

**DOZER AND DEVELOPMENT IN PANCHTHAR DISTRICT,
NEPAL**



**A Thesis Submitted to the
APF Command and Staff College
Faculty of Humanities and Social Sciences, Tribhuvan University
In Partial Fulfillment of Master Degree in
Security, Development and Peace Studies**

**Submitted by
Krishna Dhakal
Sixth Batch (2077-2079)
Roll No. 4004
TU Registration No.: 12908-95
APF Command and Staff College
Sanogaucharan, Kathmandu, Nepal**

September 2022

**DOZER AND DEVELOPMENT IN PANCHTHAR DISTRICT,
NEPAL**

**A Thesis Submitted to the
APF Command and Staff College
Faculty of Humanities and Social Sciences, Tribhuvan University
In Partial Fulfillment of Master Degree in
Security, Development and Peace Studies**

**Submitted by
Krishna Dhakal
Sixth Batch (2077-2079)
Roll No. 4004
TU Registration No.: 12908-95
APF Command and Staff College
Sanogaucharan, Kathmandu, Nepal**

September 2022

DECLARATION

I, hereby declare that the subject matter of this thesis entitled **Dozer and Development in Panchthar District, Nepal** submitted to the Armed Police Force Command and Staff College, is entirely my original work prepared under the guidance and supervision of Dr. Naresh Rimal. I have duly acknowledged all the sources used by me in course of preparing this research paper. The result of this research has not been presented or submitted anywhere else for the award of any degree or for any other purposes. I assure that no part of the content of this thesis has been published in any form before. I shall be solely responsible if any evidence is found against my research.

Signature:

Name: Krishna Dhakal

6th APF Command and Staff Course

Date: September 5, 2022

LETTER OF RECOMMENDATION

I certify that this thesis entitled **Dozer and Development in Panchthar District, Nepal** was prepared by Krishna Dhakal under my supervision. The research has fulfilled the criteria prescribed by the Department of Humanities and Social Science, Tribhuvan University. I hereby recommend the thesis for the final evaluation and approval.

.....

Dr. Naresh Rimal

Supervisor

September 5, 2022



Government of Nepal
Ministry of Home Affairs
APF Command and Staff College

Ph.No . :4413159-01

Fax No . :4414129-01

paacademic2015@gmail.com

Academic Section
Sanogaucharan,
Kathmandu

Ref. No. (

Date-

LETTER OF APPROVAL

This thesis Entitled **Dozer and Development in Panchthar District, Nepal** submitted by Krishna Dhakal has been accepted in partial fulfillment of the requirement for Master's Degree in Security, Development and Peace Studies.

EVALUATION COMMITTEE

.....

Supervisor: Dr. Naresh Rimal

Date: September 5, 2022

.....

External Examiner: Prof. Dr. Kushum Shakya

Date: September 5, 2022

.....

External Examiner: Prof. Dr. Sohan Kumar Karna

Date: September 5, 2022

.....

Internal Examiner: SP Lakesh Kumar Tumbahangphe

Date: September 5, 2022

ACKNOWLEDGEMENT

I would like to express my gratitude to my supervisor, Dr. Naresh Rimal for his guidance, cooperation, encouragement, and feedback throughout the course of preparing this thesis. Similarly, I sincerely thank Prof. Dr. Ramesh Raj Kunwar for his valuable inputs and continuous support in preparing this thesis. A special thank goes to my friend DSP Dipak Raj Baral who was an important part of my field visit and data collection and Keshar Thakuri who provided with technical support. I would also like to thank my spouse Sangita Subedi for her moral support and cooperation in times of need. My children Saanvi Dhakal and Subhaya Sagar Dhakal also deserve a note of thanks as they were always there to cheer me up from the stress of thesis preparation.

An integral part of the thesis were all the participants and respondents who contributed their valuable time and shared their knowledge and experience, so I express my high level of appreciations to them which they deserve.

Finally, I acknowledge the commandant of APF command and Staff College, academic head, directing staffs, all faculty members, other officers, library management, and administration team for their cooperation during the preparation of this thesis.

ABSTRACT

Globally, infrastructure development such as road connectivity is one of the indicators of development. After the 1990s, Nepal's road construction to connect rural areas to urban centers became the major developmental intervention. Such practice continues to effect throughout the Panchthar District after the formation of three tiered governments culminated of the regime change of 2006 after the decade long Maoist insurgency. Panchthar District is known for access road construction compared to other districts in the country. The present research attempts to understand road construction phenomenon via qualitative study approach following the thematic analysis. Although road construction in the district have contributed positively to livelihood outcomes by addressing five basic needs such as food, shelter, education, health, and employment. Alternatively, poorly designed and constructed roads put lives and properties at risk. The study revealed poor access roads are the leading cause of the social capital loss, recurrence of disasters and also the migration. Family tragedies because of deaths are added psychological impact in the community. The study suggests, ecological impact can be addressed through compliance measures required by the national laws and avoiding, minimizing and mitigation measures towards negative consequences such as by following environmental and social safeguard measures. For such measures to be effective community awareness and capacity building is quintessential to balance the needs and wants of the people aspiring for sustainable community development for now and to the future.

Keywords: Connectivity, poorly designed, disasters, impact, compliance

TABLE OF CONTENTS

Title Page	i
Declaration	ii
Letter of Recommendation	iii
Letter of Approval	iv
Acknowledgement	v
Abstract	vi
Table of Contents	vii
List of Tables	ix
List of Figures	x
Abbreviations and Acronyms	xi
Chapter One: Introduction	1
1.1 Background	1
1.1.1 Dozerization	2
1.1.2 Development	2
1.1.3 Sustainable Development	3
1.1.4 Dozer Development	4
1.2 Statement of the Problem	5
1.3 Objective of the Study	6
1.4 Significance of the Study	6
1.5 Limitations of the Study	6
1.6 Area of the Study	7
1.7 Organization of the Chapters	10
Chapter Two: Review of the Literature	12
2.1 Road Construction Status	13
2.1.1 Pattern	14
2.1.2 Polices	15
2.1.3 Economic Engineering	16
2.2 Road Construction and Sustainability	17
2.2.1 Dozer Development and Road Accessibility	19
2.2.2 Socio-Economic Impacts	19
2.2.3 Cost-Benefit Analysis of Dozerization	21

2.3	Disaster and Security Concerns	22
2.4	Summary of Chapter Two and Research Gap	23
	Chapter Three: Research Methodology	24
3.1	Background	24
3.2	Source of Data	24
3.3	Selection of Participants	25
3.4	Method of Data Analysis	25
3.5	Ethical Consideration	25
	Chapter Four: Findings and Discussions	26
4.1	Background	26
	4.1.1 Ethnicity and Structure of Society	26
	4.1.2 Economic Activities	27
4.2	Status of Road Construction in Panchthar District	28
4.3	Impacts of Dozerization on Development Sustainability	31
	4.3.1 Ecology and Habitats	32
	4.3.2 Socio Cultural Impacts	34
	4.3.3 Economic Impacts	37
	4.3.4 Environmental Impacts	38
4.4	Security and Disaster Management Concerns	39
4.5	Thematic Summaries of Corresponding Interview Narratives	45
	Chapter Five: Summary and Conclusion	47
5.1	Summary	47
	5.1.1 Panchthar District at Glance	47
	5.1.2 Road Construction	48
	5.1.3 Dozerization and Sustainability	48
	5.1.4 Disaster and Security	48
5.2	Conclusion	49
	References	50
	Appendices	56

LIST OF TABLES

Table No.	Title	Page No.
Table 1	Socio Demographic Characteristics of Panchthar District	9
Table 2	Review Areas	12
Table 3	Recorded Population of Panchthar District	35
Table 4	Impact of Disaster (2017-2022) in Panchthar District	36

LIST OF FIGURES

Figure No.	Title	Page No.
Figure 1	Local Government of Panchthar District	8
Figure 2	Population Structure of Panchthar District	10
Figure 3	Road Construction in Panchthar District	29
Figure 4	Disaster Felt by the Responders	41
Figure 5	Land Slides in Panchthar District	42
Figure 6	Land Slide in Phalelung Village	43

LIST OF ACRONYMS AND ABBREVIATIONS

AD	Anno Domini
APA	American psychological Association
APF	Armed Police Force
BL	Black Topped
BRI	Belt and Road Initiative
BS	Bikram Sambat
CADRE	Community Access for Disaster Response
CBA	Cost Benefit Analysis
CDO	Chief District Officer
COVID	Corona Virus Disease
CSSR	Collapsed Structure Search and Rescue
DDC	District Development Committee
DEOC	District Emergency Operation Center
DOLIDAR	Department of Local Infrastructure Development and Agricultural Road
DDMC	District Disaster Management Committee
DOR	Department of Road
DPRP	Disaster Preparedness and Response Plan
DRCN	District Road Core Network
DRR	Disaster Risk Reduction
DTMP	District Transport Master Plan

DTO	District Technical Office
EIA	Environment Impact Analysis
ER	Earth Road
ESIA	Environment and Social Impact Assessment
Etc	Etcetera
FGD	Focused Group Discussion
GDP	Gross National Product
GR	Graveled Road
GTZ	German Corporation for Technical Cooperation
HAI	Human Assets Index
HDI	Human Development Index
HELVETAS	Swiss Association for International Cooperation
HVC	High Value Crops
KII	Key Informants Interview
Km	Kilometer
LDMC	Local Preparedness Management Committee
LPRP	Local preparedness and Response Plan
LRIP	Local Road Improvement Program
LRN	Local Road Network
MoHA	Ministry of Home Affairs
MoPT	Ministry of Physical Infrastructure and Transport

MN	Mysore Narasimhachar
NGOs	Non-Governmental Organizations
NPR	Nepali Rupees
NRSS	Nepal Rural Road Standard
SDG	Sustainable Development Goals
SRN	Strategic Road Network
SSRN	Statistics of Strategic Road in Nepal
Sq mi	Square Mile
UN	United Nations
UNCHE	United Nations Conference on Human Environment
UNFCU	United Nations Federal Credit Unit
VDC	Village Development Committee
VR	Village Road
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background

Transport infrastructure plays a central role in rural development. Among other benefits, rural roads provide cheaper access to both markets for agricultural output and for modern inputs (Jacoby, 1998). Not only are the goods and services that these road joins are vital, but the transportation network itself creates numerous job opportunities. Tourism is another beneficial aspect of rural transportation as rural roads provide access to tourist destinations such as national parks, outdoor recreational activities, and scenic vacations. Rural transportation connectivity is indispensable for additional economic development and would provide a positive impact to rural residents. Due to the lack of connectivity, rural communities are affected by distance and limited access to medical facilities and emergency response services (Fontanez, 2020).

Road construction phenomenon is ubiquitous in Nepal. It is vivid in cities and remote villages of the country. Every community deserves better access to transportation to efficiently meet the vital need of services such as education, healthcare, supplies, and mobility. Road construction and maintenance also creates an employment opportunity. Such opportunities are valuable even more in remote communities. But roads aren't the only development cure to the need of communities (Carlson, 2019).

Carlson (2019) further added that the roads also bring the challenges to communities and individuals if not appropriately undertaken. Several cases of disasters are accompanied by poorly built roads in Nepali context. The vast majority of Nepal's local road network is cut haphazardly into steep hillsides with little or no planning, triggering landslides and washing massive amounts of soil into rivers.

One of the most prominent changes we see while travelling across Nepal these days is the presence of earth movers, bulldozers, tipper trucks and excavators. They dominate the highways, gouge out riverbeds, claw at mountainsides and rip through forests (Chitrakar, 2019).

1.1.1 Dozerization

The term "Dozerization" in this research is to denote the adaptation of the culture of socio environment unfriendly development pathways by using the dozer in making road access and other infrastructural development. It is in the context of disaster and mal governance in social and environmental fronts in Nepal. Dozerization means the use of dozers in making the road access and other infrastructural development in absence of compliance requirements and implementation. Often such road projects defy due diligence required for Environmental and Social Impact Assessment (ESIA). The term dozerization is inspired by the concept as "Sanskritization" used by MN Srinivas in his book entitled "Religion and Society among the Coorg in South India" published on 1952 to describe the process of cultural mobility in the traditional social structure of India (Srinavas,1952; in Rubi, 2021).

1.1.2 Development

Development means an improvement in the quality of life and living standards, e.g., measures of literacy, life-expectancy, and health care. Development is concerned with how people are actually affected. It looks at their actual living standards, GDP per capita, levels of literacy and education standards, levels of healthcare facilities, quality and availability of housing, levels of environmental standards, life expectancy are the major areas for development. Economic development would require improvements in infrastructure and transport as well (Pettinger, 2021).

Development means making a better life for everyone. In the present context of a highly uneven world, a better life for most people means, essentially, meeting basic needs: sufficient food to maintain good health; a safe, healthy place in which to live; affordable services available to everyone; and being treated with dignity and respect. Beyond meeting these needs, basic to human survival, the course taken by development is subject to the material and cultural visions of different societies (Peet & Elaine, 2009).

The Nobel prize-winning economist Amartya Sen has twice changed our thinking about what we mean by development. Traditional welfare economics had focused on incomes as the main measure of well-being until his ground-breaking work in the 1980's which showed that poverty involved a wider range of deprivations in health, education and living standards which were not captured by income alone. His '*capabilities approach*' led to introduction of the UN Human Development Index, and subsequently the Multidimensional Poverty Index, both

of which aim to measure development in this broader sense. Sen's view is now widely accepted: development must be judged by its impact on people, not only by changes in their income but more generally in terms of their choices, capabilities and freedoms; and we should be concerned about the distribution of these improvements, not just the simple average for a society.

