TWICE TETHERED: AN EXAMINATION OF TRANSIENCE AND SOCIAL-ECOLOGICAL VULNERABILITY IN NEPAL'S CENTRAL HILLS

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ABSTRACT

The Central Hills of Nepal are a complex agro-environmental system where people traditionally cultivated their rural livelihoods within a relatively isolated subsistence system. This encouraged an intimate relationship between smallholder farmers and the surrounding environment. In the present day, Nepali smallholders can choose to balance a separate livelihood as a labor migrant in the greater world, navigating the global labor market for additional financial gain. By working abroad, Nepali labor migrants are able to provide additional financial security to their families back home. Labor migrants in this system are pushed and pulled between the isolated villages of Central Nepal and the greater world outside, tethered to and influencing both. Recently, a changing climate has been exacerbating existing factors such as natural disaster, environmental degradation, and economic hardship, creating the potential for more smallholder households to engage in labor migration, which then creates the potential for further change to the existing relationships between people and nature. Rural livelihoods, labor migration, the climate, and environmental systems of Nepal's Central Hills have often been studied separately. Researchers have occasionally examined the relationship between one or two of these components, preferring to focus more narrowly on specific elements of these relationships. This paper holistically investigates the bonds between livelihood strategies, the changing climate and environment, and labor migration within the framing of social-ecological systems thinking in the Central Hills of Nepal.

BIOGRAPHICAL SKETCH

Jessie Hughes is from Ovid, NY, and holds a Bachelor of Science in Architecture with concentrations in Urban Development and Design History from the Georgia Institute of Technology. She spent several years in the practice of architecture. Eventually her desire to pursue a vocation that blends the natural and built environments led her to undertake a thru-hike of the Appalachian Trail, where she spent her time considering how she could best serve others in a changing world. She served as a Peace Corps Volunteer in two countries; first, briefly, in Burkina Faso as a community development volunteer, then as a food security volunteer in Nepal. While serving in Nepal, she taught sustainable farming and soil conservation practices and introduced new cultivars of fruit and vegetable to local farmers. She witnessed the same farmers face the challenges of a changing climate, increases in labor migration, and environmental degradation. These experiences inspired her to pursue an MPS in International Agriculture and Rural Development at Cornell University, where she has focused her studies on agricultural development, natural resources management, climate resilience, and migration. In her free time, she enjoys being walked by her dog, yoga, rock climbing, and knitting for friends and family.

I dedicate this paper to my family and friends the world over. Thank you for your enduring love and support; words are not enough to express my gratitude for your presence.

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CONTENTS

LIST OF ABBREVIATIONS

ACA -	Annapurna Conservation Area
ACAP -	Annapurna Conservation Area Project
CCP -	Climate Change Policy
COP -	Council of Parties
GCC -	Gulf
IRB -	Institutional Review Board
LDC -	Least Developed Country
GON -	Government of Nepal
NAPA -	National Adaptation Programme of Action
NELM -	New Economics of Labor Migration (theory)
NDC -	Nationally Determined Contribution
NGO -	Non-governmental Organization
REDD+ -	Reducing Emissions from Deforestation and Degradation
RQ1 -	Research Question 1
RQ2 -	Research Question 2
RQ3 -	Research Question 3
SEA -	Southeast Asia
SES -	Social-Ecological System
SOM -	Soil Organic Matter
UNFCC -	United Nations Framework Convention on Climate Change

INTRODUCTION

Nepal is a landlocked country of about 30 million people, bordering India to the south and Tibet to the north. In terms of area, the country can be compared to the US state of Pennsylvania. Nepal boasts three major ecological regions; the Terai flatlands, the Central Hills, and the High Himal. The Central Hills (or Pahaad) in particular are home to 68% of Nepal's geographical area and range in elevation from 700-5000m above sea level. The Central Hills are composed mostly of steep river valleys and hills which the local people have terraformed in order to perform (in most cases) basic subsistence agriculture. Owing to geographical isolation, haphazard infrastructure, and a lack of sea access, Nepal remains one of the least developed countries on Earth.

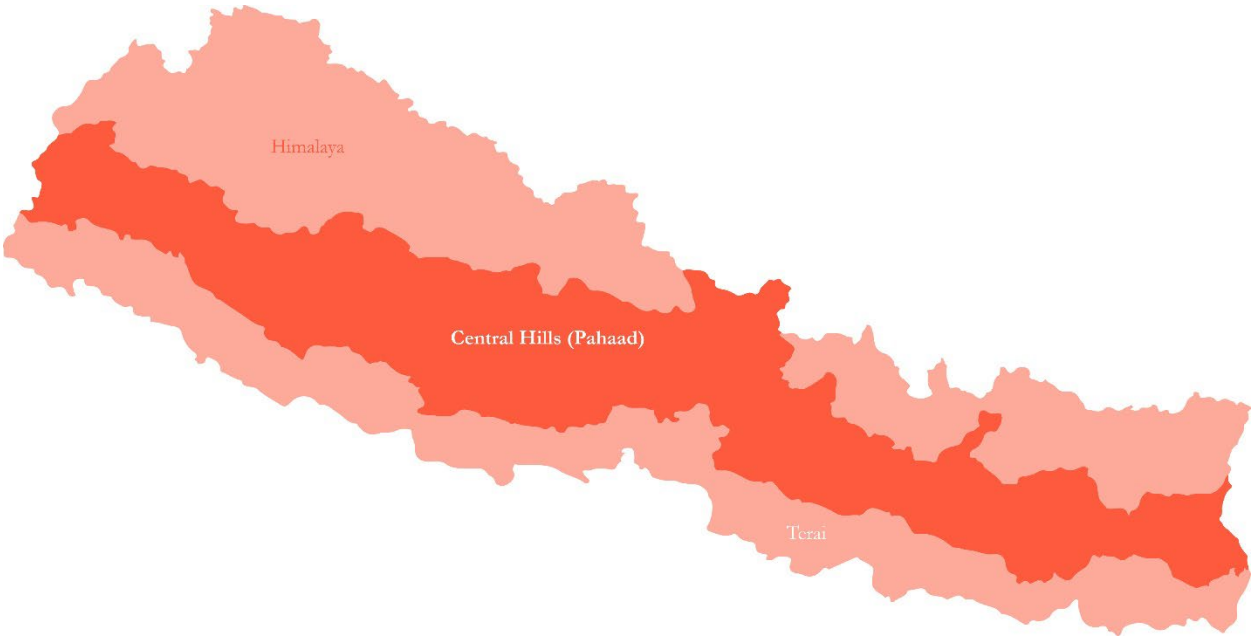


Figure 1: Ecological Zones of Nepal (Taylor et al., 2014)

A multitude of ethnic groups comprising over 45% of the human population (UN Macrotrends, 2021) call the Central Hills home. These populations derive mostly from two major groups; Tibeto-Burman and Indo-Aryan (Government of Nepal, 2011). Nearly 66% of the

population live in rural areas and support themselves through smallholder farming (CAT, 2019). One specific group, the Magar, constitute 7.1% of Nepal's population and form Nepal's third largest ethnolinguistic group (Pun, 2000), residing primarily in the Central Hills and exerting considerable demographic and cultural influence in the region (Hitchcock, 1966).

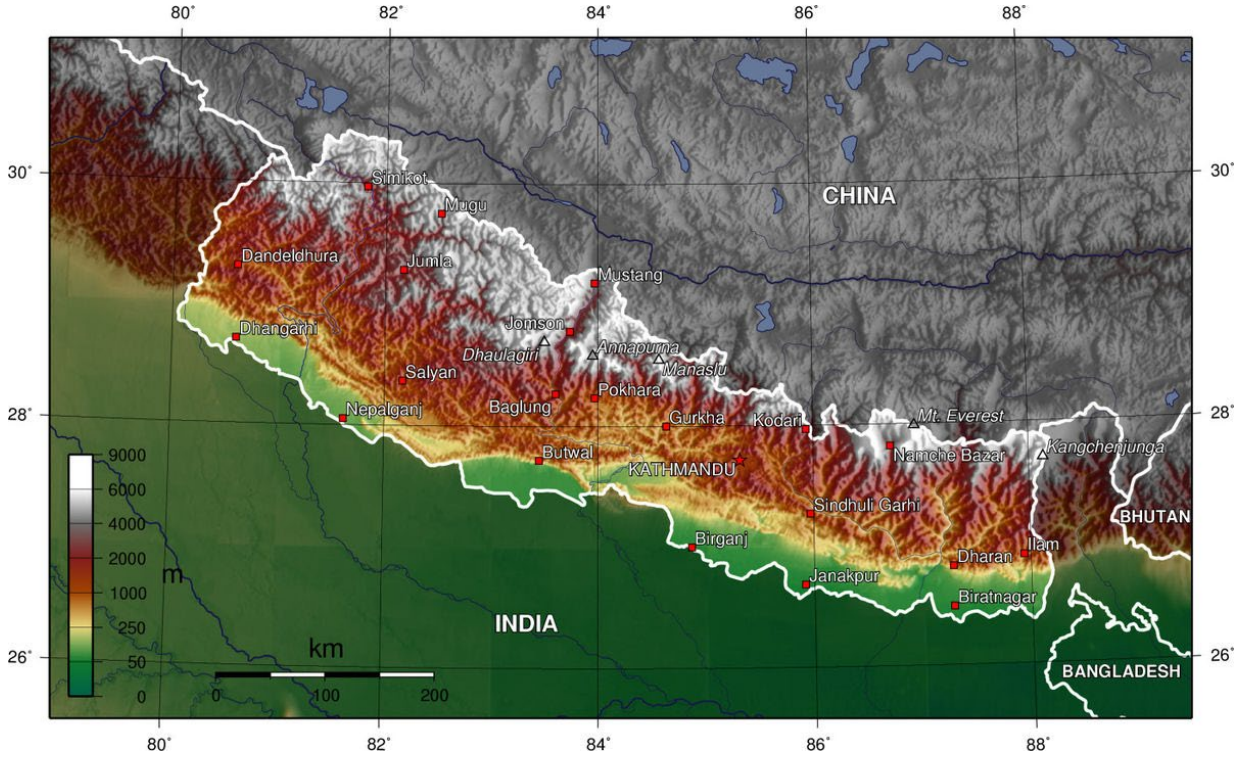


Figure 2: Topography of Nepal (Taylor et al., 2014)

The history of migration in Nepal is complex. While most of Nepal's population consists of smallholder farming families (CAT, 2019), subsistence agriculture is rarely adequate to meet household needs (Siddiqui et al., 2019). For this reason, labor migration, both internal and international, has been an aspect of Nepali life and culture for generations, and especially so in Magar culture (Hitchcock, 1966). Many Magar Nepalis view labor migration as a normal and accepted livelihood strategy, to be utilized as a complement to subsistence agriculture and enable families to afford basic household needs and build wealth.

The influence of migration is apparent in the Central Hills region, where Nepalis have migrated for employment in various sectors since the mid-18th century (Sijapati & Limbu, 2017). Labor migration is accepted amongst mountain peoples, and especially amongst the Magar, as a viable strategy for income diversification (Pun, 2000; Karki et al., 2020, Government of Nepal, 2011). The families of Nepali migrants use remittances sent home towards a number of activities, including childrens' education, consumption, and investment in agriculture (Karki et al., 2012). Remittances received have contributed significantly towards a decline in the country's poverty rate (Lokshin et al., 2010). In the last 25 years migration rates from the Central Hills of Nepal have risen drastically, with a nearly twofold increase in the rates of labor migration from the region between 2001 and 2011 alone; more than half of all Nepali households reported having at least one absentee member in the 2011 census (Siddiqui et al., 2019). These numbers are consistent with the case village for this project (Government of Nepal, 2011), and are projected to continue rising.

Nepal has emerged as especially vulnerable to the effects of a changing climate (citation?). While emitting less than 0.35 percent of the world's greenhouse gases, Nepal ranks very high on the list of countries that stand to lose the most from a global rise in temperature (CAT, 2019). This is owing to its proximity to the Hindu-Kush Himalaya, it's vast array of challenging landscapes, and a growing population (Chen et al., 2015; World Bank Group, 2021). Researchers are beginning to investigate the many factors driving environmental and climate change in Nepal, how local peoples are taking steps to mitigate or adapt to environmental change, and how their way of life may be impacted going forward. Concurrently, there are many studies investigating labor migration in Nepal, and the economic impact it may be having on communities in the Central Hills. These two fields of research have the potential to influence each other, yet have remained isolated in publication and study. This has the potential to paint a picture of research findings which do not take other influencing factors into account.

There is scant literature available that explores the triadic relationship between migration, livelihoods, and environment in mountainous regions such as Nepal's Central Hills. How are livelihood strategies affected by labor migration? How are the ecological systems of Nepal's Central Hills influenced by human migration and transience in and out of these systems? How are the social systems influenced? And how might a changing climate affect these relationships? These questions have been considered respectively by researchers, but a more holistic approach is needed in order to paint a complete picture of these complex, evolving relationships. Thus, a social-ecological systems approach is utilized herein; the systems of people in nature (Berkes & Folke, 1998; Adger, 2000; Colding & Barthel, 2019).

Owing to the isolating terrain, the people of Nepal's Central Hills have a close relationship with the surrounding ecosystem, and have developed a system of subsistence agriculture that served to meet their past nutritional needs while nestling into and interacting with the surrounding landscape (Hitchcock, 1966; Abington, 1992). The Central Hills of Nepal can be thought of as a Social-Ecological System (SES); a theoretical framework of human-environmental relations in which humans, rather than existing separately from the ecosystem (socio-ecological system), or occasionally interacting with the ecosystem (coupled/linked social and ecological systems), are active and permanent participants inside the ecological system (Berkes & Folke, 1998). The use of the SES framework serves to help researchers think of humans as one of many important ecological components. For the purposes of this project, considering a Magar village in Nepal's Central Hills as a social-ecological system and utilizing the SES framework was a fundamental element in the composition of inquiry, research methods, and project execution.

This study utilized social-ecological systems thinking to explore the relationships between labor migration, rural livelihoods, and a changing climate and environment within the context of a Central Hills Nepali village between 2018 and 2022. I chose to tackle many interrelated themes with

the intention of building on existing literature, uncovering new findings, and unearthing lines of inquiry for future research. This project's fieldwork relied on qualitative and quantitative methods for data collected in June of 2018 and January of 2022 from a case village in Myagdi District, Western Nepal. Information was gathered and analyzed using a mixed-methodology of qualitative semi-structured interviews, qualitative observation of smallholder farming households who have engaged in labor migration, and quantitative data collection in the form of GIS analysis and soil sampling. A thorough literature review on the history and impacts of migration, the trends of a changing climate, and evolving livelihoods in Nepal's Central Hills substantiated the fieldwork as a case study within the theoretical framework and potential contribution to existing literature.

The next sections of this paper will present first, a background on the past and present relationships between livelihoods, climate, environment, and migration in Nepal; second, a literature review of existing studies concerning drivers of migration, climate impacts, and the impacts of migration along the rural-urban continuum; third an analysis of qualitative and quantitative data gathered through ethnographic observation and semi-structured interviews with smallholder farming families who have engaged in labor migration; and finally, suggestions for future research in this area.

THE PAST: BACKGROUND

I. An Overview of Social-Ecological Systems Thinking

A. Social-ecological System Theory

Social-ecological systems (SES) are based on the idea that humans cannot be separated from nature, and are in fact part of nature. Berkes and Folke (1998) contributed further to this idea by stating that the separation between humanity and nature is an artificial construct and has its roots in the very human desire to distinguish ourselves from the rest of the animal world. By applying this logic, we come to understand that humanity and its actions are a system within nature, and the interactions between humanity and nature influence both.

In the past, the points of contact between the social sciences and the natural sciences have been limited. The two separate disciplines employ separate research methodologies and tackle seemingly different lines of questioning, with the social sciences utilizing qualitative methodologies and the natural sciences employing quantitative ones. But the last twenty years have seen huge strides in efforts to integrate the natural sciences into the social sciences, and vice versa (Colding & Barthel, 2019). Recent efforts to bridge the divide between the two have led to several sub-disciplines within both the social sciences and the natural sciences, such as political ecology, environmental ethics, and traditional ecological knowledge (Berkes, Colding & Folke, 2003).

One application of SES theory is that of system resilience in humanity and nature. Both social and natural systems operate within thresholds of resiliency. In "Social and ecological resilience; are they related?" Adger (2000) explores the relationship between the two factors by examining the impacts of mangrove loss on both social and ecological resilience in Vietnam, finding that the loss of ecosystem and corresponding ecosystem services affects both. This was a foundational study which sets the stage for a "land ethic" placing humanity firmly within nature's purview.

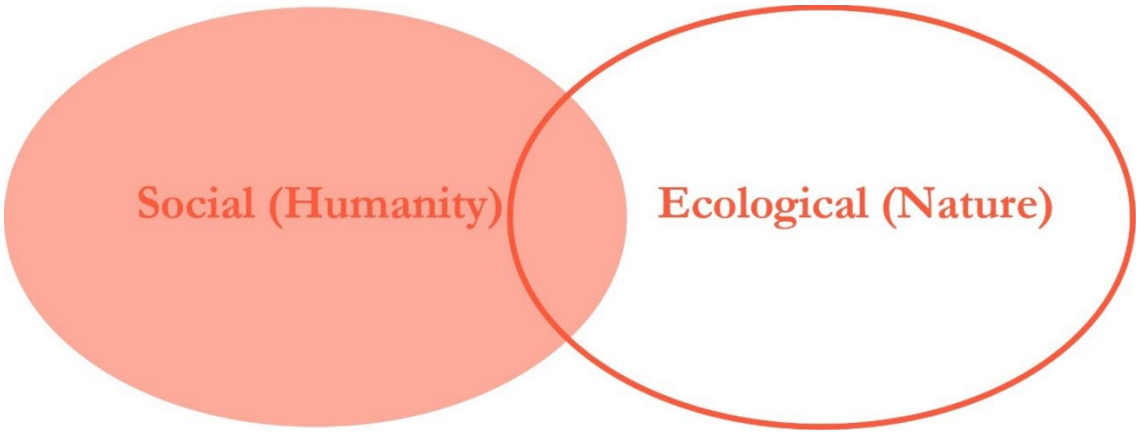


Figure 24: A socio-ecological system

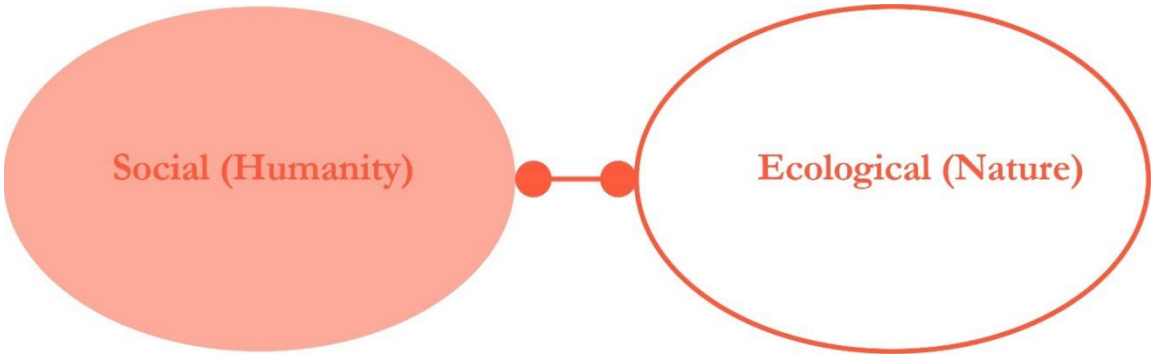


Figure 25: Linked social and ecological systems

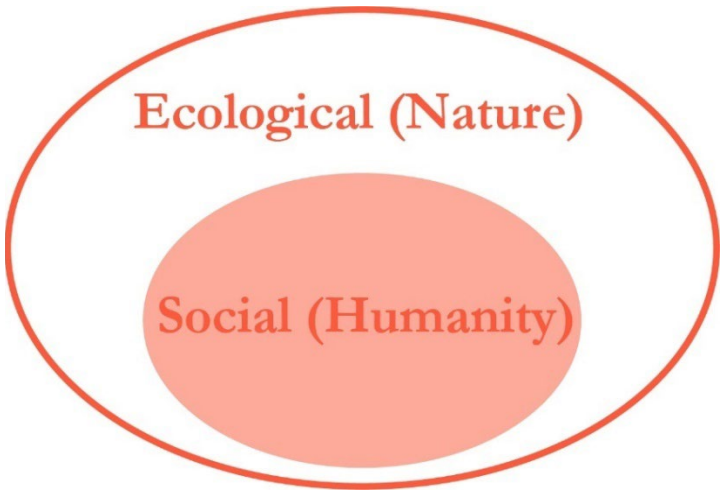


Figure 26: a Social-Ecological System, the framework for this study.

SES theory is not only applicable in rural settings, as the theory states that even urban settings qualify as being within nature. Stedman & Tidball (2013) explore the urban applications of SES theory in "Positive dependency and virtuous cycles: From resource dependence to resilience in urban social-ecological systems." They conclude that the idea of the urban as separate from nature and the applications of SES is another false construct, and that deficit-based assumptions about urban systems are a barrier in moving to a more resilient state and positive relationship with the natural world.

B. Nepal's Central Hills as an SES

Villages in the Central Hills of Nepal can qualify as a social-ecological system in several ways. Smallholder farmers in this environment are required to work closely within natural systems in the climatically volatile Hindu-Kush Himalayas. Over thousands of years the farmers in this region have developed a highly efficient method of traditional agriculture, which was affected during the experimental period of the Green Revolution (Raut et al., 2010; Dhakal et al., 2012; Paudel et al., 2019; Dev Deshar, 2013).

Smallholder farmers in this region have a close relationship with the surrounding environment thanks in part to their existing cultural, religious, and traditional relationships with the land, as well as their physical isolation from other societies and subsequent dependence upon the surrounding wilderness. These relationships are what Winter et al. (2018) refer to as a "biocultural system." Biocultural systems are present in every society, but most notable in areas where people have a more direct relationship and role within nature; especially in subsistence roles. Many indigenous groups in Nepal, including those of Magar ethnicity, count the natural world as an important part of their cultural and religious lives (Pun, 2000).

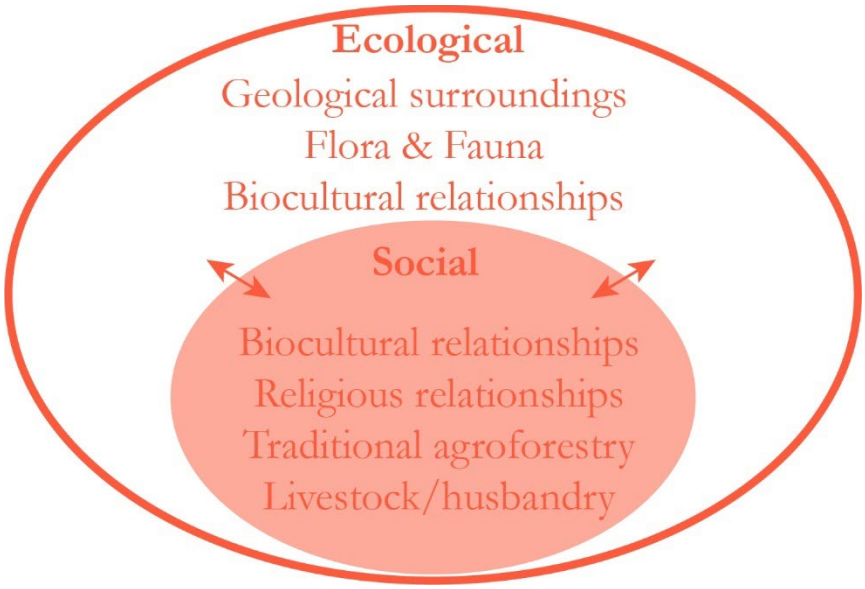


Figure 27: Traditional & historic SES interactions in Nepal's Central Hills

I. Climate and Environment Background

A. The Historical Climate in Nepal

Nepal is geographically and climatically diverse, beginning on the Gangetic Plain of Nepal's Terai at 60m above sea level (tropical), and shifting through 5 different climate zones in less than 100 miles to culminate in the mountainous Himal region, with elevations as high as 29,000 feet (alpine) (Chen et al., 2015). The Central Hills, also known as the Mahabharata Range, are an integral part of this setting, as they house the majority of Nepal's population and environmental diversity (ibid.). Both the region and the country are reliant on Himalayan glacial melt and a seasonal monsoon for water. The monsoon occurs in the summer months between June and September, with the Central Hills seeing an average of 60 inches of rain in this time period (Thyer, 1985). Nepal's annual monsoon is followed by a drier winter season. Temperatures have historically ranged between 32-55 degrees Fahrenheit in the winter months and 65-85 degrees Fahrenheit in the warmer months (World Bank Group, 2021).

B. The Changing Climate in Nepal

Nepal has emerged as especially vulnerable to anthropogenic climate change. Germanwatch Global Climate Risk Index places Nepal in the top five countries most vulnerable to climate change (Eckstein et al., 2019). From 1975-2005 Nepal saw a rise in annual average temperatures by ~0.06°C/year, with temperatures projected to increase another 1.3-3.8 degrees by 2060 (Nepal, 2016). Concurrently, the country has seen a significant decrease in rainfall, with anticipated annual precipitation decreasing 10-20% by 2060 (Nepal, 2016). Notre Dame's Global Adaptation Index places Nepal at 128 of out 181 countries in terms of vulnerability to climate-related threats (Chen et al., 2015). These changes are predicted to strike with greater impact in areas of higher altitude, with the population-dense Central Hill region of prime concern to the Government of Nepal (Government of Nepal, 2019).

II. Livelihoods and the Environment

Even today, livelihoods in Nepal are intimately linked to and dependent upon the land and land use practices (Amatya et al., 2018). The majority of migrants in Nepal hail from the Central Hills region and originate as smallholder farmers (Sharma et al., 2014, CAT, 2019). Land use in Nepal directly reflect the national economy, and overall wellness and security of its people. Shifts in land use, environmental degradation, and subsequent restoration efforts of the past 70 years have had a huge impact on Nepal in the form of demographic and economic change (Siddiqui et al., 2019; Karki et al., 2020; Amatya et al, 2018; Abington, 1992), and a shift in the mindset of many Nepalis when it comes to their relationship with and responsibility to the land.

A. Traditional Agro-economy of Nepal's Central Hills

Nepali farmers in the Central Hills have been practicing traditional indigenous agriculture for centuries. The most common system utilizes a triadic form of agroforestry; livestock production,

forestry, and conventional agriculture all contribute towards overall financial and food security for subsistence farmers in the Central Hills (Amatya et al., 2018; Sharma et al., 2007; Abington, 1992). Topsoil is difficult to build and maintain on the steep slopes of the Mahabharata (Abington, 1992). Therefore, livestock production is crucial in order to increase soil fertility through the manure application. This necessitates the use of trees for livestock fodder during the dry winter months when no other food is available. The trees planted for fodder also work to retain topsoil on steep slopes, aid in the buildup of soil organic matter, and stabilize the nutrient cycles of the soil. Finally, the soil sustains crops that improve the overall nutrition of the farmers and families who maintain this complex system (Amatya et al., 2018).

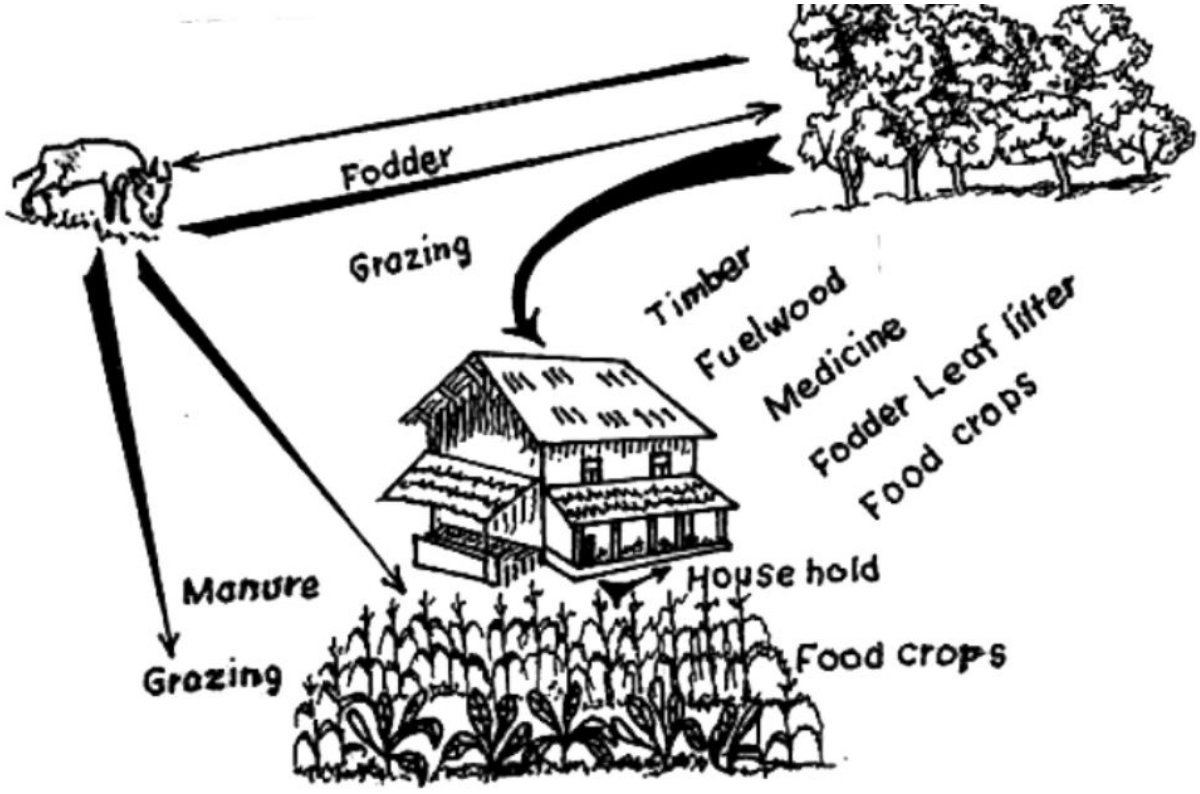


Figure 3: Inter-relationship between forest, farmland, and livestock in a traditional Nepalese agroforestry system (Amatya et al., 2018)

Farmers acknowledge that the shade of planted trees negatively affect the overall yield of their crops, but also understand that the benefits of erosion control, soil fertility, and the benefit of

livestock and their manure creates an overall positive tradeoff in the traditional Nepalese agricultural system (Abington, 1992). In the years preceding the Second World War this system of agriculture was adequate to sustain a small population of primarily hill-dwelling smallholder families (ibid.).

B. Shifts in Land Use & Environmental Degradation

The twentieth century brought changes and challenges to agriculture and land use in Nepal. Following the conclusion of the Second World War Nepal's population exploded. From 1950 - 1975 Nepal grew from 8.5 million to 13.75 million (UN Macrotrends, 2021). Today's population measures nearly 30 million, at least 45% (13.5 million) of which live in Nepal's Central Hills (ibid.). The need for additional food and the reliance of 77% of the population on the use of fuelwood (Dev Deshar, 2013) necessitated the clearing of all available land. From 1950-1975 Nepal averaged a deforestation rate of 4.1 percent, and between 1947 - 1980 overall forest cover shrank from 57% to a paltry 23% (Myers, 1986). In the Central Hills specifically, forest cover declined from 70% in 1964 to only 40% in 1978 (Karkee, 2004). The major limiting factor in deforestation was the disagreeability of sloped land for agricultural use, and the difficulty of accessing this rugged terrain (Abington, 1992). Subsequent soil loss and erosion has been evident in this region. Acharya et al. (2007) document that surface erosion soil losses vary from less than 2 ton/ha/yr to 105 tons/ha/yr in different hill region locations. Losses were indicated to be greatest on sloping agricultural land (averaging 35 tons/ha/yr) than on cultivated terraces (<1 ton/ha/yr). This led to the claim that Nepal would "slide away into the Ganges" by the year 2000, with deforestation and poor land management to blame (Raut et al., 2010).

