price so as not to cut down on the revenue these permits generate for the country. Additionally, this respondent suggested that there needs to be more requirements set in place for foreign climbers to better ensure the safety of not only themselves but also the porters and guides supporting them. Gustafsson proposed that the Nepali government should require experience with mountains over 7,000m, and to additionally economically support the Khumbu area with the number of tourists, request that some of those 7,000m mountains be in the Everest region.

Methods to address a mismatch in scales of knowledge between local or Indigenous communities and Western science must be incorporated into empirical research going forward. One example of a science that integrates an understanding of the relationship between natural and

[204] Gautam et al., “Indigenous Water Management System in Nepal.”

human systems, and links social and ecological systems, is the High Mountains Adaptation Partnership (HiMAP). Established in 2012, HiMAP focuses on remote, high-altitude mountain ecosystems and communities. Its goal is to create conditions necessary for all stakeholders who live in and are dependent upon glacial watersheds (including local communities, government agencies, and downstream populations), to become more resilient to the impacts of climate change. It is designed to strengthen the scientific, social, and institutional capacity for climate change adaptation and resilient development, as well as disaster risk mitigation and management of potentially dangerous glacial lakes and other climate-related disasters.[205]

Without incorporating an understanding of the ways cultural landscapes differ region-to-region and are constantly changing, the probability of success for institution-led environment-focused projects, such as the Nepalese government's management of mountain tourism in Khumbu, is low. However, anthropological knowledge produced by combining the practices and theoretical frameworks of reflexive and positive science[206] is increasingly becoming incorporated into discussions of international development policy. This synthesis means that there are more opportunities for successful sustainable solutions that address the disasters of anthropogenic environmental change while alleviating the social and cultural effects of these initiatives. My research demonstrates the existence of a gap in understanding and application between the processes of Himalayan communities' knowledge production and the Nepalese government's policy implementations.

[205] "High Mountains Adaptation Partnership - CCRD Project."
[206] Burawoy, "The Extended Case Method."

5.5: Some Concluding Thoughts:

Although there is extensive literature on Mount Everest, Sherpa culture, "the world's highest garbage dump," and climate change in the Himalayas, there is still a need for further integrated, interdisciplinary, internationally collaborative, and participative research. It is crucial to center the voices of Khumbu residents and put their lived experiences, scales of knowledge, and conceptual frameworks at the forefront of conversations about sustainable development in the Everest region. Additionally, research on emerging sub-sectors of climate change science, such as elevation-dependent warming and microplastic contamination, will increasingly become important to invest in as the effects of anthropogenic activities become intensified.

My research demonstrates the existence of a gap in understanding and application between the processes of Himalayan communities' knowledge production and the Nepalese government's policy implementations. It is imperative that there is a revision of current development policies in the Everest region, and that future initiatives focus on providing economic and technical support to community organizations that have been successfully running for years. Additionally, a reassessment of the number of permits issued, the cost of the permits, and how the administration is run at the community, regional, and national levels.

As I demonstrated throughout this paper, one of the main conclusions that I reached through speaking with a variety of stakeholders in Nepal, is that there are many pre-existing community efforts to manage/mitigate the effects of anthropogenic activities in the Everest region. These organizations have proven to be effective, but they many times lack funding to be fully operational or able to carry out their initial goals. I partnered with the Sagarmatha Pollution Control

Committee in January 2023 to apply for the Honnold Foundation's Grant Program. We designed a proposal to construct solar panels at Everest Base Camp for the SPCC's office where they check climbing permits, organize the icefall doctors, and enforce waste management regulations. This would allow the SPCC to shift their energy reliance away from expensive and environmentally degrading kerosene or gas so that they can more effectively carry out their roles at base camp. Additionally, the grant proposal included funding for the installation of 10 solar panel-powered trash compactors throughout Sagarmatha National Park which would decrease the risk of overflowing garbage bins and also facilitate the easier collection, transportation, and management of this waste.

As much as I thought that the SPCC was guaranteed this grant because of all of the successful work they have done so far in the Everest region, and because the organization was established and is still run by the local community, they were not selected for the Honnold Foundation grant. Additionally, one major issue that I ran into while searching for funding opportunities for the Sagarmatha Pollution Control Committee was that the majority of grants that I could find were for researchers to go to a region and study it. Although some of the money from grants of this kind could be diverted to the community nonprofit, the main focus of the money was to provide some sort of qualitative answer to how development should be conducted. Because the SPCC has already proven to be effective, it was very frustrating to find that international development aid agencies focus on generating "new" solutions to issues of environmental degradation and economic inequality, rather than recognizing small community organizations that have already proven to be effective.

Link to Google Photos Album (with captions):

https://photos.app.goo.gl/Uz2PCZHKMY9JjkaF9

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