Development is a multi-dimensional issue. Proper understanding of different facets of development and integrating them appropriately for making good economic policies and development planning is always a daunting task. In other words, finding the right balance between economic, social and environmental issues in development programs is always challenging in a developing country like Nepal (Budhathoki, 2021).

1.1.3 Sustainable Development

World Health Organization (WHO) defines the term sustainable development as a broad term to describe policies, projects and investments that provide benefits today without sacrificing environmental, social, and personal health in the future. These policies are often described as green development because they focus on limiting the impact of development on the environment. However, the benefits of sustainable development are also felt across a wide cross section of human health and well-being, including reductions in pollution- and environment-related disease, improved health outcomes and decreased stress.

Mannan (2012) discussed the concept of sustainable development originated with the environmental scope in 1980s by the UN Environment Programme, the World Wildlife Fund, and the International Union. This concept proposed three basic factors social, ecological, and economic which has been continuously developed till date.

... development to be sustainable, it must take account of social and ecological factors, as well as economic ones; of the living and non-living resource base; and of the long-term as well as the short-term advantages and disadvantages of alternative actions... (Mannan, 2012, p. 2507).

Sustainable development in simpler terms relays that resources should be naturally used in such a way that they are not over-exploited. Sustainable development aims at using natural resources and the environment for improving the standard of people in such a way that the ability of future generations to meet their own needs is not minimized. Sustainable development focuses at promoting environment-friendly and biodegradable products, while also making sustainable

planning for replacement or replenishment of resource usage. Sustainable development emphasizes on eco-friendly building and developmental practices like green architecture.

1.1.4 Dozer Development

Dozer road building usually comes along with a near-total absence of proper drainage, haphazard destruction of wide swathes of vegetation, and reckless downhill soil dumping. This is a human and environmental disaster underway in plain sight. The current upward trend in dozer road building across the country indicates the steady, if not exponential, growth of this disaster (Patley, 2019).

In 1994, the Government began its 'afno gaon afai banau' ('build your village yourself') program, which made fiscal transfers to locally elected bodies, it created incentives for building roads. The road construction process would start by opening a track and then expanding it until it was wide enough for a vehicle to ply. The roads built did improve access, but this would only last till the next monsoon when flooding, landslides, rock-fall, and lack of river crossing facilities damaged them (Dixit et al., 2021). Slowly the practice of building local roads without expert input became the norm. With subsequent central and provincial governments increasing the amounts transferred to local governments, the momentum of local roadbuilding continued with more vigor. The approach to building a good rural road has not yet been replicated in rural road projects in the country (Dixit et al., 2021).

The democratic movement in 2006 is another milestone and the new system of governance, the provincial government system guaranteed by the new constitution of Nepal in 2015 provides more power to local government, so then the communities started to enjoy the development by making road tracks door to door using dozer track without following the standard. Most of the people not just in the concerned district but in many other parts of the country prioritize roads over other developmental activities. For them 'road' is synonymous with 'development', and they are going to get them by any means possible (Chitrakar, 2019).

Road-construction is considered a major development indicator in rural areas of Nepal. Yet local road networks are cut haphazardly into steep hillsides with next to no planning, resulting in landslides, with massive amounts of soil washed to rivers and spoils dumped into the river directly by the contractors. The Government agencies and contractors use dozers to road-cuts in hilly areas. This loosens the soil, resulting in dry landslides even in the winter (Bhattarai, 2020).

Many of the roads are built without an environmental assessment or planning, encouraged by a governmental emphasis on connectivity and infrastructure. This has meant that road building projects are taking up an ever-growing share of physical infrastructure budgets at the federal, provincial and local levels (Rai B. , 2020).

Road construction with the use of dozer is a quick and easy practice that make the easy access to the community with globalized world. But it has impacts on the community's landscape, social, environment, cultural and ecosystem aspects. We need development and access to the communities in every corner of the society but with compliance of the infrastructure development requirements (Carlson, 2019).

1.2 Statement of the Problem

Dozerization is one of the pertinent issues now a days. Road access built by widespread use of dozers without regulatory oversight particularly in hilly districts plays a major role behind the devastating effect caused by landslides. Roads are required for connectivity and are the foundation of development, but when these roads are built without assessing their environmental impact it creates havoc to the community. The present study can help to understand the adversity of dozer development and allow for setting future activities that adopt appropriate development pathways for sustainable development. People, students, researchers, and the scholars in related field of environment, sustainable development, disaster and socio economic and cultural diversity could visit the area and get insight of the inappropriate development pathways adopted by the given community. This study seeks to understand the phenomenon of “Dozerization”, it is not about impacts of dozerization on development. The following are the research questions to operationalize the study.

- 1.2.1 What is the road construction status in Panchthar District?
- 1.2.2 What are the key issues of Dozerization on development sustainability in Panchthar District?
- 1.2.3 What are the security and disaster management concerns of Dozerization in Panchthar District?

1.3 Objectives of the Study

The general objective of the research is to study the phenomenon of dozer development in Panchthar District. Based on the general objective the specific objectives are as follows.

- 1.3.1 To examine the status of road construction in Panchthar District.
- 1.3.2 To analyze the key issues of Dozerization on development sustainability in Panchthar District.
- 1.3.3 To determine the security and disaster management concerns of Dozerization in Panchthar District.

1.4 Significance of the Study

While roads and connectivity are seen as markers of development on the path to progress, but this rural road access is simply turning into dozerization. The study is useful to understand the phenomenon of dozerization for development. This thesis unravels the number of implications of such development intervention to social, environmental, economic and cultural aspects of communities of Panchthar District which has the various stretches of road and other land development activities within the short span of time. The repeated and sporadic disaster have culminated in the district because of the intervention that does not follow the sustainable guidelines and good practices. This paper is a beneficial report for the policy maker regarding policy making and designing the proper plans of road access specially in hill areas. Apart from this, different researcher who is trying to analyze similar topic could learn from this paper.

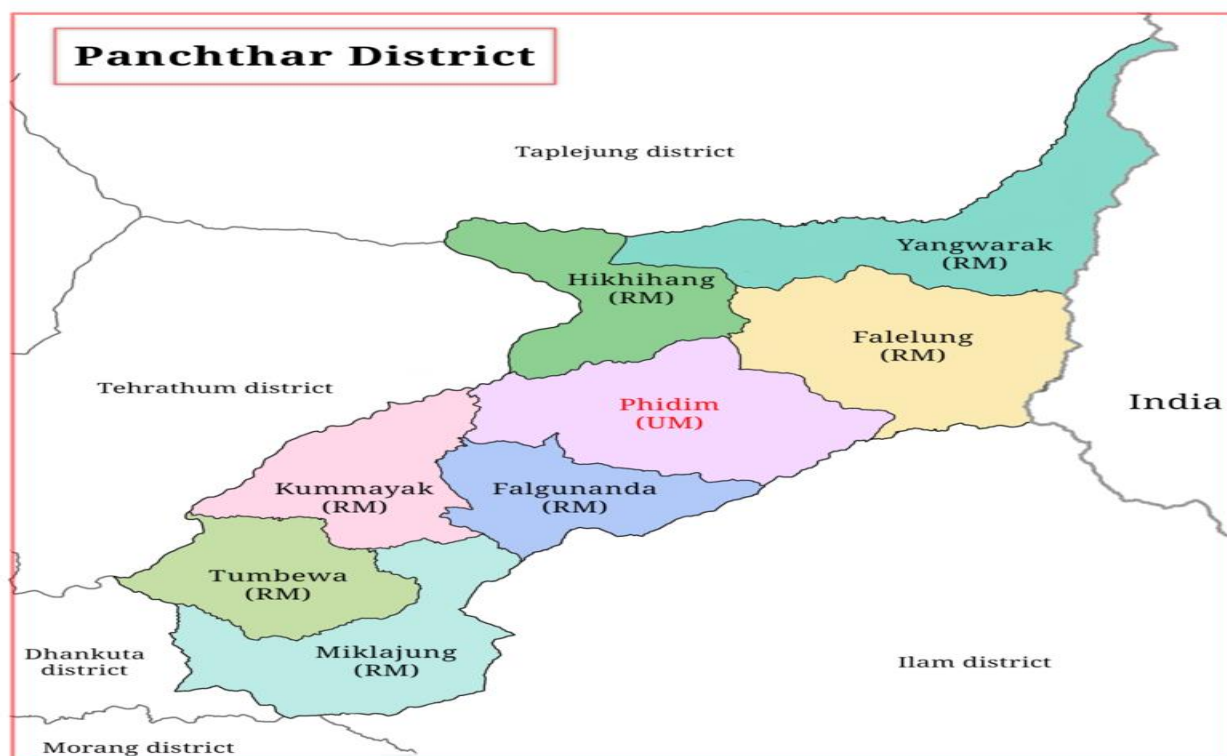
1.5 Limitations of the Study

The research is related to the socio-economic unfriendly development practices through the dozerization mostly in hilly areas on the name of road access. However, the use of technology makes the process of road access easier but without the proper analysis on economic, environment and social impact of dozer use which culminated the sporadic disaster and environmental degradation as well as the negative consequences to the socio-cultural pattern of community which also leads to the security impact. The district selected here is one of the most affected and massively used dozer in making road access.

The study does not cover the other aspect of development process because there are so many social transformations due to the development process which makes the life easy to the villagers. The intention of this research will neither nullify the new technological process of development nor it will unveil the other greater wrong practices of development. This paper is all about the communities with practices of road making in such ways that leads to the degradation on resources and social phenomenon. The thesis is conducted through the massive review of related literature and the published and unpublished documents as well as the field visit with semi structured interviews with 100 different respondents through Focused Group Discussion (FGD) and Key informant interview (KII) to collect the primary data (See Appendix 'A').

1.6 Area of the Study

Panchthar is one of 14 Districts in Nepal's Province No. 1 in the eastern hilly zone. It is an eastern Nepalese hill district and has area of 1,241 km² (479 sq mi). The 2021 census revealed its population to be of 174,419. Phidim is the administrative center of the district. Panchthar District stretches from south to north and is bordered on the east by India's Sikkim and Darjeeling, on the west by Terhathum and Dhankuta, on the north by Taplejung, and on the south by Ilam and Morang. Panchthar District is one of the highly privileged districts in allocating the annual budget for construction of road access in all of its villages which has significant impact on social networking and economy, but it leads to the negative consequences on social, environmental and cultural aspects too. Figure 1 shows the local governments in Panchthar District.

Figure 1*Local Governments of Panchthar District*

Note. The Figure shows all the local government of Panchthar which are: Phidim Municipality, Hikihang Rural Municipality, Kummayak Rural Municipality, Miklajung Rural Municipality, Phalelung Rural Municipality, Phalgunanda Rural Municipality, Tumbewa Rural Municipality and Yangwarak Rural Municipality

Source: Panchthar District Division.png

Panchthar was a part of Old Dhankuta District during Rana era and until 1962. It became a separate district in 1962 when the old 32 traditional districts divided into 75 districts. With the new administration division after the formulation of new constitution in 2015 and reformation of the new governance system, there are total of 8 local governments. Panchthar District has the heterogeneous society in many forms such as demography, environment, governance system and the livelihood. Table 1 shows the demographic characteristics of Panchthar District.