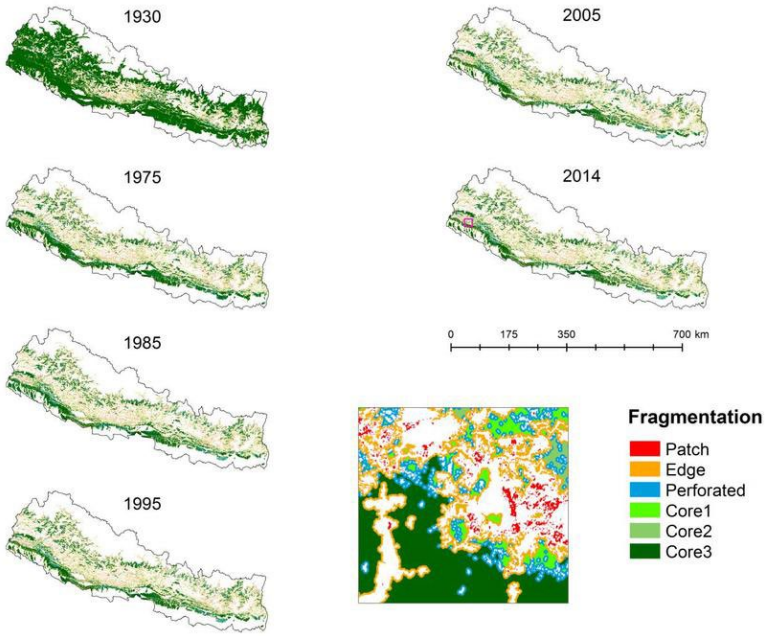


Figure 4: Forest Fragmentation Map of Nepal from 1930-2014 (Sudakhar et al., 2018)

The population increase instigated not just the clearing of virgin forest, but the intensification of existing cropland, and Nepali farmers were not immune to the influence of the Green Revolution that swept through Asia in the 1960s and 1970s. With the introduction of new technology, farmers began increasing the number of crops per annum (from 1.6 to 2.5 (Raut et al., 2010)), introducing new high-yield crop varieties of maize and rice (Paudel et al., 2019; Raut et al., 2010), and employing irrigation technologies to use available land to the fullest extent (Dhakal et al., 2012; Dev Deshar, 2013). Farmers also began applying synthetic fertilizers and pesticides. As a result of these intensification measures, yields in cereal and vegetable production increased by 41% and 61% respectively from 1980-1990 (Raut et al., 2010). However, since 1990 yield gains have stagnated (Adhikari et al., 2021). This is due primarily to fertilizer saturation of the soil and over-application of pesticides (ibid.); two practices which also have the unfortunate side effects of increasing soil erosion and decreasing biodiversity. Nepal has received nothing in exchange for the health of their natural environment and agricultural land, as yield gains have failed to keep up with the needs of Nepal's growing population. As a result, Nepal has been a net importer of cereals and vegetables since the

mid-1990s, a trend which continues through the modern day and has been exacerbated by the COVID-19 Pandemic (ibid). Overall, there is considerable evidence that Green Revolution policies have, at best, only partially solved twentieth-century problems in the Central Hills.

C. Environmental Restoration Efforts in the Central Hills

In the modern-day Nepal remains highly dependent on its considerable land, water, and forest resources to meet development goals (Acharya et al., 2008). Due especially to the dependence of local populations on forests for resources, forest restoration and environmental restoration have become commutable terms. Drawing sustainable livelihoods from the environment has emerged as a key national policy objective (Government of Nepal, 2019). Environmental restoration efforts in Nepal, and the Central Hills in particular, have spanned a gamut of approaches, from top-down federal initiatives and policies to on-the-ground efforts on the part of smallholder farmers.

i. Top-down Federal Initiatives

Top down, federal government policies and regulations formed Nepal's initial approach to environmental restoration, and have mostly been a failure (Gautam et al., 2004). Reasons range from the difficulty of managing such a diverse range of ecosystems and land uses, to a lack of capacity to enforce regulations, and finally a reluctance to engage with local communities (ibid.). Prior to 1957 the government's main considerations were on forests conversion to farmland and timbering for export. Following the nationalization of all forests from 1957 - 1976, efforts focused on strict control of forest usage by the government and expansion of enforcement efforts through the growth of the forestry regulation bureaucracy. A look at the increased deforestation rates through the 1980s shows that this approach did not work (Gautam et al., 2004). Local populations viewed these regulations as patronizing, and these did not stop large timbering companies from continuing to clear-cut forests.

Beginning in the late 1970s and early 1980s the federal government began to pivot towards policies that emphasized research, educational programming, and monitoring and evaluation efforts. Countless policies and laws, including the Nepal Conservation Strategy of 1988 and the Nepal Environmental Policy and Action Plan of 1993, emphasize a need for sustainable growth and development over strict conservation and lack of access to forest resources (Acharya et al., 2008). As a result of this policy shift, the federal government has been successful in shifting control of forestry resources to local organizations and community forestry groups, while focusing its limited resources on research and monitoring that provide tools and resources to these smaller, more effective groups.

ii. Community-led initiatives

Community-led restoration programs, especially in Nepal's Central Hills, have seen success and served as an example for restoration programs the world over. Community forestry groups are led by community members and meet at set times to determine how best to use the forested land under their jurisdiction and care. As of 2014, more than 35% of Nepal's population was involved in community forestry programs, which number 1.45 million households, over 17,500 individual groups, and more than 1.6 million hectares of forests handed over to community management (Stahl & Sapkota, 2014). Countless studies have suggested that Nepal's community forestry programs have proven effective in reversing deforestation, degradation, and encroachment (Acharya et al., 2008).

iii. Nepal's National Agroforestry policy

Presently, the federal government is brainstorming ways to tackle environmental degradation and underutilization of agricultural land in the Central Hills, while also providing livelihoods and the potential for economic growth. Agroforestry has emerged as a possible answer which builds on the recent successes of community forestry. Nepal recently passed a National Agroforestry Policy, one of only two countries to do so (Government of Nepal, 2019). The intensification of agroforestry in Nepal's Central Hills may provide an answer to the challenges presented by environmental

degradation, economic stagnation, and a changing climate. Agroforestry as a solution is also popular with smallholder farmers. Biggs et al. (2013) interviewed 120 farmers across four districts of the Central Hills region and found that implementing improved agroforestry practices and organic farming are among the most popular methods of combatting the environmental degradation that plagues the country (Biggs et al., 2013).

III. Migration

A. The History of Labor Migration in Nepal

Nepal has a rich historic background of migration; Trade, conquest, colonization, military service, and labor migration have all had major impacts on migration patterns and transience both within and outside the country. The Trans-Himalayan trade between India, Tibet, China, and Nepal found the country acting as a commercial thoroughfare through the mountain passes as early as 500 BCE (Sijapati & Limbu, 2017). In the Central Hills, many indigenous groups trace ancestry to the Tibeto-Burman peoples who conducted this trade, and until recently, Nepal had closer ties with Tibet than any other nation (Ibid.).

The British invasion of Northern India and Nepal served as a catalyst for new forms of migration. The Anglo-Nepalese war of 1814-1816 was fought between the British forces of the East India Company and the Ghorkali army of the Kingdom of Nepal. British soldiers were impressed by the display of strength and discipline from the Ghurka forces. The subsequent peace treaty (in which Nepal retained its independence but lost considerable territory) introduced the idea of Nepali conscription into British and Indian military service and sparked a tradition that has lasted more than 200 years (Dutt, 1981, Sijapati & Limbu, 2017, IOM, 2019). In the present day, military service as a Ghurka soldier continues to be a highly respected profession amongst the peoples of Nepal's Central Hills.

Following the conclusion of the war the British government encouraged hill-dwelling Nepalis to engage in labor migration for the purpose of filling the labor gap in their northern territories. As a result of this policy, Nepalese settlers cleared and settled portions of India, Sikkim, and Bhutan, and continue to have considerable influence in the region today; with 60% of Sikkim's population and roughly 40% of Bhutan's population of Nepalese descent (Dutt, 1981). Nepalis also engaged in temporary circular migration, primarily to India, in large numbers until the mid-20th century, when they began seeking employment in other regions.

From 1970 onward, Nepalis sought employment in Gulf Coast Countries and Southeast Asia, and with the introduction of the Foreign Employment Act in 1985 foreign labor migration became a much more official and lucrative game (Sijapati & Limbu, 2017). In the mid-1990s, conflict stemming from Nepal's Civil War sparked a further surge in rural-urban movement and international labor migration to these new countries, especially from the Central Hills where conflict was common. Nepalis were often forced from their homes as refugees, and many fled the country and were settled in both neighboring regions and through refugee resettlement programs in Europe and North America (IOM, 2019). Following the conclusion of the civil war, Nepalis continued to seek employment in GCC and SEA countries, but also branched out toward Europe and Asian countries such as Japan and South Korea, seeking employment in the agriculture and service industries (Siddiqui et al., 2019). In the 2011 census roughly 7.5% of the Nepali population identified as an international labor migrant, and just over half of all Nepali households had at least one individual working away to bring income into the home (IOM, 2019).

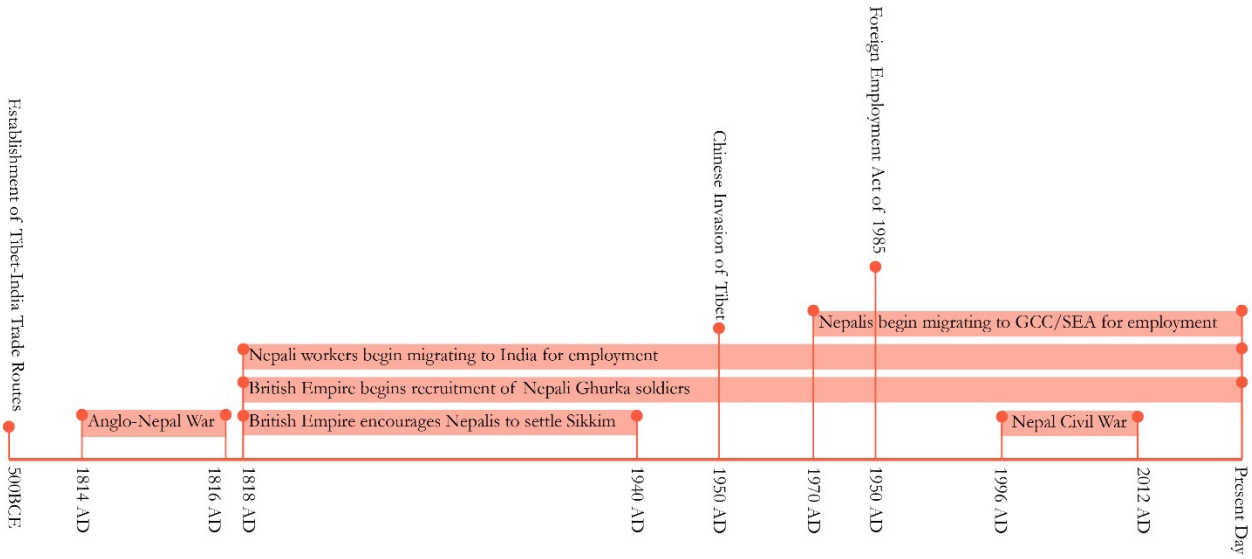


Figure 5: A timeline of migration history in Nepal

B. An Overview of Migration Theory in the Nepali Context

Modern-day labor migration studies are awash in theory on the factors shaping movement and the choices people make when deciding whether or not to engage in migration. All of these theories are dictated by the simple "push-pull" idea of migration drivers, postulating that potential migrants are pushed from one location and pulled towards another due to a series of factors (Shrestha, 2017). Different theories present different factors, and several theories provide a helpful foundation for understanding migration in the context of Nepal's Central Hills. Massey et al. (1993) provide a review of popular existing theories, as shown in the table below:

Theory Name	**Date**	**Brief Explanation**
Neoclassical Economics	1954	International migration is caused by a discrepancy in the supply of and demand for labor in wealthy countries
Cumulative Causation	1957	The movement and actions of one migrant influence the decisions of multiple other migrants in ways that make migration more likely
Dual-labor/Segmented Market	1979	The labor market is segmented into two sections; a primary sector for high-earning native workers, and a secondary sector for low-earning migrant workers

World Systems	1981	The globalized world market has created demand for a mobile population of migrant workers
Network Theory	1981	Migrants rely on existing social ties and networks in order to make migration decisions
New Economics of Labor Migration (NELM)	1985	Labor migrants are sovereign decision makers, but households make labor decisions together in order to maximize income and minimize risk/ market failure
Migration Systems	1989	Countries are grouped in "migration systems" which are economically or politically linked and provide more potential for migration between the country groups

Table 1: Different migration theories, with brief explanations

All of these theories can find purchase in Nepal, due to the breadth of different motivations for migration and transience. Several theories stand out as viable approaches for the majority of the population in Nepal; NELM, Dual-Market, and World Systems theories.

The New Economics of Labor Migration (NELM) theory is generally considered amongst contemporary researchers to be the most applicable to Nepali society and culture. With NELM, the decision to migrate is made as a household unit, and labor migration is carried out not just as a way of building wealth, but to diversify income streams and build resilience against adversities such as market failure, crop failure, natural disaster, etc. NELM challenges the presumptions of Neoclassical theories, which draw inspiration from simple supply and demand economics. In Nepali culture, families often live together in multigenerational homes, and sons will bring their wives into the fold as new household members. Any migration decision concerning one member concerns the entire household, and household members will involve themselves in other forms of work, such as agriculture, while the departed member is away. For many Nepali families, engaging in labor migration is a way to minimize risk in a difficult environment, and remittances sent home can either be used for consumption or have the potential to stimulate and stabilize the domestic economy (Taylor, 1999).

Dual-Market Theory, also known as Segmented Market Theory, builds on an inherent dualism between different types of labor, notably the primary and secondary labor markets. In the secondary labor market, low wages and a lack of economic mobility are unattractive for native-born workers in a developed country. Instead, these native-born workers are pulled towards the more secure, higher paying jobs in the primary sector, which are capital-intensive and often promise upward mobility. To fill the resulting demand for workers in the secondary labor market, immigrant labor is often brought in. For Nepali workers who travel to countries like those in the GCC or other Asian countries, this means work in low-skilled jobs like construction, landscaping, or domestic labor.

World Systems Theory takes the disruptions caused by globalization and capitalist development under consideration. Called a new mercantilist theory by many, World Systems postulates that rapid capitalist development in developed countries requires manufacturing, labor, and raw materials from less developed countries, which effectively ties less developed countries into a global economic system. Local prices are now influenced by markets that are thousands of miles away, and even as migration flows are generated from these countries, the migration decision is dictated by the globalized price of everyday items at market (Massey et al., 1993).

C. Drivers of Migration in Nepal

The drivers of migration in Nepal are diverse and have changed over time to reflect both historical and global factors. There are two main kinds of drivers; "pull" factors which incentivize people to migrate from their homes, and "push" factors that leave them with no other option (Shrestha, 2017). Major push and pull drivers influencing migration in Nepal are described below.

i. Pull Factors

- Marriage: KC (2020) identifies marriage as a major reason for migration in Nepal, accounting for over a quarter of all moves within the country. For women, marriage is the main reason

for undergoing migration, as many cultural customs in Nepal dictate that a women travel to live with her husband's family.

- Military Service: Nepalese Gorkha soldiers, composed mostly of indigenous groups that hail from Nepal's Central Hills, have a reputation as world class military units, and a long history of military conscription in foreign armies, notably the British Forces and the Indian Army (Sijapati & Limbu, 2017). As of April 2021, there were over 4,000 Gorkha troops serving in the British Army (Ministry of Defense, 2021), and in 2020 the Indian Army numbered well over 32,000 Nepali troops (Online Khabar, 2020).
- Employment and Livelihood Diversification: Livelihood improvement is a primary driver of migration both internally and internationally. Nearly 28% of migrants identified "work" as their primary reason for migrating (Sharma et al. 2014, KC 2020). In accordance with the NELM theory of migration, Rabbani et al. (2016) notes that "Migration as a supplementary and/or complementary income-generating strategy has been a feature of Nepali society for at least the last two hundred years," asserting that migration is a deliberate decision towards income diversification on the parts of migrants and their families.
- Education: Most villages in rural Nepal have schools that provide secondary level education up to the age of 16. For anything further, families must send their children to boarding schools in urban centers. This flood of youth into the cities is a significant source of rural-urban migration, and contributes towards permanent rural outmigration from the Central Hills (KC 2020, Rabbani et al. 2016).

ii. Push Factors

- Conflict: The 10-year long Civil War in Nepal (1996 - 2006) forced many young men and women to make a choice between recruitment from Maoist forces or fleeing their homes in rural villages to safer urban areas (KC, 2020). Numbers vary depending on source, but the

International Organization for Migration puts the numbers of Nepalis internally displaced from the conflict between 89,000 and 200,000 (IOM, 2019). A study from Shrestha (2017) suggests that rural Nepalis react to conflict by moving to urban areas, while urban Nepalis react by moving abroad.

- Natural Disaster: Disasters such as flooding, landslides, earthquakes and drought are common causes of displacement for many Nepalis in rural areas. KC (2020) names the 2015 earthquake and recurring floods and landslides in the region as major reasons for internal displacement. Rabbani et al (2016) notes that a response to "too much or too little water" resulting in a crop-destroying scenario resulted in an increase in wage labor migration both internally and internationally.
- Environmental Degradation: Deforestation, pollution, and erosion of fertile land resulting from poor farming practices can result in crop failure and a need for many smallholding families to engage in labor migration.
- Economic Hardship: Environmental degradation and economic hardship are often used interchangeably in Nepal, a country where nearly 70% of the population are smallholder farmers (CAT, 2019). But economic hardship can also stem through failures in the manufacturing, tourism, and business sectors, all sizable sources of employment for the Nepali population. Tourism in particular has been hit hard both by the 2015 earthquake and the 2020 COVID-19 pandemic, forcing some Nepalis to travel elsewhere for work (KC 2020).
- Climate Change: The link between a changing climate and rural outmigration in Nepal has been lightly established in existing literature and will be further fleshed out in the forthcoming literature review. The International Organization for Migration (2019) states that "it is difficult to establish a direct causal link between environmental factors and the

decision to migrate. Rather, it can be a cumulative effect that impacts of climate change and environmental degradation have on the sustainability of livelihoods, for example, failure in agriculture, resulting in reduced income or poverty which drives migration." Rather than serving as a push factor on its own, a changing climate may influence and exacerbate existing push factors such as natural disasters, environmental degradation, and economic hardship.

D. Types of Migration

There are various types of migration that Nepalis may engage in. These types can be split into two categories, temporary or permanent, and are detailed below:

i. Temporary

- Short-term seasonal: Consists of migration episodes lasting no more than one year, often towards places with short term need for many laborers, such as the agriculture or construction sectors.
- Long-term circular: Consists of travel back and forth between home and another location. Long-term migrants may be away from home for periods of 1-5 years, return for a brief visit, then choose to remain at home or depart for another period of time.

ii. Permanent Population Shifts

- Internal: Rural to rural migration: Migrants have many reasons for moving between two rural areas within Nepal; marriage, education, and the purchase of land elsewhere are all common reasons for Nepalis to relocate permanently.
- Internal: Rural to urban migration: Economic hardship, environmental degradation, conflict, and the opportunities present in urban areas are all factors driving rural outmigration and rapid urban growth in Nepal. Families and individuals who move into cities may one day

return to their village of origin. However, many find permanent opportunities and stable livelihoods in urban areas and choose to stay.

- International: Stepwise migration: Many Nepalis engage in migration as a series of steps leading towards a permanent international destination that they perceive as having better prospects for themselves and their families. A stepwise migrant normally begins in a destination that is easy to access with lower wages for migrant workers, and then leverages the experience gained in this "starter" country to work their way towards a destination with more lucrative pay and other benefits, but may not be initially accessible to them at the start of their migration journey.

E. Migration Statistics from the Central Hills

Who migrates, how many migrate, where migrants go, and how Nepalis benefit are of interest to the Government of Nepal and relevant national and international organizations.

i. Who migrates

53% of all households in Nepal reported having at least one absentee member living either elsewhere in Nepal or outside the country, and the Government of Nepal reported a more-than twofold increase in the number of Nepalis living internationally in between 2001 and 2011 (Siddiqui et al., 2019). 96% of all labor migrants are men, although women represent a growing proportion of migrants (Government of Nepal, 2016). The majority of migrants, both international and internal, hail from the Central Hills region of Nepal (see figure below), with a clear hierarchy in destination; migrants in the poorest quintile choosing to engage in international migration, while those in the richest quintile remain in the country (see figure below). (Sharma et al., 2014).

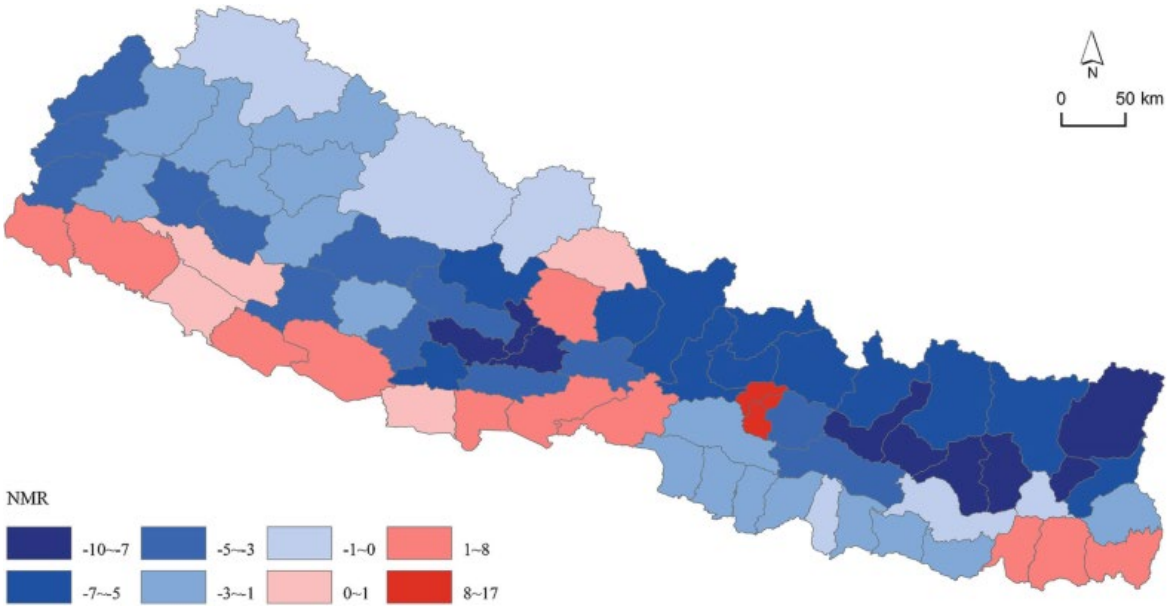


Figure 6: Net Migration Rates, districts of Nepal, 2006-2011 (KC, 2020)

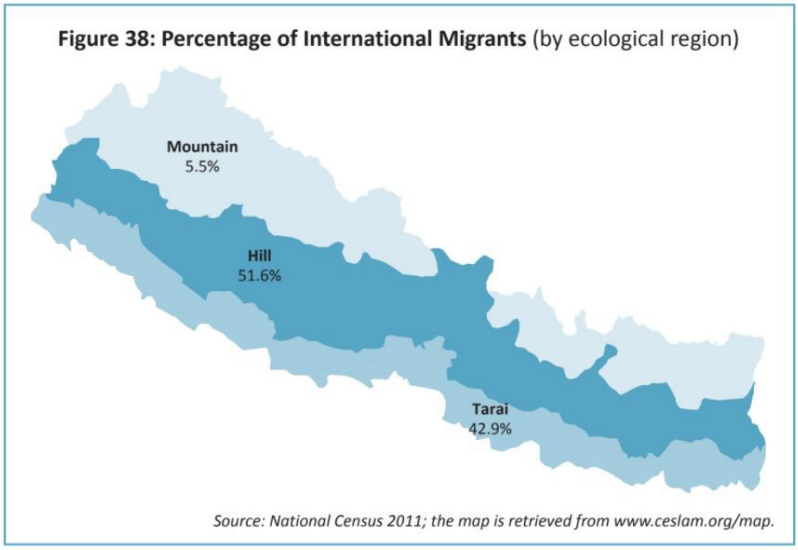


Figure 7: Percentage of International Migrants by ecological region (Sharma et al., 2014)

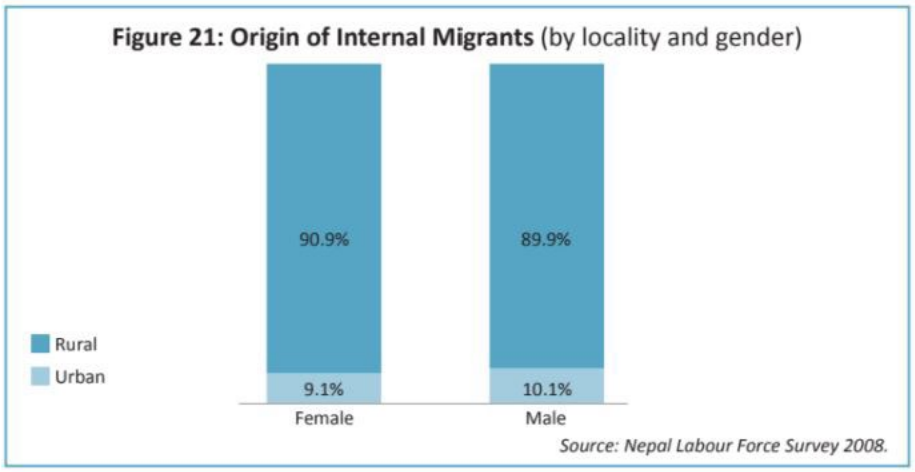


Figure 8: Origin of Internal Migrants by locality and gender (Sharma et al., 2014)

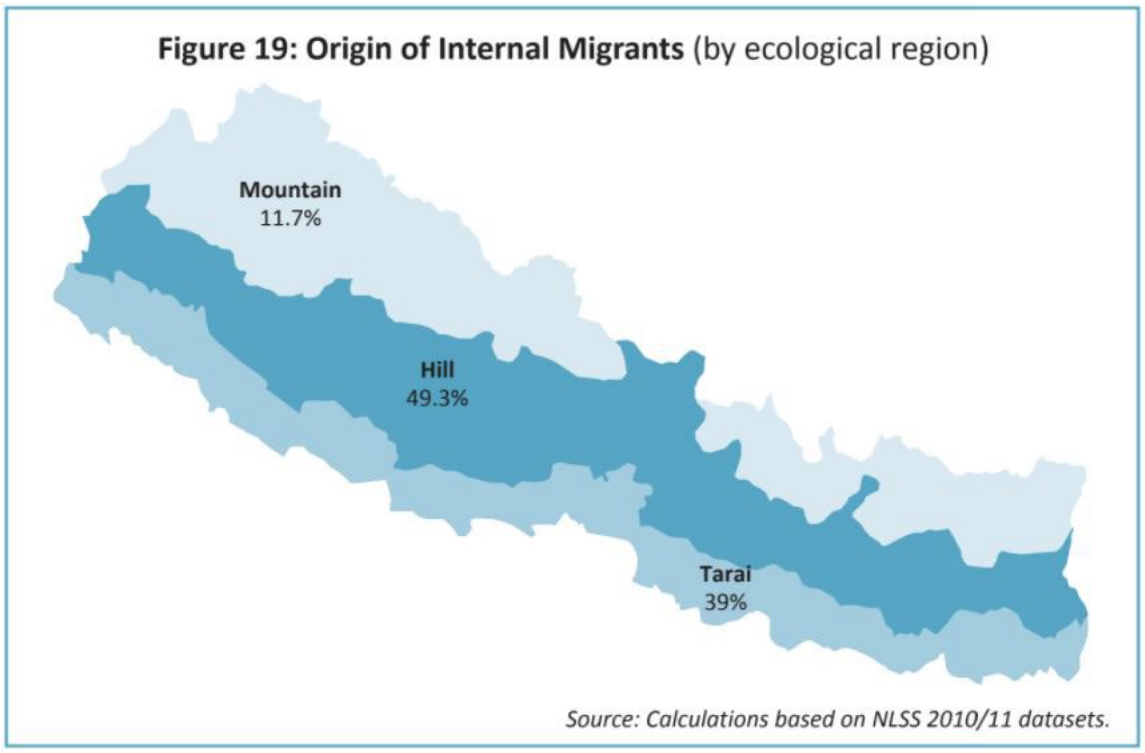


Figure 9: Origin of Internal migrants by ecological region (Sharma et al., 2014)

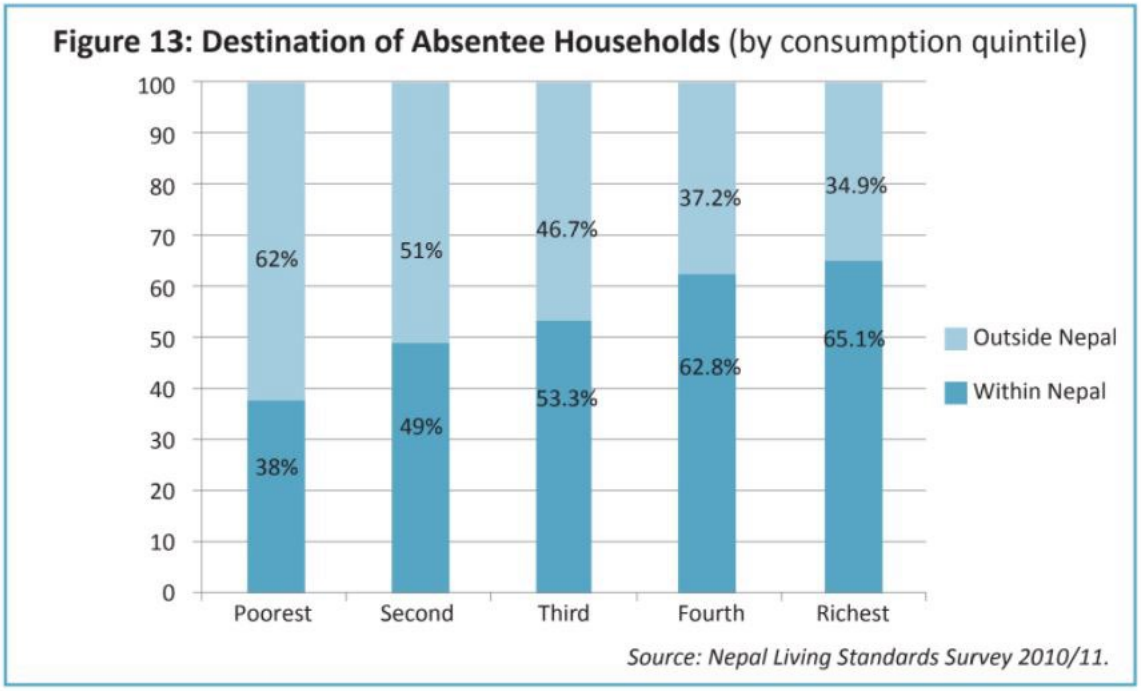


Figure 10: Destination of absentee household by consumption quintile (Sharma et al., 2014)

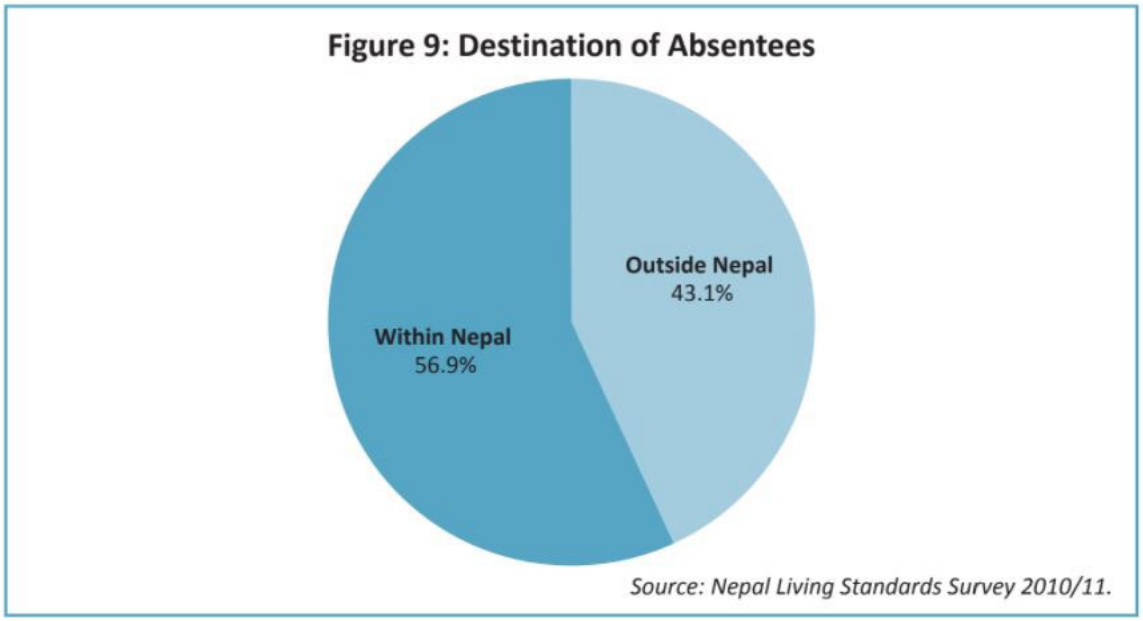


Figure 11: Destination of absentees, overall (Sharma et al., 2014)

ii. How many and where

The Nepal National Living Standards Survey of 2011 found that over one-fifth of Nepal's population (~6 million people) were engaging in internal migration, mainly from rural to urban areas (Sharma et al., 2014). Internationally, Nepalis are represented in more than 100 countries, with some sources estimating that there may be as many as 3 million Nepalis (10% of the total population) living and working in India (Sharma, 2011), and another 800,000 (at least) working in the GCC (Williams & Gray, 2019). In a Gulf Coast States specific study, Sharma (2011) asserts that the Department of Labor recorded more than a million labor permits granted to Nepali workers seeking employment in GCC countries such as Saudi Arabia, and the Government of Nepal (2011) reports that 85% of the labor permits issued between 2001-2011 were to work in the GCC and Malaysia, with other Asian countries and Europe as secondary destinations (Siddiqui et al., 2019).