Table 1*Socio Demographic Characteristics of Panchthar District***Demographic**

Ethnicity and structure of Society: Limbu (40%)/ Nepali (34%) Tamang (7%)/ Bhantawa (6%)/Rai (5%)/Magar (3%)/ Others (6%)

Religion: Kiratism (52%), Hinduism (34%), Buddhism (12%), Other (02%)

Languages: Nepali (73.35), Limbu (25.15)

Literacy rate: More than 90%

HDI: 0.396, HAI- 50.2

Income source- agriculture, cottage industries, service sector, foreign employment and tourism

Environmental

Upper Tropical (18.3%), Subtropical (52.6%), Temperate (23.9%), Subalpine (4.7%), Alpine (0.4%)

Governance

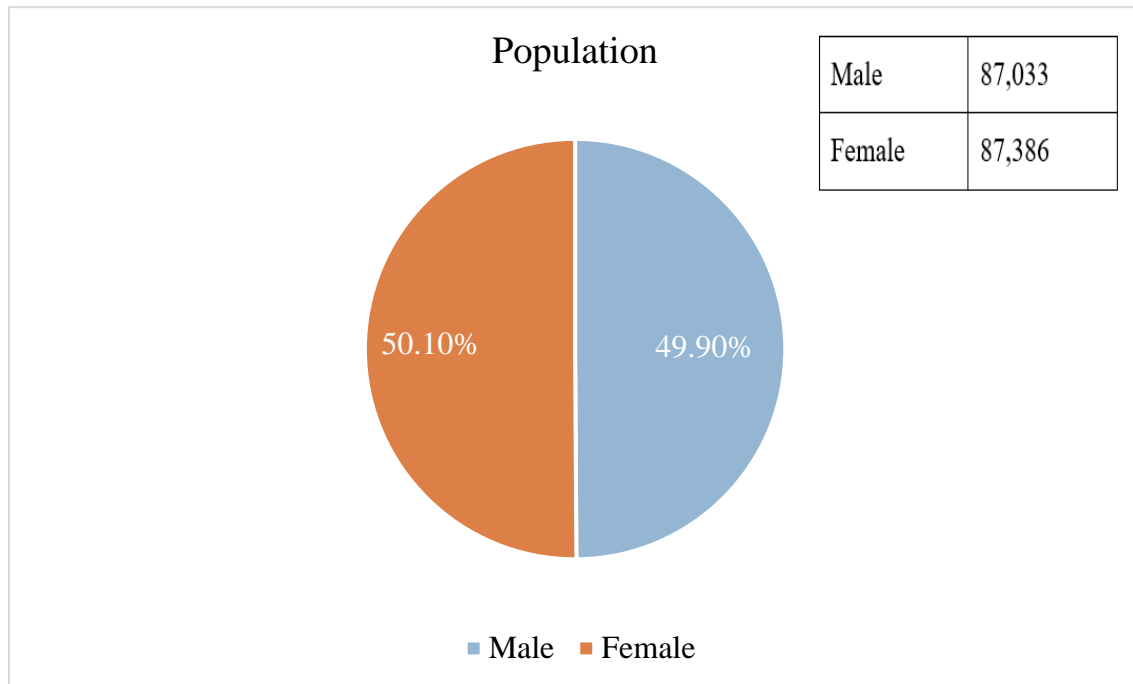
Federal, Provincial and Local, 8 Local Levels (1 Municipality, 7 Rural Municipalities)

Livelihood

Agriculture surplus producer (15%) Self-Sustain (20%), Sustain for ½ year (25%), Sustain for 3 months (35%), foreign employment, tourism, cottage industries, labor and agriculture

Note. The table shows the demographic characteristics of the Panchthar District, where 40 percent of Limbu community residing in the district, which is the largest population, similarly the second largest population is the rai community which is 34 percent. Total of 52 percent people follow the Kiratism followed by Hinduism with 34 percent. Total of 73.35 speak language and rest follow the Limbu language. The literacy rate is more than 90 percent, and the district's 52.6 percent covered by the subtropical environment. The district has total of eight local government. Agriculture is the subsistence occupation with 15 percent and the foreign employment, cottage industries and tourism also the source of economic activities in the district.

Source: National Population Census of Nepal, 2011

Figure 2*Population Structure of Panchthar District*

Note. This figure shows the gender ratio of Panchthar District, where out of 174,419 population, the female population is 87,386 which is 50.10 percent and the rest 87,033 which is 49.90 percent is male population.

Source: National Population Census of Nepal, 2021

1.7 Organization of the Chapters

This Thesis is contained with five chapters: (1) Introduction, (2) Literature Review, (3) Research Methodology, (4) Findings and Discussion and (5) Summary and Conclusion

The introduction chapter is the concept of the topic emphasizing the importance of the study of the subject. It includes the background, the general concept of development, the sustainability of the development, the dozerization as new coined terminology, the dozer development and its impact to the community. Similarly, this chapter also covers significance and objectives of this research and the questions how they justify the objectives. The second

chapter is the review of the related literature which helps to understand the research gap to make the study more relevant and noteworthy.

Chapter Three covers the methodology, research design, data collection and analysis and the ethical issues during data preparation of the thesis. The chapter describes the research design that includes the primary and the secondary data collection methods such as review of the different journals, books, articles, field visit with semi structured interviews with fifty different respondents through focused group discussion and key informant interviews.

Fourth chapter comprises with the findings and discussion which describes the collected data through different methods. Finally, the chapter five will be about the conclusion and recommendation which includes a brief description of the significant findings.

CHAPTER TWO

REVIEW OF THE LITERATURE

The purpose of this chapter is to review the relevant literature critically to the study area of Dozer and Development. It is not the summary of whole field, or a haphazard regurgitation of everything the researcher observed in the field but an organized and critical discussion that lets the reader see what researcher have made of the literature relevant to the topic or thesis and the research questions. It functions to contextualize the thesis within that field by identifying where there are gaps in previous research and will help to fill. The chapter is divided into nine basic sections. The sections deal with history of road construction in Nepal, road construction pattern, policies and legal status, economic engineering of road construction, socio-economic impacts of road access in rural area, cost-benefit analysis of dozerization, road construction and sustainability and dozerization and road accessibility respectively. The thesis is prepared with the review of different literatures. Table 2 shows the five broad five categories of literature reviews in relation to the research questions.

Table 2

Review Areas

Review Areas	Journals and Articles	Books	Documents	Web Pages
Road Construction Status	3	1	-	9
Road Construction and Sustainability	8	5	1	11
Disaster and Security Concerns	-	-	1	5

Note. The table demonstrates the different literatures reviewed in different areas such as in the area of road construction status there are total 3 journal/articles, 1 book and 9 web pages were reviewed. Similarly in the area of road construction and sustainability there are 8 journal/article, 5 books, 1 document and 11 web pages were reviewed and in the area of disaster and security there are 1 document, and 5 web pages were reviewed.

Source: Researcher, 2022

2.1 Road Construction Status

In many developing countries around the world including Nepal, roads became the vehicles for development of communities in rural areas with reduction of travel time on foot, opportunities opened for quicker transportation of goods and better access to employment, education, health care and markets.

Pokharel & Acharya (2015) opined that in the early stage of transport development government of Nepal focused on connecting the borders of neighboring country, primarily with India and later with China. They also stated that The East West highway construction was the second stage of transport development and connection of all district headquarters by road was targeted on 10th plan (2002-2007). And further stated that though the discussions for rapid, safe, reliable, comfortable, and low carbon technology was brought up and even some effective policies were introduced in the national periodic plans but failed at the implementation level.

Upreti & Shrestha (2016) generally classified the roads in Nepal as national roads, (i.e., Strategic Road Network, SRN) under the jurisdiction of the Department of Roads (DOR), or local roads (i.e., Local Road Network, LRN). The LRN is comprised of the District Road Core Network (DRCN) and Village Roads (VR) under the jurisdiction of the Department of Local Infrastructure Development and Agricultural Roads. They further added road building started to gain momentum in Nepal with the advent of multiparty democracy in the early 1990s, intensified further after the Maoist insurgency ended in 2006 and continues to be one of the country's main priorities. About twenty years ago, Nepal's road network was one of the smallest in the world with a road density for both SRN and LRN estimated at 13.7 km per 100 km² in 1998.

Dixit et al. (2021) presented the data that from 4,780 km in 1998, the local road network increased to 53,310 km in 2016, an increase of 1200 percent. By mid-March 2019/20, out of the total 61,395 km of local and provincial roads, the shares of blacktop, gravel, and fair-weather roads were 6.4 percent, 22.1 percent, and 71.5 percent respectively. 54.7 percent of local and provincial roads are in the hilly region, whereas roads in the mountainous and Terai regions comprise 13.7 percent and 31.58 percent of the total respectively. From these data we can easily assess the growth in road construction.

Pokharel & Acharya (2015) stated Nepal devolves significant power to local and provincial administrations, it is uncertain whether the newly formed local administrations will rise to the challenge of establishing safeguards to ensure that promised benefits outweigh potential losses. They further suggested that the issue of poor roads in Nepal is more of a political issue than a technical one for which better service and less environmental damage could both be significantly addressed through improved governance. This commentary points to the need for improved road governance based on research, consultations and observations of road construction and associated landslides in Nepal and around the world. It also highlights the need for more scientific studies on the topic as most relevant publications emanated from the grey literature, government publications or media articles.

2.1.1 Pattern

Dixit et al. (2021) stated that road building is one of the best methods of securing votes in an election. Local governments want to build roads to show off their ability to bring about development, the public wants roads built to improve connectivity and avoid drudgery, farmers want roads to improve access to markets and landowners want roads to increase the price of their land. From this we can understand that road construction attracts the attention of multiple stakeholders, whether the roads are engineered or non-engineered.

Pokhrel (2018) stated that the Nepali people had great hopes that the first elected government in twenty years would bring a new wave of development, but recent trends show that many elected mayors, village heads and ward members are construction contractors. They have not divested from their companies, but instead are awarding projects to themselves, which is a clear case of conflict of interest.

Aryal (2021) considered road development in Nepal as somewhat haphazard and the main reason behind this probably being the multiple agencies involvement and sharing the responsibilities of planning, construction & maintenance. Aryal further added the construction & maintenance of important roads (Highways, Feeder Road & other strategic roads etc.) is carried out by the Department of Road (DOR). In contrast, other roads like village road, District roads, city roads etc., are under respective local governments.

Pokharel & Acharya (2015) expressed about Nepal's tough geography that it poses a significant barrier for the country's aim to improve transport. The Himalayan range in the north of the country has huge physical obstacles. In the same context (Highways, 2014) talks about Nepal's

Hill Region which includes altitudes ranging from 800-4,000 m, itself providing difficulties for road builders as a result of the technical issues resulting from the country's geography as well as a shortage of construction machinery, building roads in Nepal can be an expensive and almost painfully slow process.

2.1.2 Policies

Ghimire (2000) stated that A National Transport Policy was prepared in 1998 by the then Ministry of Works and Transport with the objective of providing a base for the government, the Ministry of Physical Planning and Works, in particular, to undertake the responsibility of planning of the transportation network within the country. Ghimire further added, the basic objective of transport sector planning in Nepal has been to create capital and increase national income to mitigate disparity and reduce poverty, to achieve this objective, the investment made on the development sectors should be safeguarded. From these statements it is learnt that the sustainable socio-economic development of a country would only be possible through the integration of environmental aspects in the development plan and policies.

According to Coburn (2020) in recent decades, Nepal has gone from having few drivable roads to more than 7,000 miles of paved roads, as of 2015, yet over the last several years, the pace of road building has quickened dramatically, driven by the country's new constitution, enacted in 2015, which emphasizes decentralized economic growth and includes a directive that roads be constructed to remote settlements.

Sudmeier-Rieux et al. (2019) added that the new provincial government administrations now could develop policies and practices, which can realign the current trend of poorly engineered, inefficient and hazardous road construction towards a more sustainable trajectory. They provided an overview of some of the obstacles along the way for a more sustainable road network in Nepal and illustrated how good governance, development and landslide risk are intertwined. The opinion presented in their brief commentary lends little hope that Nepal's current pathway of unsustainable road construction can be changed towards the direction of the much-needed sustainable road network through checks and balances put in place to curb noncompliance with existing laws and policies. They continued to give us opinion that in the past two decades development of the road network in Nepal has topped community and government priorities, a trend likely to continue as the country transitions to a decentralized federal government.

Giving example of roads being built to the Manaslu region, Coburn (2020) focused the roads being built are part of an ambitious new effort in Nepal to construct paved, gravel, or dirt roads to every town and sizeable settlement in the country. As this frenzy of road construction gnaws into even the most remote valleys of the Himalayas, subsistence farmers and traders long neglected by Nepal's government are hoping the roads will bring jobs, lower trade and transportation costs, and improved education and health care to the country's far-flung corners.

2.1.3 Economic Engineering

McGee (2022) explained an engineering economic analysis as a breakdown of the various options for an engineering project based on its overall costs, these analyses allow companies to decide which option works best from a profit standpoint before they begin the project. Since time is such a fundamental aspect in construction and manufacturing, it has a huge impact on the direction in which a company will choose to go. Childress (2022) too has the similar opinion, he states an engineering economic analysis commonly looks at a project from two basic directions: the physical costs, such as materials and labor, and the time to complete the project.

Carlson (2019) explained, from 1998 to 2016, the length of Nepal's road network multiplied by a factor of 11. A dozer road building boom is currently underway in the wake of federalism, and many anticipate that another surge will occur along several new major road corridors being built by foreign development actors. Along these corridors, such as the under-construction Rasuwa highway, improper construction magnifies the vulnerabilities of communities and the environment.

Rai (2020) added most local bodies are still in the process of drafting new master plans to replace those that were in place before the federal restructuring in 2017. Without proper data to assess needs, road construction has been informal, uncoordinated, and unmonitored. This meant that the road building projects are taking up an ever-growing share of physical infrastructure budgets at all three tiers of government in federal system but without environmental assessment.

Chitrakar (2019) presented an interesting situation saying if asked Nepalis in the Districts what they want the most, and the answer will be "A road", for them 'Road' is synonymous with 'development', and they are going to get them by any means possible. Thus, it can be seen that federal, provincial, and local government all seek to fulfill the community desire for road

connectivity by any means but in doing so paying little to no attention to environmental assessment or planning.

2.2 Road Construction and Sustainability

Asher (2019) expressed the view about sustainable development as the concept having its roots in a variety of published works and efforts in environmental activism from the 1960's onward, each instrumental in the popularization and advancement of modern political environmental consciousness and discourse. Egelston (2012) too stated that, throughout the late 1960's and early 1970's many non-state actors, specifically in the form of environmental non-governmental organizations, also played an increasingly important role in introducing and articulating the concerns associated with environmental sustainability. He further went ahead to explain, in 1972, the United Nations Conference on Human Environment (UNCHE) adopted the ideas frequently popularized by environmentally focused NGOs and activists, and formally incorporated them within the language of the UN international body.

Sustainable development necessarily requires an inclusive problem-solving approach that addresses both socio-economic and environmental concerns (Willsher, 2022). Willsher further added as challenges to environmental sustainability are both shaped and exacerbated by human activities, it is necessary for practitioners to work directly with communities, institutions, organizations, businesses, and governments to alter behaviors and practices in a way that realizes solutions.

Xiaofeng et al. (2021) stated the impact of highways on the ecological environment can be divided into the impact on the environment, vegetation, and animals specifically, road construction and excavation lead to soil exposed and erosion caused by changes in ground runoff conditions. They further added, the road engineering destroys surface vegetation, resulting in a decrease in plant species an ecosystem structure and function; road construction destroys wildlife habitat, changes such as increased roadbeds have led to disturbances in wildlife migration and other activities; road construction will produce chemical pollutants, noise and other impacts.

Bhattarai (2020) stated about Environment Impact Assessment (EIA) practice in Nepal. As per the law, all development projects should undertake EIA, but this is mostly seen as a ritual by government agencies. If the EIA shows huge environmental impact of a project, it should be

relocated. Bhattarai further added if trees are to be felled, there should be compensatory plantation. Building roads and undertaking other development works without any engineering, it will ruin the development sustainability and the country as a whole.

Majerova (2015) was of the opinion that a well-balanced relationship between economic and social progress is the main prerequisite of rural community stability. Economic development is influenced by many factors. Some of these are statistically discoverable and quantifiable, while others, which fall within the sphere of social relations and their identification, are more difficult to measure and interpret.

Claxton (1994) explained that a development strategy, incorporating the cultural dimension, constitutes an integrated approach to development which comprises not only concrete development action in key areas such as health, education, technology, agriculture etc. but also seeks to utilize the creative energies of the people in finding local solutions to the problems encountered in those areas. Claxton further said, in the type of development which ignores the cultural dimension, and depends on the application of external models, the creative capacities of the local culture are stunted, the capacity of the society to resist the unwanted intrusion of foreign cultural influences and models is weakened, and this produces cultural anomalies.

Chitrakar (2019) stated about the impacts of roads as a two-way street that they may be designed and built to take local produce to market, but roads also bring the market to remote villages. This can have a huge negative impact on the local economy if competitiveness is lost. Roads can also become an incentive to produce more, or disincentive to pack up and leave for the city or go abroad.

Rai (2018) exposed that at least 300 mayors and village council chiefs are members of the Federation of Contractor's Association of Nepal. Many more were elected who are not affiliated to the Federation, but still own small and medium-size construction firms or rent heavy equipment. Many of them have been found to be abusing their authority to award road, bridge, and other construction contracts to their own companies.

The Green Roads is an established practice that reduces the environmental impacts of road building by using local materials and bioengineering (Dahan & Goykhman, 2009). They further added these roads also use local manual labor and distribute paid work among community members. Carlson (2019) gave the example of Jiri Road, which somehow demonstrate that large road projects can minimize environmental impacts while supporting local communities.

Hearn & Martin (2022) too gave the example of 50 km-long road from Dharan to Dhankuta which was designed and constructed between 1974 and 1982. Forty years on, performance assessment of the completed road shows that the model has proven successful in allowing landslide and fluvial hazards and problematic ground conditions to be anticipated and hence accommodated in route selection and engineering design. It is concluded that the road has performed well in comparison to some others in Nepal.

2.2.1 Dozer Development and Road Accessibility

Petley (2019) expressed road building as ubiquitous across Nepal, from Kathmandu to the most remote corners of the country. Every Nepali deserves access to a road and the vital services that come with it: education, medicine, access to new markets, and easy transport to urban centers. Petley added, road building and maintenance bring paid work, especially needed in remote communities. Nobody would argue against the importance of these outcomes. But roads aren't the development cure-all that many pretend they are. Just as ubiquitous as road building in Nepal is the destruction that accompanies it.

2.2.2 Socio Economic Impacts

The roads also fuel migration and numerous social changes, both positive and negative. The consequences of poorly constructed roads in mountainous areas of Nepal are the increasement of erosion and landslide risk as they often cut through fragile geology, destabilizing slopes, and altering local hydrological conditions, with costs to lives and livelihoods (Sudmeier-Rieux, et al., 2019).

Hettige (2006) expressed the view that the improved rural roads guarantee access throughout the year, so that those villagers who are able can now invest time and resources in an outside endeavor knowing that communications and links with the outside world are reasonably assured, and they can make use of a wider variety of transport services, which are more frequent, take less time to get to nearby centers, and are often cheaper than before road rehabilitation. Rural roads are, therefore, can be concluded as an important enabling condition for livelihood development.

Fukubayashi & Kimura (2014) stated roads as globally accepted livelihood links for communities in rural areas which reduces the travel time on foot, open the opportunities for quicker and easy transportation of goods and better access to employment, education and

health. Additionally, they stated roads generally create direct and indirect benefits to rural populations, directly through employment in constructing and maintaining them and in providing rural transportation services or indirectly they provide opportunities for marketing goods and services, flexibility for employment and roadside businesses, and opportunities for transporting agricultural products to markets.

Pokharel & Acharya (2015) highlighted the importance of roads as a safety net of sorts in generating alternative livelihood opportunities, especially in circumstances in which conditions for agriculture are difficult. With this statement it can be understood that the connectivity is thus positively correlated with lower poverty rates. They also highlighted many other nonmonetary benefits of roads, especially greater access for the poor to health and other public services, such as education, which can significantly reduce vulnerability and even gender inequality.

Blaikie et al. (1994) viewed about migration saying, in Nepal, roads are also linked to the current boom in migration, facilitating easier mobility to both near and distant migration destinations and finally and foremostly, a robust road infrastructure can provide vital corridors for evacuation and rescue in the aftermath of disaster.

Shah (2013) highlighted that the social and human development, necessarily requires a unified approach, integrating the economic and social components in plans, policies and programs for people's betterment. The challenge is to simultaneously integrate cross sectoral and regional developmental needs as well as to make for a participative development. Shah focused on the issues of environment, pollution, women, habitat, hunger and employment, which have come to the fore one by one and continue to require public and institutional attention along with resource allocations. Shah (2013) took two major contemporary concerns that require focus in any development initiative as human security and sustainability. We need to ensure that development does not mean social dislocation, violence and war and that we meet the needs of the present generation without compromising the ability of future generations to meet their own needs.

Coburn (2020) revealed the inequalities created by road construction in Nepal which leads to loss of livelihoods for those without possibilities to invest and enhanced opportunities for those who could. Furthermore, other impacts, such as increased environmental hazards, pollution, crime and unwanted cultural influences, are often overlooked. Sing (2018) backed up the

scientists blame that the extreme weather events caused by global warming, the impact of which has been exacerbated by a construction spree of unplanned and poorly built roads along fragile mountain slopes.

2.2.3 Cost-benefit Analysis of Dozerization

Hayes (2022) described a Cost-Benefit Analysis (CBA) as a systematic process that businesses use to analyze which decisions to make and which to forgo and the cost-benefit analyst sums the potential rewards expected from a situation or action and then subtracts the total costs associated with taking that action. Hayes further added the results of the aggregate costs and benefits should be compared quantitatively to determine if the benefits outweigh the costs, if so, then the rational decision is to go forward with the project if not, the business should review the project to see if it can make adjustments to either increase benefits or decrease costs to make the project viable. Otherwise, the company should likely avoid the project.

Gunatilake (2013) stated because of the divergence between private and social costs and benefits, governments intervene in the economy and CBA provides a key tool for assessing whether such intervention will improve social welfare. According to him CBA aims to ensure that projects contribute to net social welfare and that if there are any 'losers' from a project, aggregate benefits are large enough for gainers to potentially compensate any losers.

Lut (2020) disclosed when we focus on the environmental aspects of sustainable development, we look at the natural resources, both renewable and non-renewable, those make up our surroundings and help us to sustain and better our lives. Environmental concerns are inextricably linked to economic issues such as damaging the environment simply to survive such as cutting trees and social issues such as population growth. Lut too talked about effects population growth as, rapidly growing population places strains on a country's natural resources, as well as on its ability to provide housing, health care, education, safe water, and sanitation for all.

Hettige (2006) opined that the benefits of roads need to be weighed alongside evidence that roads may benefit nonpoor households more, perhaps making development less even. At the same line Carlson (2019) also expressed his views that dozer road construction is a quick and easy practice that mostly benefits contractors and government officials but, it damages communities, landscapes and ecosystems across Nepal and beyond.

Showing concerns towards remote Himalayan areas Coburn (2020) added new roads already have expanded access and economic opportunity in populated lowland areas but in remote areas of the Himalayas where traditional livelihoods and trek tourism incomes rely on unspoiled natural resources, some local officials, and residents fear that the socio-economic and environmental costs of this road-building spree will be high.

2.3 Disaster and Security Concerns

Carlson (2019) focused on the adverse effects of haphazard road construction by saying communities feel the negative effects of road building locally whereas most significant effects spread downstream across mountains, hills and plains. Vast amounts of exposed soil created by dozer road building wash into rivers and are carried downstream to the Tarai. There, this soil raises riverbed levels and causes more devastating flood disasters. Combined with the construction of embankments, which force larger amounts of sediment to settle in smaller rivers, flood disasters that the nation already struggles to cope with are made even worse.

Petley (2019) emphasized the dozer roads are known to contribute to or directly cause landslides. Remote communities relying on already precarious access to infrastructure are further isolated and endangered. Dozer road building doesn't just damage the landscape in the short-term, it makes those who rely on it in the long-term more vulnerable.

Rai (2020) wrote, across the country's fragile hills, poorly built roads are increasingly putting families at risk of landslides and landslips. Many of these roads are built without an environmental assessment or planning, encouraged by a governmental emphasis on connectivity and infrastructure. According to the Ministry of Finance, NRs 109 billion was earmarked for physical infrastructure projects in 2018/19, which then ballooned further the following year to NRs 163 billion.

Robson et al. (2021) stated the vast majority of Nepal's local road network is cut haphazardly into steep hillsides with little or no planning, triggering landslides and washing massive amounts of soil into rivers. They further added dozer road building usually comes along with a near-total absence of proper drainage, haphazard destruction of wide swathes of vegetation, and reckless downhill soil dumping. This is a human and environmental disaster underway in plain sight. The current upward trend in dozer road building across the country indicates the steady, if not exponential, growth of this disaster.

Bhattarai (2020) stated the number of landslides in Nepal began to tick up after 1994 when the central government increased development budget for local bodies, these local bodies in turn started carving roads without any study. Bhattarai relates that when more resources have been transferred to local governments with the federal structure the more haphazard construction started. Similarly, the federal government is also building highways which are already prone to disasters. in various parts of the country without considering their environmental impact.

Mausam (2016) highlighted that the haphazard use of heavy equipment has brought problems, and national and community forests are being destroyed for road construction projects. In many cases, road construction projects violate the law of the land, which states that it is mandatory to conduct an environment impact assessment before launching any road construction project.

2.4 Summary of Chapter Two and the Research Gap

From the above-mentioned literary reviews, we can get insight into the history of road construction in Nepal. These prevalent literatures give the overview of how the roads are considered synonymous of development. The community people, government and other stake holders all has a fascination towards road construction as they can be shown as the visible proof of development. Road construction spree started from late 90s and got momentum after the country transitioned to federal system of governance. Good amount budget is allocated ever year for road building but little to no attention is given towards its impact upon the communities. Misuse of budget and authority is another problematic area as everyone look for the benefit from road construction, but nobody like to take the sole responsibility.

Monitoring and evaluation are neglected. The haphazard road construction practices without proper environmental assessment have brought the adverse socio-environment and economic effects. The road accessibility changed the life of the local people in both negative and positive light. People are able to get better access to various facilities and livelihood options, but the disaster bought by haphazard road constructions have made them more vulnerable.

The prevalent literature present with generalized areas of the thesis topic and no specific study area with its issues are addressed. This is perceived as the study gap by the researcher, so the present thesis tries to fill the gap by conducting the field-based research with analytical and descriptive method.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Background

This thesis research is based on the qualitative approach engaging participants in receiving information via in-depth interview, key-informant interviews, and focus group discussions. The researcher's observation also be embedded during the thematic analysis of the data. The study gathered primary and secondary data in relevance to the impact of dozer development phenomenon in construction of rural access road. The chapter describes the research strategy, method and procedures employed for this thesis. The following topics are explored in this chapter: research design, nature and source of data, data collection, data validation, processing, analysis and interpretation. This thesis is descriptive and analytical. The research design of the study is non-experimental based on qualitative method to understand the subject, gain in-depth understanding of a specific context. It is also planned to answer the research questions using empirical data. Researcher's deeper observation and key informant interviews are iteratively conducted.

3.2 Source of Data

The data collected from the meeting (See Appendix 'D') with locals, stakeholders and key-informants by open-ended questions. Similarly, two focused group discussions were conducted in the Falelung Village Municipality, where recent landslide hit and three people lost their life and Yangbarak Village Municipality frequented by the disaster. The participants interviews are developed in narrative format. The key sources of the data are the following.

- 3.2.1 Community participants
- 3.2.2 Key informants
- 3.2.3 Focused group discussion
- 3.2.4 Direct observation
- 3.2.5 Documents analysis

3.3 Selection of Participants

The population of given area who have faced directly or indirectly to the consequences of the road access infrastructure development, the government authorities, the local leaders, the contractors and the people who are directly affected with their daily subsistence were used as the participants for the data collection of this study. The local community of Falelung Village Municipality who suffered from the recent landslide were included as the focused group discussion and the members of District Disaster Management Committee (DDMC), members of Local Disaster Management Committee (LDMC), in various villages, the contractors, the cluster head and their representatives, the officials of mid-hill highway, and the development agencies such as office of infrastructure development and the office of irrigation were interviewed as the participants for the preparation of thesis.