RESEARCH OBJECTIVES AND QUESTIONS

This study examined the relationships between livelihood strategies, climate, environment, and migration along the rural-urban continuum in Nepal, and how these relationships are affected by a changing climate. Qualitative and quantitative data (mixed-methodology) contributed towards answering the research questions.

I. Research Objectives

- RO 1: Explore + identify how migration patterns and trends in Nepal have evolved, both historically and presently.
- RO 2: Explore + Identify livelihood strategies of the people along the rural-urban continuum in Nepal and how they relate to labor migration patterns and trends
- RO 3: Explore + Identify social-ecological challenges and vulnerabilities of the people along the rural-urban continuum in Nepal and how they relate to labor migration patterns and trends.
- RO 4: Examine study findings and speculate on the effects of climate change in regards to the relationships between livelihoods, social-ecological systems, and labor migration in Nepal.
- RO 5: Develop recommendations for further research and inquiry on this subject.

II. Research Questions

The primary research question for this capstone paper is:

How are evolving livelihood strategies and Nepal's Central Hill environment both influencing and influenced by migration along the rural-urban continuum in Nepal? How might a changing climate affect these relationships?

The specific questions to support this research are:

Research Question 1: Livelihood strategies and migration

How are livelihood strategies in Nepal's Central Hills relating to migration along the rural-urban continuum? How might a changing climate affect the relationship between livelihood strategies and migration?

Research Question 2: Migration and Environment

How is the environment (defined for this study as the ecosystem and social system of Nepal's Central Hills) relating to migration along the rural-urban continuum? How might a changing climate affect the relationship between the environment and migration?

Research Question 3: Environment, and Livelihood Strategies

How is the environment (defined for this study as the ecosystem and social system of Nepal's Central Hills) relating to livelihood strategies along the rural-urban continuum? How might a changing climate affect the relationship between social-ecological systems and livelihood strategies?

THE PRESENT: LITERATURE REVIEW

I. Climate Impacts and Mitigation Efforts

A. Impacts

More important than the empirical changes to the climate in rural Nepal are the effects blowing in on its coattails; that of the change perceived by rural smallholder farmers, and the impacts to their livelihoods. If communities do not perceive a change that could affect their livelihoods or the existing social-ecological system (SES) then there is little justification for continued research. The last decade has shown growing interest in studying the perceptions of climate change by smallholder farmers in Nepal, and the Central Hills in particular. Some studies of note which examine smallholder farmers' perceptions of weather and climate in Nepal's Central Hills are expanded upon below.

In "Impacts of environmental change on agroecosystems and livelihoods in Annapurna Conservation Area, Nepal", researchers conducted surveys, focus groups, and town hall meetings amongst rural villagers in the two mountainous districts of Myagdi and Mustang. Residents expressed concern for the following; unpredictable rainfall during monsoon, and a decrease in precipitation during the winter, introduction of mosquitoes with warmer summer temperatures, and an increase in pests and plant pathogens. Myagdi and Mustang form a significant region for tourism, yet most of the population is still engaged in farming, and subsequent declines in crop yields are concerning. Perceptions of change in the region are backed up by researchers with existing meteorological data (Dangi et al., 2015).

In Humla, a similarly mountainous district in the far northwest of the country, Gautam (2017) examined drivers of seasonal migration, in which residents in a focus group-based study presented a clear awareness in the subtle changes in seasonal weather patterns, notably an increase in erratic precipitation that affects planting times and germination rates, and subsequent crop yields

and incomes in smallholding households. As a result, these families face food insecurity and household budget deficits due to a decrease in available livelihoods (Gautam, 2017).

In a study covering all three ecological zones of Nepal (Terai, Central Hill, and Himalaya) researchers surveyed 530 farmers to further understand perceptions of climate change, finding that farmers across all zones identified an increase in temperature (over 99% of those surveyed), a decrease in precipitation (98.9%), and a growth in climate-related diseases such as crop rust and agricultural pests (96.8%). Once again, scientific observation in temperature and precipitation change are consistent with farmers' perceptions (Paudel et al., 2019).

The below figures show (a) the field locations of existing studies on farmers' perceptions of climate change and climate impacts on livelihoods, and (b) what those changes and impacts are stated to be. Overall, the literature suggests that farmers are perceiving more erratic weather, followed by corrosive impacts to traditional agricultural methods. The literature also suggests that these trends will continue into the future.

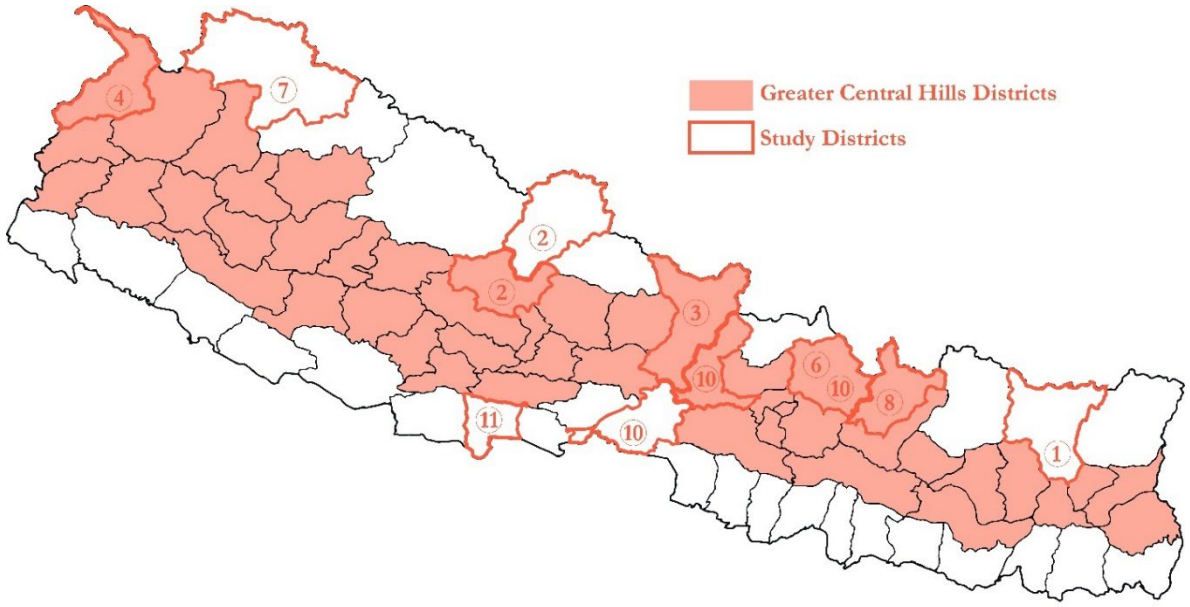


Figure 12: A map depicting existing study areas and where they fall within the Greater Central Hills Region

	Study Citation	Location (District)	Perceived Climate Changes
1	Sharma, 2011	Sankhuwasabha	Erratic rainfall, decreased length of winter, droughts, crop & livestock pests/diseases
2	Dangi et al., 2015	Myagdi & Mustang	Crop & livestock pests/diseases, decrease in snowfall, erratic precipitation, temperature increase
3	Devkota et al., 2016	Gorkha	Temperature increase, erratic precipitation, drought, floods
4	Rabbani et al., 2016	Darchula	Temperature increase, high winds, erratic precipitation, floods, landslides, heat waves
5	Sujakhu et al., 2016	Sindhupalchok	Crop & livestock pests/diseases, hail, landslides, erratic precipitation, floods, thunderstorms
6	Bocciola, 2017	Greater Central Hills	Drought, erratic precipitation, temperature increase, decreased length of winter
7	Gautam, 2017	Humla	Erratic precipitation, decreased length of winter, drought
8	Mbow & Rosenzweig, 2019	Rasuwa	Drought, crop & livestock pests/diseases
9	Paudel et al., 2019	Greater Central Hills	Drought, temperature increase, crop & livestock pests/diseases
10	Karki et al., 2020	Sindhupalchok, Dhading, & Chitwan	Drought, erratic precipitation, hail, landslides, fog, high winds
11	Aryal et al., 2021	Rupandehi	Drought, excessive rainfall, flooding, crop & livestock pests/diseases

Table 2: Index of perceived climate changes by smallholder farmers, organized by study

B. Mitigation Efforts

As a Least Developed Country (LDC) Nepal has developed a multi-tiered partnership system with scientists, policymakers, farmers, and non-governmental organizations (NGOs) both local and international (Bocciola, 2017). However, many rural smallholders in the Central Hills still lack institutional support in building resilience to the impacts and hazards presented by climate change. As such, social scientists have recently demonstrated interest both in how traditional

institutions are attempting to mitigate the effects of climate change, and how individual farmers and communities are taking steps to adapt or lessen climate impacts in their area.

i. Current Institutional actions and shortcomings

The Government of Nepal has traditionally taken a stance of adapting to existing challenges rather than mitigation against future ones. A prime example of this includes the National Adaptation Programme of Action (NAPA), which "identifies priority activities that respond to their immediate needs to adapt to climate change, ultimately leading to the implementation of projects aimed at reducing the economic and social costs of climate change" (Nepal, 2016). For Nepal this included activities such as building resilience to natural disasters and encouraging farmers to intensify the cultivation of existing land.

In an about-face from their historic focus on adaptation, Nepal ratified the UNFCC Council of Parties' (COP) Paris Agreement in 2016, and submitted their first Nationally Determined Contribution (NDC) in the same year. In it, GON lays out a framework which builds on Nepal's existing Climate Change Policy (CCP), adopted in 2011. The CCP "…envisions a country spared from the adverse impacts of climate change, by considering climate justice, through the pursuit of environmental conservation, human development, and sustainable development – all contributing toward a prosperous society" (Nepal, 2016). In the shift toward climate change mitigation, Nepal's NDC focuses on sustainable energy development, building codes, reforestation policies (through programs like REDD+), development of electric-based transport systems, climate-sensitive agriculture, and management of waste.

Nepal's NDC goals require close collaboration with local communities to become a reality, something that the government has struggled with in the past and present. In "An Overview of Climate Change and Its Impact on Agriculture: a Review From Least Developing Country, Nepal" Karki et al. (2012) states that "Nepal has low adaptive capacity to respond to the weather variability

which occurs due to climate change" resulting both from the limited capacity of the government and other organizations to offer programming that pertains to NDC goals, and the inability of poorer, vulnerable populations to access those services (Karki et al., 2012). Dangi et al. (2015) backs this perspective up by adding that in their interviews and focus groups with over 83 households in Myagdi and Mustang districts, a majority of households perceived a disconnect between the local government attempting to implement policies and local residents undertaking livelihoods (Dangi et al., 2015).

ii. Actions taken by individuals

Apart from the government, individual farmers and communities in the Central Hills have attempted to lessen the impact of a changing climate in various ways. The first of these is the introduction of improved crop varieties, technology, and cropping methods. With temperatures rising and growing seasons changing, farmers are experimenting with new or additional crop rotations that intensify their existing land sustainably (Charmakar, 2010; Manandhar et al., 2011). As a result, Nepali farmers have increased the number of crops on the same land per year from 1.6 to 2.5 (Raut et al., 2010). Aryal et al. (2021) interviewed over 1900 farm households in Bangladesh, India, and Nepal, finding that leading climate change adaptation strategies included changing existing household farming practices, and introducing newer sustainable methods that they had received training on.

Many farmers are also making moves away from traditional subsistence farming, and towards cash crops and income avenues that promise income rather than food. In their study of indigenous mountain populations in Nepal, Mbow & Rosenzsweig (2019) note that farmers in the Rasuwa district prefer to grow local varieties of grain and beans for their tolerance to erratic weather conditions, but shirk the same crops when it is time to decide which foods to sell, due to their low value on the market (ibid.).

While moving away from purely traditional farming techniques, many Nepali farmers maintain that traditional knowledge is still important in the process of adapting to climate change. Interviewees in Dangi et al.'s "Impacts of environmental change on agroecosystems and livelihoods in Annapurna Conservation Area, Nepal," supported the statement that "Such knowledge is embedded in social systems and coevolve with ecological processes (Gómez-Baggethun et al., 2013), can improve livelihoods (Chaudhary et al., 2007), sustain ecosystem services (Gadgil et al., 1993), and build resilience in "social-ecological systems." Interviewees also pointed out that their traditional systems of animal husbandry is integral to the process of creating natural compost to stabilize soil chemistry processes, and that local plants and products help local populations meet their nutritional needs and are highly valued resources, giving local populations an incentive to protect their environment (Dangi et al., 2015).

The main weaknesses of individual climate change adaptation, as identified by Rijal et al. (2021) and Aryal et al. (2021) is that many local actions are short term or reactive, and local solutions are often ignored or not encouraged at the national level. In order to effectively combat the effects of a changing climate, they urge, local solutions need to be effectively communicated to government policy makers who could disseminate useful information to other communities, and the national governments needs to more effectively communicate national policies to local communities, creating a dialogue between the two factions of the country. A good example of Nepal's recent efforts to bridge the gap between local and national efforts is the nation's new agroforestry policy, which makes room for economic improvement through the production of cash crops while also encouraging the restoration of regulating ecosystem services through reforestation and land conservation (Government of Nepal, 2019)

II. Labor Migration to…

World-wide, social scientists often present migration as a strategy towards adaptation to diverse hardships. In Nepal, existing literature has viewed migration foremost as a livelihood diversification strategy, while migration to alleviate agro-ecological challenges is also prominently placed. More current literature takes the impact of a changing climate into account. and is beginning to suggest that economic and agro-ecological challenges pertaining to a changing climate have the potential to play an increasingly important role in years to come.

A. Diversify Livelihood Strategies

NELM Theory postulates that migration is less a reaction to adversity popular in the public imagination, and more an intentional, cogent action taken on the part of migrants to diversify a household's sources of income (Massey et al., 1993). Chapagain & Gentle (2015) argue that Nepali migrants are adhering to NELM theory by considering migration less as a last resort and more as a "calculative strategy." There are as many ways people migrate for livelihoods as there are livelihoods; some of the most popular have been studied in the existing literature.

i. Migration to Diversify Income and Offset Scarcity

Nepali migrants are savvy, dynamic actors in the global labor market. Migration has been traditionally viewed as a strategy to diversify income streams and offset scarcity; two problems that are often present in the lives of smallholder farmers. Sharma et al. (2014) conducted a review on existing migration literature and statistics in Nepal and found that the majority of migrants currently working abroad are from farming families in rural areas. The Eastern Terai and the Western Hills, both rural farming economies, receive the highest shares of international remittances. In "Harnessing the development potential of labor migration; Challenging the dominant paradigm of 'development in place,'" Tesfaye et al. (2021) argue that the current system of international development and investment is not conducive nor productive for supporting labor migrants, or helping smallholder families to reap the most benefit from remittances sent home. In a qualitative

study featuring focus groups with smallholder farmers and policy analysis, researchers found that labor migrants were primarily economically motivated, with respondents stating that they were driven by the search for higher salaries (84%) and the lack of employment opportunities in their home areas (73%). The "development in place" paradigm then, is mostly a politically motivated attempt to retain Nepali citizens within their own borders, and prevent them from seeking the highest salaries in other countries, where they may be seen to be competing with the native workforce.

Remittances sent back to rural areas are estimated to constitute nearly 30% of Nepal's total GDP (Sharma, 2011); the third-highest on Earth, with only Haiti and Tonga sending home more (The World Bank, 2014). This complements a study from the International Labor Organization (2016) which found that remittances sent home to Nepal is more than triple what the country receives in foreign aid. Nepalis use these remittances for a variety of purposes; consumption, education (which further increases rural-urban migration), and investment in agriculture and other businesses (Siddiqui et al., 2019). Fully one-fifth of poverty reduction which occurred in Nepal between 1995 and 2004 can be attributed to labor remittances (Lokshin et al., 2010). Sharma (2011) found that escape from poverty occurred twice as fast for families with at least one sending migrant than those with none. Remittances earned from internal labor migration can have a similar effect; Sharma et al. (2014) found that over one-fifth of the Nepali population also engages in internal migration.

Overall, the current research supports the idea that migration in Nepal is still primarily economically-driven, although environmental shocks are having more of an effect as time goes on.

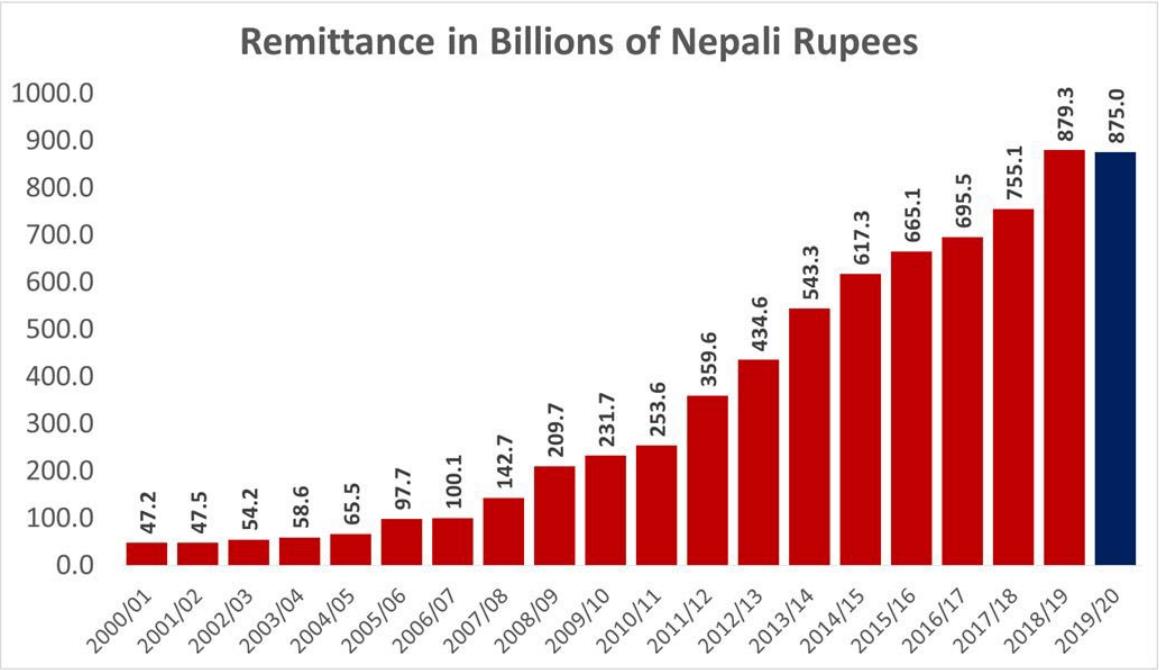


Figure 13: Remittances sent to Nepali households from outside the country over time (Khadka, 2020)

ii. Diversification by Choice vs. Necessity Driven Diversification

It is important to discuss what Davies (1996) refers to as "diversification by choice" versus "necessity driven diversification." In "Seasonal migration and Livelihood Resilience in the Face of Climate Change in Nepal" Gautam (2017) examined drivers of seasonal migration from the rural district of Humla, Nepal. Farmers here were primarily engaging in necessity-driven diversification. They could use seasonal migration to escape food scarcity, but could only access the lowest-paying jobs. This allowed them to almost fill their household food deficits, but not accumulate savings or improve their financial situation. It was viewed as an act of coping. This is very different from diversification by choice, where migrants seek to improve a situation that is poor but manageable, and have the resources to do so. The poorest rural families all over Nepal have a very different set of options than families of modest income, and many may not be able to afford to migrate at all,

leaving them in a more precarious situation for the future. Arslan et al. (2021) identifies this "migration gap" when investigating migration as an ex-ante measure to financially protect households against weather shocks. They state that the decision to migrate is "both a function of the ability to migrate and the incentives to do so," and found that poorer rural families, like those in Humla, lack the capital to migrate in a strategic way that allows them to build wealth. Thus, families with the ability to migrate stand a better chance of diversifying incomes and building wealth, while poorer families that lack the capital to send someone abroad have the potential to fall further into poverty.

B. Alleviate Environmental Vulnerabilities

The last century of development has led to agricultural innovation in Nepal, but has also created novel environmental problems for smallholder farmers, especially in the Central Hills. According to Massey et al. (2010) "...there is a growing body of evidence that both the gradual deterioration of local environments (through deforestation, aridity, desertification, and loss of biodiversity) as well as natural calamities and disasters (earthquakes, tsunamis, hurricanes, and typhoons) are fundamentally related to out-migration." Here we examine agricultural and environmental challenges that have served as drivers of migration in the recent past and present, and how migration can act to alleviate these problems and bolster Nepali families facing a degraded agricultural system in an environment prone to natural disasters.

i. Environmental Degradation (anthropogenic)

The International Organization for Migration states that although it is "difficult to establish a direct causal link between environmental factors and the decision to migrate..." that "environmental degradation (can have an effect on) the sustainability of livelihoods, for example, failure in agriculture, resulting in reduced income or poverty which drives migration (IOM, 2019). In "The

Impact of Environment Change on Labor Migration from Nepal to the Gulf States," Sharma (2011) provides an overview on the environmental context of Nepali families which shapes labor migration, and argues that migration is a dynamic response to manage fragile environmental situations. Researchers found that overexploitation of agricultural land, deforestation, and soil degradation caused by a growing population in the Central Hills has had a direct impact on regional food security for at least five decades. They also found that land productivity has stagnated, despite increased usage of fertilizers, while population has increased, resulting in a dependence on store-bought food and families needing to allocate on average 60% of their budget towards food. Rural villagers have also reported on worsening water availability in the hills and mountains (Sharma 2011). For many, temporary labor migration is an effective way to alleviate their monetary and environmental burden. Massey et al. (2010) found that environmental change is more related to short distance moves (for example, a family moves to a neighboring village) than long distance ones, providing the idea that rural villagers prefer to remain close-by rather than making a drastic move further away. Researchers found that individuals that perceived agricultural productivity to be declining were 31% more likely to move elsewhere within their district, saying that their findings are "consistent with the argument that the deeper underlying causes of environmental migration are not only related to the severe environmental calamities but also to a more gradual deterioration of conditions and to subjective perceptions about the degree of deterioration" (Massey et al., 2010).

ii. Natural Hazards and Disasters (non-anthropogenic)

Due to the climatically fragile basal status of Nepal's Central Hills, both fast and slow-onset natural disasters are common. Fast-onset disasters can include hail, flash-flooding, landslides, storms, etc. While slow-onset disasters can be drought, prolonged cold snaps, or heat waves. Williams & Gray (2019) studied how weather shocks impact migration in Chitwan district, finding that short-term migration tends to be stronger with increased rainfall and temperatures. As with

environmental degradation, equally important to actual natural disasters are the perceptions of these natural disasters. Researchers found that "perceptions that local livelihoods resources are becoming scarcer are related to increased migration." They also added that weather shocks had the potential to REDUCE migration by removing the resources needed to migrate and thus creating a low-mobility trap, added that "the devil appears to be in the details" (Williams & Gray, 2019). Chapagain & Gentle (2015) explore fast and slow-onset water-based disasters and migration in "Withdrawing from agrarian livelihoods: Environmental migration in Nepal." Researchers explored three different case studies in Nepal and found that a chain of push factors could be found to derive from water-based hazards such as flooding. Respondents in each case study village gave reasons for crop failure or reduced crop yields, which included responses such as drought, flooding during planting time, a gradual drying of springs, and inadequate snowfall to sustain winter crops. Only 20% of the families in the three case villages were able to grow enough food to sustain themselves throughout the year, which made labor migration to make up the difference seem a very palatable option (Chapagain & Gentle, 2015).

C. Climate Change as a Driver of Migration in Nepal: Evidence

Migration in the literature is accepted as a method of diversifying livelihood strategies in rural communities, and as a way to alleviate environmental vulnerabilities and build resilience to the capricious weather of the Central Hills. Thanks to a growing body of literature during the past decade, climate change is increasingly accepted as exacerbating both of these factors into affecting more and more people as time passes. As the effects of a changing climate begin to be felt in Nepal, policymakers and public figures have taken to warning of massive, sudden displacements, and the rise of the "climate refugee." These fears are summed up neatly in the World Bank's "Groundswell Report," which warns of an increase in the number of climate refugees to more than 143 million

worldwide by 2050, with 40 million of that number originating from South Asia (Rigaud et al., 2018). While many of these reports are founded on statistical projections, the number of Nepalis choosing to emigrate for work has risen steadily over the last fifty years, and markedly so in the last decade (Rabbani et al., 2016). In order to shed light on some of these speculations, the more prominent literature on climate change as a migration driver in Nepal is featured here.

The idea of a changing climate abruptly displacing peoples is the first assumption to be challenged. In "Environmental change and out-migration: evidence from Nepal," Massey et al. (2010) begin an inquiry into the relationship between climate change and migration, in a very general sense of the movement of peoples. Using Chitwan district as a case study, researchers examined the perceptions of a changing climate and how affected the likelihood is of short or long-distance movement from an individual's original location. They found that individuals who perceived a decline in agricultural productivity were 31% more likely to move within Chitwan district than those who did not perceive a decline. There was little evidence to suggest that demographic change was a variable in migration decisions; migration decisions were not influenced by an increase or decrease in population density. Massey et al. state that "(their) findings are consistent with the argument that the deeper underlying causes of environmental migration are not only related to the severe environmental calamities but also to a more gradual deterioration of conditions and to subjective perceptions about the degree of deterioration" (Massey et al., 2010). This study suggests that climate change may influence migration, but not in the dramatic way policymakers and governments may have originally envisioned.

Rabbani et al. (2016) back up Massey et al. in "Assessing the Climate Change Environmental Degradation and Migration Nexus in South Asia. Using a study covering 5 villages in Darchula District, researchers interviewed 323 households and conducted focus groups and in-depth interviews with key personnel to determine the strength of a changing climate on migration rates.

Researchers found that interviewees did not perceive climate change to be a direct driver of migration, but that the uncertainties introduced into their lives and livelihoods as the result of climate change absolutely contribute to increasing migration rates from Darchula. 98% of those interviewed identified poverty as a direct cause of migration, with climate-induced hazards such as erratic precipitation, temperature swings, floods, and heat waves affecting villagers' livelihoods. As a result of these factors, Darchula district has seen a dramatic increase in the number of migrants in the last two decades (Rabbani et al., 2016).

Another district seeing drastic increases in labor migration is nearby Humla, where Gautam (2017) conducted his study "Seasonal migration and livelihood resilience in the face of climate change in Nepal." A household socio-economic survey and focus groups were conducted with 74 individuals from all major caste and ethnic groups in the area. Humla residents stated that they were very aware of climate variability and change in the area, and the negative impacts it presents for their crops. Climate change is not directly driving migration out of Humla, but indirect effects leading to agricultural and economic decline have spurred an increase in outmigration in this region (Gautam, 2017).

Chapagain & Gentle (2015), pursuing the same inquiry, expanded the reach of their study in "Withdrawing from agrarian livelihoods: Environmental migration in Nepal." The research examined the environmental reasons for declining crop production in the three major ecological zones of Nepal, with corresponding income decline pushing rural populations to accept labor migration as a larger share of livelihoods. The research included qualitative interviews with 90 people in three districts, corresponding to the three major ecological zones, and focused on natural hazards as they affect agricultural life in the three zones. Participants from all three zones noted the increase in frequency of water-based hazards such as flood, storms, and landslides, which have affected their planting times, crop maturation, and overall crop yields. In order to deal with this adversity, and in

keeping with NELM theory, Nepali families send labor migrants abroad as a diversification tool and safeguard against further climate shocks and economic decline. Over 90% of the participants in the study had at least one family member working abroad to bring income into the household. Participants also state that the flow of young people to other countries or internal migration to cities has accelerated in the past decade (Chapagain & Gentle, 2015).

Summing up a decade of exploration on climate-change and migration rates, Arslan et al. (2021) attempts to disentangle the effect of immediate weather shocks on income, versus the influence of changing weather patterns on migration rates, to determine whether households are sending out labor migrants as a reactive versus a proactive measure. Researchers state that as a result of this project they believe that "The decision to migrate is both a function of the ability to migrate and the incentives to do so. Climate change is likely to decrease the former while increasing the latter" (Arslan et al., 2021). Like Chapagain & Gentle (2015), Arslan et al. advocate for the idea of Nepali labor migrants as savvy players on the global economic stage, and contribute to the literature by proving this through a combination of qualitative interviews and quantitative data collection. Researchers also warn of a policy gap in helping poorer households to address the challenges of climate change while lacking the capital to send a family member abroad (Arslan et al., 2021).

III. Nepal's Changing Demographics

With this study it is my hope to showcase the social-ecological effects of migration in rural areas, while postulating on the increasing trend of rural-urban migration within Nepal (Sharma et al., 2014). The current literature suggests that rural-urban migrants view rural out-migration as an opportunity made possible by the remittances of labor migration, in order to escape present and evolving vulnerabilities in rural areas. These relationships will be laid out in the following sections

and will contribute to the readers' overall understanding of modern migration flows and their impact in Nepal.

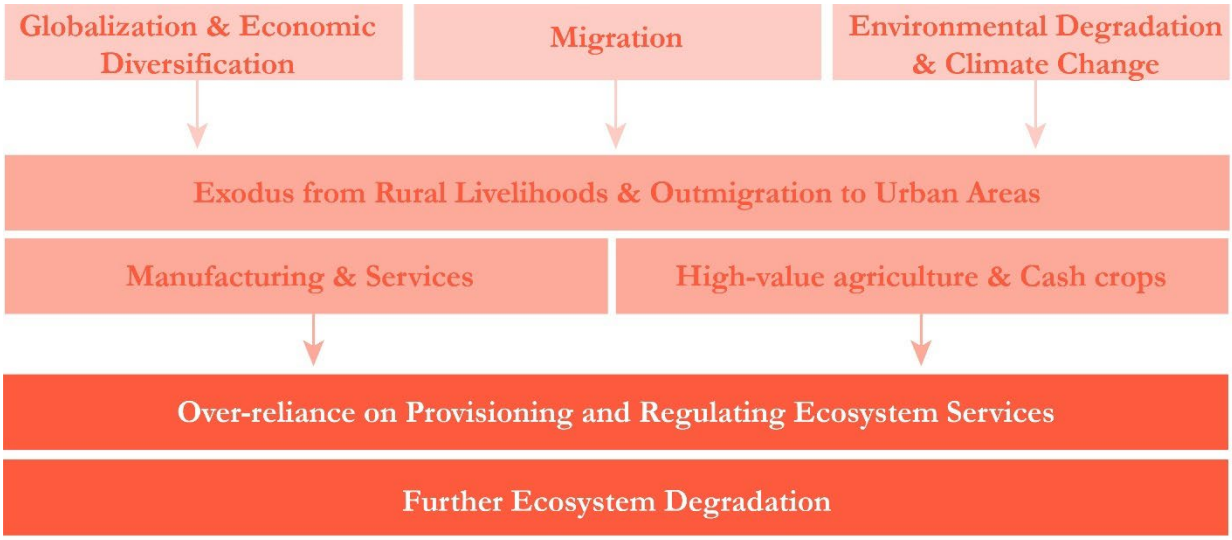


Figure 14: The process of outmigration and environment degradation along the rural-urban continuum

A. Exit from Rural Livelihoods

Even when former labor migrants are choosing to live in rural areas, they are not necessarily engaging in land-based livelihoods. Many Nepalis learn new skills or knowledge abroad that they bring back to their homeland as "human capital remittances." However, this can often lead to exit from previous professions that keep rural economies turning, such as agriculture.

In a review on the state of migration in Nepal, Sharma et al. (2014) found that before migration, 70% of internal migrants reported an involvement in agriculture prior to migration, whereas after migrating, engagement in agriculture dropped to only 3%. The agricultural engagement gap amongst international migrants was found to be even more pronounced; nearly 90% of individuals who previously engaged in farming did not return after one cycle of migration. Respondents preferred to engage in sectors such as manufacturing, mining, or utilities (Ibid.).

A corresponding study by Tuladhar et al. (2014) used cross-section national level household data and found that labor migration is having a negative effect on agricultural yield in rural areas, and also that increased incomes due to labor migration are not having a positive effect on agricultural yield. Their overall finding is that remittances being sent home from abroad are not being invested back into the agricultural sector in Nepal, implying an exit from agriculture in many rural areas. A similar study from Khanal et al. (2015) examined the relationships between labor migration and rural agriculture, interviewing 120 randomly sampled households in Tanahun district on livelihood practices. They found that non-migrating families invest more in agriculture and have more agricultural landing holdings than families who engage in labor migration (Khanal et al., 2015).

Sugden et al. (2021) analyzed the relationship between cyclical labor migration and agrarian transition in a community in upland Nepal, finding that Central Hill communities engaging in migration have reduced their consumption of locally grown products and instead have begun to rely on store-bought foods imported from India. Interview respondents stated that they returned to their home village for family or for lack of work abroad rather than opportunity, and when they did invest in agriculture it was only modestly incomed families who did so. These trends can lead to land abandonment and land use change in the Central Hills. In "Understanding rural outmigration and agricultural land use change in the Gandaki Basin, Nepal," researchers examined agricultural land use change in three districts of Nepal as it related to migration. Overall, agricultural land abandonment was higher in mountain areas, but that internal migration had a much more significant effect on land abandonment than international migration. However, the authors also point out that international migration and transition to new livelihoods is fueling rural outmigration and urbanization in Nepal, which has not been accounted for in their study (Maharjan et al. 2020).

B. Exodus from Rural Areas

The most obvious consequence of migration in Nepal is rural outmigration in its various forms. This phenomenon has been observed for decades by demographers utilizing Nepal's extensive census data, many questions of which track migration specifically (Government of Nepal, 2011). Since the 1950s a steady stream of migrants has flowed out of Nepal's Central Hills, bound for a diverse range of destinations (Sijapati & Limbu, 2017). Why people leave and where they are going are hot points of research in this area.

i. The Migration Numbers

Subedi (2021), builds on Maharjan's findings by pointing out a gradual shift in migration patterns between the 2001 and 2011 census data; from rural-rural to rural-urban patterns. In 'Rural-urban migration and ethnic diversification in Kathmandu Metropolitan City, Nepal," Subedi points out that fully 52.5 percent of Kathmandu's population consisted of internal migrants, and of these, 70 percent hail from rural areas, and 11 percent from other urban areas. Nepali families are engaging in permanent migrations out of their rural points of origin, and increasingly drawn to cities. Nepal currently has one of the highest rates of urbanization in the world; increasing from a 17 percent urbanization level in 2011 to nearly 64% in 2017 (Subedi, 2021). Subedi also notes that these rural-urban migrants are increasingly hailing from indigenous groups in the Central Hills, coming from villages very similar to the one examined in the upcoming case study.

Taking a look at district-level population growth in Nepal, we can see that Central Hill and Himalaya districts almost universally have negative growth rates, while the only districts with positive growth rates are those which host Nepal's major urban centers, such as Kathmandu, Lalitpur, and the Terai (Republica, 2017).

ii. Reasons for Outmigration

In the same year as Chapagain & Gentle's (2015) study on withdrawing from agrarian livelihoods, Tiwari & Joshi (2015) provided a complementary addition to the literature by examining

the links between climate change and rural outmigration in the Himalayas. Their findings, which draw on cumulative climate and crop data, as well as number on were rural-outmigration from the mountainous areas of Nepal, show that the exodus occurring in the hills is driven in part by the combined stresses of resource exploitation, a growing population inside a fragile ecosystem, and a changing climate which demands intensification of existing land in order to meet yield needs. All of these factors drive the trends seen presently; that of former labor migrants "giving up" on agriculture and moving elsewhere in search of more provident domestic livelihoods, and they all have the potential to strengthen in the future (Tiwari & Joshi, 2015).

The results of a study by Maharjan et al. (2020) reveal that agricultural land abandonment is significantly higher in mountain areas than in Nepal's Terai, despite having similar rates of labor migration. "Understanding rural outmigration and agricultural land use change in the Gandaki Basin, Nepal" collected data from three districts in the Central Hills of West Nepal (Chitwan, Nuwakot, and Lamjung) to find that outmigration has steadily increased in the two decades between 1990 and 2017. Maharjan notes that international migration does not initially have an effect on outmigration, as the men of the household leave to work abroad and the burden of the agricultural work falls on the women.

Finally, in "Social change, outmigration, and exit from farming in Nepal," Ghimire et al. (2021) supports this idea through their findings, which suggest that labor remittances actually alleviate rural out-migration, while a higher number of absentee household members can simultaneously exacerbate urbanization rates. In the long run, researchers state that international migration tends to fuel internal migration in the form of women exiting from agriculture and the children of international labor migrants having access to education and new livelihoods in urban centers (Ghimire et al., 2021)

RESEARCH DESIGN AND METHODOLOGY

I. Overview

Researchers are beginning to study the Central Hills of Nepal by examining relationships between environmental change and livelihoods, as well as the relationships between livelihoods and labor migration. There exists a lack of understanding as to how the three components of migration, livelihoods, and environment relate to each other within Nepal's Central Hill social-ecological system, and how they might change in the future. How are livelihood strategies affected and changed by human migration? How are the social-ecological systems of Nepal's Central Hills (the relationships between people and land) influenced by migration and transience? And how might a changing climate affect these relationships, for better or worse?

This research was conducted using a mixed-methods approach, relying primarily on qualitative data collection and secondarily on quantitative data collection. Primary research was conducted in two phases; in June-September of 2018 and January of 2022 in Myagdi, Nepal. In 2018, primary data was collected in the form of ethnographic observation and GIS analysis, and in January of 2022 primary data was collected in the form of semi-structured interviews, ethnographic observation, GIS analysis, and soil sampling. Primary data collection was justified following a literature review which highlighted gaps in the literature concerning migration, livelihoods, and the environment. All data was collected in Begkhola, Myagdi, in Western Nepal, where I served as a Peace Corps volunteer in 2018-2020.

II. Research Setting

Myagdi is a district in the Central Hills of Western Nepal with a population of 107,372. It is a medium-sized district which lies squarely in the mountainous agro-ecological zone (NepalMap, 2022). The district is bordered on the west by Dhaulagiri, the seventh highest mountain on Earth, and on the east by the Kali Gandaki River, an important waterway whose valley traditionally served

as a thoroughfare between India and Chinese Tibet. Altitudes vary from sub-tropical climates at 792 meters above sea level to arctic conditions at 8127 meters above sea level. A variety of crops are grown in several different climate zones within this district (NepalMap, 2022).

Figure 15: Myagdi District in Western Nepal

Myagdi District is an ideal location to study the intersection of migration and social-ecological systems. The vast majority of the population make their living as subsistence farmers and are attuned to the land and their relationship with it (Government of Nepal, 2011). Out of 27,727 households, 11,439 households (41%) reported having at least one member absent and working outside the household to bring in income (Government of Nepal, 2011). These numbers are slightly lower than the nationwide average of 52% of households with at least one absentee member (Siddiqui et al., 2019). Myagdi District is mixed caste and is home to the largest Magar population (an ethnic minority group) in Nepal (40%) (NepalMap, 2022). Migration for work is a culturally accepted practice in Magar communities (KC, 2020).

Within Myagdi, five villages within the ward (local rural government unit) of Begkhola were selected for the research setting. The villages are Baskot (tol 1), Deurali (tol 2), Sihm-Sihrbaari (tol 3), Upper Bega (tol 4), and Lower Bega (tol 5). Begkhola is an idea case for examining rural Central Hill social-ecological systems, livelihoods, and migration, as it is a mid-sized ward of 1,522 residents, with nine (9) total satellite villages and one main bazaar (market). There are a total of 402 households in Begkhola as of the 2011 census. The population of Begkhola has been steadily falling, in part due to rural outmigration of its residents. Between the 1991 and 2011 censuses the overall population fell from 1770 individuals to 1552 (Government of Nepal, 1991; Government of Nepal, 2011). The majority of Begkhola's residents practice a combination of subsistence agriculture and cash-crop agriculture. Out of 402 households, 189 reported at least one absentee member working outside of the village, whether domestically or internationally. Begkhola's caste makeup is primarily of the Magar ethnic group, with a small population identifying as Dalit (10 households), and a small population (3 households) identifying as Hill Brahmin (Government of Nepal, 2011).

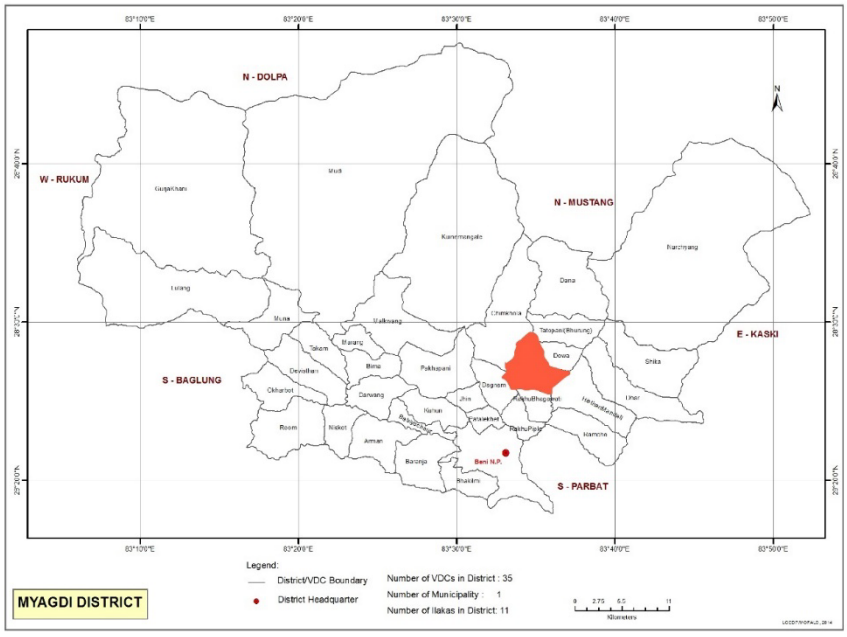
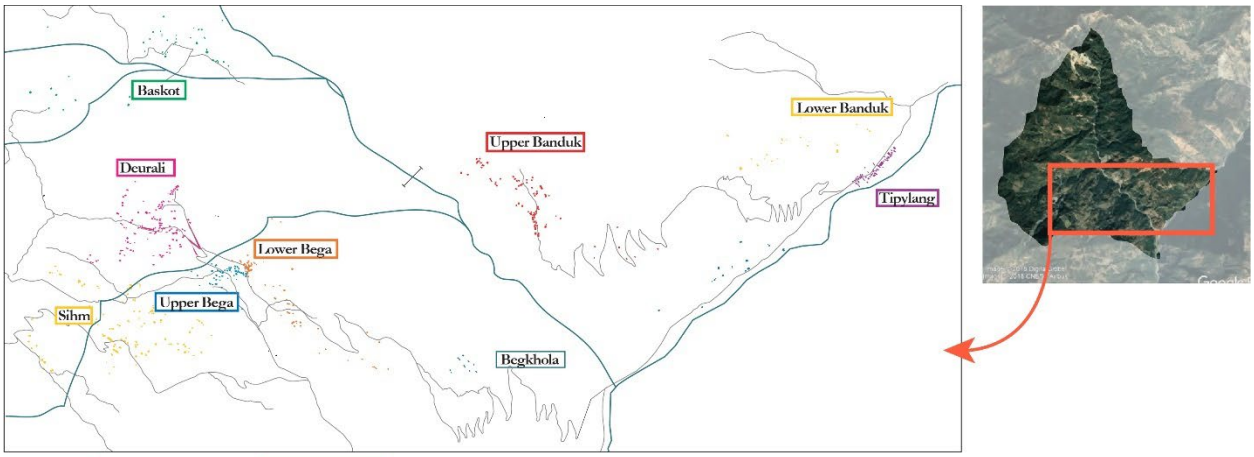


Figure 16: The Ward of Begkhola (in orange) within Myagdi District (LCCDP, 2022)



Baskot	1550 m	Lower Bega	1750 m	Tipylang	630 m
Deurali	1780 m	Begkhola	1400 m		
Sihm	2000 m	Upper Banduk	1700 m		
Upper Bega	1800 m	Lower Banduk	1100 m		

Figure 17: The nine (9) tols (villages) of Begkhola

Figures 18 & 19: Tol number 4&5 (Lower & Upper Bega) within the ward of Begkhola

Figures 20 & 21: Tol number 2 (Deurali) within the ward of Begkhola

Figures 22 & 23: Tol number 3 (Sihm) within the ward of Begkhola

I served as a Food Security Volunteer with Peace Corps Nepal in Begkhola in 2018-2020, and am familiar with the area, its community, and the language and culture, which contributed towards this research setting selection.

III. Framing Begkhola Through SES Thinking

Begkhola, Myagdi is a mostly isolated biocultural system of subsistence farmers interacting and co-existing with their natural environment. The main movement of peoples in and out of this system in the past and present involve labor migration. The other main driver of migration in and out of Begkhola is marriage, however migration for marriage is more permanent and involves less international movement, and therefore less of an impact on the existing system. Labor migrants bring home more than money. They also bring social and informational remittances that affect the social-ecological systems of their home village in diverse ways. Social and informational remittances can also impact existing livelihoods at home, bringing in new ideas that can change the existing livelihood systems.

The vast majority of Begkhola's residents identify as Magar (Government of Nepal, 2011), and aspects of Magar culture and religion (Hinduism or Buddhism) influence their lives and their relationship with nature. Hitchcock's (1966) foundational ethnography "The Magars of Banyan Hill" explores the relationships and religious ceremonies of the Magar people in West Nepal, pointing to "Bhume Puja" (translating to "Earth Worship"), a ceremony in which people express thanks to the earth as, one of many examples. In Begkhola, the people attempt to co-exist with the land, and define their own roles within the surrounding environment.

On its own, Nepal contributes only 0.35% of the world's greenhouse gases, yet stands to experience more impact than most other countries. The literature has established that a changing climate stands to impact both the existing social-ecological system of Begkhola through environmental change, and the rates of labor migration in and out of the Central Hills through a transformation in rural economies.

Framing Begkhola through SES thinking allows us to envision an established system of people-in-nature that are being affected by the relatively new interactions of labor migration and

climate change. These two new factors affect the established system both positively and negatively, but they also affect each other. It is these interactions and relationships that this study primarily seeks to define. The diagram below provides a visual aid in thinking of these interactions.

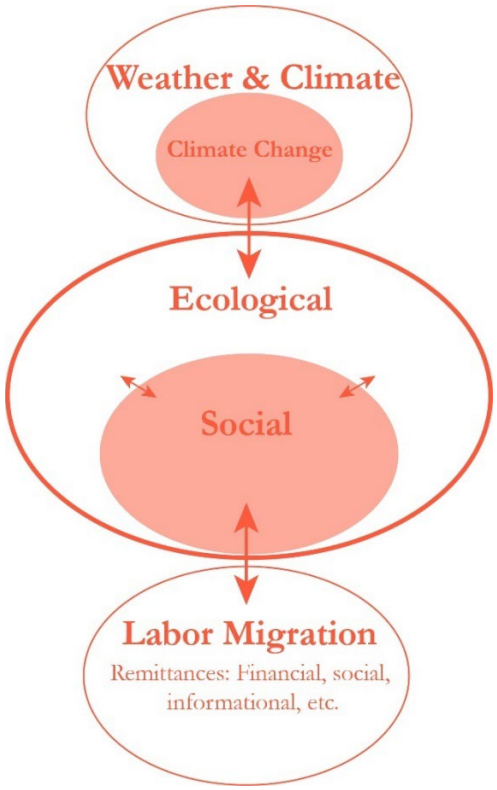


Figure 28: Modern-day SES interactions in Nepal's Central Hills

IV. Methods

A. Mixed Methodology: A Three-legged Stool

This study examined the relationships between livelihood strategies, social-ecological systems, and migration along the rural-urban continuum in Nepal, and how these relationships are affected by a changing climate. To study these relationships and contribute towards answering the research questions, it was necessary to collect data from both qualitative and quantitative sources, which required the use of a mixed methodology approach.

Tashakkori & Teddlie's "Mixed Methodology; Combining Qualitative and Quantitative Approaches" (1998) establishes mixed-methodologies as a distinct form of inquiry in which quantitative and qualitative methods are combined to reveal complementary findings within a research study. Building on mixed-methodology theory, Creswell et al. (2003) developed a Triangulation Approach that relies on both qualitative and quantitative data to develop an interpreted answer to complex research questions. This can be done by converging or triangulating different qualitative and quantitative data sources across different phases of the research, which reveals new findings based on data sources that complement and build on each other.

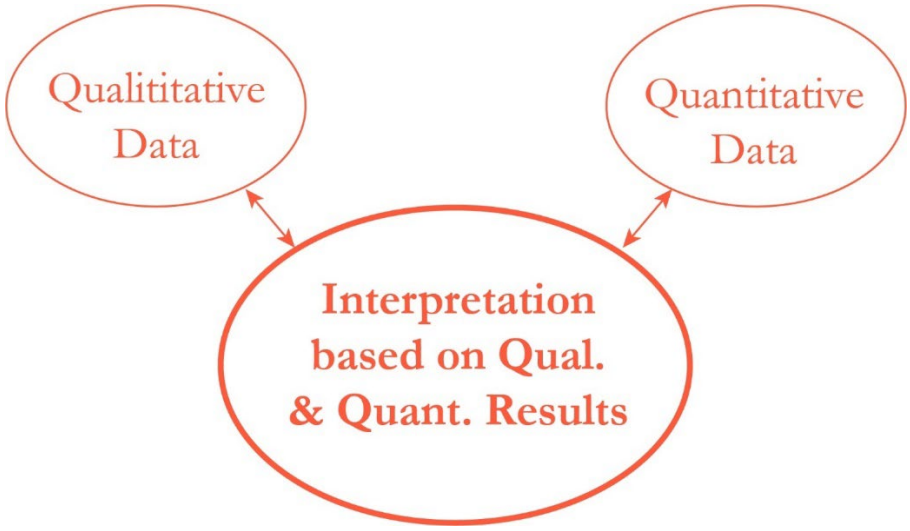


Figure 29: Triangulation design within a mixed methodology (Tashakkori & Teddlie, 1998; Creswell et al., 2003)

In this particular study, qualitative data was primarily used to generate findings that addressed the main research questions, and qualitative data was used to augment or enhance the legitimacy of these findings. Overall, the study employs a mixed-methodology that serves as a "three-legged stool" to firmly establish the legitimacy of the author's findings.

My three-legged stool is a methodology made of semi-structured interviews (qualitative), field observation (qualitative), and GIS analysis/soil sampling (quantitative). A graphic describing the relationship between these three and the research questions is presented below:

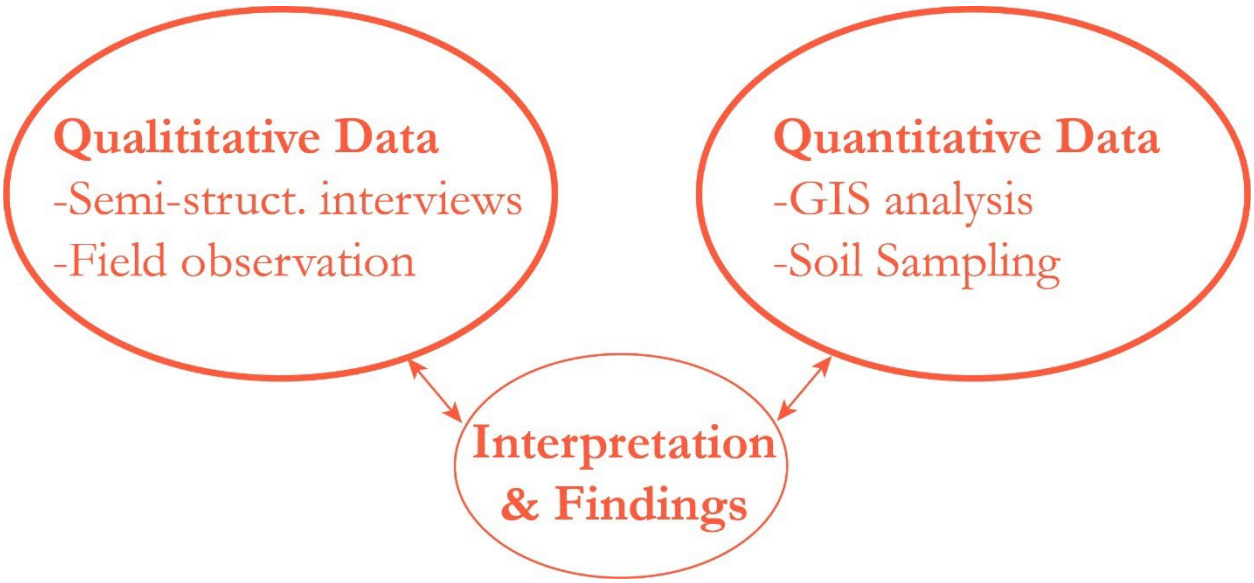


Figure 30: The mixed-methodology triangulation being employed for this specific study

B. Data Collection and Analyses: Influences

I drew primary inspiration for my methodology from Tashakkori & Teddlie's (1998) "three-legged stool" metaphor for mixed-methodology. Secondary ideas for methodology were inspired by a literature review of social-ecological systems research and migration conducted in the context of smallholder farmers within Nepal's Central Hills region. These included a study on perceptions of climate change and impacts to smallholder farmers by Dangi et al. (2015), the interaction of rural labor migration and environmental change in rural mountain Nepal by Gautam (2017), and the interdependencies of climate shocks, migration, and agriculture in Nepal's Central Hills by Arslan et al. (2021). These articles used case studies as the primary methodology for qualitative date collection, and several papers (Dangi et al., 2015; Arslan et al., 2021) backed up their qualitative data with quantitative regional climate data. My methods for conducting and analyzing semi-structured

qualitative interviews were also influenced by Lauber & Tidball's (2014) "Characterizing Healthy Urban Systems: Implications for Urban Environmental Education" which utilized a Miles & Huberman (1994) method of qualitative semi-structured interview analysis and presentation I found relevant for my own study.

C. IRB Exemption

A Notice of Exemption was provided by the Institutional Review Board for Human Participant Research (IRB) at Cornell University for this study (Protocol ID #2110010665). The protocol and methodology for this study were determined not to harm the human participants physically or psychologically. Many of the participants of this study were acquaintances or friends during my time as a Peace Corps Volunteer in Begkhola. I think of several of them as family. I took care to select participants who would provide honest answers and refrain from revealing identifying information. Extra care was taken in protecting the names and physical descriptions of study participants; names and identifying characteristics are not used in this study, nor were they important for the purpose of the study. I determined that my study protocol and methodology would keep all participants safe and anonymous.

D. Data Collection

i. Qualitative: Field Observation

2018: Between June and September of 2018, observation was carried out on 72 households within five villages in Begkhola. The initial goal of this observation was to determine which trainings and resources I should dedicate my time to as a Food Security Volunteer in the Peace Corps. Through this observation I also came to have a basic understanding of the villagers of Begkhola as people and neighbors, as well as some basic hypothesis on the relationships between livelihoods, social-ecological systems, and migration. I visited households in the village to familiarize myself with

local agricultural and livestock practices, family dynamics, livelihood strategies, and household demographics. This data provided a base with which to compare against the 2022 observation.

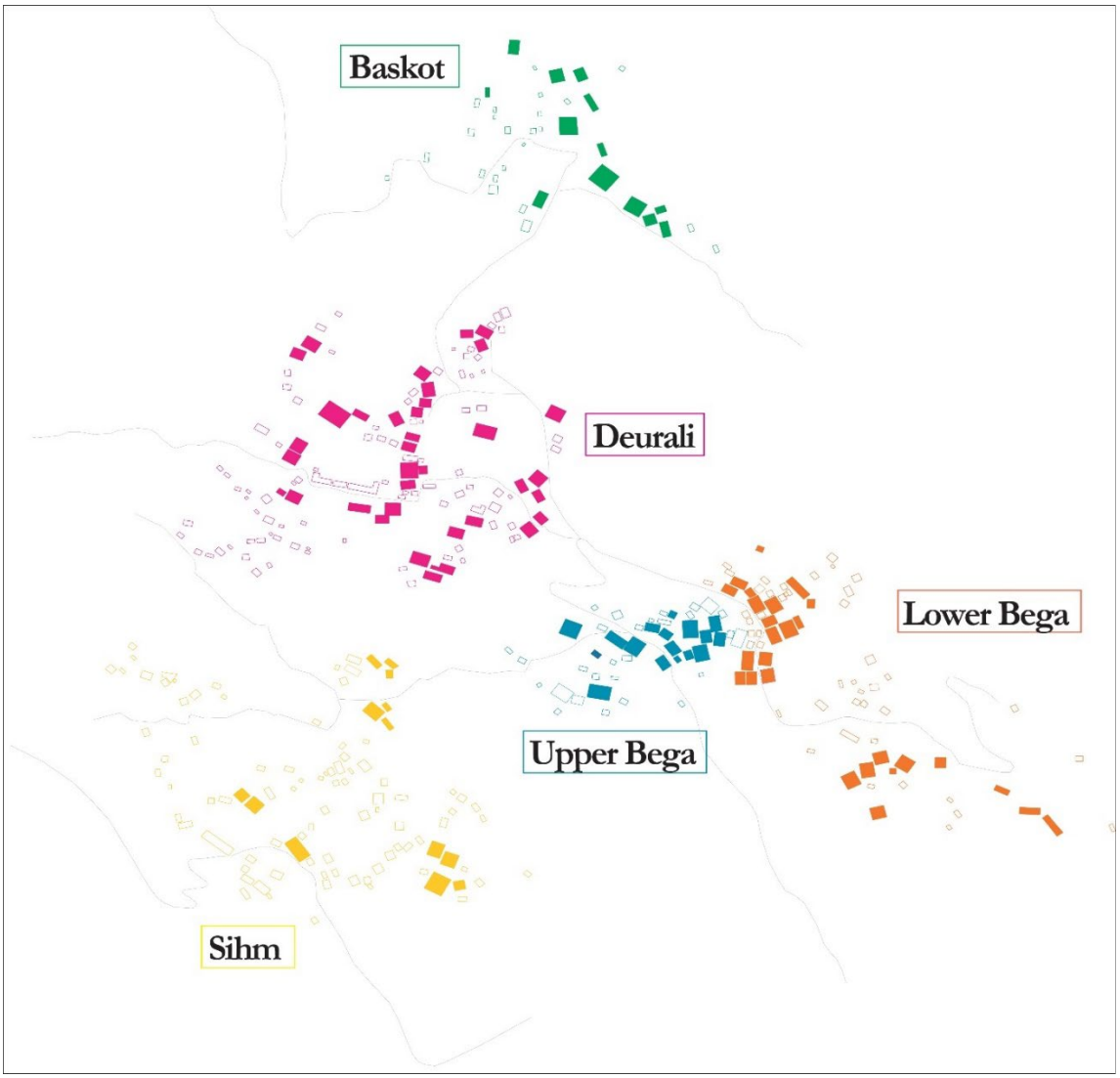


Figure 31: A condensed conceptual map (condensed for ease of reading and not to scale) of households in five different villages where I conducted field observation and semi-structured interviews between 2018 and 2022 (shaded houses)

2022: In the 2022 observation I narrowed my focus to observation including migration, livelihoods, and the social-ecological system of Begkhola. Observation included updating the original numbers of migrants in each household, observation on the locations from which soil samples were taken, new skills learned, and any updates on agricultural techniques used on household land.

Overall, I observed data on the following topics:

- Coordinates of household
- Head of Household gender
- of individuals in immediate household
- Is there a kitchen garden?
- Are there Livestock?
- Any family members working abroad?
- Comments on what family members are doing abroad
- Children under 5? Under 2?
- Comments on household occupations and livelihoods
- Use of family owned and communal land

ii. Qualitative: Semi-structured Interviews

In Nepal, I conducted 22 in-person, semi-structured interviews with community members from five villages in Begkhola, Myagdi. The semi-structured interviews were conducted entirely in Nepali and audio-recorded on site. Interviewees were initially selected from a pool of 72 smallholder farmers and other residents of Begkhola, who had been informally interviewed and observed in 2018. Interviewees were also selected based on availability of schedule.

I was not able to analyze every interview that I recorded; five interviews were not able to be used, for separate reasons. In one recording the participant repeatedly misunderstood the questions, grew frustrated, and did not want to continue. In the second interview, the participant was judged to not be of sound mind due to alcohol inebriation, which I was unaware of when I showed up for our designated interview time and began the recording. Two interviews were conducted in urban settings, with the participants from Begkhola, and I concluded that their input would not be appropriate for the purposes of this study. One recorded interview was unintelligible due to

technical issues with the recorder. Out of 22 interviews recorded, 17 interviews have been translated and transcribed for further analysis.

A total of 23 people provided their input during the 17 interviews that were ultimately translated and transcribed. Several of these interviews were conducted with more than one person present, which provided an impromptu form of snowball sampling. Interviewees were drawn primarily from 4 groups;

1. Family members of individuals who are currently engaged in labor migration;
2. Family members of individuals who have engaged in labor migration at least once;
3. Individuals with no engagement in labor migration, but who have intimate knowledge of the area and engage in the surrounding community; and
4. Individuals who have engaged in labor migration at least once in the past.

The below chart provides more specific demographic details on interview participants:

Table 3: Demographic information of all interview participants

Age Group	**Migrant?**	**Household member migrated for work?**	**Occupation**	**Sex**	**Tag #**
39-55	Yes	Yes, self	Farmer	Male	0
55+	No	Yes	Farmer	Female	0
24-39	Yes	Yes, self	Farmer	Male	0
55+	No	Yes	Farmer	Female	15
24-39	No	Yes	Housewife	Female	15
55+	No	Yes	Unemployed	Female	19
24-39	No	Yes	Education	Female	20
24-39	No	Yes	Farmer	Female	23
16-24	No	Yes	Farmer	Female	39
16-24	No	Yes	Farmer	Female	41
55+	No	Yes	Farmer	Female	41
39-55	No	No	Education	Female	47

55+	No	Yes	Farmer	Female	49
24-39	No	Yes	Farmer	Female	59
55+	No	Yes	Farmer	Female	49
55+	No	Yes	Farmer	Female	63
39-55	No	Yes	Education	Female	7
39-55	Yes	Yes, self	Business	Male	9
24-39	No	Yes	Education	Female	9
55+	No	Yes	Farmer	Female	9
55+	No	Yes, self	Farmer	Male	C
39-55	No	Yes	Farmer	Female	C
16-24	No	Yes	Business	Female	D

Interview questions were mostly open-ended and focused on interviewees' perceptions of the following relationships;

1. The relationship between Livelihood strategies and Environment (without the influence of migration);
2. The relationships between Livelihood strategies and Migration; and
3. The relationship between Migration and Environment

iii. Quantitative: GIS Analysis and Soil Sampling

2018: Observation in 2018 was tied to the coordinates in which the observation took place. This provided an opportunity for me to understand how the demographic makeup of my service population as a Peace Corps Volunteer. Each day, observation was collected and recorded in the form of encrypted Google Surveys which would go into an excel sheet that I would access later. For the purposes of the present study, it allowed me to map the locations of households with absentee members and compare with other data such as soil fertility and landscape type. Such data types and points served to provision and supplement claims made by interview participants about the state of the land and environment with quantitative data. The quantitative data assist in the triangulation

method of mixed-methodology utilized in this study. All GIS data has been de-identified to keep study participants safe and anonymous.