3.4 Method of Data Analysis

The researcher transcribed the verbalization of the locals, the contractors, the key-informants as the primary data. The secondary sources are thematically analyzed deemed appropriate for meeting the research objectives. The primary data collected from the direct observation, key informant interviews and the focus group discussion are validated with the secondary data. The thematic analysis was linked to relevant and standard literature in the interpretation phase of data analysis.

3.5 Ethical Consideration

This thesis adopted code of ethics of American Psychological Association Seventh Edition. The study was carried out to benefit the larger scale of population. The written consent was signed by the participants before their engagement in providing necessary information during research (See Appendix 'B'). The study also ensures the anonymity of the individual, role and the incidents. The researcher remained critical of maintaining intent of the participants articulation of issues relevant for the study and data sources are kept highly confidential. Researcher was aware of social and cultural diversity while engaging in interaction. The choice of time and the place for the interview was given priority as per the participant.

CHAPTER FOUR

FINDINGS AND DISCUSSION

4.1 Background

In many countries around the world which are in the process of development, roads and transportation are most essential for the development of the rural areas and communities. As transportation emits the labor of having to walk despite any condition, it opens the doors of development. It not only reduces the travel time on foot but also makes the transportation of goods easier and quicker, several other opportunities are also opened. People get better access to education, health care, employment, markets, etc. New roads also bring numerous social changes, both positive and negative. Rural people have also realized the importance of roads and transportation for their development. In recent times many road routes have been opened in rural areas. Such roads are poorly constructed in the difficult terrain. The mountainous areas of Nepal are geographically difficult to conquer, still roads are constructed without considering the fragile geology and destabilizing slopes and altering local hydrological conditions. This has adversely affected costs to lives and livelihoods.

The district selected for this thesis is Panchthar District which is one of the remarkable Districts for the study, as the district heavily followed the development activities using dozerization for rural access to the road. This thesis mainly focused on the overall impacts of rapid and inconsiderate dozer development in different sectors such as environmental, social, economic and other aspect of culture and religion along with the traditional subsistence occupation of the society.

The following section will describe the outcome of the data analysis on the various thematic areas linked to dozerization. These thematic areas are coded from articulation, verbalization, observation and descriptive statistics received from the field study following the methodological approach in chapter three.

4.1.1 Ethnicity and Structure of Society

Panchthar District with high ethnic diversity is an example of peaceful coexistence. The Limbu ethnic community of the district is significant population as a major ethnic group followed by

Bhramins and Kshetris groups. Other significant ethnic population of the district are Rai, Newar, Sherpa, Gurung, Damai and Kami. The people from various ethnicities have their own cultural, religious, and traditional practices leading to cohesive need of peace and harmony. Despite Nepal undergoing several ethnic conflicts elsewhere, the study District had no record of any ethnic conflict issues.

4.1.2 Economic Activities

Khadka (2018) referred all activities related with production, distribution, marketing, and sales of goods or services as economic activities which are carried out for profit or self-consumption. Such economic activities determine the level of production, distribution and consumption of goods and services and the location of establishment and total unit of economic activities play determinants for the economic status.

Nepal is predominantly an agricultural country, where the agricultural sector contributes 33 percent of Nepal's GDP (World Bank 2010) and employs two-thirds of the work force. Despite the potential for commercial production of High Value Crops (HVC) such as vegetables, fruits, tea and spices in the province one of Nepal, subsistence farming continues to dominate over commercial farming. The Tarai districts are the main producers of food grains in province one, with the Hill and Mountain districts suffering food deficits and being more vulnerable to winter droughts (UNFCU, 2022).

Panchthar District depends upon agriculture for maintaining their livelihoods. Most of the household is engaged in farming and livestock rearing. According to Agriculture Knowledge Center Panchthar, the district is known for high cash yielding crops of Alaichi-cardamom, Alu-potato, Amliso-broomgrass often denoted as triple A. Apart from these cash crops paddy, millet, corn and buckwheat are also grown traditionally. People also raise cows, buffaloes, goats, sheep and chickens. Milk products are also famous from the district. Another important economic aspect is the production of medicinal herbs.

District Coordination Committee identifies other economic activities as tourism and hydroelectricity. If provide with infra-structure and other aids Panchthar has great potentiality to change the economic condition of the district from these sectors. Like most other districts of the country the people of this district has also travelled abroad to sell their labor. Hence, remittance is also the source of livelihood. Including everything Panchthar District can maintain an average income level.

4.2 Status of Road Construction in Panchthar District

In Nepal, the rural road based on people's participation has been taking place since the mid-1980s, with the advent of multiparty democracy in 1989, there has been a tremendous demand of constructing rural roads in rural areas. The National Strategy for Rural Infrastructure Development 1997 pinpointed the responsibility demarcation between central and local level decentralized governance system by utilizing the local level resources and private sector involvement (Khatri, 2019).

Rural infrastructures were constructed by Department of Road (DOR) before the establishment of Department of Local Infrastructure Development and Agricultural Road (DoLIDAR). DoLIDAR was established later in 2055 under the ministry of local development. Later in 2058 District Technical Offices (DTO) were established in 75 Districts of the country. After then all the rural road and infrastructure were constructed by District Development Committee (DDC) under technical support of DTO (Poudel, 2014).

Nepal Rural Road Standard (NRSS) was introduced in 2055 BS to set the classification & geometric design standard for Local Road Networks (LRN) to be followed by all involving in the road development network including user committees, Village Development Committees, District Development Committees, District Technical Offices, Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR) and development partners. It was revised in 2010 AD in which existing district road were classified as District Road 'A' and all previous village roads were classified as district road 'B' with no change in their geometric parameters (Poudel, 2014).

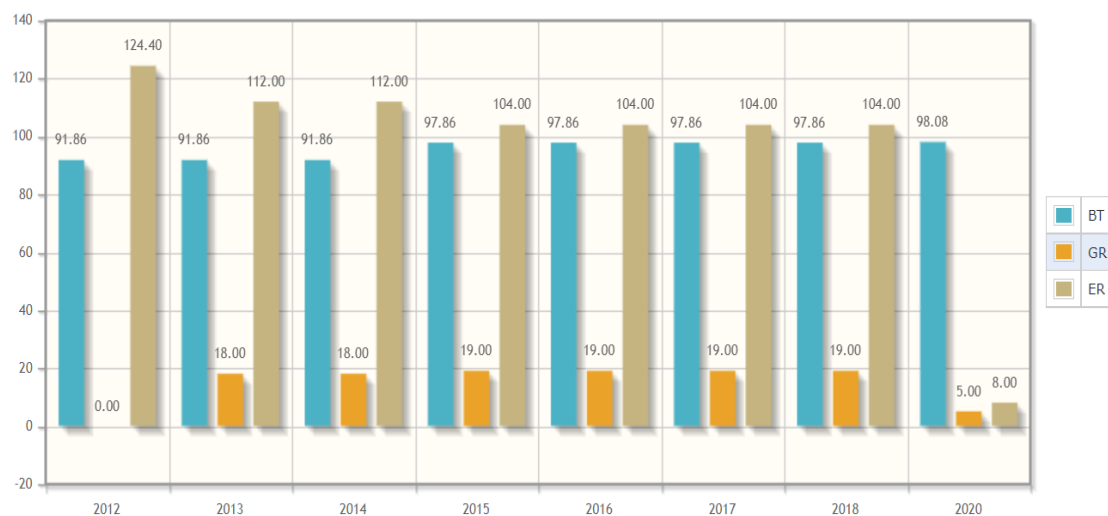
Ministry of Physical Infrastructure and Transport (MoPIT) was established in 2000 in order to bring important infrastructural development under the umbrella of a single Ministry. The MoPIT is the central authority of Government of Nepal charged with the responsibilities to enhance the economic and social development of country by linking various geographical and economic regions through the national strategic transport network to support various economic activities and projects related with tourism, agricultural, electrical, industrial and other sectors of Nepal (MoPIT, 2020).

Panchthar District with one municipality and seven village municipalities has a total of sixty wards from municipality and rural municipalities are doing their developmental activities in the local level. The district has basic infrastructures like road transportation, electricity,

telecommunications etc. According to the Infrastructure Development Office Panchthar, there are three corridor roads that are under construction with the objective of developing them as fast-track highways which include the Hewa Corridor, the Nibu Corridor, and the Nawa Corridor. The Hewa corridor covers the northern areas, the Nibu Corridor the central and the Nawa corridor covers the southern belt of the district. These corridors linking to other hilly roads would be connected to the Tamor Corridor Road which is the roadway that connects three countries- Nepal- India and China, passes through Dhankuta, Panchthar and Taplejung districts. Including the above-mentioned road corridors, several village road constructions is still going on within the district. Figure 3 shows the development of road in last decade.

Figure 3

Road Construction in Panchthar District (2012-2020)



Note. The figure demonstrates the road constructions in Panchthar district from 2012 to 2020 in kilometers. The construction of blacktopped and the earthen roads are mostly consistently higher throughout the decade while the graveled roads are consistently lower.

Source: SSRN, 2021

The Statistics of Strategic Road of Nepal (SSRN) published the data showing the connectivity status of Panchthar District. The above data shows the constant increment in the blacktop road construction, while the earthen road construction was at the pace of hundred kilometers per year. The data shows the pace of graveled road construction is very slow with fifteen kilometers

in average per annum. The construction of both earthen and graveled road declined in the year of 2020 whereas the blacktop road construction remained the same.

The change in the road transportation scenario is the most visible change after dozer-driven development practice in the Panchthar District. Length of black top and gravel roads has increased significantly in the district and more strikingly rural road tracks are opened at every other neighborhood. It has eased the daily life of people in the district by minimizing the time and cost of travelling. This in turn has improved the connectivity to and from the center to the remote areas and opened vast opportunities.

One of the members from local government as the participant of KII expressed the view that

“The decrease in transportation cost is the visible change due to the rural road access, and people are happy to give the credit to the local government for connectivity to remote and rural areas.”

One of the participants of FGD in Phalelung village said,

“Recently we have lost three people’s life due to landslide because of poor road construction and the negligence of the contractor, the life of Falelung people is miserable.”

Most of the participants expressed their view that the poor road construction practice done by the contractors made the soil erosion, and the frequency of landslide is very high even in dry season more specifically in rainy seasons. Denying the argument one of the contractors participated in KII said

“We have good concern to practice the environment friendly road construction process, but the problem of untimely bidding system and the delay in the payment system of development agencies are responsible for this, and they should be more accountable in this regard.”

Similarly, another contractor involved in road construction in the district as well as other parts of the Province one of Nepal said

“We cannot go beyond the design made by the particular development agencies or the office, whatever the design is we have to follow that during construction, so the problem is in design not in the practice.”

In many cases, road construction projects violate the law of the land, which states that it is mandatory to conduct an environment impact assessment before launching any road construction project (Mausam, 2016). Every infrastructure project must by law have an Environmental Impact Assessment but none of the new improvised roads here have done EIAs (Sing, 2018).

Above discussion revealed that There are ample amount of road constructed and are being under going in Panchthar District, people have concerned towards the construction of road as development pathways but the increasing number of earthen road are not well assessed through the EIA and ESIA which is making the community at high risk for disaster and socio environment effects.

4.3 Impacts of Dozerization on Development Sustainability

Sustainable development has developed as a concept through several decades of active international scientific debate and has acquired distinct political connotations in the context of globalization. The concept of sustainable development proposes an integrated policy and decision-making approach, in which environmental protection and long-term economic development are considered to be complementary and interdependent (Lut, 2020).

Baffoe et al. (2021) states that the roads and the urban-rural linkages are considered as the backbone of development which gives attraction to more investment, basic access to village resources, social economic services, cheaper transport from agriculture markets, better access to school and health facilities, access to a greater variety of consumer goods, reduction in rural poverty through income generating opportunity and administrative linkage to district and regional headquarters.

Roads are vital livelihood links for rural populations for improved access to markets, health care, education, employment and migration. When mobility is increased, there are possibilities of new economic opportunities, ultimately reducing economic vulnerability. However, mountain roads, especially when poorly constructed present particular challenges to sustainability, risk and governance (Sidle & Ziegler, 2012).

The explosions made during rural road construction shakes the fragile geology of the hills and thus destabilize the slopes during rainy season. This factor along with earthquake and climate

change contributes to the increasing number of landslides and casualties caused by it in Nepal McAdoo et al. (2018). McAdoo et al. (2018) further added China's Belt and Road Initiative (BRI) aim to construct three major trunk roads through the Nepali Himalayan regions, and from the present practice, it is clear that the adjacent communities will seek to join their place to these trunk roads through rural road tracks. Hence the trend is going nowhere in the near future but instead is likely to rise as the development continues.

Hence, the full benefits of such roads in mountainous areas should be questioned. The issue of poorly designed; poorly constructed and risky road conditions is not only in Panchthar District alone but also all hilly districts of Nepal is more of a political issue than a technical one. Nepal has already transitioned into a provincial system of governance which gives greater decentralization of power. This is a perfectly appropriate time period for the local and national administrations to move towards safer, suitable and more sustainable road development.