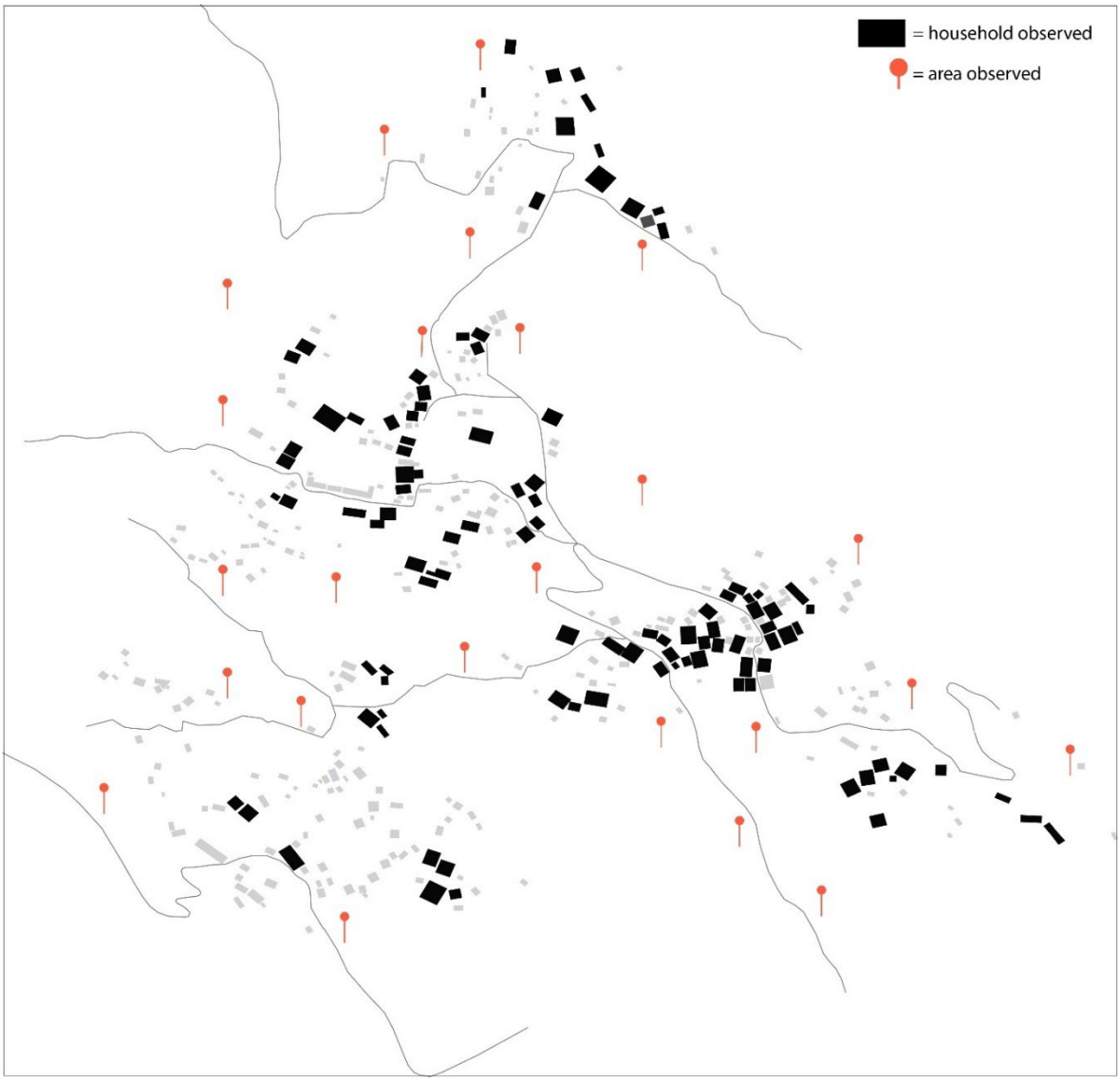


Figure 32: households and areas observed on the conceptual map under the Field Observation phase of data collection in both 2018 and 2022

2022: In the 2022 data collection my soil sampling, observations, and interviews were tied to the coordinates where they took place. Both the GIS dataset from 2018 and the dataset from 2022 include 72 households, but the breadth of data varies. The 2022 dataset and the 2018 dataset overlap

on the topics of absentee household members, occupations of household members, and soil sampling. Each day, observation was collected and recorded in the form of encrypted Google Surveys which would go into an excel sheet that I would access later. Informal observation was collected at each of the 72 households where I had performed observation in 2018, with more detailed observation occurring at the 20 households where I collect semi-structured interviews and soil samples.

Soil sample collection occurred at the households where I conducted semi-structured interviews and at select observation areas, such as agroforestry and silvopastoral areas surrounding households and villages. Samples were taken using standard field collection methods; a small auger and probe were employed to collect five samples from each area, which were then combined, run through a 2mm sieve to remove large debris, and dried at temperatures between 55- and 70-degrees Fahrenheit, out of direct sunlight. The samples were then bagged, labeled, and taken to Kathmandu for professional testing.

Figure 33: Soil sampling site of a Conventional Agriculture area

Figure 34: Soil sampling site of a Silvopastoral Forest area

Figure 35: Preparation of soil samples for testing in Kathmandu

E. Data Analyses

i. Qualitative: Field Observation

The semi-structured interviews that were audio-recorded in the field were taken from Nepal to the United States, where they were translated and transcribed into English by the author. The transcripts were uploaded into NVivo (a qualitative data analysis software), coded (Miles & Huberman, 1994), broken into meaningful segments (phrases, sentences or paragraphs), and assigned to relationships between livelihood strategies, environment, and migration, as well as specific characteristics of these relationships. I quantified;

1. The number of times each perceived characteristic was identified (by me) throughout all interviews, and;
2. The number of times each perceived relationship was identified (by me) throughout all interviews.

Some statements fit into more than one relationship.

ii. Qualitative: Semi-structured Interviews

Observational data served to complement data collected during the semi-structured interviews, such as the number of absentee members in a household, or the type of livestock being managed. In some cases, observational data provided information that substantiated findings drawn from semi-structured interviews or quantitative data collection, in accordance with Takkashori & Teddlie's (1998) mixed-methodology in which triangulation of different kinds of data serves to strengthen the legitimacy of each finding.

Observational data provided more nuanced information on households interviewed, such as background information on family history, reasons for engaging in labor migration, and religio-cultural information such as engagement in local festivals, involvement and investment in the community, and relationships with other community members that proved relevant to the findings.

iii. Quantitative: GIS Analysis and Soil Sampling

GIS analysis and soil sampling helped to provide quantitative evidence towards findings and claims made by study participants in semi-structured interviews, such as the number and locations of households with absentee members, or the soil fertility of farmers with different agricultural management techniques. As an example of the efficacy of these data points in supporting interview claimants concerning the climate and migration, soil fertility can be used as a marker of environmental improvement and care, as well as a marker of human presence and environmental management. Quantitative data collected in this study is more diverse than the qualitative data collection categories (informant semi-structured interviews OR field observation), and in this study is primarily used to verify findings derived from qualitative interviews.

Soil samples were prepared and tested in Kathmandu for the following qualities:

- pH level
- Nitrogen (%)
- Phosphorus (ppm)
- Potassium (ppm)
- Organic Carbon (%)

RESULTS

I. Overview

A. Analysis Overview

Through the semi-structured interview analysis, I identified 12 descriptive characteristics that interviewees identified as pertaining to the relationships between livelihood strategies, migration, and environment which affect their lives. Qualitative and quantitative data from observation, GIS data, and soil sampling reinforced these findings, and these findings in turn support those of studies previously conducted in this region and elsewhere. These characteristics can be grouped into two main categories;

1. **Observations**: External themes and trends which interviewees observe as affecting their lives and express in their interviews. Words like "profit," "pattern", and "contribution" are used.
2. **Sentiments**: Internal thoughts and feelings resulting from trends, that interviewees are expressing in interviews. Words like "belief," "desire," and "frustration" are used.

These two categories arose from a desire on my part to separate characteristics into "internal" and "external" observations on the part of interviewees. As physically isolated subsistence farmers surrounded by wilderness, the villagers of Begkhola have a direct, intimate relationship with the land around them. They often incorporated emotional language into answering what I originally thought to be discrete, detached questions concerning land management and agricultural techniques.

Relationship	Characteristic	Trend	Sentiment	#
RQ1: Livelihood Strategies and Social-Ecological Systems	1. A desire to co-exist and grow with the surrounding environment		X	20
	2. A belief that livelihood outcomes are linked to the surrounding environment		X	32
	3. Pride in care for their immediate environment and the gains they have seen as a result		X	24
	4. Frustration that new environmental challenges are appearing (due to climate change) despite their best efforts		X	14
RQ2: Livelihood Strategies and Migration	1. Rising numbers of labor migrants	X		NA
	2. The belief that labor migration is inevitable for those who want a living salary		X	30
	3. Difficulties in land management associated with labor migration	X		20
	4. A desire to engage in different kinds of labor migration than the previous generation	X		17
RQ3: Migration and Social-Ecological Systems	1. Migration as a contributor towards land abandonment/outmigration, or acquirement/investment	X		11
	2. A newfound openness towards trying improved agricultural livelihood methods		X	11
	3. Labor migration and remittances are seen as a safety net and diversification tool		X	10
	4. Migration as a contributor towards food insecurity and a growing reliance on imports	X		7

Table 4: Relationship characteristics and mentions received in semi-structured interviews

B. Speaking in Reflexive Terms

Throughout the Results section of this publication, I may choose to speak in reflexive terms, in order to indicate an observational aspect of this analysis, and to provide explanation or possible cultural context to particular words or phrases. This will serve to give the reader a more complete view of the data, rather than being forced to draw their own conclusions without the benefit of experiential knowledge that I possess on this specific case study village.

II. Research Question 1: Livelihood Strategies and Environment

A. Sentiment: A desire to co-exist and grow with the environment

Despite steady outmigration from the village (Government of Nepal, 1991; Government of Nepal, 2011), the villagers I spoke to desired to remain in Begkhola and maintain their relationship with the surrounding environment. Villagers often leverage extra income by investing it in land purchase for further cultivation, which they stated in interviews. Villagers have also attempted to diversify their agricultural activities in order to remain competitive on the agricultural market, while remaining in harmony with the surrounding environment.

Interviewee 3 05:01: Yes, we've got chickens, no cow, two bissee, and some goats in a setup further up the hill.

Jessie Hughes 05:10: And why are these important to you?

Interviewee 1 05:29: Well, the livestock are culturally important as a tradition, and they also help provide livelihoods other than agriculture in this area. By raising livestock, you can offset the price of certain foods, and it does not take that much work. For staying here, it is very important. And it is also important to our culture.

Interviewee *1 10:50: When my husband has gone abroad, he hasn't gone to do agricultural work.*

Interviewee 2 10:55: But when he has come home, he has said that we should increase the amount of agriculture we are doing, and buy more land. Now we have an extra ten ropani (Nepali unit of land measurement).

The statements made by interview participants in semi-structured interviews agree with data from my field observation which shows that, through the acquirement of livestock (especially water buffalo and cows, a desirable and expensive commodity in Nepali culture), households who have chosen to remain in village seem eager to fill the gap from households that have left. Between 2018 and 2022 I observed that nine (9) of the 17 households I interviewed had increased their livestock holdings, while only one (1) of 17 households had decreased their livestock holdings.

B. Sentiment: A belief that livelihood outcomes are linked to the environment

During these interviews many villagers spoke of past problems which can be linked to the surrounding environment and directly affect their livelihoods, such as landslides, hail, flooding, or drought. They are often accepting of these hardships, using phrases like "what can we do?" and "it's like that for us."

Interviewee 12:51: Yes, in this village I have not seen many challenges and problems with the environment in the past. Um, in the past there have been problems, you know, year-to-year, there have been landslides and floods. There are many challenges though. Sometimes the floods and landslides will damage homes, and there's not much we can do about it. For nature, I can say the same thing. What can we do? Only mold the land. It's like that too. Not much we can do.

Jessie Hughes 05:35: I agree. I've read a lot of papers talking about how hard agriculture is here in the hills.

Interviewee 1/2 05:40: Yes, so difficult! There is a lot of jungle. The weather is problematic. However, we have the best compost that we can get both from the jungle and the bissee and cows. But in the growing of things there is difficult. And the rains come and sweep all of that compost away. Takes it to India where they plant their rice on the flat land *laughter* *but it's like that. Lots of problems, but it's like that.* *laughter*

This sentiment appeared multiple times in semi-structured interviews with informants, and comports with soil science data showing that areas in the village typically prone to landslides and environmental degradation tended to have lower levels of soil organic matter (SOM). Soil sample sites in which environmental degradation has occurred tend to be areas affected by landslides or flooding, the soil of which villagers do not attempt to enrich through compost application or livestock grazing.

C. Sentiment: Pride in caring for their environment and observed gains

Begkhola has not been exempt from problems resulting from land degradation and deforestation. Many villagers spoke about the problems they faced just twenty years ago as a result of poor land management, and the lessons they learned. They spoke, often with pride, about how

they mobilized as a community to address these problems, and the positive change they saw as a result.

Interviewee 11:08: Well in the past our environmental challenges were very great. Because before, we polluted our environment a bit more. Overall, there used to be less water, and we had cut down all the trees. From place to place there was more erosion. So, like that, things were out of balance with the environment. Because we cut down the trees and polluted, things were out of balance, and not as much rain fell as it should, no? It would go a long time without raining. There were also different kinds of environmental problems. To combat these, we planted many different kinds of trees and plants, and improved our hygiene. Now we do not practice deforestation, although from time to time we will go into the forest to cut wood for our needs.

The statements made by interview informants are quantitatively supported by GIS data showing the multiple agroforestry and reforestation initiatives undertaken by the village as a whole over the course of about 30 years. When I visited in January of 2022 to conduct this field research the village had completed two new agroforestry plots of considerable size; about 5-6 acres each. A map depicting the many agroforestry and reforestation projects in Begkhola is shown below.

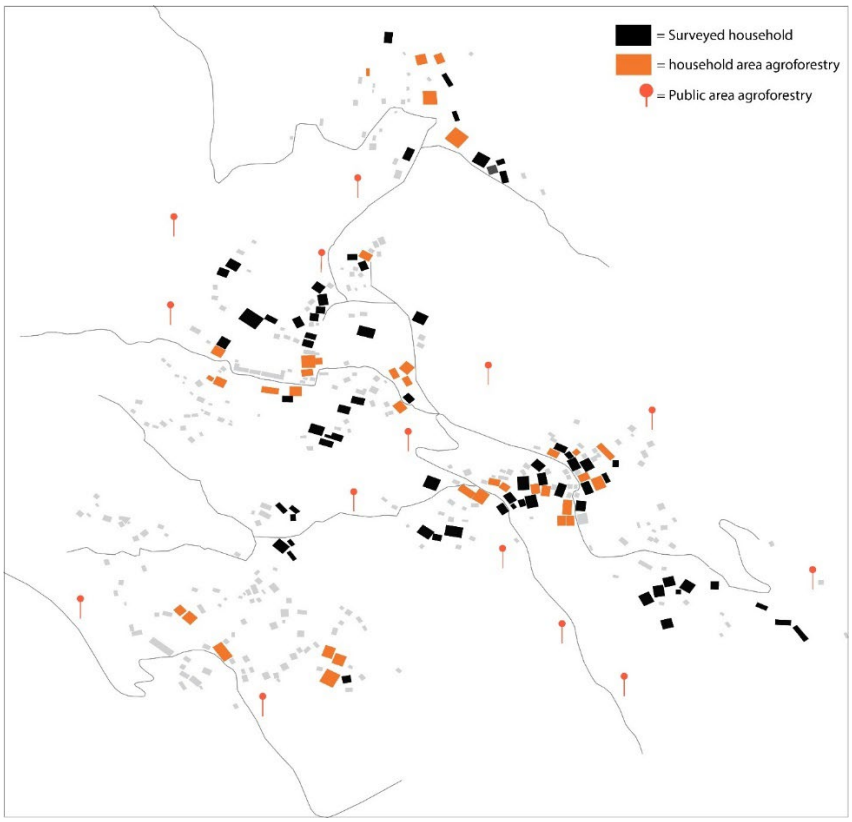


Figure 36: Public and private agroforestry projects of all categories in Begkhola

D. Sentiment: Frustration concerning new challenges in the social-ecological system

Many villagers expressed frustration to me that despite their past efforts and present investment in diverse agricultural ventures, they are still experiencing challenges and hardship over which they believe they have no control. Many villagers are aware that the weather is changing, but without climate education they believe themselves to be the cause, as they did with the environmental degradation of the late twentieth century. More well-educated villagers, such as teachers, are aware that these new changes are a global problem and not necessarily their fault.

Jessie Hughes 08:01: Yes, when I came here a few years ago I saw that a lot of people had gone abroad. I thought then that if we planted a lot of fruit trees and made a lot of money then the men could afford to come home. But it didn't quite work.

Interviewee 08:22: Yes, well as you see, we planted a lot of fruit trees. But the hail came, and ruined quite a lot of them. We didn't think quite the same. We were quite certain we could make our fruit groves just the same as they do in other countries. Now we don't have the money to make them the same, or as safe. They (the government) told us that planting trees would solve the environmental problems. We planted trees and the hail ruined a lot of them. Surely, you've seen the orange groves below. There are so many of them!

Interviewee 1 04:12: But overall, the hail is the worst thing for us here, and it's the worst place on the hill to be.

Interviewee 2 04:18: Yes. Last year some of our corn crop was absolutely destroyed by hail. Only the corn stems remained after that. There are so many problems here. It's like that. There is not a lot of hail per say. It comes maybe once a year. But it is heavy when it comes. It actually used to be more. It used to be 4-5 times a year but lighter. Now it's once a year, but very heavy and destructive.

Interviewee 2 04:43: Yes, very destructive, especially for the fruit. Especially in this tol it is difficult with the hail. And we've tried to fix it with (plastic) tunnels to protect against hail and snow, when we are planting vegetables. We also add compost to the fields in winter to try and make our crops a little stronger. In our Nepal we have this to say about it.

Interviewee 0.1 08:53: In the past, there was not a lot of water in this season. But now there is more water and rain than there used to be, and it is not so good for the orange groves. The winter has changed slightly, and for millet and corn farming it has also been difficult. The monsoon comes later than it used to but it is heavier when it does come. And sometimes it lasts longer. This makes it difficult to plant and harvest all of our crops before the winter. We know that the weather is changing, but thought if we changed our ways the problems would be fixed. Last year we also had a plague of locusts and that was not fun.

Interviewee 12:33: Ah, what are the changes? -Reads the question to self- from twenty years ago to the present in this village? -Repeats the question to self- So from twenty years ago, I have seen a lot of environmental changes. Hmmm what has happened since then, well there has been a lot of pollution. Then we had a huge drought, and then now we are getting more rain than we are used to. In the past there were also many floods and landslides, and these have continued,

no? So, these are the things which I believe are the main environmental challenges and how they have changed. Aside from the changes in the weather and the rain, there has been an increase in temperature throughout the country. In this village when there is an increase in temperature it affects our crops. The crops do not give as much yield as they should. When the yield is low it affects the people and they must work harder. And it's not just a problem affecting Nepal either. Other countries are also seeing a temperature increase. Pollution has increased, no? Air pollution, water pollution, even pollution of the earth. Because of this, the government has brought in programs that plant more trees, and we hope that will act in protecting the earth. Because we have planted all these trees, we've seen an improvement and we are sure it will continue to work.

The statements and perceptions of interview informants comport with external data and research in the Central Hill and Himalayan regions of Nepal, showing a rapid rise in temperature, newly erratic nature of precipitation, and relatively swift melting of glaciers, more specifically in the Annapurna Conservation Area Project (ACAP), which includes the districts of Myagdi, Kaski, Lamjung, Mustang, and Parbat (Bagale & Devkota, 2015; Joshi et al., 2019).

III. Research Question 2: Livelihood strategies and migration

A. Observation: Rising trend in labor migration

The observational demographic data from 2018-2022 indicate a trend of increasing numbers of both men and women leaving Begkhola to engage in temporary labor migration. The COVID-19 pandemic temporarily halted this flow of migration and forced some migrants to return home in 2020. However, despite this, the number of labor migrants in the data set households has increased, from 31/72 households surveyed to 51/72 households surveyed.

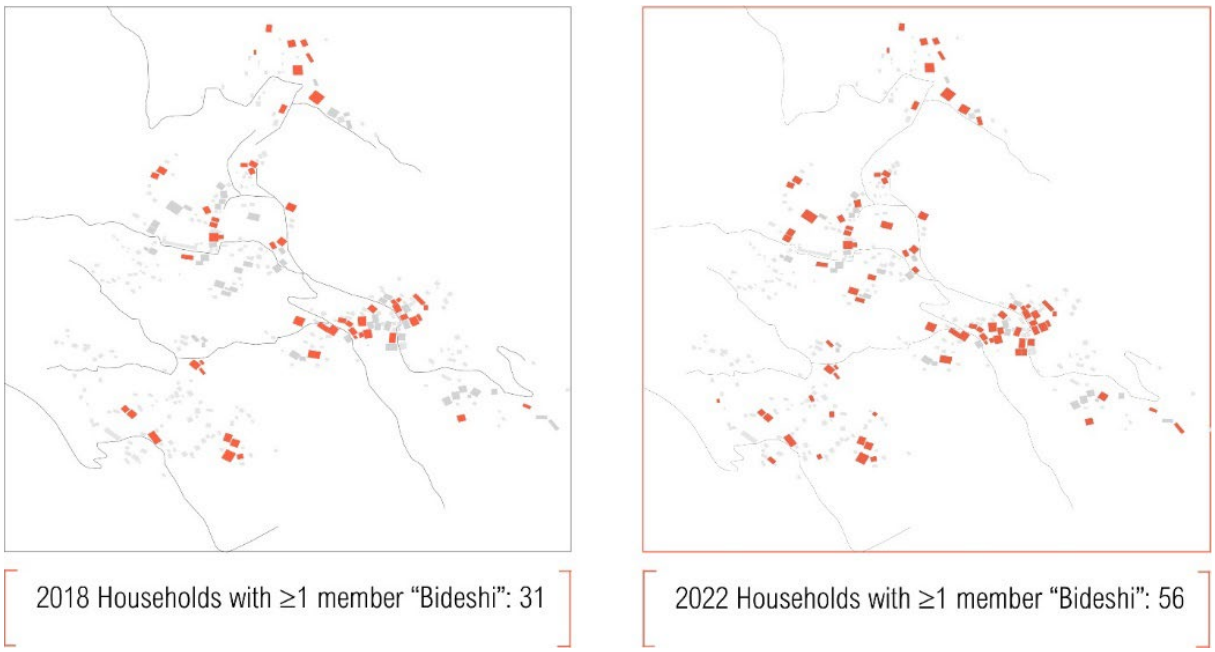


Figure 37: The increase in migrant households between 2018 and 2022

The data collected in the field at the case village is consistent with nationwide datasets that portray an overall rise in migration rates in the last few decades (Sharma et al., 2014; Sharma, 2011; Siddiqui et al., 2019).

B. Sentiment: The growing belief that labor migration is inevitable

Many villagers I spoke with believed that they and their families had no other option but to send a household member abroad in search of a living salary. Some participants were adamant that this was only a bad thing, while others were ambivalent or enthusiastic about the situation. This is consistent with the NELM theory of migration, which states that migrants are making economic decisions based on income gain and livelihood diversification (Taylor, 1999; Massey et al., 1993).

Interviewee 04:40: Ok well it's not great that we have to send our family members away from their homes to find work and bring in income. It's preferable for them to stay at home. There are better livelihoods abroad, and the livelihoods here in Nepal are not as good. Since there are not good livelihoods available, they must go abroad to search for livelihoods. Once they have left to work abroad, they begin sending home a good income, no? So, it's overall good that they go abroad. They get new experiences, they get to see a different country, there's good income coming into the home here. But it's also bad that they have to leave.

Interviewee 0.1 00:21: In this house? Well right now we have no official forms of income, I should go abroad as soon as I can. But in the meantime, we are farmers and make some income by selling our produce and grains to fellow villagers. There is no way to make a lot of money in village, only through agriculture. But if we go abroad to work, we can find a good salary. For here it is like that.

Jessie Hughes 06:41: So, like, was sending your husband abroad to work good or bad, do you think?

Interviewee 06:56: …well as long as he stays here there is no money to be had. Even to see money he has to go abroad. Neither of us would say it's been a good thing. And here alone, I have many problems and hardships. But we should send him abroad. It's like that.

Jessie Hughes 07:25: ...So in your opinion, was sending a family member to work abroad worth the trouble? Why or why not?

Interviewee 07:40...Ahhh, not worth it. I suppose because my husband is not educated enough to get a good job in this country, it is enough. In general, Nepali people are not well educated and need to go abroad to work. Everyone wants to make a lot of money, and they want to make it quickly, right? We all want to earn money, so everyone goes abroad. It's like that, they should go.

The statements made by interview informants are supported by field data which states that migration rates in Begkhola have increased between 2018 and 2022

C. Observation: Difficulties in land management associated with labor migration

Many participants, especially women, expressed hardships associated with an uneven division of labor, resulting from the absence of their spouses. To combat this, the villagers of Begkhola have developed a complex system of splitting labor, in which they rely on extended family members, or swap hours of labor to ensure that everyone's work gets done in a timely manner. This is especially important for activities such as planting and harvest.

Interviewee 1 10:32: While I was in Dubai? Who did the work in this house? Well, I was gone from 1997, so about 25 years ago. Here at home my three sons were very small. One was ten, one was five, and one was three. About those ages. And I left my wife and family here to work there. And she managed everything. She managed the children, the farming, the bissee, it was a lot of volume for her. We also had a cow then, and she took care of that. In the morning she cut the grass

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Interviewee 12:20: Yes. Three babies I had, and I also had to run the entire household. Cutting the grass, running the farm, tending to the bissee (water buffalo), I did it myself. After my wedding all of that work fell on me. All of this was very difficult, and I did it all alone.

Interviewee 3 11:23: My other sons will come to plow, and if they can't, then we call other people's sons to come and do the work that we need doing.

Interviewee 2 11:36: Yes, we call others to come do this work

Interviewee 1 11:42: We don't have a problem with that in this family, since there are so many sons. I was one of them doing that work at one point.

Jessie Hughes 11:48: Ok, would you say there are enough men in this village for that work to get done?

Interviewee 1 11:51: I mean, sometimes this kind of work is hard for women. Sometimes I'm the only man around that can do this work, but sometimes I have to go abroad for work. So, they manage as best as they can. In order to do that work they might call the neighbors…just so, when I go abroad, they might need to call on the neighbors, and when the neighbors call on them, they will help too. They will swap days of labor.

Interviewee 1 03:57: Ah, well sometime I would come home from abroad to do things like that. If I happened to be home then I was working my usual work…

Interviewee 2 04:03: In the meantime, I would search for men to do that work while he was gone.

Interviewee 1 04:08: Since I was not there all the time the wife would call men to come and plow for me. Sometimes family would come and help if needed. And if I was here while a family member was away, I would be doing their work too. We do work turn by turn, it's like that. In order for everyone to plant their khets we have to work with each other.

Aside from informants' statements on labor shortages and systems that they have put in place to mitigate these issues, the only data supporting this finding is that of absentee household member numbers available in the Nepal Census for 2011 (Government of Nepal, 2011). These numbers state that in Begkhola counted 145 households with at least one absentee member, out of 402 households. A total of 189 individuals were engaging in employment outside of the village (Government of Nepal, 2011). This represents a considerable percentage of working-age adults in Begkhola, and comports with interviewee statements on labor shortages.

D. Sentiment: A desire to engage in new kinds of labor migration

The villagers of Begkhola have engaged in labor migration for generations, often in the form of military service. This is consistent with the literature on Nepal's migration history, especially

concerning migration for military service from the Central Hills (Dutt, 1981, Sijapati & Limbu, 2017, IOM, 2019). Recently, Begkholans have pivoted towards new forms of migration, often away from military service and towards low-skilled occupations in GCC countries and wealthier countries in Asia (Japan, Korea, etc.). They would explain that military service is now too dangerous. Several women expressed to me that their husbands faced danger and hardship, or were killed during military service. This is evident in the observational data.

Jessie Hughes 13:42: Ah, and what work does he do?

Interviewee 13:45: Who knows? I certainly don't. I've never asked what kind of work he does.

Jessie Hughes 13:53: Perhaps he is in the army there?

Interviewee 13:55: Oh no, after my husband's experience we did not want any of our children to go into the army. They did not do that. I will not have them dying or experiencing hardship like that. So, no army. But I don't know what kind of work he does, no.

Jessie Hughes 24:02: laughter it's fine! It's like that. So, in your opinion, are there any new challenges that migrants face today? How do they plan to address them?

Interviewee 1 24:17: Who knows? Now our son has a comfortable job in Japan, he does some work on the computer even. How is it? The work certainly seems a little less. Certainly, in the last fifteen or sixteen years since I came home the work has still been difficult, but maybe the challenges are improving. So, who knows? Abroad there is money and here we farm. We have no budget, working abroad a little bit allows us that, and we find the best work for the money. We work like that.

The statements made by informants in interviews is supported by the observational field data, which shows the professions of absentee household members and how they have changed over time. While there are still Begkholans that engage in service with the army and with the Singapore Police, most of the military absentee members are older men who migrated for work several decades ago, while the younger generations are choosing to search for low-skilled labor in developed countries.

IV. Research Question 3: Migration and Environment

A. Observation: Land abandonment/outmigration, or acquirement/investment

While conducting semi-structured interviews I observed participants' awareness of migration as a contributor towards rural outmigration. Many participants I interviewed were older, and all of their children had left the village to move into urban areas with no intention of returning. This contributed towards land abandonment. At the same time, several participants expressed to me that they viewed this as an opportunity to increase their own land holdings by buying the land of those who had left, with money they earned working outside the village. This has resulted in fewer villagers owning larger shares of land.

Interviewee 19:01: Well, they should have given us livelihoods. Nowadays there are slightly more livelihoods. But in Nepal there are still not many livelihoods, and the government does not give us any, and so we need to go abroad to find good jobs. If we had good jobs here we would not want to go abroad. Now there are so many Nepalis working abroad. And after they go abroad and make money sometimes, they don't come back, and they take their families with them.

Jessie Hughes 12:43: I see, and what do your children do now?

Interviewee 49 12:55: Stops to talk to daughter in the khet above

Jessie Hughes 12:57: Well, there's your one daughter who will be here for a long time (one daughter with down syndrome)

Interviewee 49 13:06: Well, I have one son abroad, and one daughter who lives in America.

Jessie Hughes 13:08: Oh, I remember her! She came here a long time ago! Just once. She showed up, and donated a lot of money to the mother's group. She lives in Pittsburgh, so I have never met her in America. She was very generous with her money.

Interviewee 49 13:34: Yes, and I also have a son who is living in France

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Interviewee 1 12:29: Yes, while I was working in Dubai, I saved up 1 lakh. At that time my salary was very small. Maybe in one month my salary was 15,000 rupees. Nepali rupees. From now it can be about 25,000 rupees for the same work. Still not a lot. So, I would send about 5,000 rupees back per month for the wife and children, for expenses. It allowed them to buy things like soap, and clothing. For that, the entire month, I sent 5,000 rupees, and I would save 10,000 rupees. I would continuously save 10,000 rupees a month. In this way, after about 4 years I saved…how much total? Well, I know that after 8 years I had saved 5 lakhs. And with that 5 lakh we bought land and this house at that time. It was like that.

Jessie Hughes 13:49: And that was a good development?

Interviewee 1 13:52: Ha-ha, yes it was a good thing to buy this house for the future. And we plant our crops and feed our family like this. It's a good place to stay, overall. But we can't save money with this land.

Interviewee 2 14:18: Yes, so we have this house, but no official jobs, there's a little tension from that, to not be able to earn and save money.

B. Sentiment: An openness towards trying improved agricultural livelihood methods

Several villagers expressed to me that their spouses or children come home from abroad wanting to try new methods of agriculture that they hope will be more sustainable and profitable. A good example of this is the desire to invest in fruit tree farming, which stems from a combination of government extension programs, and labor migrants viewing profitable fruticulture ventures in other countries.

Jessie Hughes 07:28: No? laughter Because he's in the army, maybe he hasn't learned anything he can use here for agriculture?

Interviewee 07:39: What was said? How?

Jessie Hughes 07:40: So sometimes when people go to work abroad and come back, they bring back new knowledge that they can use here.

Interviewee 07:54: Well, the planting of the orange trees was somewhat his idea. He came back and proposed that we do that.

Interviewee 05:48: Yes, after going abroad my sisters and brothers (in a communal countrywide sense) learn so many different techniques and bring them back with them. They learn about agriculture, and other technical professions, how to operate machinery, etc. They also learn about hygiene and cleanliness while abroad. Once they've learned all of these things, they bring them back here. Once the youth go abroad and learn these tools they return and apply them to agriculture and start to improve things. They start new things too; hog raising, chicken raising, no? They also have introduced new methods of agriculture, like the orange orchards. Because they've gone abroad, they've learned these new techniques and are inspired to try them here. They also learn new systems. So overall, I would say that this has been a good thing for our village and our country. Otherwise, no one is learning anything new and new techniques are not coming into our country. There are many useful and good systems in other countries that they can learn from, and once they come home, they begin to utilize them.

The statements made by interview participants comport with the slow shift in agricultural livelihoods in Begkhola; away from primarily grains/pulse cultivation with complementary livestock

and towards cash crops and an increase in animal husbandry. Along with statements of interest from villagers initiating cultivation of new cash crops or investing in livestock raising (such as chicken farming or beekeeping), the GIS data showing the agricultural ventures of former labor migrants supports this finding.

C. Sentiment: Labor migration is seen as a safety net and diversification tool

Shortly before my arrival in Begkhola to conduct this research there was a catastrophic jeep accident in which four people were killed. I knew all four individuals well, and had planned to interview two of them for this study. In a small community with strong kinship systems the loss of four people is felt very strongly. It was a tragedy for everyone in the village, including myself. I had the privilege of observing the safety net of migration remittances and expatriate groups from Begkhola come together to assist the families of those who had lost a loved one. Almost everyone I interviewed had something to say about this event, mostly pertaining to infrastructure concerns or while expressing pride in the resilience of the community.

Aside from this tragedy, interview participants also believed in the power of remittances to help them weather general hardship such as natural disaster or crop loss.

Interviewee 15:27: Ohhh. Oh no they've been helpful. Recently, whenever someone got sick, they were there to take care of them even if they had no money. They gave everyone a good price on healthcare; it was very helpful. Oh, and recently they helped out the victims of that terrible jeep accident; did you know about that?

Jessie Hughes 15:59: Yeah, I knew about that. I was really sad to hear it.

Interviewee 16:03: Yes, four people died, and everyone in town raised money house by house and gave them help.

Interviewee 1 23:47: Are you meaning things that organizations did for us or for the whole village? Because the Red Cross did come and do that project. And the local government has done some work for the village too. They've built roads and temples, and done some work for the school, and for the sick (when COVID arrived), and they also helped out after that jeep accident.

Interviewee 2 24:15: Yes, and also after the accident a lot of our associations in the UK and Singapore, all of them sent us money to help with that.

Interviewee 1 24:26: Yes, we have associations abroad, and they got in touch with our local government when they heard what had happened to ask how they could help. It's like that.

Interviewee 0.1 03:00: To earn money? Well right now, none! Right now, our brother and sister-in-law are abroad in Japan, and they send money home to us. But the rest of us are just here at home, doing agriculture. It's just enough for food. No incomes. If we did not have my brother in Japan, things would not be as certain.

D. Observation: Growing food insecurity and a reliance on imports

Villagers are aware that their crop yields are decreasing, and that they are cultivating less acreage and relying more on store-bought food. They would complain about food prices and that the prices for basic necessities have risen, which forces more of them to engage in labor migration in order to provide for basic necessities.

Jessie Hughes 04:51: Ok, would you say that the rice you grow is enough for your family to eat without buying any grain from the store?

Interviewee 1 05:00: No definitely not.

Interviewee 2 05:01: No not enough. We should buy some extra too.

Jessie Hughes 05:05: Ok, from where do you buy it?

Interviewee 1 05:07: Oh, at the store.

Interviewee 1 04:40: Well, overall, it was not good. There are problems associated with going and working abroad, no? If things were adequate in the village, economically, then we would not have to leave. The environment here is very good for us; we like being here. And while we are working abroad our families remain behind. They live together and manage the work as best as they can in order to grow food to eat. Here in our own country, there is not much of an economic system. There is no development. We can't make enough money for our own expenses let alone to feed ourselves. Many years we cannot grow enough food and have to buy it, and so we must go abroad. So many problems. It's like that.

The statements made by interview participants are supported by field observation of past and present activity at the local market, in which the population has fallen slightly between 2018 and 2020, while the good available at the market have increased in both volume and price, despite the onset of the COVID-19 pandemic.

THE FUTURE: DISCUSSION

I. Interpretation of Findings

	Finding	Supports	Builds	New
RQ1	1. A desire to co-exist and grow with the surrounding environment	X	X	
	2. A belief that livelihood outcomes are linked to the surrounding environment			X
	3. Pride in care for their environment and the gains they have seen as a result			X
	4. Frustration that new environmental challenges are appearing (due to climate change) despite their best efforts			
RQ2	1. Rising numbers of labor migrants	X	X	
	2. The belief that labor migration is inevitable for those who want a living salary	X		X
	3. Difficulties in land management associated with labor migration	X		
	4. A desire to engage in different kinds of labor migration than the previous generation	X		
RQ3	1. Migration as a contributor towards land abandonment/outmigration, or acquirement/investment	X		X
	2. A newfound openness towards trying improved agricultural livelihood methods	X		
	3. Labor migration and remittances are seen as a safety net and diversification tool	X		
	4. Migration as a contributor towards food insecurity and a growing reliance on imports	X		

Table 5: Summary of research findings, showing whether a finding supports existing literature, builds on existing literature, or can be considered a new finding.

A. RQ1: Livelihood Strategies and Environment

i. Sentiment: A desire to co-exist and grow with the environment

Villagers in Begkhola view the land and location as an opportunity not just for livelihood improvement, but as a way to maintain their culture and way of life. This was evident not just in the data collected for this study between 2018 and 2022, but also in my personal experience and observation of the different emotional attitudes of those who leave, versus those who remain. Begkholans who have left and return only for holidays or to visit family regard the village sentimentally, as the headwaters of their culture, whilst Begkholans who have remained in the village consider the environment as a cultural aspect of life which is under their care and protection. They

attempt to carry out this responsibility through responsible stewardship and development of the land; the ward has multiple groups and committees who oversee the use and distribution of certain resources, such as firewood and water.

This finding **builds on existing literature** such as Stahl & Sapkota's (2014) review of restoration policies in Nepal, which found that roughly 35% of the population has become engaged in forest conservation and land restoration initiatives since the mid-1980s, as the government has begun to hand over responsibility of the land to smallholder villagers. Abington (1992) also noted that Nepali farmers viewed forest conservation and initiatives such as agroforestry as a tradeoff; with minor losses in crop yield leading to larger gains in natural resource availability and environmental health. Massey et al.'s 2010 study "Environmental change and out-migration: evidence from Nepal" also backs up this finding, as it deals primarily with the hardships and fallout of anthropogenic environmental change such as the availability of firewood. This finding moves beyond merely examining the consequences of environmental apathy and also shows that the villagers of Begkhola have a cultural or sentimental desire to further cultivate their relationship with the environment.

ii. Sentiment: A belief that livelihood outcomes are linked to the environment

Interview informants stated and provided examples of the ways that the environment affected their livelihood outcomes, but believe their ability to control such events is limited, and puts limits on the development of the village. Some of the examples they provided included landslides that washed away livestock and crops, flooding which led to vehicle accidents, and the troubles their children face while trying to get to school to further their education.

This finding **supports existing literature** which finds that rural smallholders in Nepal are starting to have more difficulty in maintaining their livelihoods, such as the interviews conducted in Dangi et al.'s (2015) "Impacts of environmental change on agroecosystems and livelihoods in

Annapurna Conservation Area, Nepal." Gautam (2017) also backs this finding up by examining how rural farmers in Humla are affected by the environment.

iii. Sentiment: Pride in caring for their environment and observed gains

I consider this sentiment to be a relatively **new finding**, due to the noticeable lack of studies in this area which examine social-ecological relationships and sentiments between smallholder farmers and the environment. There are many studies which examine farmers' perceptions of the environment and a changing climate (Dangi et al., 2015; Gautam, 2017; Paudel et al., Chapagain & Gentle, 2015; etc.) and research which examines farmers' attitudes towards rural livelihoods (Tuladhar et al., 2014; Arslan et al., 2021; Khanal et al., 2015; Sugden et al., 2021). There also exist ethnographies on mountain peoples, their culture, and their past relationships with the environment (Hitchcock, 1966). However, it stands to reason that with a changing climate will come an evolving culture, and there is not much current research examining mountain peoples' evolving relationships with their environment.

iv. Sentiment: Frustration concerning new challenges in the social-ecological system

I consider this to be a relatively **new finding**, as it relates to and builds off of finding iii (Pride in caring for their immediate environment and the gains they have seen as a result). The villagers of Begkhola are intimately connected to their environment and are constantly looking for ways to improve it. They see this as improving their own situation, and villagers have done a lot of work to restore anthropogenic environmental degradation in the past and have seen positive results for it. Now that things are becoming environmentally difficult again many of them have an underlying feeling that the gains seen from their past efforts may not bear fruit in the long term, and that control of the situation is out of their hands. Due to this, they may be more risk averse and less likely to want to undertake innovative agroecological measures in the future. A good example of this is the statement that villagers were initially excited about orange trees, but didn't see the payoffs they

were expecting, and thus were reluctant to engage in large scale tree planting later on, except in circumstances which they knew would have a payoff, such as agroforestry for the purpose of cultivating livestock fodder. The emotional element of a changing climate, that of frustration or disappointment, may prove to be a powerful force in the future.

B. RQ2: Livelihood Strategies and Migration

i. Observation: Rising trend in labor migration

This **finding supports existing literature** and data which show that rates of labor migration in Nepal have been steady climbing in the last few decades (Sharma et al., 2014; Sharma, 2011; Siddiqui et al., 2019). At the time of this writing (May 2022) the census data showing absentee members of households and the actual numbers of labor migrants remains unavailable. However, in Begkhola the data shows that rates of migration increased between 2018 and 2022, even with the onset of the COVID-19 pandemic that notoriously left millions of migrant workers either stranded in foreign countries or forced to return home due to labor restrictions or a lack of work.

ii. Sentiment: The growing belief that labor migration is inevitable

This sentiment can be viewed either as a **new finding** or as **supporting existing literature**. NELM Theory (Taylor, 1999) posits that Nepali migrants are deftly navigating the global labor migration stage with their and their households' best interests at heart, and that the choice to engage in labor migration is primarily an economic one and a choice made freely. The literature on labor migration in Nepal tends to support this theory (Shrestha, 2017; Rabbani et al., 2016; Sharma et al., 2014). However, more recent studies have explored the effects that a changing climate have on Nepali households' migration decisions, finding that the economic hardships imposed by rising temperatures and more erratic rainfall are starting to change the way migration decisions are made, with more of an outlook that if households want to be able to meet their basic needs, then at least one member needs to be working abroad to bring money home (Gautam, 2017; Chapagain &

Gentle, 2015; Rabbani et al., 2016). Many Begkholans view their migration decision as a choice between two bad options, with migration merely being the lesser of two evils. This is a sentiment that could potentially increase in the future, as the effects of a changing climate are increasingly felt in small mountain communities.

iii. Observation: Difficulties in land management associated with labor migration

This observation fully **supports existing literature**. Households that engage in labor migration have a higher chance of reduced agricultural yields (Tuladhar et al., 2014) and this is due in part to labor shortages in these families. Concurrently, a study by Khanal et al. (2015) finds that non-migrating families engage far more in agricultural investment than migrating families. In Begkhola, labor shortages have led to attempts to cope, such as sharing labor, or calling on extended family members and in-laws to help with the work. Ultimately, this system still leads to exhaustion, burnout, and exit from agriculture by rural smallholders. Another way that families may be coping is through the implementation of new kinds of agriculture, such as agroforestry, or engaging in labor diversification.

iv. Sentiment: A desire to engage in new kinds of labor migration

The sentiment of Begkholans to shy away from conscription into military service is a trend that **supports existing literature**. Sijapati & Limbu (2017) note that until the Foreign Labor Migration Act of 1985, labor migration was equated mostly with travel to India or conscription into the British and Indian militaries. The International Organization for Migration (2019) also notes that since the onset of this legislation, Nepali migrants have tended to search for more lucrative pursuits than the military. There is also the issue of safety. Many older women I spoke with were vocally opposed to the idea of military service, unless it was a prestigious position such as a spot with the Ghurka Regiments or the Singapore Police. These are highly coveted positions in Begkhola, and a family member serving in these units is a source of pride for their families.

C. RQ3: Migration and Environment

i. Observation: Land abandonment/outmigration, or acquirement/investment

The idea of migration as a contributor towards land abandonment is **supported by the literature** (Tuladhar et al., 2014; Tiwari & Joshi, 2015; Chapagain & Gentle, 2015; etc.), but the corresponding idea of remaining families acquiring the land left behind by others seems to be a relatively **new finding** for which I could not find much existing literature in support of. In Begkhola, at least, there are several families who are taking the initiative towards buying vacant land and attempting to cultivate it themselves. Helping the families who choose to remain in rural areas acquire land and find agricultural ventures that reward their hard work could be potentially crucial development and policy measures in the future, but further research in necessary to determine if this is an ongoing observation.

ii. Sentiment: An openness towards trying improved agricultural livelihood methods

This finding is partially **supported by the literature**. The literature internationally is split on whether remittances from labor migration are used for agricultural investment. In some countries remittances are used primarily for consumption and household expenditures, while in Nepal the decision to use remittances for investment in agricultural ventures seems to be linked to elevation and isolation (Sugden et al., 2021). Maharjan et al. (2020) also found that families who engage in labor migration are less likely to spend their money on agricultural pursuits. So, the decision on whether or not to pursue agricultural investment with remittances from labor migration seems to be based on other factors, and could be a source of inquiry in the future.

iii. Sentiment: Labor migration is seen as a safety net and diversification tool

This finding is **supported by the literature**, as it dovetails nicely with the well-supported NELM Theory of migration (Massey et al., 1993; Taylor, 1999).

iv. Observation: Growing food insecurity and a reliance on imports

This finding is **supported by the literature** which states that Nepal has had a growing dependence on food imports, especially from countries like India, since the late 1980s (Arslan et al., 2021), despite the fact that Nepali farmers had cleared almost the absolute maximum of allowable land for the terrain of the Central Hills (Raut et al., 2010). The finding paints a picture of growing dependence on foreign remittances, while being unable to support a growing population through agriculture.

II. Limitations

A. COVID-19

Due to the COVID-19 pandemic I was unable to collect as much data as I would have liked, particularly on the qualitative side. The original project was intended to study the confluence of migration, livelihoods, and SES in the Central Hills of rural Nepal AS WELL AS it's urban areas. I intended to accomplish this through semi-structured interviews with households residing in Begkhola and those who have moved away from Begkhola in part due to labor migration. However, when I arrived in Kathmandu in early January of 2022 the Omicron variant of COVID-19 had just been detected in the capital and was starting to spread through the rest of the country. I conducted the rural component of this project in the first phase of my field research, and in that time the Government of Nepal began to impose travel restrictions and school closings in select regions, including Gandaki Province where I was conducting my research. The rural component of my research was conducted successfully with minor inconvenience, but my contacts in urban areas were reluctant to meet in person and I was not willing to ask them to feel unsafe. Despite the restrictions I was able to conduct two (2) interviews with households in Pokhara, a large city about six hours to the southeast of Begkhola. The social and societal components of migration were discussed far more in these interviews, with interviewees expressing and relating their experiences pertaining to caste,

culture, governmental issues, and their changing relationships with the natural environment. I made the decision not to use these interviews as part of my analysis, however, informant responses have convinced me that this may be a fruitful venture for future research.

B. Cultural Nuance

Due to my original background in design, planning, and development I have limited experience in anthropological work and ethnographic observation. I am very familiar with Nepali culture, and especially so with Magar culture, but it's possible that subtle observations that may have been detected by a trained anthropologist and ethnographer have been missed by me. Most of my knowledge of Nepali culture and society is purely experiential, and I lack the theoretical background in anthropology and sociology that may have allowed me to craft a more nuanced analysis of collected data.

C. Language Barriers

I am a native English speaker who speaks Nepali with conversational fluency and Hindi at the intermediate level. Through my continued study of Nepali at Cornell University I was able to retain my language skills and was successful in conducting the qualitative data collection for this project. However, the variation of language and expressions in Nepali is as diverse as the country itself. More than once I found myself asking an informant to repeat themselves or clarify a colloquial phrase I was unfamiliar with. In the translating of semi-structured interviews, I did my best to accurately represent the views and ideas of everyone who graciously offered me their time. The final translations are accurate in the intention of informant answers, but not translated literally, word for word. I spent considerable time making sure that my translations had minimal errors, and requested the help of another Nepali speaker to double check my work, but despite my best efforts I'm certain that these translations are not perfect.

III. Suggestions for Future Research

A. Inquiry and Support on Rural Outmigration and Urban Expansion

The literature is clear in validating increasing trends in rural outmigration and exit from rural livelihoods. However, my findings in Begkhola show that for those households that chooses to move away to the city there are households that choose to remain. Whether for cultural, sentimental, or perceived economic reasons remain unclear. There are several inquiries that could be pursued in this area:

1. Why are rural families choosing to remain in small mountain communities? Are there sentimental and cultural motivations to remain, or are villagers purely economically motivated?
2. In countries like Nepal, with a growing dependency on foreign food imports and increasing rural outmigration/exit from rural livelihoods that increase food security, how can governments, NGOs, and formal institutions encourage and assist households who choose to remain in rural areas? What are ways that rural households can pursue new, more lucrative agricultural livelihoods with a decreasing pool of labor, that also help the government in achieving its development goals and improving overall food security in the region?
3. Conversely, many households that choose to move to urban areas still possess intimate knowledge on agriculture and environment that can prove useful in urban environments and especially in the emerging field of urban agriculture. How can households that have moved away remain connected to and assist those households that are still attempting to pursue agricultural livelihoods? Are there ways that pre-existing social and familial ties can be leveraged to improve food security, resilience, and environmental relations in both rural and urban environments?

B. Cultural Attitudes and Evolving Relationships with the Environment

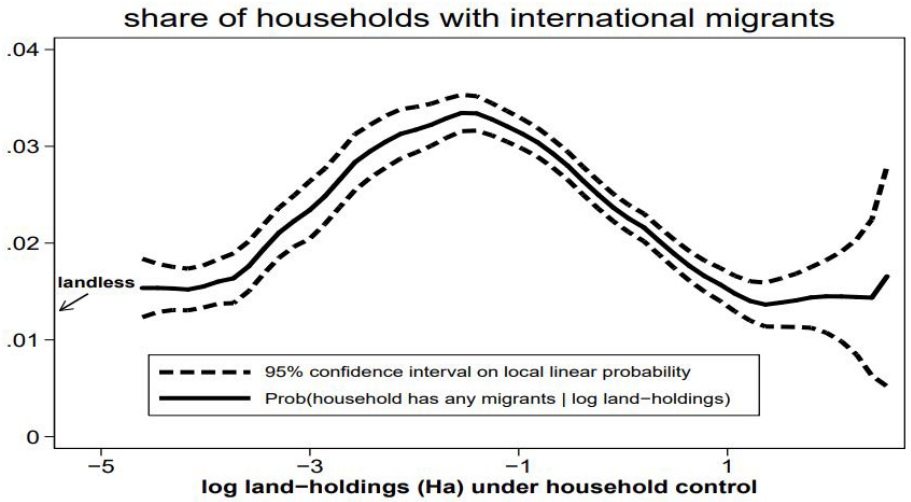
The villagers of Begkhola spoke at length about how quickly the village has modernized in the past twenty years. In the early 1990s the village was without a road, electricity, cell service, or a market. By 2010 the village had all of these things and was connected to regional and (on some level) global markets. Elderly informants especially spoke on the difference between their livelihood and cultural experiences and that of their children. Along with changes to the village of Begkhola and the changes in migration flows in and out of Begkhola come changes to the social-ecological system of the region, and that of the relationship between the people and the environment.

There is great potential to study the evolving cultural attitudes and relationships between mountain peoples and their environment. How could a changing climate be contributing to shifting cultural attitudes and ideas about the environment? What effects do shifting cultural attitudes have upon the environment in return? And as the environment changes in volatile mountain social-ecological systems, what is the role that traditional lifeways and cultures have to play in the future?

C. Migration, Wealth, and Vulnerability

Several institutions and studies have attempted to depict the relationship between migration and wealth, which presents as a bell curve in which the wealthiest of society have no need to engage in labor migration, and the poorest of society are unable to afford the upfront cost of doing so, and will remain poor unless they find a way to build wealth locally. Ultimately this is a triadic system in which the ultra-rich have access to wealth, ideas, and the benefits of a globalized society, the ultra-poor have access to none of these things, and those in the middle have the potential of access through engagement in labor migration. Figures depicting this relationship are shown below:

Figure 2: Migrants Drawn from the Middle of the Landholdings Distribution



Notes: Calculations based on nationally representative household survey (*Susenas*) data collected in July 2005. The nonparametric regression curve and analytic confidence band is based on a local linear probability regression of an indicator for whether of a household member worked abroad from 2002-2005 on log landholdings under household control. The estimates employ a bandwidth of 0.4 and an Epanechnikov kernel. There are a total of 257,906 households in the data and 124,472 report controlling any landholdings at the time of enumeration. Both the mean estimate for migration probabilities in landless households and the nonparametric regression employ sampling weights. The top percentile of landholdings are trimmed from the figure for presentational purposes.

Figure 38: Depicting the relationship between wealth (in the form of landholdings in Indonesia) and the likelihood of households engaging in labor migration (Bazzi et al., 2012).

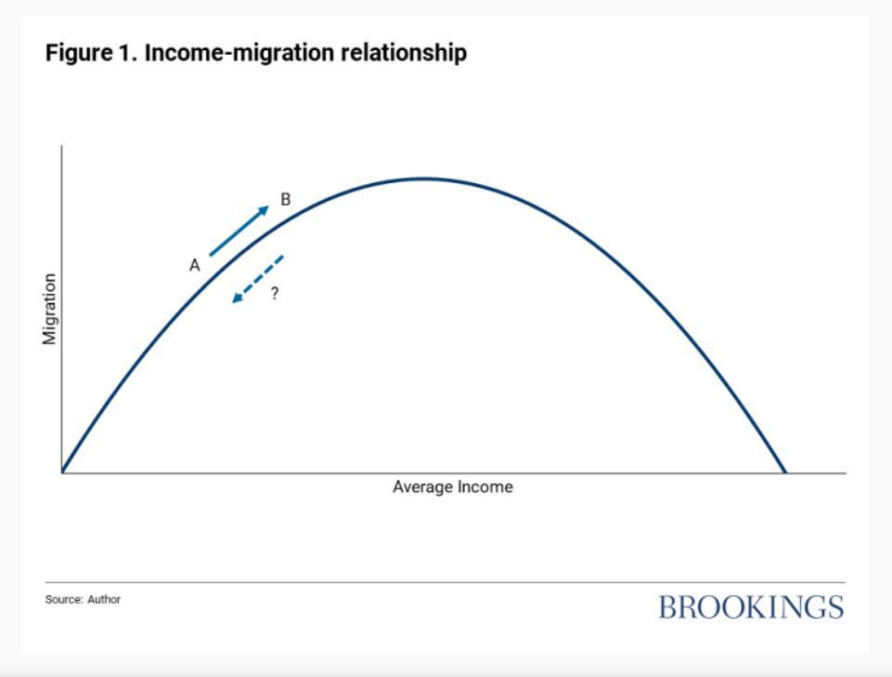


Figure 39: Depicting the relationship between income and the likelihood of labor migration (Bermeo, 2021).

Other researchers have explored the relationships between migration and vulnerability to the effects of environmental degradation and a changing climate (Gautam, 2017; Massey et al., 2010; Dangi et al., 2015; etc.), with the literature generally concluding that environmental degradation and climate change has the potential to affect migration flows in and out of a community in various ways.

The confluence of all three factors (wealth, migration, and a changing climate) creates a situation in which migration is considered as an aspect of resilience in accordance with NELM theory, and engaging in migration is increasingly seen an inevitability rather than an option. However, as the effects of a changing climate are increasingly felt in smallholder communities, there exists the potential for fewer and fewer people to be able to afford the upfront cost of labor migration, and missing out on the opportunity to build resilience and wealth. This creates a trap, in which those who can afford to grow wealth and resilience do so, while the pool of those who cannot grows larger than it would have without the effects of a changing climate. Over time, the pool of those who fall deeper into poverty as a result of a changing climate grows larger than the pool of those who would have fallen into poverty as a result of natural climatic variance affecting their rural smallholder livelihoods. My attempt at depicting these relationships is presented below:

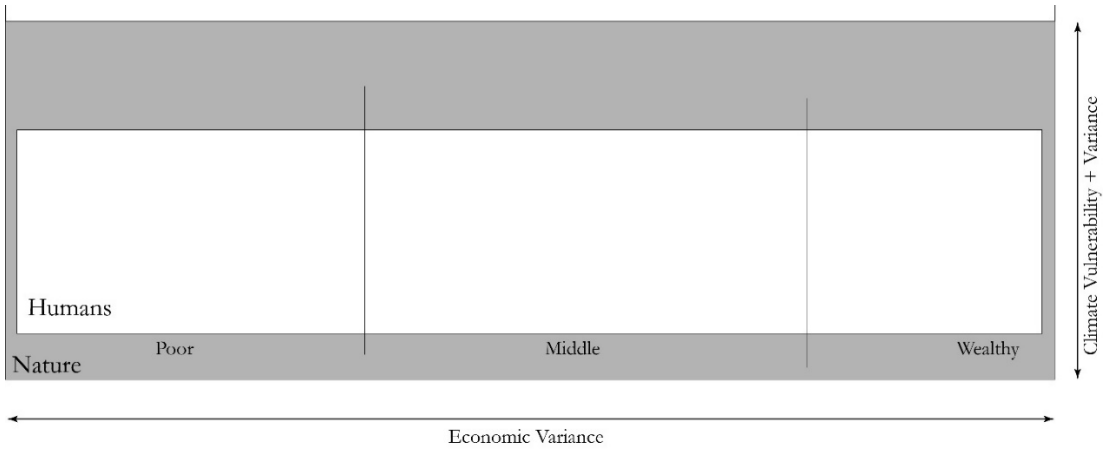


Figure 40: The setup for the relationship between economic variance, climate variance + vulnerability, and likelihood of engaging in labor migration

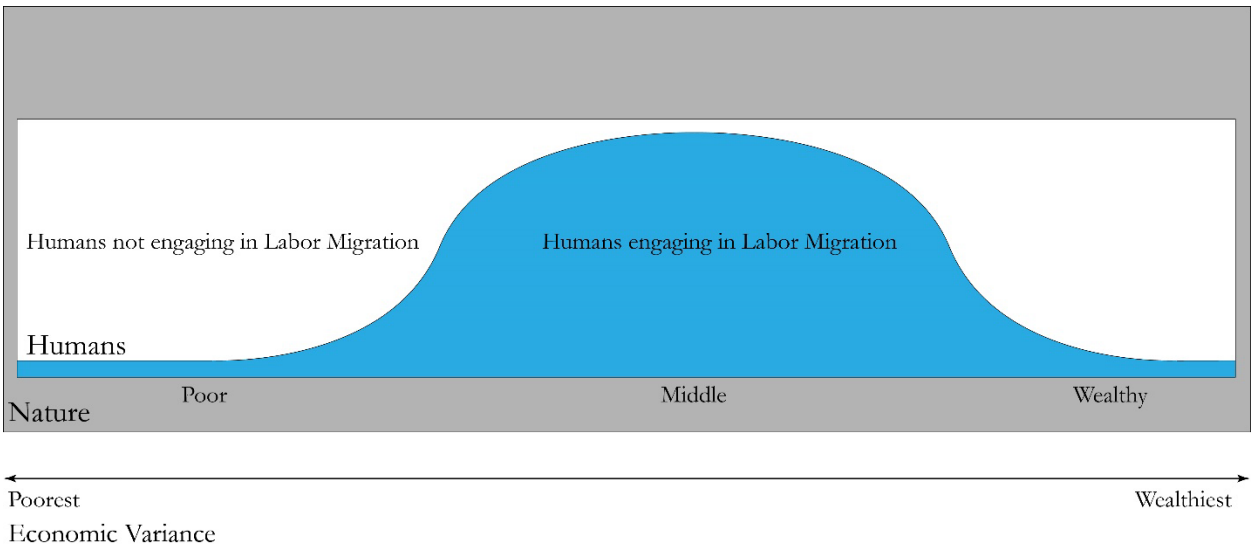


Figure 41: The relationship between wealth and the likelihood of labor migration

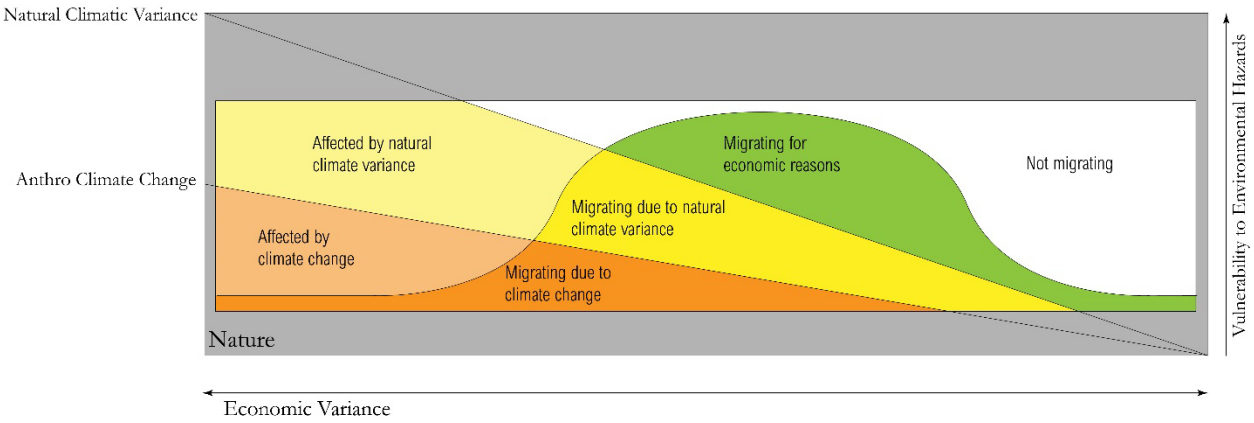


Figure 42: The relationship between wealth, the likelihood of labor migration, and the effect that natural climatic variance and climate change have on reasons for migration

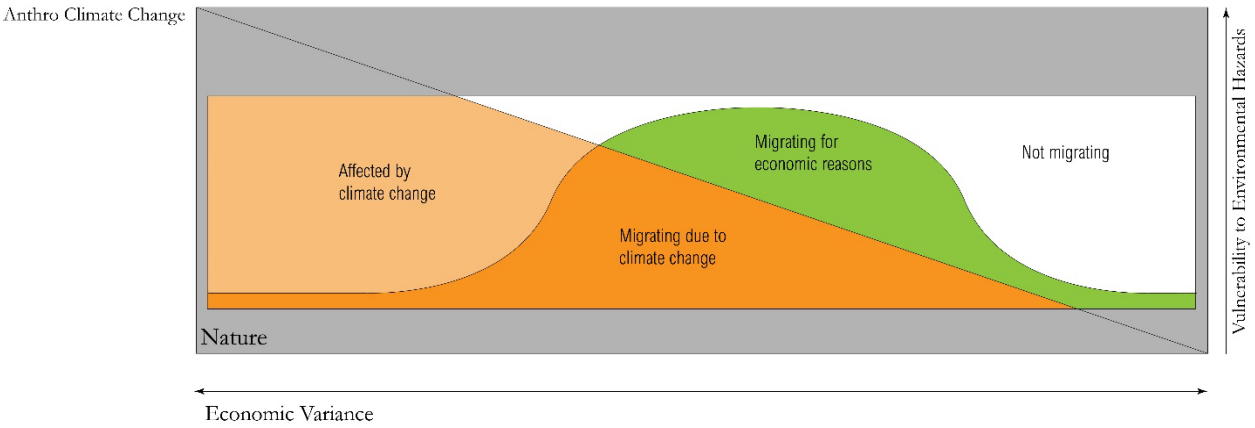


Figure 43: An alternative future in which Anthropogenic Climate Change replaces and has the potential to exceed Natural Climate Variance as a driver of labor migration.