4.3.1 Ecology and Habitats

Fisher (2017) defines environment as all the conditions that influence and affect the development and sustainability of life of all organisms present on the earth, it is an immediate surrounding of living organisms in which it lives and operates. He further added, people are demanding the development without destruction, it is not just about biodiversity but also about the lives of humans and communities linked to the forest, water resources, irrigation, food security and future generations to coexist with respect.

Organisms and environment are interrelated and interdependent and any change in the environment affects the living organisms and vice-versa (Khadka, 2018). An ecosystem is the structural and functional unit of ecology, it is a community of living organisms along with the abiotic components interacting together through energy flows and nutrient cycles (Khadka, 2018).

Klappenbach (2018) defines the ecology as the study of the relationship between plants and animals (including humans) and their environment. Habitats are the places where plants and animals (including humans) live and where they can acquire adequate food, water, shelter and living space, every living thing has evolved and adapted to a specific range of environments where it is best capable of surviving and reproducing.

Dozer roads are known to contribute to or directly cause landslides and the remote communities relying on already precarious access to infrastructure are further isolated and endangered. Dozer road building doesn't just damage the landscape in the short-term, it makes those who rely on it in the long-term more vulnerable (Carlson, 2019).

The interview with one of the local disaster management committees of Panchthar District stated that

“After dozer development, many forest area has been destroyed and number of wild animals is decreased more than it was expected.”

According to the representative of district forest office of Panchthar District

“Some of the endangered animals has been disappeared, such as ‘SALAK’ and so on.”

The interview with one of the members of Panchthar Chamber of Commerce & Industries, there are some changes of habitats of wild animals can be seen due to the dozer development, according to him

“When the dozer destroys the forest, many wild animals & birds’ habitats are also destroyed.”

Coburn (2020) also sensitized with saying one important environmental concern is that the trade in endangered species in Nepal could significantly worsen as roads are carved into evermore remote areas. He added Nepal has long been known as a transit country for tiger skin, musk deer pods, and other endangered animal parts, typically carried from India on foot over Himalayan passes to pharmaceutical markets in China and Vietnam.

Earth's natural habitats are not only the home of countless plants and animal species, but they can be of much greater value for humankind. We can get economic and health benefits from them as they provide us with food and raw materials for medicine also, they help to filter air and water pollution. We can also benefit from its scientific understanding as we are getting to learn new things from various plants and animals which possess the possibility to better our lives. The observation and the interviews with the informants revealed that the ecology and habitats has affected negatively by dozerization.

4.3.2 Socio Cultural Impacts

The Cadmus Group (2018) expressed the development of new roads, or rehabilitation of existing ones, often improves personal livelihoods, access to educational opportunities and to social services, including health care, is often a key rationale for road improvements. The national transport policy was established in 2058 BS, which principal objective is to develop a reliable, cost effective, safe facility oriented and sustainable transport system that promotes and sustains the economic, social, cultural and tourism development of Nepal as a whole (Khatri, 2019).

The change in the road transportation scenario is the most visible change after dozer-driven development practice in the Panchthar District. Length of black top and gravel roads has increased in the district and more strikingly rural road tracks are opened at every other neighborhood. It has eased the human efforts needed to travel and minimized the cost of travelling. This in turn has improved the connectivity to and from the center to the remote areas.

People are happy to get connected with the centers. The rural life has been changed and people are pleased to have it. The reason behind is the minimal cost on construction and travel. It also has benefited by reducing the cost of the food and utilities. The use of dozer has increased the level of work at the low cost.

At the same time the area is put at the risk of construction driven disasters like landslide and floods. Some respondents argued that the people are forced to be displaced from their place of origin due to the consequences of the dozer driven development. It can also be seen clearly that hectares of fertile agricultural land have been messed up and ruined after using the dozers. Some respondents have said that landslides are the most visible changes after using the dozer in the name of development.

Contrary to the previous statement, The Cadmus Group (2018) opined, socio-cultural values however may also be altered, and the stability of communities adversely affected by exposure to social change. The group added, new road access can change how a place is used or valued, for example, increased hunting or fishing access may impact the food supply of local communities.

According to a participant who is temporarily residing in Phalelung, Panchthar,

“The temples and culture heritages are destroyed due to the road construction; people are migrating with the risk of landslide disaster and there are so many cultural and religious indigenous impact can be seen.”

According to the census of 2021 the population of Panchthar District shows that instead of population growth the district is facing the decreased population owing to migration together with other various factors which surely will have negative impact to the society with scarcity in human capital in the future. The table 3 shows data from various census.

Table 3

Recorded Population of Panchthar District

District	Population Census 1981	Population Census 1991	Population Census 2001	Population Census 2011	Population Census 2021
Panchthar	153,746	175,206	202,056	191,817	174,419

Note. The table demonstrate the population of Panchthar District according to the last five national censuses. The population in 1981 is of 153,746 and increasing up to the year 1991 but the population since 2001 is declining from 202,056 to 174,419 in 2021.

Source: Central Bureau of Statistics Nepal (web).

The abovementioned table shows that the population of the district is at decreasing ratio in last two decades. Though the causes might be of wide range, migration is seen as the major factor by many locals. This situation has basically two aspects, in one hand the indigenous people are migrating from the district and in other hand the imported culture from the outside world is replacing the distinct religious and cultural system of the district. One of the participants said

“Because of the road access the religious indignity followed by our ancestors are replaced by the western culture”.

Most of the participants in KII and FGD identified the immediate impacts of the disasters as destruction of property, loss of life, casualties and injuries, impaired public services and others. Panchthar District experienced number of disasters in recent five years. Landslide is the most

recurrent and disastrous disaster among the others. Table 4 shows the impact of Disaster from 2017-2022.

Table 4

Impact of Disasters (2017-2022) in Panchthar District

Disasters	Death	Missing	Affected Family	Estimated Loss	Injured
Landslides	37	6	91	7866000	13
Floods	1	1	20	1450000	1
Total	38	7	111	9316000	14

Note. This table demonstrate the disaster effects in Panchthar District from 2017 to 2022. Thirty-seven people were killed by landslides and one by the floods. Total seven people are still missing, 14 were injured where 111 families were affected. NPR 93,16,000 was estimated to be lost due to the duo disasters.

Source: District Risk Reduction portal, MoHA

Most of the participants of FGD conducted in Falelung village expressed the view that more than 25 percent of the migrated people from the village are due to the disaster they also added the fewer development progress and dozer development induces landslide and life-threatening condition causes the migration.

The discussion highlights, a conserving biodiversity, restoring ecosystems, hence are questioning incompetent governance. So, to make the development for the future generation the government and all the stakeholders need to be more serious on sustainable development pathways. The district is facing the loss of life, property and economic lost due to the disaster. The community also facing the displaced problem because of the high risk of disaster like landslides. Similarly, the religious and cultural indigenous practices are replaced by the influence of outer culture.

4.3.3 Economic Impacts

Creation of the employment opportunities have been the major objective of the development planning in recent days. Transport infrastructure provides a basis for economic activities in the rural areas in the long term. Roads bring the promise of increased access to natural resources and, in turn, to markets and trade for producers. A road by itself is but a disturbed piece of earth, but when connected with other roads, it becomes a link in a broader network (Coffin et al., 2021). They further added, road networks can open entire regions to trade, economic development, and new ideas and uses, and people often see roads as signs of progress, so it is no wonder that developing the road network is central to many socio-economic development objectives.

Prior to the 1960s, transport investment in general and road investment was regarded as indispensable to economic development. Transport is clearly a necessary ingredient of nearly every aspect of economic and social development. A rationale for public investment in rural roads is that households can better exploit agricultural and nonagricultural opportunities to employ labor and capital more efficiently.

Rural roads of Panchthar are found to reduce poverty significantly through higher agricultural production, lower input and transportation costs, and higher agricultural output prices at local village markets. Rural road development has also led to higher secondary schooling enrollment for boys and girls, as compared to primary school enrollment. The rural roads of Panchthar have also benefited the poor, meaning the gains are significant for the poor and in some cases disproportionately higher than for the nonpoor.

The local communities are directly benefitted by the rural roads. One of participants said

“Roads has made it easy for the villagers to sell their local product to the market.”

Similarly, another participant said that

“The rural roads have made it easy for us to look for jobs and go for jobs in the nearby districts.”

Another respondent however aggressively points out,

“When the process of road construction already destroys our fertile agricultural land then how can we produce enough crops to sell in the market? instead local people buy goods from market than producing themselves.”

The discussion demonstrates, a rapid industrialization is not viable in the district. Several studies have shown that road infrastructure is positively correlated with the economic development. Easy access to markets, get rid from the physical isolation and better access to other complimentary infrastructure like health, education, communication is vastly possible after the development of the roads. The road construction has made the market more accessible to the local product however the local production is at decline as the fertile agricultural lands are used for road construction and people are getting more dependent towards market product than their own production.

4.3.4 Environmental impact

Kapadia (2021) highlighted that it is now no secret that the human health is connected to the surrounding environment. Human health is in jeopardy with the air, water and land pollution. Increasing cases of cancer, outbreaks of infectious diseases etc. can be seen as the effects of poor environment upon human health. He further said our environment not only provides us food, but other natural resources provide basic things necessary for survival like clean air clean water, medicines and also clothing, wood, biofuels, fossil fuels, etc. Natural resources not only promote human survival but also enhance the living standards of people.

Environment friendly construction techniques, participatory and decentralization approach, optimum utilization of local resources, simple technology, local capacity building and self-help efforts justified green road approach as a best way of constructing rural roads in hill Districts of Nepal (Mulmi, 2009). There is high probability of a correlation between the expansion of the road network and increased erosion/deposition in the watershed. Finally, a few deep-seated and potentially very destructive failures were observed in the watershed, in large part triggered by road construction (Leibundgut, Penna, & Adhikari, 2015).

Coffin et al. (2021) also added however the road network is central to many socio-economic development objectives, yet roads alter and degrade the scenic and natural value of the landscapes. Which can affect the tourism development to the area.

The department of road and the mildhill road project of Panchthar district claim that the road development processes in Panchthar District are environment friendly but contrary to this the representative of Health Office Panchthar argues

“It occurs problem like landslide & disappeared water resources.”

The representative of Nepal Red Cross Society of Panchthar District, one of the representatives of Division Forest Office of Panchthar District and the representative of Infrastructure Development Office of Panchthar District have also the same version as the representative of Health office regarding dozer development and environment. They also focused the over exploitation of resources and extra excavation due to dozer development.

The construction of new roads may also introduce exotic or non-indigenous flora and fauna that may severely destabilize local plant and animal communities. Road access can also contribute to poaching and the trapping of endangered species or species with international trade value. High-speed roads can significantly raise animal mortality (The Cadmus Group, 2018).

The above discussion revealed that the environment of the district is deteriorating due to the haphazard road construction. The sources of natural water are getting dried out and the water and air pollution is noticed.

4.4 Security and Disaster Management Concerns

On an average the countries all over the world spend around only 20–50 percent of what they should be spending on maintenance of their road network. This shows a lack of interest and improper management system for road maintenance which need to be upgraded in order to achieve a better transportation system. The deterioration of the roads during heavy raining, snowfall, excessive hot weather & other seasonal effect along with natural calamities and human activities causes severe failure like cracking, distortion, bleeding or flushing, potholes etc. which impacts the road transport system and increase the chances of accidents (Sahoo et al., 2020).

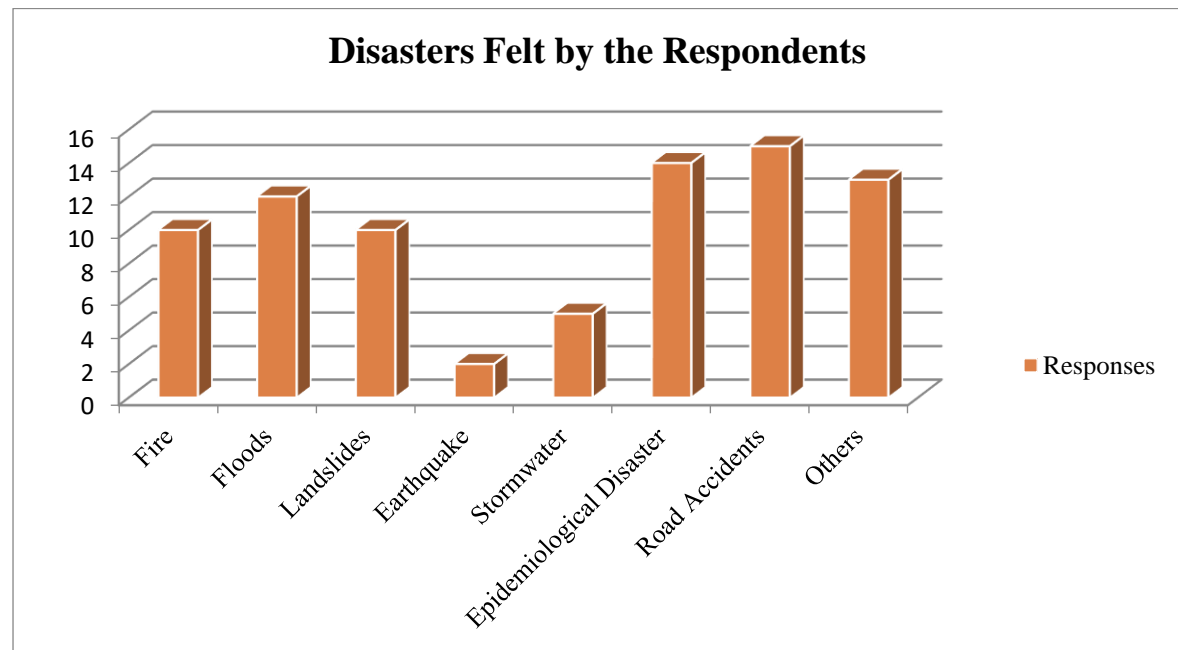
The Nepal Police recorded those 488 landslide incidents occurred across the country in 2020. A comparison of 337 visible landslide sites across 35 hill districts with the nearest road on Google Earth showed that 205 landslides (61 percent) had occurred near roads. The remaining

132 (39 percent) were on hills without nearby roads. A temporal analysis based on Google Earth images showed that since 2008, 179 of the 205 landslides (87 percent) had evolved following the construction of a road. The remaining landslides (13 percent), in contrast, were in existence before roads were built. This spatial relation between roads and landslides reinforces road building as an important causal factor for landslides in Nepal's hills.