This idea is only a hypothesis regarding future scenarios. Future inquires for research are described below:

1. Further research needs to be done to further validate my hypothesis, which has been lightly established indirectly but, aside from this study, remains largely unexplored. The policy implications of migration as a tool to enhance resilience in a changing climate are wide-reaching and I view this as an important line of inquiry; it is something I will be pursuing in later study.
2. There is potential for researchers to explore the quantifiable benefits and effects of migration on resilience to climate change. There is no single answer to the problems presented by a changing climate. Along with in-place development and resilience measures and despite the stigma against it, there is potential for governments and formal institutions to develop programs that allow those in poverty to improve their situations through labor migration, even domestically.

CONCLUSION

The Central Hills of Nepal are a complex social-ecological system where people originally cultivated their lives and livelihoods within a relatively isolated system of relationships between smallholder farmers and the surrounding environment. In the present day, Nepali smallholders can choose to balance a separate livelihood as a labor migrant in the greater world, acting as savvy labor actors on the global stage, and working abroad to provide additional financial security. Labor migrants in this system are pushed and pulled between the isolated villages of Central Nepal and the greater world outside, tethered to and influencing both.

Rural livelihoods, labor migration, and ecological elements, which are intertwined and comprise Nepal's Central Hills SES, have often been studied separately. In the past, researchers have preferred to focus more narrowly on reductive elements of these relationships, if they do think of them as related to one another. Very rarely have researchers attempted a more holistic analysis of all three.

In this study I attempted to examine the relationships between livelihoods, migration, and environment in a case village of Central Nepal. I employed a mixed-methodology in order to collect both qualitative and quantitative data in the form of semi-structured interviews, field observation, soil sampling, and GIS data collection. I also utilized available data and reports concerning migration in Nepal that had been derived from the Census of Nepal and the Nepal Living Standards Survey. The semi-structured interviews provided the bulk of my immediate findings and analysis concerning the case village. Findings from the semi-structured interviews were appraised using triangulation with field observation, soil sampling, and GIS analysis.

I uncovered several findings which either reinforce existing literature, build upon the existing literature, or qualify as a new finding altogether with concern to the relationships between livelihoods, migration, and the social-ecological system of Central Nepali villages.

With regards to the relationship between livelihood strategies and environment, the villagers of Begkhola nurture the belief that their livelihood outcomes are intimately linked to the surrounding environment, and they expressed a desire to grow with that environment. They have experienced the fallout of environmental degradation in the past, and are immensely proud of the work they have done to repair the damage done to their environment through deforestation and improper land use practices. However, with the rising threat of a changing climate has come the new frustration amongst villagers that new challenges are appearing which they did not foresee and are unprepared to face.

The villagers of Begkhola increasingly believe that engaging in labor migration is necessary for those who want to earn a living wage, and the data show that migration out of the village has increased between 2018 and 2022. While household members are away, the household members who remain have constructed an elaborate system of labor sharing in an attempt to cope with the loss of labor and ensure that the area's agriculture does not fall into disarray. This system is not always effective. Due to safety concerns, Begkholans have recently begun shying away from traditional forms of labor migration, such as military service, and towards low-skilled labor or agricultural labor in developed countries, which are perceived as safer occupations.

There has been a slow but steady exit from rural livelihoods and permanent migration out of Begkhola. But when it is not leading directly to outmigration, the labor shortage caused by labor migration is encouraging families to find newer, modern ways to engage in agricultural livelihoods. Labor migration and the resulting remittances are viewed as a safety net and diversification tool for many households, with villagers being able to recall many experiences and events where remittances served this purpose. But overall, in Begkhola labor migration and remittances are serving as a contributor towards reduced agricultural yields and a growing reliance on imported food from outside the village.

Going forward there are many lines of inquiry stemming from these findings that could yield fruitful results for researchers, including myself. Further inquiry on rural outmigration and urban expansion is needed. Presently most researchers rely on the Nepal Census and Living Standards Survey to provide them with data on movement. Those data sources are only updated every ten years and lack the more nuanced questions and information that researchers need. Secondly, researchers should pursue the study of shifting cultural attitudes and the evolving relationships between people in this region and their environment. Attitudes and feelings about our environment shape humanity's interactions with said environment, this will be important going forward. Finally, attention needs to be paid towards solidifying the relationship between migration, wealth, and vulnerability to the effects of a changing climate. Going forward, it will be increasingly important to determine where points of vulnerability lie in a society, and my future focus of study will be on identifying the role that migration plays in shaping and protecting against vulnerabilities.

Nepal is a beautiful and vastly diverse country, which has contributed very little to the gradual warming of the planet yet stands to endure much change from it. The people of Nepal are deftly finding new ways to cope with these changes, but with the intellectual and research resources at our disposal they should not have to manage it on their own. Going forward, findings related to livelihoods, migration, and social-ecological systems will be will be increasingly important to enact policy change and develop innovative resiliency measures to the rapidly changing environment in Nepal's mountain communities. Not only that, future findings will help us as a species further understand our evolving relationship with the environment, and within the greater social-ecological system going forward which would change what?. This is your shot – be bold in your last sentence! ☺

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APPENDIX

A. INTERVIEW QUESTIONS FOR SEMI-STRUCTURED INTERVIEWS

NEW DATA COLLECTION AND ANALYSES: INTERVIEW QUESTIONS

Interviews are meant to be semi-structured and conducted entirely in Nepali. Interviews will be recorded in 30-90 minutes and data will be de-identified for publication. Data collection technology will include both an analog audio recorder and a phone for redundancy, with data storage occurring both on encrypted devices and through Cornell Box.

Introduction to Interviewee

Ask permission to record and record confirmation.
मैले यो बैठक रेकर्ड गर्न सक्छु?

Intro on why we are here together – To explore the livelihood strategies, concerns, thoughts, ideas, and actions of Nepali citizens living along the rural-urban continuum when faced with 21st century challenges, utilizing a case group of Nepalese living in and coming from a small village in the high mountain region of Nepal (Begkhola, Myagdi).

मेरो विश्वविद्यालयले मलाई यहाँ तपाईंको जीवनको बारेमा थप जान्न पठाएको छ
यो शताब्दीमा नेपालको गाउँ मान्छेहरुले कामका लागि अन्य देशमा सर्छन्
किनभने तपाइँ यो चाहि पहिले व्यक्ति गर्नेचन हुनाले, हामीलाई जीन्यासु लाग्छौ। यो के जस्तो छ?
म तपाईलाई तपाईको भावना, विचार र कार्यहरूको बारेमा सोध्न चाहन्छु

Thank you for agreeing to meet with us, this should take 30-45 minutes total, and will include the opportunity to follow-up with any additional comments for the interviewer.
त्यसैले मसँग भेट्नु भएकोमा धन्यवाद | यसले ३० मिनेट देखि ४५ मिनेट सम्म लाग्नेछ

RURAL ETHNOGRAPHIC OBSERVATION AND SEMI-STRUCTURED INTERVIEW

I. Following up on past characteristics (ethnographic observation survey)

PI (Jessie Hughes): Fill out survey.

II. Rural Livelihood Strategies

What are your household's main sources of earned income?
तपाईको परिवारले आम्दानी कसरी कमाउँछन् *?*
Which crops, livestock, or foraged products are the most important to you, and why?
तपाईका लागि कुन बाली र पशुपालन महत्त्वपूर्ण छ*?* किन*?*
If you had additional income, what would you do with it?
यदि तपाईंसँग अतिरिक्त पैसा थियो भने, तपाईं यसलाई के गर्नुहुन्छ*?*

What are the most important things that you spend earned income on?
तपाईले पैसा खर्च का लागि गर्ने सबैभन्दा महत्त्वपूर्ण चीजहरू के के हुन्? किन?
What is the role of the household's women in earning income? The men? The elderly?
पैसा कमाउन घरका महिलाको भूमिका के हुन्छ? घरका श्रीमानहरू? पुराना मानिसहरू?

III. RQ1: The relationship between livelihood strategies and migration

What are/were the responsibilities of different household members while your family member was abroad?
तपाईको परिवारको सदस्य गएको बेला, घरमा विभिन्न व्यक्तिहरूको जिम्मेवारी के हुन्छ?
Was sending a family member to work abroad worth the trouble? Why or why not?
के परिवारको सदस्यलाई गाउँबाहिर काम गर्न पठाउनु राम्रो लगानी हो? किन वा किन छैन?
Did your family member learn anything while working abroad that they have brought back to the village or taught you?
विदेशमा काम गर्दा तपाईको परिवारका सदस्यले गाउँमा ल्याएका वा सिकाएका केही कुरा सिकेका छन्?
What was it like for you when your family member left to work abroad?
तपाईको परिवारका सदस्य वैदेशिक रोजगारीमा जाँदा तपाईलाई कस्तो लाग्यो?
Why did your family member decide to migrate outside of the village?
तपाइको परिवार को सदस्य विदेश मा किन निर्णय गर्नुभयो?
When your family member was preparing to leave the household, what challenges did they face? Did they delay their departure?
जब तपाईको परिवारको सदस्य छोड्न खोज्दै थियो, त्यहाँ के चुनौतीहरू थिए? के तिनीहरूले छोड्न ढिलाइ गरे?
How long after deciding to migrate did your family member leave the household? For how long were they/have they been abroad?
तपाईको परिवारको सदस्य छोड्ने निर्णय गरेर कति समय पछि जानुभयो ? कति समय को लागि विदेश मा बस्नुभएको छ?
How often would/do you communicate with your family member abroad? How do you communicate (phone, letters, Facebook, tiktok, other apps, other people, etc.)?
तपाईं आफ्नो बिदेशी परिवारको सदस्यसँग कति पटक कुरा गर्नुहुन्छ? तिनीहरूसँग कसरी कुरा गर्नुहुन्छ?
When you communicate with your family member, what do you talk about?
जब तपाईं आफ्नो परिवारको सदस्यसँग कुरा गर्नुहुन्छ, तपाईं के को बारेमा कुरा गर्नुहुन्छ?
Is your family member abroad responsible for household decisions? If so, what are those decisions?
के तपाईको विदेशी परिवारको सदस्यले घर को निर्णयहरु गर्छ? कुन निर्णयहरु
Does your family member abroad ask you to make difficult decisions? If so, what are some of those decisions?
के तपाईको विदेशी परिवारको सदस्यले तपाईलाई निर्णयहरु गर्न सोध्छ? कुन निर्णयहरु?

IV. RQ2: The relationship between vulnerabilities and migration

What are some environmental challenges that you faced in the village in the past? How did you address them?
गाउँमा विगतमा देख्नुभएको वातावरणीय चुनौतीहरू के के छन् ? तपाईंले तिनीहरूलाई कसरी ठीक गर्ने प्रयास गर्नुभयो?

In the past twenty years, have you noticed any changes to environmental challenges that you face in the village? How did/do you address them? Are there any challenges that you feel you are not prepared to face?
२० वर्षा देखि, तपाइले गाउँमा अरु नय विगतमा देख्नुभएको वातावरणीय चुनौतीहरू के के छन् ? तपाईंले तिनीहरूलाई कसरी ठीक गर्ने प्रयास गर्नुभयो?
What are some social challenges that you faced in the village in the past? How did you address them?
गाउँमा विगतमा देख्नुभएको सामाजिक चुनौतीहरू के के छन् ? तपाईंले तिनीहरूलाई कसरी ठीक गर्ने प्रयास गर्नुभयो?
In the past twenty years, have you noticed any changes to social challenges that you face in the village? How did/do you address them? Are there any challenges that you feel you are not prepared to face?
२० वर्षा देखि, तपाइले गाउँमा अरु नय विगतमा देख्नुभएको सामाजिक चुनौतीहरू के के छन् ? तपाईंले तिनीहरूलाई कसरी ठीक गर्ने प्रयास गर्नुभयो?
Are there challenges migrants have faced in the past? How did they address them?
विदेश कम गर्ने मान्छेहरु को बिगतमा कुन कुन चुनौतिहरु आएको छन्? उनीहरुले कसरि मर्मत गरेको छन्?
Are there any new challenges that migrants face today? How do they plan to address them?
विदेश कम गर्ने मान्छेहरुलाई अजा को चुनौतिहरु के के छन् तपाइको बिचार मा? उनीहरुले एस्तो चुनौतिहरु कसरि मर्मत गर्ने?

V. RQ3: NGOs, formal institutions, and their practices

What, if anything, have NGOs or formal institutions helped you with in the past to help you address challenges?
विगतमा सरकार वा अन्य संस्थाहरूले समस्या समाधान गर्न मद्दत गरे? कसरी?
Is there anything that other groups or institutions may have the resources to help you with that you are not already doing yourself, to address new challenges?
के त्यहाँ सरकार वा अन्य संस्थाहरूले तपाईंलाई मद्दत गर्न सक्ने केही छन् जुन तिनीहरूले गरिरहेका छैनन्?
Is there anything that the government or NGOs could do to assist migrants as they go about finding work and livelihoods?
विदेश कम गर्ने मान्छेहरुले नया कम को लागि खोज्दा, सरकार र ण्घोहरुले कसरि उनीहरुलाई सहयोग गर्नुपर्छ?

B. ACKNOWLEDGEMENT OF CONSENT FORM

ACKNOWLEDGEMENT OF CONSENT

I am asking you to participate in a research study titled "Transience and Vulnerability Along the Rural-Urban Continuum in Nepal". I will describe this study to you and answer any of your questions. This study is being led by **Jessie Hughes, Department of Global Development at Cornell University**. The Faculty Advisor for this study is **Keith Tidball, Department of Global Development at Cornell University.**

What the study is about

The purpose of this research is to explore livelihood strategies and vulnerabilities in Nepal's rural and urban spaces as they pertain to migration, urbanization, and a changing climate. It will also postulate on potential ramifications of current trends from a socio-ecological viewpoint. Additionally, it takes a look at how NGOs and formal institutions currently and could respond to evolving needs.

What we will ask you to do

I will ask you to answer any questions asked to the best of your ability. I anticipate this interview taking no more than 90 minutes of your time, and if work or family commitments interrupt our time together those commitments will be respected and the interview will end. You will not be asked to answer any question that you feel uncomfortable or unknowledgeable answering.

Risks and discomforts

I do not anticipate any risks from participating in this research.

Benefits

There are no direct benefits to the participant in the immediate moment. We anticipate that the information gained from this study may benefit others in the future, and we hope to learn more about how smallholder farmers and labor migrants are changing their livelihood strategies to meet evolving needs and challenges, and how formal institutions can help them do this.

Compensation for participation

Participants will receive no compensation in exchange for their participation in this study.

Audio/Video Recording

The PI would like to make an audio recording of this interview, in order to transcribe it from Nepali into English, and analyze it for data collection and posterity. Audio recordings will be archived after transcription on an encrypted device, and destroyed after 5 years.

Please sign below if you are willing to have this interview recorded by audio. You may still participate in this study if you are not willing to have the interview recorded.

I do not want to have this interview recorded.
I am willing to have this interview recorded:

Signed: _____
Date: _____

Privacy/Confidentiality/Data Security

Interviews are meant to be semi-structured and conducted entirely in Nepali. Interviews will be recorded in 30-90 minutes and data will be transcribed and de-identified for publication. Data collection technology will include both an analog audio recorder and a phone for redundancy, with data storage occurring both on encrypted devices and through Cornell Box.

Sharing De-identified Data Collected in this Research

De-identified data from this study may be shared with the research community at large to advance science and health. Transcripts will be created from audio recordings, which de-identifies participants. No one will be able to identify you from the information we share. Despite these measures, we cannot guarantee anonymity of your personal data.

Taking part is voluntary

Your involvement in this study is voluntary, and you may refuse to participate before the study begins, discontinue at any time, or skip any questions/procedures that may make you feel uncomfortable, with no penalty to you.

Follow up studies

We may contact you again to request your participation in a follow up study. As always, your participation will be voluntary and we will ask for your explicit consent to participate in any of the follow up studies.
May we contact you again to request your participation in a follow up study? Yes/No

If you have questions

The main researcher conducting this study is **Jessie Hughes, a graduate student at Cornell University**. Please ask any questions you have now. If you have questions later, you may contact Jessie Hughes at jah667@cornell.edu or at +1 (315)-694-3216. If you have any questions or concerns regarding your rights as a subject in this study, you may contact the Institutional Review Board (IRB) for Human Participants at +1 607-255-5138 or access their website at http://www.irb.cornell.edu. You may also report your concerns or complaints anonymously through Ethicspoint online at www.hotline.cornell.edu or by calling toll free at 1-866-293-3077. Ethicspoint is an independent organization that serves as a liaison between the University and the person bringing the complaint so that anonymity can be ensured.

Statement of Consent

I have read the above information, and have received answers to any questions I asked. I consent to take part in the study.

Your Signature_____ Date_____

Your Name (printed)_____

Signature of person obtaining consent (PI)_____ Date_____

Printed name of person obtaining consent (PI)_____

This consent form will be kept by the researcher for five years beyond the end of the study.

C. EXAMPLE TRANSCRIPT SELECTED FROM SEMI-STRUCTURED INTERVIEWS

2022.01.12
Jessie Hughes – Capstone Research
Ethnographic Observation + Semi-structured Interviews: Rural

Interviewer: Jessie Hughes (Principal Investigator)
Interviewee: [redacted] (Tag number: 0)

Questions asked in this Interview (**bolded**):
What are your household's main sources of earned income?
Which crops, livestock, or foraged products are the most important to you, and why?
If you had additional income, what would you do with it?
What are the most important things that you spend earned income on?
What is the role of the household's women in earning income? The men? The elderly?

What are/were the responsibilities of different household members while your family member was abroad?
Was sending a family member to work abroad worth the trouble? Why or why not?
Did your family member learn anything while working abroad that they have brought back to the village or taught you?
What was it like for you when your family member left to work abroad?
Why did your family member decide to migrate outside of the village?
When your family member was preparing to leave the household, what challenges did they face? Did they delay their departure?
How long after deciding to migrate did your family member leave the household? For how long were they/have they been abroad?
How often would/do you communicate with your family member abroad? How do you communicate (phone, letters, Facebook, tiktok, other apps, other people, etc.)?
When you communicate with your family member, what do you talk about?
Is your family member abroad responsible for household decisions? If so, what are those decisions?
Does your family member abroad ask you to make difficult decisions? If so, what are some of those decisions?

What are some environmental challenges that you faced in the village in the past? How did you address them?
In the past twenty years, have you noticed any changes to environmental challenges that you face in the village? How did/do you address them? Are there any challenges that you feel you are not prepared to face?
What are some social challenges that you faced in the village in the past? How did you address them?
In the past twenty years, have you noticed any changes to social challenges that you face in the village? How did/do you address them? Are there any challenges that you feel you are not prepared to face?
Are there challenges migrants have faced in the past? How did they address them?
Are there any new challenges that migrants face today? How do they plan to address them?

[Begin Transcript]

Jessie Hughes 00:03
So, can I record this thing?

Interviewee 1 0:05
Hajur, go ahead

Jessie Hughes 00:08
Ok, so I'm going to give my name, please give me your name, and then we will begin. So, my name is Nisha Phagami, Raghuganga Gaupalika ward number 1 tol number five. And your names?

Interviewee 1 00:25
Well, my name is [Name Redacted], Raghuganga Gaupalika, ward number 1 tol number 5 is where I live.

Jessie Hughes 00:42
Excellent, and you Aamaa?

Interviewee 2 00:49
Mine? My name is [Name Redacted], Raghuganga Gaupalika Ward number 1, tol number 5.

Jessie Hughes 01:02
Alright, very good. So, let's begin! So, with this first section, I will be asking about income, livelihoods, and agriculture. So, **what are your household's main sources of earned income?**

Interviewee 1 01:22
Well, it's very difficult for us to earn an income in village. It's like that. We plant millet and corn; we eat a little of it, a little of it goes bad, and we sell the rest. Then we use the money to buy things like oil, salt. Things like salt and oil need to be bought. In the summer season we plant those things, then in this season we plant wheat, barley, potatoes; things that can be sold. This goes into our budget after we eat a little of these things and sell the rest. This makes up the bulk of our budget. And we use it to buy things that we cannot make or grow, like salt and oil.

Jessie Hughes 02:12
Excellent. And you Aamaa? Would you like to add anything?

Interviewee 2 02:18
Ha-ha, no I think that's fine.

Jessie Hughes 02:21
Ha-ha, ok, so **Which crops, livestock, or foraged products are the most important to you, and why?**

Interviewee 1 02:27

Plants? Here, at first the orange tree groves were very good. But now the weather is a little rotten for them. There have been problems with the weather and the oranges in recent years. For us, the millet, corn, and rice has been very good in recent years. Firstly, important is corn, then millet, then lastly rice. After that we also have the potatoes, cauliflower and cabbage; those are also good for us to earn money. The oranges are a little important, as are the bananas. The fruits are important, and we had high hopes for them, but it's been difficult.

Interviewee 2 03:20
You've seen the very old orange tree that we planted here many years ago. That tree is still giving oranges, a lot of them. But the new seedlings we planted are not giving much yield. The weather is bad for them.

Interviewee 1 03:36
Now we have these new fruit plants, like the kiwi. Those have been good. But in this specific spot on the hill the weather is overall not good for fruit. There is a lot of hail in this specific spot compared to other places on the hill. When the hail comes there is nothing, we can do to save our fruit trees.

Jessie Hughes 03:46
So, this place can never be safe?

Interviewee 1 03:51
No, it can't. Because we're so close to the jungle it's also difficult. We spend so much time on our crops.

Interviewee 2 04:06
The first yield came (from the kiwis) and we were really happy. We got two kilos.

Jessie Hughes 04:09
Yeah, I was happy about that too!

Interviewee 1 04:12
But overall, the hail is the worst thing for us here, and it's the worst place on the hill to be.

Interviewee 2 04:18
Yes. Last year some of our corn crop was absolutely destroyed by hail. Only the corn stems remained after that. There are so problems here. It's like that. There is not a lot of hail per say. It comes maybe once a year. But it is heavy when it comes. It actually used to be more. It used to be 4-5 times a year but lighter. Now it's once a year, but very heavy and destructive.

Interviewee 2 04:43
Yes, very destructive, especially for the fruit. Especially in this tol it is difficult with the hail. And we've tried to fix it with (plastic) tunnels to protect against hail and snow, when we are planting vegetables. We also add compost to the fields in winter to try and make our crops a little stronger. In our Nepal we have this to say about it.

Interviewee 1 005:21

Now in places like Pokhara there is lots of good land. They can easily make tunnels and clear land for planting. But up here in the hills it is very difficult. We put tunnels on the little land we have and it doesn't work. It's a big problem.

Jessie Hughes 05:35
I agree. I've read a lot of papers talking about how hard agriculture is here in the hills.

Interviewee 1/2 05:40
Yes, so difficult! There a lot of jungle. The weather is problematic. However, we have the best compost that we can get both from the jungle and the bissee and cows. But in the growing of things there is difficulty. And the rains come and sweep all of that compost away. Takes it to India where they plant their rice on the flat land **laughter** but it's like that. Lots of problems, but it's like that. **laughter**

Jessie Hughes 06:15
laughter yes. So, if you had additional income, what would you do with it?

Interviewee 1 06:22
Sorry, what thing?

Jessie Hughes 06:25
Like, extra money, or income.

Interviewee 2 06:30
Who knows?! Now the both of us are old, we can't do anything with extra money.

Interviewee 1 06:41
Yes, what would we do? We can't do anything with extra money. We might save up for nice things, but right now we can't, because of our income situation. But if we, could we would save up extra money for nice things. But we can't.

Interviewee 2 07:01
Yes, not a lot of income. We grow enough food with our agriculture to eat. We grow, we eat a little, we grow again, and then it's finished. It's difficult for us to budget for things. We don't have official jobs, but we have to budget anyways. Ani, for the farmers it's difficult. And though we grow a lot of vegetables, the markets are far away, the transportation is difficult.

Jessie Hughes 07:43
Would you say that the making of the road has made things a little easier?

Interviewee 2 07:46
Yes, a little easier. But the market is still far away, and transportation is still difficult and expensive

Interviewee 1 07:56

But as much as it's in our power, the people here think that if they make a large yield of things like oranges and kiwis, then companies will come to us to purchase the fruit in bulk and take it from here to the market. So, if we make a lot of yield, it will attract buyers to us. Maybe. But if we don't make a lot of yield that will not happen. So even if we don't sell all of it and there is some waste, we want to grow as much as possible. Buyers do not want to buy only 20 kilos of a fruit.

Jessie Hughes 08:28
Well, maybe in the future you can find some more seedlings for kiwis and increase your yield. Maybe from Beni

Interviewee 1 08:41
Well, we can do that. But kiwis take a few years to produce, and if we buy a lot of them at once we won't have any money left to budget for other things. Right now, we have the two kiwi plants, but they have not given a lot of yield yet. If we had a lot of seedlings, how would we manage them?

Jessie Hughes 09:05
Ha-ha, yeah, well, they will bear kiwis again this year. So, ok, so for feeding your family, this is enough land?

Interviewee 1 09:18
For us? Yes, it is just enough. We have the rice khets below, the land just outside our house, etc. For eating it is enough, but we don't make much actual income. We must buy clothes, and salt, and oil, and soap. To obtain the money for these things with just the land is a little difficult. For eating, it's enough.

Jessie Hughes 9:58
Ok, alright. Ani, so this next section is about labour migrants and your experience. So, these next two questions are about you and your son, and your experiences. So, while your son is working in Japan **What are/were the responsibilities of different household members while your family member was abroad?** And, while you were working in Qatar, sorry Dubai, **what are/were the responsibilities of different household members while your family member was abroad?**

Interviewee 1 10:32
While I was in Dubai? Who did the work in this house? Well, I was gone from 1997, so about 25 years ago. Here at home my three sons were very small. One was ten, one was five, and one was three. About those ages. And I left my wife and family here to work there. And she managed everything. She managed the children, the farming, the bissee, it was a lot of volume for her. We also had a cow then, and she took care of that. In the morning she cut the grass

Jessie Hughes 11:15
How did you do that, Aamaa?

Interviewee 2 11:18
In the morning I'd cut grass, and I'd eat while I was cutting grass, which took about an hour. I'd go to a friends' for khajaa, then go out to work and cut more grass. Once I'd added enough to my dhoko I would return in the

afternoon. Always always I was cutting grass and working. In the evening I would throw it at the bissee and cow, and then I would come home. It was hard!

Interviewee 1 11:57
A lot of problems yes. Back then at first it was very difficult, and the money was very little too.

Interviewee 2 12:04
We didn't even have this house. This house used to be our auntie's; we came from Dagnam *(a village on the other side of the hill)* because his (Interviewee 0.1) maternal home is in Baskot *(a village further down the hill).* We came here and bought this house about 25 years ago. Maybe 26-27 years ago now.

Jessie Hughes 12:25
Ah, so you guys bought this house then?

Interviewee 1 12:29
Yes, while I was working in Dubai, I saved up 1 lakh. At that time my salary was very small. Maybe in one month my salary was 15,000 rupees. Nepali rupees. From now it can be about 25,000 rupees for the same work. Still not a lot. So, I would send about 5,000 rupees back per month for the wife and children, for expenses. It allowed them to buy things like soap, and clothing. For that, the entire month, I sent 5,000 rupees, and I would save 10,000 rupees. I would continuously save 10,000 rupees a month. In this way, after about 4 years I saved…how much total? Well, I know that after 8 years I had saved 5 lakhs. And with that 5 lakh we bought land and this house at that time. It was like that.

Jessie Hughes 13:49
And that was a good development?

Interviewee 1 13:52
Ha-ha, yes it was a good thing to buy this house for the future. And we plant our crops and feed our family like this. It's a good place to stay, overall. But we can't save money with this land.

Interviewee 2 14:18
Yes, so we have this house, but no official jobs, there's a little tension from that, to not be able to earn and save money.

Jessie Hughes 14:29
Ok, I see. So, while you were in Dubai, **did your family member learn anything while working abroad that they have brought back to the village or taught you?**

Interviewee 1 14:38
Well, while the children were little I was gone. And neither of us are educated. We never went to school. We did the same work until we were grown up, and then we married. From then, I went to Dubai, and didn't study or learn very much there either. I just did a lot of work. I was working with ironworks and scaffolding, to make towers. For eight years I did that.

Jessie Hughes 15:14
Well, that's still some new skill or information. So, you learned some scaffolding and construction skills.

Interviewee 1 15:26
Yes, yes, I did the scaffolding and made the towers, 40 or 50 meters high. And I watched a few people fall from that height. How dangerous it was! After doing that much sadness came for me. Sometimes we would work for 24 hours straight, and I made 15,000 rupees a month from that. But after coming back to Nepal, there is no scaffolding work here. So I went back to agricultural work; scaffolding and construction is not available. Maybe there is a little bit of that work available in Kathmandu, but we prefer to do our agriculture and not go there. Now I am an old man, I just want to stay here.

Jessie Hughes 16:15
Yeah, you should stay here

Interviewee 2 16:17
Yes, we're happy to stay here and do our work, now that we are old.

Jessie Hughes 16:28
You know, you said earlier that you would not have much to say but you have said quite a lot so far **laughter** So, while you were working abroad, **how often would/do you communicate with your family member abroad? How do you communicate (phone, letters, Facebook, tiktok, other apps, other people, etc.)?**

Interviewee 1 16:43
Well, there were not a lot of ways to communicate back then. We would write letters, but neither of us could read or write. At the fastest, a letter would take one month to arrive, maybe two or three months sometimes. Our neighbors and friends would read us the letters and then write them for us.

Interviewee 2 17:21
Once my oldest son was old enough, he would read and write the letters for me. I told him what to write and he would write them for me.

Jessie Hughes 17:26
Aww!

Interviewee 1 17:33
Yes, we would do it like that. And then after some time we were able to talk on the phone. So maybe once a month like that. Sometimes once every two or three months.

Jessie Hughes 17:43
Ah I see. So, with your son (in Japan) how many times per week do you talk to him?

Interviewee 1 17:48
With Maila? (Middle son)

Jessie Hughes 17:49
Oh no, with Jetha (eldest son)

Interviewee 1 17:52
Oh, with our oldest son? The one in Japan? With him, we talk to him once a week, maybe once a month. Maila (middle son) talks with him once a week at least, sometimes two to three times per week. Sometimes during the holidays or festivals we talk with him more. But Maila talks with him the most. He calls Maila a lot more than he calls us.

Jessie Hughes 18:15
Ah. So…. hmmm. So how do they talk? Like, on Facebook, or with a normal phone? How do they talk?

Interviewee 1/2 18:27
Oh, probably with both. Sometimes with Facebook, sometimes on the normal phone. I have seen them doing both. Oh, sometimes Maila says "would you like to talk with mom and dad on Facebook" and so then we have a conversation on Facebook like that. Sometimes.

Jessie Hughes 18:55
Ok. So, when you were writing your letters, what did you two talk about? When you communicate with your family member, what do you talk about?

Interviewee 1 19:00
In those first letters back then? Abroad, I would ask in those letters "are you comfortable? How are you? What work have you done? Do you miss me? How are the children? Are they good?" After I said those things, the neighbors would write them. **laughter** And then she would say "Oh it's fine! We're comfortable, the money is fine, I am doing a lot of work, the children are studying," and then she would send me that! **laughter**

Interviewee 2 19:38
This many letters! *(indicates a stack about 8" high)* From that post office (In Rakhu Bhagwati) they would bring them to give to me. A lot!

Jessie Hughes 19:54
I've heard there was a post office in Rakhu. So, you had to go to that post office?

Interviewee 1 19:57
Yes, many years before there was a post office in Rakhu. But today with the phone and with Facebook that post office is finished and closed. It's like that.

Jessie Hughes 20:08
Yes, I guess it's like that!

Interviewee 1/2 20:11
Yes, much has changed from before! A lot of change. Now there is connection, and jeeps that come daily, and electricity, and the phones. Now we have to go to Beni once monthly to pay our electricity bills. But back then

while he was gone, we had to use oil lamps (?) to light things at night. I would have to carry oil from Beni. It was also hard! We had to pay money for oil for the lamps.

(Rumbling sound)

Jessie Hughes 21:32
Oh, has the jeep come? How strange, it's late. So, while your husband was working abroad, **Is your family member abroad responsible for household decisions? If so, what are those decisions?**

Interviewee 2 21:45
Me? Who knows! I managed the agriculture and the farm; I would cut grass for the bissee and the cow. That much. I did it all. No decisions came from him, only goals.

Jessie Hughes 22:01
Ah, so were these decisions hard or not?

Interviewee 1 22:05
They're difficult, yes.

Interviewee 2 22:13
For me overall it's a little difficult to remember but some things come back. My entire life I did similar work, so I made similar decisions. It's like that. Now I'm an old lady, it's hard to remember decisions I made back then.