Soil erosion is often caused by failing to keep water off road surfaces. Roads that cross hilly or steep terrain without following contours or minimizing grades are especially susceptible to erosion, as are roads that collect water and do not have enough side drainage to handle heavy precipitation or abnormal flooding (The Cadmus Group, 2018).

Nepal has always been one of the most landslide-prone countries in Asia. Between 1950 and 2009, the frequency of fatal landslides was highest in China, followed by Indonesia, India, the Philippines, Japan, Pakistan and Nepal. These seven countries accounted for 87 percent of the 17,830 landslide-related fatalities reported in Asia between 1950 and 2009, and 82 percent of the 267 reported landslides. Even so, the frequency of landslides in Nepal has been constantly increasing (Bhattarai, 2020).

The disaster management clusters have identified landslides and floods as the most recurrent disasters in Panchthar District. The Panchthar Chamber of Commerce believes that deforestation, and haphazard construction of road is the main cause of the disaster. Nepal Red Cross Society of the districts also has the similar opinions on the disaster. The increasing pattern of landslides water related disaster and epidemiological disasters is making the district more vulnerable. In the contrast, Mid-hill Road Project has identified the road traffic accident as the most recurrent disaster in the district. Flood and landslides are termed disasters by road department of the district. Health and sanitation cluster has the say that landslide, fire, and road accidents are the frequent disasters in the Panchthar Districts. Education cluster has mentioned the COVID-19 as one of the most vulnerable disasters in the district. Figure 4 shows the most disasters felt by the respondents of field visit.

Figure 4*Disaster Felt by the Respondents*

Note. This figure explains the disaster felt by the respondents in the Panchthar District. Out of 76 respondents, majority people considered road accident and land slide as the major disaster.

Source: Researcher, 2022

Most of the respondents experienced some sort of disaster in their lifetime. Road traffic accident, epidemiological disasters, floods, landslides are the most felt disasters. The DDMC members also identified the landslides, flood and earthquake as the prominent disasters that may create the vulnerability of the Panchthar District. However, fire and road traffic accident are also seen fatal in the district. Both the road accidents and the landslides are considered as the consequences of poor road condition without proper design and alignment.

The Figure 5 shows the condition of landslide in Panchthar District and the Figure 6 shows the land slide on 1st July 2022 in Phalelung Rural Municipality-7, Bidin of the district where three people lost their lives.

Figure 5

Land Slides in Panchthar District



Note. The figure is a photograph of Panchthar that displays the density of landslide in a single frame.

Source: Bhim Banskota, Panchthar (Annapurna Post Daily)

The record of DEOC Panchthar last year says that 344 houses were destroyed by the flood and landslide. At the same time 1392 households were partially destroyed and 37 houses are at the risk of collapse. Domestic animals worth NPR. 2,74,00,000 was swept away. Loss of human life is the major tragedy brought by the last years' flood/landslide disaster. Water and Sanitation Division recorded the loss exceeded the cost of NPR 1,99,969 in their infrastructure. Total of 87,760 people of 17,653 households were victimized because by the landslide and flood. The focus group discussion was conducted in Phalelung Village municipality ward no. 7, Sidin, where the landslide hit and swept the houses causing loss of three people's life including the property damaged, one of the participants expressed his view that,

“However, the rural road construction making the transportation easy, but road making without proper engineering and ignoring the ecology the villages are in risk of landslide disaster and people are living their life in high threats.”

Another participant from same District says,

“The road construction is making life easier for transportation, but the life and the agriculture products are in threat.”

Figure 6

Land Slide in Phalelung



Note. The figure shows the landslide of Falelung which claimed three human lives.

Source: Researcher, 2022

Before completion of any road projects, it has the problem of falling apart because of negligence of the contractor company, lack of proper foundation and uses of substandard materials in the construction process. Three people had lost their life after the landslide triggered by incessant rainfall on 1st July 2022 swept away the house of Dal Prasad Magar, 71, in Phalelung Rural Municipality-7, Bidin of the district according to Suresh Neupane, the Chief District Officer (CDO) of Panchthar District.

According to the members of District Disaster Management Committee as well as the district security committee, landslide and floods are often in Panchthar District, the security personnel of all security agencies have been engaging in rescue operation specially in rainy season. However, they are mobilizing with their resources and taking speedy action through

coordination among all stakeholders, but the material has been provided by the local government are not sufficient.

The committee also highlights; however, the development of road network seems satisfactory which connect the villages, but the risk of landslide and road accident has also been increased in the area. The landslide and the road accident making the area most vulnerable after increased of dozer use.

Interview with the district disaster management committee revealed that there are issues of property destruction, life losses, human injuries, effects on animal husbandry and the closure of schools due to the disaster. They also disclosed the sad story of people being displaced due to the lack of food and health care facilities to the victims.

The committee often conducts the simulation exercise, recently on 1st of July 2022 morning on the same day the landslide occurred in Falelung village municipality where they lost the life of three people, the combined simulation exercise was conducted for disaster response, it shows that the security agencies are highly engaged in disaster response and rescue, preparing the contingency plan for possible disaster in the area, the plans of disaster response are reviewed periodically, and the training and mock drills are organized in yearly basis.

The committee also highlighted the possibilities of riot during the relief distribution due to the irregularities. The district security committee specially the security agencies working in the area highlighted that, the road construction and widening the roads in the district is increasing day by day, it has the positive on social changes and life of the people but the increased use of dozer without proper assessment creating the area much vulnerable with the landslide possibilities. There are so many cases faced by the security agencies in response and rescue operations. The unassessed rural roads in one hand creating the havoc situation causing human lost, property damage, environment lost, human displacement, cultural damage and in another hand possibilities of riot in the area are the human security concerns in Panchthar District.

District Disaster Management Committee of Panchthar District holds a concrete plan on disaster management. The detailed plan has earmarked the roles and responsibilities of all stakeholders/clusters. Disaster Preparedness and Response Plan (DPRP), Monsoon Disaster Management Plan, and Cold wave management plans are prepared and implemented effectively. However, the lack of resources was seen in the field at the time of action for effective implementation of the plan. To overcome this shortcoming mock drill to test the plans

were also conducted. Every year the DDMC conducts simulation exercises (SimEx) to test the plans. Local levels are failing to prepare Local Preparedness and Response Plan (LPRP) that is the great setback identified during the visit.

DDMC and other stakeholders are active in conducting the trainings. Emergency first aid, light search and rescue, dead body management after disaster, community early warning system, Community Access for Disaster Response (CADRE), Collapsed Structures Search and Rescue (CSSR) are a few trainings to name but not all.

The discussion concludes, there are several issues in disaster and security due to the haphazard road construction. The frequently occurring landslides in the district is making human security more vulnerable. The road itself has become the cause of landslides which is the cause of death and destruction. On the other side poor road condition makes the rescue operation more challenging and engaging to the security forces.

4.5 Thematic Summaries of Corresponding Interview Narratives

The relationship between transport and development has defied simple synthesis and remains paradoxical. Transport is clearly a necessary ingredient of nearly every aspect of economic and social development. The over-riding impression gained from reviewing available impact studies is of the paucity of evidence on the effects of road investment programs on rural incomes and income distribution.

Because of the road access spiritual values set by our ancestors are gradually replaced by the western culture. Cultural heritages are destroyed while road construction, people are forced to migrate due to the risk of landslide disaster and many cultural and religious indigenous practices are left behind. Although road accessibility offers educational opportunities and social services, including health care poor road access instead degrades livelihood opportunities.

Roads play a central role in rural development, yet little is known about the size and distribution of benefits from such investments. The empirical analysis, using data from Panchthar, suggests that providing extensive road access to markets would confer substantial benefits on average, much of these going to poor households. Road construction is making life easier by transportation facility and the reduced cost of food and utilities, but human life and local

agricultural products are threatened. However, the benefits would not be large enough or targeted efficiently enough to appreciably reduce income inequality in the population.

Haphazard road access degrades the environment, aesthetics, and tourism. During road construction, the cutting of slopes and consequently spoil management result in erosion and landslide. Furthermore, it also causes water pollution to the nearby water sources. The sedimentation and the consequences are increasing the risk of more disaster in the downstream.

Recent loss of three life due to a landslide induced by poor road construction and the negligence of the contractor is evidence. In another hand, people are forced to be displaced from their place of origin due to the consequences of the dozer-driven development further leading to loss of property, life, injuries, animals, and closure of schools. Constructing more roads without proper engineering and ignoring the ecology of the villages puts them at risk of landslide disaster hence people are living in vulnerabilities. Landslides are visible changes caused by using dozer in development. The rural road network connects villages at the cost of risk of landslide and road accidents. The landslides and the road accidents made the area most vulnerable after increased dozer usage. (See Appendix 'C')

CHAPTER FIVE

SUMMARY AND CONCLUSION

5.1 Summary

The district selected for the research paper is Panchthar district which is one of the remarkable districts for the study, as the district heavily followed the development activities using dozerization for rural access to the road. This research paper was focused on the outcomes of rapid and inconsiderate dozer development in the district in the sectors of environmental, social, economic and other aspect of culture and religion along with the traditional subsistence occupation of the society.

The study was based on the data collected through community participants, focused group discussions, direct observation and document analysis. The relevant literature available on the subject matter was also assessed for the theoretical understanding of the development practice of Nepal over years. The research was mainly focused on situation of road construction in Panchthar district, the excessive use of dozer for rural road connectivity and the issues raised by it in the development sustainability and the challenges brought by dozer development upon the security forces and local authority for the risk and disaster management. After the assessment of the derived findings and discussions the researcher's observations are summarized as follows.

5.1.1 Panchthar District at Glance

Panchthar is an ethnically diverse district where Limbu is the major ethnic population. Brhamins, Kshetris, Rai, Newar, Sherpa, Gurung, Damai and Kami group are also significantly present and follow their own cultural, religious and traditional practices. All the ethnicities coexist peacefully in the district.

People of the district depend upon agriculture for maintaining their livelihood. Most of the household is engaged in farming and livestock rearing. Tourism and production of medicinal herbs are the other economic activities. People also travel to other part of the country and world for jobs. The district maintains an average income level.

5.1.2 Road Construction

After the advent of multiparty democracy in 1989 the demand for rural road construction went high and after the country transitioned into provincial governmental system the road construction spree has been ever growing. The three-tiered governmental system gave more power and budget to local governments which they fully exercised for rural road construction.

One municipality and seven village municipalities of Panchthar district are engaged in different developmental activities where in the dozer driven road construction tops the priority list. It has eased the daily life of people by increasing the connectivity and opening the vast opportunities.

5.1.3 Dozerization and Sustainability

Urban-rural linkages are considered as the backbone of development with cheaper transport better access and income generating opportunities. Such linkages are only possible when there is availability of sufficient roads. But the construction of rural roads being practiced in Panchthar district can be considered as dozerization which does not follow the sustainable principle and environmental assessment. These practiced roads construction in Panchthar district have few positive impacts and more negative to the ecology and habitat, socio-cultural, economy and environment which are adverse to the sustainable development.

5.1.4 Disaster and Security

Nepal has always been one of the most landslide prone countries in Asia which accounted more landslide related fatalities, and the frequency has been constantly increasing. Panchthar district is identified as much vulnerable to landslides and floods. Road accident is also one of the increased life-threatening disasters. The accounted disasters caused loss of lives and property.

The security agencies working in Panchthar district are highly engaged to cope up pre and post disaster operations with their limited resources. In one hand the hapazardous road became the cause of disaster and on the other hand such roads are making rescues operation more challenging to the security forces or other stakeholders to response. The disaster itself is making the economic loss to the people and the government and the response operations become more expensive and challenging to the responsive authorities.

5.2 Conclusion

The issue of poorly designed and constructed risk-prone road conditions in Panchthar District is a political issue although often related to development. The access road construction requires regulatory compliance mainly environmental and Social Impact Assessments linked to Nepal Sustainable Development Goals. Rural road access offers the possibility of better lives, but the ecology and habitats have been affected negatively by dozerization. Conserving biodiversity, and restoring ecosystems, are questioning the incompetent governance. So, to make the development for the future generation the government and all the stakeholders need to focus on sustainable development pathways.

The district is facing the loss of life, property, and economy because of recurring disasters. The community also faces displacement based on landslides and acculturation of spiritual and indigenous practices. The frequently occurring landslides in the district are making human security more vulnerable. The road itself has become the cause of landslides which is the cause of death and destruction. On the other side, poor road condition makes the rescue operation more challenging and engaging for the security forces.