Jessie Hughes 22:43
Ok, well for you then, while you were working abroad, **are there challenges migrants have faced in the past? How did they address them?**

Interviewee 1 22:50
Problems? They were there. Now there are new problems, for me the language was a huge problem. So, we would go to the market and not know how to buy food. What food was there? Certainly not our own food, we didn't know. We didn't know how to ask. In English it was very difficult. Sometimes we would meet a Hindi speaker. In Arab countries a lot of Hindi is spoken. So, we were able to buy food in Hindi and wander around the market, and make do with Hindi. There was a little bit of English and things were sometimes done in English. Back then I learned some of the language, and after some time I was comfortable there. There were a lot of Hindi friends, and some from the Philippines, and some from Qatar. And so, I learned the languages. But now I've forgotten them all **laughter**

Jessie Hughes 24:02
laughter it's fine! It's like that. So, in your opinion, **are there any new challenges that migrants face today? How do they plan to address them?**

Interviewee 1 24:17
Who knows? Now our son has a comfortable job in Japan, he does some work on the computer even. How is it? The work certainly seems a little less. Certainly, in the last fifteen or sixteen years since I came home the

work has still been difficult, but maybe the challenges are improving. So, who knows? Abroad there is money and here we farm. We have no budget, working abroad a little bit allows us that. We work like that.

Jessie Hughes 24:53
Did he learn the language? Japanese?

Interviewee 2 24:56
Yes, he's learned a little bit of it.

Interviewee 1 24:59
Yes, he spent three months learning the language. And after that there was a job available for him, they gave him one. He passed an exam five years ago and then he went to Japan.

Jessie Hughes 25:15
Ah, I see. Well, this is my last section. And it's about the government and other organizations. So, in this village, **what, if anything, have NGOs or formal institutions helped you with in the past to help you address challenges?**

Interviewee 2 25:41
Well here, the government has done a lot in the last four or five years to improve challenges. But in the past, they did not do very much at all. From the past there has been a lot of change, and the government has done some of that. But I don't know much about these challenges, I know some about agricultural and farming challenges. But about governmental challenges I do not know much. We haven't asked about them. So they go about with their own ideas, daily, and we go about with ours. But overall, it's just about fine.

Jessie Hughes 26:25
How should they improve things? In your opinion? Like, with challenges and problems, how should they address them?

Interviewee 1 26:38
Who knows? The government doesn't ask us how they should improve things. For us there is not an opinion box available. What should the government do? There aren't livelihoods available here, there is a little development, and now we are an old man and lady, maybe they should give us an old person allowance. That would be pretty nice. But for now, the government doesn't really watch the problems, in my opinion. For that is a problem. The road, and the big bridge has been an improvement. But as for the people, the government has not done much for them. It's like that.

Jessie Hughes 27:27
Yes, I suppose it's like that.

Interviewee 2 27:34
Earlier (years earlier) it was like that, there was a small allowance, but no longer.

Jessie Hughes 27:44

Ok, so **Is there anything that the government or NGOs could do to assist migrants as they go about finding work and livelihoods?**

Interviewee 2 27:54
People working abroad?

Jessie Hughes 27:55
Ah, yes

Interviewee 1 27:57
Well, the government doesn't currently help people who are working abroad. They go, they finish their work, they return. If they want to go, they have to pay a little to the government, and then they can go again. After they come back and can't find work they go again. Malia did this, and now wants to go again. But they must pay a lot of money just to go.

Jessie Hughes 28:45
Well, that was my last question. But I had another question that popped into my head while I was talking to you. How were things during the war? Because you said that you left in 1997. But the Civil War was from 1996-2006. So how was that here? Did problems come?

Interviewee 1 29:10
Yeah, some problems came here, but not a lot. The army came, and a few problems also came. The army came and asked us questions. For us small people there were a few problems.

Jessie Hughes 29:53
My friend who lived in Mauphat (village on the other side of the hill) said that there were many problems in that village. But for you here it was not bad. That is good to hear.

Interviewee 1 29;56
Yes, here in Begkhola there were very few problems. One or two people went off causing trouble, but overall, it was fine.

Interviewee 2 30:17
Yes, some people came and tried to ask for money, but other than that it was fine.

Interviewee 1 30:26
Yup! All good!

Jessie Hughes 20:30
Alright! Well, just like that we're finished. Thank you so much for your time. I really appreciate it! Look, 30 minutes! We talked a lot and it was good, don't worry about that.

[End Transcript]

D. COLLECTED SOIL SAMPLES: ANALYSIS REPORT

Regd. No.: 1898/527/241/050/51
VAT No.: 500189115

AGRICULTURAL TECHNOLOGY CENTRE (ATC)
Kupondole, Lalitpur, Nepal
Tel. No. : 01-5425956
E-mail: agritech1993@gmail.com

Soil Sample Analysis Report

Report No.	78-R-76	**Sample Received Date**	2078/10/04
Entry No.	78089	**Date Completed**	2078/10/18
Client	Jessie Hughes	**Sampled By**	Client
Contact No.			

S.N.	Sample Code	Sample Identification	pH (अमलीपन)	N % (नाइट्रोजन)	P_2O_5 ppm (फस्फोरस)	K_2O ppm (पोटासियम)	O.C % (कार्बन)
1	078/1211	Durga Bahadur Phagami	6.67	0.37	103.28	160.8	4.35
2	078/1212	Durga Bahadur Phagami	6.72	0.33	102.34	221.3	3.84
3	078/1213	Durga Bahadur Phagami	6.51	0.37	148.82	160.8	4.27
4	078/1214	Tara Debi Garbuja	6.44	0.54	281.20	107.2	6.23
5	078/1215	Bishnu Mati Pun	6.21	0.35	202.80	261.3	4.08
6	078/1216	Keema Devi Chochangi	6.83	0.50	196.23	402.0	5.80
7	078/1217	Tika Purja	6.35	0.25	141.31	221.1	2.94
8	078/1218	Sushila Phagami	6.27	0.40	145.06	207.7	4.63
9	078/1219	Rasmi Pun	6.78	0.38	201.40	294.8	4.47
10	078/1220	Tulbhasaa Phagami	7.21	0.40	334.25	321.6	1.72
11	078/1221	Mankumari Garbuja	6.28	0.43	142.24	120.6	4.98
12	078/1222	Ha Maya Purja	7.13	0.28	147.41	147.4	3.10
13	078/1223	Yam Tilija	7.31	0.43	290.59	348.4	5.06
14	078/1224	Isaara Phagami	6.28	0.32	105.63	154.1	3.76
15	078/1225	Ta Maya Garbuja	7.02	0.78	233.32	294.8	9.09
16	078/1226	Dal Prasad Tilija	7.34	0.72	314.07	710.2	8.39
17	078/1227	Dal Prasad Tilija	7.21	0.54	314.53	268.0	6.23
18	078/1228	Bhim Bahadur Pun	6.17	0.55	242.71	234.5	6.35
19	078/1229	Karishma Garbuja	7.23	0.43	206.56	435.5	4.98
20	078/1230		5.79	0.50	56.80	241.2	5.76
21	078/1231		5.79	0.22	47.88	73.7	2.57

Parameter	Low	Medium	High
नाइट्रोजन N (Hill)	<0.1	0.1-0.3	>0.3
नाइट्रोजन N (Terai)	<0.075	0.075-0.15	>0.15
फस्फोरस P_2O_5	<31	31-55	>55
पोटासियम K_2O	<110	110-280	>280
कार्बन OM	<2.5	2.5-5.0	>5

Note:

1. *The issued report refers only to the sample received and tested.*
2. *This is neither to be reproduced wholly or partially and nor can be used as an evidence in the court of Law.*
3. *Samples will be kept stored for a month only.*

Regd. No.: 1898/527/241/050/51
VAT No.: 500189115

AGRICULTURAL TECHNOLOGY CENTRE (ATC)

Kupondole, Lalitpur, Nepal
Tel. No. : 01-5425956
E-mail: agritech1993@gmail.com

S.N.	Sample Code	Sample Identification	pH	N %	P_2O_5 ppm	K_2O ppm	O.C %
22	078/1232		5.64	0.48	40.37	107.2	5.60
23	078/1233		5.62	0.39	32.86	73.7	4.59
24	078/1234		6.05	0.38	43.66	154.1	4.39
25	078/1235		5.16	0.32	63.85	113.9	3.72
26	078/1236		6.50	1.55	51.64	395.3	18.03

Test Methods

- ***Total Nitrogen**: Kjeldahl Digestion Distillation Method*
- ***Available Phosphorus**: Modified Olsen's Bicarbonate Method*
- ***Available Potassium**: Ammonium Acetate (Flame Photometric Method)*
- ***Soil pH**: Potentiometric (1:2.5) Method*
- ***Soil Organic Carbon**: Walkley and Black Method*

Checked By
Date:2078/10/19

Agricultural Technology Center Lalitpur Nepal 1993

Soil Specialist
Date:2078/10/19

Parameter	Low	Medium	High
N (Hill)	<0.1	0.1-0.3	>0.3
N (Terai)	<0.075	0.075-0.15	>0.15
P_2O_5	<31	31-55	>55
K_2O	<110	110-280	>280
OM	<2.5	2.5-5.0	>5

Note:

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E. FIELD OBSERVATION DATA

Tag #	HOH Name	HOH Gender	Tol #Name	Coordinates	Past: Anyone abroad?	2018 Anyone abroad?	2018 Family Professions	2022 Anyone abroad?	2022 Family Professions	# in Family	Garden?	Trees or AgFo?	Livestock?	# in Household	Kids?	Under 5?	Under 2?
4	Naru Garbuja	Female	5 - Lower Bega	28.4393, 83.5811	Yes (army)	No	Farmer	No	Farmer, carpentry	5	No	No	Chickens	2	Yes	No	No
6	Tilija	Unknown	2 - Deurali	28.44272222, 83.57633333	No	No	Farmer	No	Farmer	4	No	No	Cows, Chickens	2	No	No	No
10	Simahari Garbuja	Female	5 - Lower Bega	28.43578889, 83.58409722	Yes	No	Farmer	Yes	Farmer, migrant	4	No	No	Cows, Chickens, Cats	2	Yes	No	No
11	Ma Bahadur Simkila	Male	5 - Lower Bega	28.43651667, 83.58386667	No	No	Farmer	Yes	Farmer, migrant	5	No	No	Chickens, Cats, Rabbits	5	Yes	Yes	No
14	Kumari Singali	Male	5 - Lower Bega	28.43647778, 83.58342500	No	No	Farmer	Yes	Farmer, migrant	5	Yes	No	Cows, Chickens, Cats	4	Yes	No	No
16	Syam Purja(Kumari Purja	Male	5 - Lower Bega	28.43267500, 83.58864722	No	No	Farmer	No	Farmer	3	Yes	No	Cows, Cats	2	Yes	No	No
17	Gaunda Maya Garbuja	Female	5 - Lower Bega	28.43453333, 83.58720556	No	No	Farmer	No	Farmer	6	No	No	Chickens	3	Yes	No	No
18	Deumati BK	Female	4 - Upper Bega	28.438897, 83.579946	Yes	No	Farmer	Yes	Farmer, migrant	5	Yes	No	Cows, Chickens, Cats	5	Yes	Yes	Yes
25	Ka Bahadur Phagami	Male	2 - Deurali	28.44014 8, 83.576282	Yes (army)	No	Farmer	Yes	Farmer, migrant	6	No	No	Goats, Cows, Chickens, Bees	4	Yes	No	
26	TaBahadur Pun	Male	2 - Deurali	28.440653, 83.576787	No	No	Farmer	No	Farmer	4	No	No	Cats	4	Yes	No	
28	Til Chandra Singali	Male	4 - Upper Bega	28.43928889, 83.58050833	Yes	No	Farmer	Yes	Farmer, day laborer	4	No	No	Chickens, Cats	4	Yes	Yes	No
30	Thapa	Male	2 - Deurali	28.44211944, 83.57706111	No	No	Farmer	No	Farmer	2	No	No	Cows, Chickens	2	Yes	No	
41	Tulbhasaa Phagami	Male	1 - Baskot	28.450612, 83.579201	Yes	No	Farmer	Yes	Farmer, migrant	5	No	No	Cows, Chickens	3			
42	Adakshyako pupu	Female	1 - Baskot	28.45058056, 83.57931944	No	No	Farmer	No	Farmer	1	No	No		1			
43	DhaanKumars Brother	Male	1 - Baskot	28.45054167, 83.57940833	No	No	Farmer	Yes	Farmer, Migrant	4	Yes	No	Cows, Chickens	2			
56	Suman Garbuja	Male	5 - Lower Bega	28.439535, 83.581102	Yes	No	farmer	Yes	Farmer, migrant	5	No	No	Chickens, Cats	4			
57	Unknown Dalit	Male	4 - Upper Bega	28.439288, 83.579089	Yes	No	farmer	Yes	farmer, migrant	8	No	No	Goats, Chickens	8			
60	Garbuja	Male	4 - Upper Bega	28.438605, 83.579019	No	No	Farmer	No	Farmer	4	Yes	No	Chickens, Cats	4			
62	Purja?	Male	2 - Deurali	28.441634, 83.576266	No	No	Farmer	No	Farmer	4	No	No	Cows, Chickens	4			
66	Silkumari Garbuja	Female	5 - Lower Bega	28.43618 4, 83.58481 8	No	No	farmer	No	farmer	3	Yes	No	Cows, Chickens, Cats	2			
67	Dudchha Tilija	Male	2 - Deurali	28.442874, 83.576397	No	No	farmer	No	farmer	5	No	No	Goats, Chickens	6			
71	Garbuja	Male	2 - Deurali	28.441201, 83.577608	No	No	farmer	No	farmer	4	Yes	No	Cows, Chickens	4			
1	Mankumari Garbuja	Female	5 - Lower Bega	28.43898, 83.58104	Yes (army)	No	Farmer	Yes (army)	Farmer,	9	No	Yes	Cows, Chickens	4	Yes	No	No
27	Durga Garbuja	Female	5 - Lower Bega	28.438844, 83.580895	No	No	Farmer	Yes	Farmer, migrant	5	Yes	Yes	Cows, Chickens	2	Yes	No	
33	Sushmita Garbuja	Female	4 - Upper Bega	28.43922, 83.58046	Yes	No	Farmer	Yes	Farmer, migrant	5	Yes	Yes	Cows, Chickens	5			
39	Uman Garbuja	Male	1 - Baskot	28.452287, 83.578367	Yes	No	Farmer	Yes	Farmer, migrant	8	No	Yes	Cows, Chickens, Cats	8			
48	Ka Maya Garbuja	Female	7 - Banduk	28.44343, 83.59662	No	No	farmer	Yes	Farmer, migrant	8	Yes	Yes	Goats, Cows, Chickens	8			
54	Gripara Tilija	Male	5 - Lower Bega	28.439729, 83.581009	No	No	farmer	No	farmer	3	Yes	Yes	Goats, Chickens	3			
69	Jit Bahadur Pun	Male	2 - Deurali	28.441458, 83.577613	No	No	farmer	Yes	farmer, migrant, forester	4	Yes	Yes	Cows, Chickens	4			
70	Jabir Purja	Male	2 - Deurali	28.441111, 83.577517	Yes (army)	No	farmer	Yes	farmer, migrant, egg farmer	1	No	Yes	Chickens	1			
72	Nabina Garbuja	Male	2 - Deurali	28.441914, 83.574703	No	No	farmer	Yes	farmer, health post worker	5	No	Yes	Cows, Chickens	5			
21	Puspa Garbuja	Male	2 - Deurali	28.441368, 83.576032	Yes	No	Farmer	Yes	Farmer, migrant	4	No	Yes	Chickens, Cats	4	Yes	Yes	
61	Samaya Rujal	Male	2 - Deurali	28.443363, 83.574415	Yes	No	Farmer,	Yes	Farmer	6	No	No	Cows, Chickens	6			
32	Bil Bahadur Phagami	Male	4 - Upper Bega	28.43921, 83.58057	No	No	Farmer, government	Yes	Farmer, government, migrant	6	No	Yes	Chickens	5			
29	Laxmi Phagami	Male	5 - Lower Bega	28°.43963, 83.58081	Yes	No	Farmer, migrant	Yes	Farmer, migrant, nutrition assistant	4	No	Yes	Chickens, Cats	4	Yes	Yes	No
20	Tika Purja	Female	2 - Deurali	28.441335, 83.575765	Yes	No	Farmer, teacher	Yes	Farmer, teacher, migrant	4	No	Yes		4	No		
2	Myrcella Tilija	Female	3 - Sihm	28.43845556, 83.57530000	No	No	None	No	None	3	No	No		3	No	No	No
5	Bajai(?) Garbuja	Male	2 - Deurali	28.44223056, 83.57795556	No	No	Retired	No	Retired	8	Yes	No	Cows	8	Yes	Yes	Yes
31	ChauMaya	Female	2 - Deurali	28.44098333, 83.57697500	Yes	No	Retired	No	Retired	3	No	No	Chickens	2	Yes	No	
8	Romis BK	Male	2 - Deurali	28.43924444, 83.57952778	Yes	No	Shopkeeper	No	Shopkeeper, farmer	5	No	Yes	Chickens	4	Yes	Yes	Yes
47	Mankumari Garbuja	Male	2 - Deurali	28.44129167, 83.57493611	No	No	Teacher, farmer	No	Teacher, farmer	4	No	Yes	Cows	4			
13	Chandra Purja	Male	4 - Upper Bega	28.43951111, 83.58046111	No	Yes	Farmer	Yes	Farmer, office work	3	Yes	No	Chickens, Cats	2	Yes	Yes	No
52	Tilija	Male	5 - Lower Bega	28.43951, 83.580973	No	Yes	farmer	Yes	farmer	5	No	No	Chickens	4			
63	Ta Maya Garbuja	Female	4 - Upper Bega	28.439286, 83.580368	Yes (army)	Yes (army)	Farmer	Yes (army)	Farmer	8	No	No	Cows, Chickens	4			
68	Kusum Phagami	Female	2 - Deurali	28.442571, 83.576066	Yes	Yes	farmer	No	farmer, fish farmer	4	Yes	No	Goats, Chickens	3			
3	Debi Garbuja	Female	3 - Sihm	28.43536389, 83.57723889	Yes	Yes	Farmer	Yes	Farmer	4	No	Yes	Chickens	4	No	No	No
49	Ha Maya Purja	Female	5 - Lower Bega	28.439324, 83.581191	Yes (army)	Yes	Farmer	Yes	Farmer	4	No	Yes	Cows, Chickens	2			
19	Gau Maya Sayamatri	Female	4 - Upper Bega	28.439026, 83.580158	Yes	Yes	Farmer, migrant	Yes	Farmer, migrant	10	Yes	No	Chickens	4	Yes	Yes	SOON
35	Deepa Phagami	Female	4 - Upper Bega	28.43858333, 83.57930556	Yes	Yes	Farmer, migrant	Yes	Farmer, migrant	3	Yes	No	Cows, Chickens, Cats	2			
40	Monmani Chicanji	Female	1 - Baskot	28.451848, 83.578688	No	Yes	Farmer, migrant	No	Farmer	4	Yes	No	Goats, Chickens, Cats	2			
44	Darbita Pun	Female	1 - Baskot	28.44902778, 83.57483889	Yes	Yes	Farmer, migrant	Yes	Farmer, migrant	4	Yes	No	Cows, Chickens, Cats	3			
53	Khusi Garbuja	Female	5 - Lower Bega	28.43912 7, 83.580406	No	Yes	farmer, migrant	Yes	farmer, migrant	4	No	No	Chickens, Cats	3			
12	Kumari Thapa	Female	5 - Lower Bega	28.43930278, 83.57991111	No	Yes	Farmer, migrant	Yes	Farmer, migrant	5	No	Yes	Chickens, Cats	4	Yes	Yes	Yes
34	Kumari Garbuja	Female	3 - Sihm	28.43638611, 83.57399444	No	Yes	Farmer, migrant	No	Farmer	2	No	Yes	Goats, Chickens, Dogs	1			
37	Mona Manaj	Female	1 - Baskot	28.45219 3, 83.576303	Yes (army)	Yes	Farmer, migrant	Yes	Farmer, migrant, agfo	3	No	Yes	Cows, Chickens, Cats	2			
38	MonMaya Garbuja, Binum (	Male	1 - Baskot	28.451565, 83.578268	No	Yes	Farmer, migrant	Yes	Farmer, migrant	5	Yes	Yes	Goats, Cows, Chickens	3			
45	NauMaya Pun	Female	2 - Deurali	28.44164722, 83.57763889	Yes (army)	Yes	Farmer, migrant	Yes	Farmer, migrant	3	No	Yes	Cows, Chickens	2			
46	Lok Bahadur Phagami	Male	2 - Deurali	28.44201944, 83.57626667	Yes	Yes	Farmer, migrant	Yes	Farmer, migrant, agfo (orchards)	5	No	Yes	Cows, Chickens	4			
51	Yam Tilija	Male	5 - Lower Bega	28.439713, 83.581379	Yes	Yes (army)	farmer, migrant	Yes	farmer, migrant	5	Yes	Yes	Cows, Chickens, Cats	3			
59	Isara Phagami	Female	3 - Sihm	28.43491389, 83.57763333	Yes (army)	Yes	farmer, migrant	Yes	farmer, migrant	6	Yes	Yes	Cows, Chickens, Cats	5			
64	Mankumari Garbuja	Female	4 - Upper Bega	28.439314, 83.580043	No	Yes	farmer, migrant	Yes	farmer, migrant, agfo (orchards)	4	No	Yes	Cows, Chickens, Cats	3			
65	Parbati Tilija	Female	2 - Deurali	28.44342, 83.576962	No	Yes	farmer, migrant	Yes	farmer, migrant	4	No	Yes	Cows, Chickens	3			
24	TakMaya Garbuja	Female	3 - Sihm	28.43772 9, 83.574848	No	Yes	Farmer, migrant	Yes	Farmer, migrant	4	No	No	Cows, Chickens	3	Yes	Yes	No
22	Yemuna Garbuja	Female	3 - Sihm	28.435509, 83.574381	Yes	Yes	Farmer, migrant	Yes	Farmer, migrant	7	Yes	Yes	Cows, Chickens, Cats	4	Yes	No	
23	Sushila Phagami	Female	1 - Baskot	28.451051, 83.578831	Yes	Yes	Farmer, migrant	Yes	Farmer, migrant	4	No	Yes	Cows, Chickens, Cats, Bees	3	Yes	No	
15	Kima Debi Chochangi	Female	5 - Lower Bega	28.439015, 83.580915	Yes (army)	Yes (army)	Farmer, migrant (army)	Yes	Farmer, migrant (army)	3	No	Yes	Cows, Chickens	1	Yes	No	No
36	Bil Bahadur Thajali	Male	1 - Baskot	28.452992, 83.576476	No	Yes	Farmer, migrant, governmen	Yes	Farmer, migrant, government	7	Yes	No	Goats, Chickens, Dogs	2			
9	Bishnu Mati Pun	Male	2 - Deurali	28.44153611, 83.57749167	Yes (army)	Yes	Farmer, migrant, teacher	Yes	farmer, businessman, teacher	8	Yes	Yes	Cows, Chickens, Cats	4	Yes	No	No
7	Tara Debi Garbuja	Female	2 - Deurali	28.44155833, 83.57648611	Yes (army)	Yes (army)	Farmer, teacher, migrant	Yes (army)	Farmer, teacher, migrant, shopkeeper	4	Yes	Yes	Cows, Chickens	5	Yes	No	No
50	Sita Phagami	Female	5 - Lower Bega	28.439385, 83.581076	No	Yes	Government, farmer	Yes	Government, farmer	5	No	No	Chickens	4			
47	Ta Maya Serpujaa	Male	7 - Banduk	28.44218, 83.59647	No	Yes	Shopkeeper	Yes	Shopkeeper, migrant	5	No	No	Cows, Chickens	3			
								~20 person increase from 2018									

Tag #	HOH Name	Additional notes
4	Naru Garbuja	All of her kids live and work in Kathmandu and are college educated. Hom Garbuja is a science teacher at the school and also has a thriving fruit orchard. Does carpenter work. Very hard working and connected couple.
6	Tilija	Go back for more info later.
10	Simahari Garbuja	Simahari(last name unknown). Lives here with her daughter. Doesn't know where her husband is. Took one of our kittens
11	Ma Bahadur Simkila	They mostly grow corn beans and rice but also have these cool flower peppers
14	Kumari Singali	Kumari Singali, her husband(makes baskets), younger son and older daughter
16	Syam Purja(Kumari Purja	The family is Christian and very nice. One son who goes to school in Dhaulagiri Tatopani. Large diversity of plants and very willing to learn and teach new things.
17	Gaunda Maya Garbuja	Didi comes from a village above Tatopani. They have two daughters and a son.
18	Deumati BK	Dipa Sayamatri. Lives here with her three children and husband. Makes bags in her free time.
25	Ka Bahadur Phagami	
26	TaBahadur Pun	
28	Til Chandra Singali	Dai is a laborer. Two little girls and the mom plays volleyball. Sapansa and Subinaa(oldest)
30	Thapa	Kumari Thapa's pusai and pupu. They own a mill and have some bisee
41	Tulbhasaa Phagami	Your Tol 1 Adakshyas house
42	Adakshyako pupu	
43	DhaanKumars Brother	That guy that owns land on the other side of the ravine. His brother is DhaanKumar
56	Suman Garbuja	This lady appears to be pretty wealthy. But her husband got bit by a snake and her son broke his arm recently, so a string of bad luck aayo
57	Unknown Dalit	Yu Maya and Rakkaa live here. The girls you play volleyball with. They have three children under the age of five between them and work as tailors
60	Garbuja	A little girl and her family lives here. There are three of them total and an aamaa. Lots of chickens and the typical crop rotations.
62	Purja?	I think the guy that is in the mothers group lives here. He is a Purja. One daughter school age and a wife
66	Silkumari Garbuja	Silkumari Didi. Has an accomplished vegetable garden and just remarried. Has a daughter in Pokhara.
67	Dudchha Tilija	This building has writing all over it and I should go back to it. Dudcha Tilija. 4 women in this house. 2 husbands bideshi. Chickens and goats
71	Garbuja	Has a young daughter and is in the mothers group
1	Mankumari Garbuja	Mankumari didi, her husband, and their parents. They have five children, 3 daughters 2 sons. I think all three daughters live in village somewhere. 2 sons in Pokhara.
27	Durga Garbuja	Their grandchildren are here to visit and they live a pretty posh existence compared to a lot of people in village
33	Sushmita Garbuja	Sushmita Garbuja. FCHV. Lives here with husband and three children, youngest is 9, oldest is studying in Pokhara and is 18. Dying tomato greenhouse and various other vegetables in garden
39	Uman Garbuja	Uman Garbuja has two little girls one under the age of five. Their names also start with "u". Husband is bideshi
48	Ka Maya Garbuja	Ka Maya Garbuja. FCHV, many people in this house. Garden and goats and stuff
54	Gripara Tilija	Gripara Tilija. Has some goats and a daughter and wife who usually watch them.
69	Jit Bahadur Pun	Jit Bahadur Pun. Lives here with wife and two younger children. Gao Maya Pun lives here
70	Jabir Purja	Jabir Purja. I think he's a bachelor
72	Nabina Garbuja	Nabina Garbuja lives here. She has three older brothers.
21	Puspa Garbuja	Puspa Garbuja and her daughter and husband. FCHV
61	Samaya Rujal	Samaya Rujal has a matching scar on her arm. This family has a couple small children and I think they're Dalits. Babbaa is a shoe fixer but they have the typical farm setup
32	Bil Bahadur Phagami	Bil is the ward chairman
29	Laxmi Phagami	Laxmi does soil conservation work and her husband owns the shop. Their son swayam and his mother live with them.
20	Tika Purja	Tika is a teacher at the sihm school. She lives here with 4 other women
2	Mycella Tilija	Stopped to talk to a older woman named mycella and her daughter(I think). Mycella was nice but I couldn't understand her, and her daughter ignored me.
5	Bajai(?) Garbuja	Sarcerai Garbuja lives here with 7 other people. The family owns a pasal that her buwaari runs and in the back they have the remains of the old Japanese reforestation project. They also own two kiwi vines, and she has a small daughter of 5 months
31	ChauMaya	Chaumaya is the woman with the bad finger that you took to the health post. Her daughter is one of the Paachan.
8	Romis BK	They're shopkeepers with a little girl under 5, another in school in Beni.
47	Mankumari Garbuja	Mankumari Garbuja and her husband are teachers at the school, but they have a bisee and kiwi and lots of vegetables. Two children, a girl in year 4 and a boy in year 7(I think).
13	Chandra Purja	Chandra works in the govt. office and has a little girl under age 5
52	Tilija	Miss Tilija. Has a shop and lives here with her two granddaughters and husband. Son is bideshi. Also farms
63	Ta Maya Garbuja	Ta Maya Phagami. Mothers group member Tol 4. Two daughters and three grandchildren, 2 in this house.
68	Kusum Phagami	Kusum Phagami. Has a small daughter and works at the school. Husband is bideshi
3	Debi Garbuja	Debi's husband works in Pokhara(speaks English) and she lives here with her parents. She is your bajini's aunt and Kesun also lives with her
49	Ha Maya Purja	Hamaya Purja and Sanji Purja(daughter), her husband is bideshi, she practices good composting and has a son in Beni
19	Gau Maya Sayamatri	Gau Maya Sayamatri and Dhaankumari Sayamatri. Lives here with DK's daughter and GM's granddaughter. Only 4 people in house but collectively 12 people in family. GM's daughter and son are abroad(in Japan and Qatar), and DM's son is in Saudi Arabia. Both their husbands are dead.
35	Deepa Phagami	Prakriti and her aunt live here with her aunts 10 month old baby. Her husband is in Dubai
40	Monmani Chicanji	
44	Darbita Pun	Darbita Pun with one son and mother. Husband is in Saudi
53	Khusi Garbuja	Khusi Garbuja, her mother and two older siblings live her. Husband is bideshi.
12	Kumari Thapa	Kumari and her three children live here. The house is messy and it seems like no one helps her. She is Christian.
34	Kumari Garbuja	
37	Mona Manaj	Mona Manaj and one small baby
38	MonMaya Garbuja, Binum (	MonMaya Garbuja, her husband and one son. Other two sons are in Pokhara. Her one remaining son is the Tol 1 Adakshya
45	NauMaya Pun	NauMaya Pun lives here with her daughter in a fairly large house. There are chickens and ghoru and her husband is bideshi
46	Lok Bahadur Phagami	Lok Bahadur Phagami and his wife. Mingma Phagami lives here with her baby son Liam. The family has a corn thresher and is fairly well off. Husband is in Dubai
51	Yam Tilija	Yam Tilija. Has three daughters, two are married one still in school. Has bisee, 110 orange trees, and grows various crops. His other two daughters are bideshi but visit on occasion
59	Isara Phagami	Isara Phagami. Tol 3 Mothers Group Leader, lives here with buwaari and three children. 2 of them around age 5. Husband is bideshi. Does scaffolding work in Qatar
64	Mankumari Garbuja	Mankumari Garbuja. Has a son and a daughter. Husband is bideshi. Chickens and bisee.
65	Parbati Tilija	Parbati Tilija. An older mother and son live with her. She has orange trees, composting and presumably bisee.
24	TakMaya Garbuja	TakMaya Garbuja and two sons. Husband in Malaysia
22	Yemuna Garbuja	Yemuna Garbuja, her 4 children and PuPu. Husband is in Kuwait. FCHV
23	Sushila Phagami	Sushila Phagami: has two daughters, her husband is in Kuwait. FCHV
15	Kima Debi Chochangi	Keema Chopagain. FCHV. Has three children including a daughter(Anita) and granddaughter(Yuna) under age 5.
36	Bil Bahadur Thajali	Bil Bahadur Thajali. Three daughters and two sons. Both sons in Qatar. One daughter is Lila Pun and works at the coop. The other is in Sihm and one is in another ward
9	Bishnu Mati Pun	Six children total, multiple grandchildren, two of their children work at the school. Bishnu is a mother's group member
7	Tara Debi Garbuja	Thada Debi Garbuja also lives here. Durga's husband works abroad in the UK
50	Sita Phagami	Sita Phagami. Is unmarried but lives here with her sister and her one year old nephew. Her sister farms and she works in the gaunpalikas. Sisters husband is bideshi
47	Ta Maya Serpujaa	Ta Maya Serpujaa. FCHV. Two daughters and a son(in Singapore as a policeman). Bisee and chickens