Road constructions have made the market more accessible to the local product however the local production is in decline as the fertile agricultural lands are used for road construction and people are getting more dependent on the market for survival. The environment of the district is deteriorating due to the haphazard road construction. The sources of natural spring water are getting dried out and water and air pollution is noticed. The rural road condition can be useful to the community if the proper assessment and policies are adopted and implemented in the district with due respect to livelihoods and ecology.

REFERENCES

- Aryal, S. (2021, May 9). *Road development in Nepal: A brief insight*. Retrieved July 16, 2022, from <https://sumitaryal.com.np/road-development-in-nepal-a-brief-insight/>
- Asher, D. (2019, April 22). *The origins and evolution of sustainable development concepts*. Retrieved July 16, 2022, from <https://www.linkedin.com/pulse/origins-evolution-sustainable-development-concepts-dillion-asher>
- Baffoe, G., Zhou, X., & Monimuddin, M. (2021, July 1). Urban–rural linkages: effective solutions for achieving sustainable development in Ghana from an SDG interlinkage perspective. *16*(4), 1341-1362. doi:10.1007/s11625-021-00929-8
- Bhattarai, K. D. (2020, October 3). *Why are landslides occurring with more frequency in Nepal*. Retrieved May 8, 2022, from <https://theannapurnaexpress.com/news/why-are-landslides-occurring-with-more-frequency-in-nepal-2819>
- Blaikie, P. M., Cannon, T., Davis, I., & Wisner, B. (1994). *At risk: natural hazards, people's vulnerability and disasters*. New York: Routledge.
- Budhathoki, D. P. (2021, June 4). *Development in Nepal: Keep head on horizon and hands on land*. Retrieved July 21, 2022, from My Republica: <http://myrepublica.nagariknetwork.com/news/111827/>
- Carlson, D. (2019, September 3). *The Himalayan Times*. Retrieved May 8, 2022, from <https://thehimalayantimes.com/opinion/the-road-to-disaster-dozer-use-causing-landslides>
- Childress, H. (2022, August 24). *What is engineering economics*. Retrieved August 26, 2022, from <http://www.smartcapitalmind.com/what-is-engineering-economics.htm>
- Chitrakar, A. (2019, May 16). *Dozers and Nepal's development*. Retrieved May 8, 2022, from <https://www.nepalitimes.com/opinion/dozers-and-nepals-development/>
- Claxton, M. (1994, February 1). *Culture and development: a study*. Retrieved from [http://lst-iiiep.iiiep-unesco.org/cgi-bin/wwwi32.exe/\[in=epidoc1.in\]?t2000=004566/\(100](http://lst-iiiep.iiiep-unesco.org/cgi-bin/wwwi32.exe/[in=epidoc1.in]?t2000=004566/(100)

- Coburn, B. (2020, January 2). *Nepal's road-building spree pushes into the heart of the himalayas*. Retrieved May 9, 2022, from <https://e360.yale.edu/features/paving-the-himalayas-a-road-building-sprees-rolls-over-nepal>
- Coffin, A. W., Ouren, D. S., & Bettez, N. D. (2021, June). The ecology of rural roads: Effects, management & research. (23), 36. Retrieved July 29, 2022, from https://www.esa.org/wp-content/uploads/2021/06/IIIE_24-Rural-Roads.pdf
- Dahan, O., & Goykhman, A. (2009, August 26). *The Importance of Green Roads | Greenbiz*. Retrieved July 29, 2022, from <https://www.greenbiz.com/article/importance-green-roads>
- Dixit, A., Neupane, S., Bhandari, D., & Acharya, B. K. (2021, April). *Political economy of 2020 landslides, road construction and disaster risk reduction in Nepal*. Retrieved August 2022, 2022, from <https://reliefweb.int/report/nepal/political-economy-2020-landslides-road-construction-and-disaster-risk-reduction-nepal>
- Egelston, A. E. (2012). *Sustainable development: A history*. Springer Science & Business Media.
- Fisher, M. R. (2017). Environment & sustainability. Retrieved August 25, 2022, from <https://openoregon.pressbooks.pub/envirobiology/chapter/1-3-environment-sustainability/>
- Fontanez, D. R. (2020, July 17). *Rural roads and bridges: Why they're important*. Retrieved 07 21, 2022, from U.S. Bridge: <https://usbridge.com/rural-roads-and-bridges/>
- Fukubayashi, Y., & Kimura, M. (2014, February 1). Improvement of rural access roads in developing countries with initiative for self-reliance of communities. *54*(1), 22-35. doi: 10.1016 / j. sandf. 2013.12.003
- Ghimire, S. (2000, January 1). Development of roads in Nepal. *Hokudai Bishauni*. Retrieved July 16, 2022, from https://www.academia.edu/860568/Development_of_roads_in_Nepal
- Group, T. C. (2018, May). Sector environmental guidelines: Rural roads. 49. Retrieved August 17, 2022, from https://www.usaid.gov/sites/default/files/documents/1860/SectorEnvironmentalGuidelines_RuralRoads_2018.pdf

- Gunatilake, H. M. (2013). *Cost-benefit analysis for development: a practical guide*. Manila, Philippines : Asian Development Bank.
- Hayes, D. (2022, August 4). *What is cost-benefit analysis*. Retrieved August 23, 2022, from <https://www.investopedia.com/terms/c/cost-benefitanalysis.asp>
- Hearn, G. J., & Martin, R. P. (2022, March 3). The performance of the Dharan-Dhankuta road, east Nepal. *81*(4), 132. doi:10.1007/s10064-021-02514-w
- Hettige, H. (2006). *When do rural roads benefit the poor and how?* Metro Manila, Philippines : Operations Evaluation Dept., Asian Development Bank.
- Highways, W. (2014, March 12). *Nepal plans road infrastructure expansion*. Retrieved July 16, 2022, from World Highways
- Jacoby, H. G. (1998, December). Access to markets and the benefits of rural roads. 37.
- Kapadia, F. (2021, June 3). *The connection between environment and human health*. Retrieved August 22, 2022, from <https://socialdhara.com/the-connection-between-environment-and-human-health/>
- Khadka, G. (2018). Provincial status of economic activities in Nepal. *9*(8), 8.
- Khatri, S. (2019, May 4). Rural roads development in Nepal. Retrieved August 4, 2022, from <https://www.slideshare.net/SunilKhatri29/rural-roads-development-in-nepal>
- Klappenbach, L. (2018, March 7). *How animals are shaped by their environment*. Retrieved August 25, 2022, from <https://www.thoughtco.com/animals-and-their-environment-130920>
- Klappenbach, L. a. (2018, March 7). How animals are shaped by their environment. Retrieved August 25, 2022, from <https://www.thoughtco.com/animals-and-their-environment-130920>
- Leibundgut, J., Penna, I., & Adhikari, A. (2015, April 1). Phewa Lake watershed, Western region, Nepal. Retrieved August 3, 2022, from <https://ui.adsabs.harvard.edu/abs/2015EGUGA.17.8996L>

- Lut, D. (2020). Environmental aspect of sustainable development. *Tourism and Sustainable Development Conference*. Timisoara.
- Majerova, V. (2015, May 1). Social aspects of rural community development. *12*. doi:10.1515/aree-2015-0003
- Mannan, S. (2012). *Lee's loss prevention in the process industries: hazard identification, assessment, and control* (4th ed.). Amsterdam: Elsevier Butterworth-Heinemann.
- Mausam. (2016, July 29). *Haphazard road construction puts settlements at risk*. Retrieved May 9, 2022, from <https://thehimalayantimes.com/nepal/haphazard-road-construction-puts-settlements-risk>
- McAdoo, B. G., Quak, M., & Gnyawali, K. R. (2018, November 30). Rads and Landslides in Nepal: How development affects environmental risk. *18*(12), 3203-3210. doi: 10.5194/nhess-18-3203-2018
- McGee, M. (2022, June 16). *What is engineering economic analysis*. Retrieved July 16, 2022, from <http://www.smartcapitalmind.com/what-is-engineering-economic-analysis.htm>
- MoPIT. (2020, November 23). *Ministry of Physical Infrastructure and Transport*. Retrieved August 27, 2022, from <http://www.mopit.gov.np/content/97/2019/43280716/>
- Mulmi, A. D. (2009, July 31). Green road approach in rural road construction for the sustainable development of Nepal. *Journal of Sustainable Development*, *2*(3), p149. doi: 10.5539/jsd.v2n3p149
- Patley, D. (2019, September 3). *The tyranny of dozer road building*. Retrieved July 3, 2022, from <https://blogs.agu.org/landslideblog/2019/09/03/dozer-roads/>
- Peet, R., & Elaine, R. (2009). Theories of development: contentions, arguments, alternatives. In R. E. Richard Peet, *Theories of development: contentions, arguments, alternatives* (2nd ed., p. 324). New York, America: Guilford Press.
- Pettinger, T. (2021, September 23). *Difference between economic growth and development*. Retrieved August 5, 2022, from Economics Help: <https://www.economicshelp.org/blog/1187/development/economic-growth-and-development/>

- Pokhrel, M. (2018, February 4). *Elected contractors*. Retrieved July 16, 2022, from <http://archive.nepalitimes.com/article/from-nepali-press/Elected-contractors,4182>
- Pokhrel, R., & Acharya, S. R. (2015). Sustainable transport development in Nepal: Challenges, opportunities and strategies. *Journal of the Eastern Asia Society for Transportation Studies*, 11, 19.
- Poudel, N. (2014, October 16). Overview of rural road development in Nepal. Retrieved August 4, 2022, from <https://www.slideshare.net/nabaraj101/overview-of-rural-road-development-in-nepalclass-presentation>
- Rai, B. (2020, November 10). *Across Nepal's mid-hills, unplanned roads are leading to more landslides and more deaths*. Retrieved May 10, 2022, from [https://www.recordnepal.com / across-nepals-mid-hills-unplanned-roads-are-leading-to-more-landslides-and-more-deaths](https://www.recordnepal.com/cross-nepals-mid-hills-unplanned-roads-are-leading-to-more-landslides-and-more-deaths)
- Rai, O. A. (2018, February 9). Bulldozing democracy. Retrieved July 16, 2022, from <http://archive.nepalitimes.com/article/nation/bulldozing-democracy-in-nepal,4184>
- Robson, E., Utili, S., Milledge, D., & Upadhyay, N. (2021). Road slope stabilisation in Nepal: stakeholder perspectives. Retrieved August 26, 2022, from https://www.researchgate.net/publication/350705397_Road_slope_stabilisation_in_Nepal_stakeholder_perspectives
- Rubi. (2021, July 11). <https://tameduin.com/sanskritization/>. Retrieved July 6, 2022, from <https://tameduin.com/sanskritization/>
- Sahoo, D., Choudhury, S. P., & Shah, P. (2020). Urban road maintenance management & repairing techniques.
- Shah, S. (2013, September 30). *Development: Meaning and concept of development*. Retrieved May 9, 2022, from [https://www.sociologydiscussion.com /society / development-meaning-and-concept-of-development/688](https://www.sociologydiscussion.com/society/development-meaning-and-concept-of-development/688)
- Sidle, R., & Ziegler, A. (2012). The dilemma of mountain roads. doi:10.1038/NGEO1512
- Sing, B. P. (2018, July 6). *From nowhere to nowhere*. Retrieved July 16, 2022, from <https://www.nepalitimes.com/banner/from-nowhere-to-nowhere/>

- Sudmeier-Rieux, K., McAdoo, B., Devkota, S., Rajbhandari, P. C., Howell, J., & Sharma, S. (2019, March 29). Invited perspectives: Mountain roads in Nepal at a new crossroads. *Natural Hazards and Earth System Sciences*, 19(3), 655-660. doi: 10.5194/nhess-19-655-2019
- UNFCU. (2022). *UN digital library Nepal*. Biratnagar, Nepal. Retrieved August 22, 2022, from <https://un.info.np/Net/NeoDocs/View/1261>
- Upreti, G., & Upreti, B. R. (2016, August 30). Linking migration, mobility, and development for strengthening adaptation to climate and disaster risks: Reflections from Nepal. Springer International Publishing. Retrieved August 5, 2022, from https://doi.org/10.1007/978-3-319-33880-4_9
- Willsher, I. (2022, May 17). *What is Sustainable Development and Why Is It Necessary?* Retrieved July 14, 2022, from <https://utopia.org/guide/what-is-sustainable-development-and-why-is-it-necessary/>
- Xiaofeng, L., Siwei, L., & Yue, Y. (2021). Analysis of the impact of highway construction related to social and environment. 233, 01113. doi:10.1051/e3sconf/202123301113

APPENDICES

APPENDIX 'A'

(Referred to page no 7)

Open-ended Questions for KII

Personal Details

Name:	Sex:	Age:
Organization:		Respondent's Code: (<i>Researcher will fill it</i>)
Address:		_____

All details will be kept confidential.

Part 1

Objective 1: Analyze the linkages of dozer and development for rural road access in Panchthar District.

1. Please explain the ethnic diversity of the district.

.....

2. Please explain the income level and source of the local people.

.....

3. Please explain what the development infrastructure situation is of the decade.

.....

4. Please explain how the social changes is undergoing in the district in the decade.

.....

5. Please explain the local disaster you experienced in your lifetime.

.....

If yes, indicate the types of disasters that you have experienced

a. Fire

e. Floods

- b. Landslide
 - c. Stormwater
 - d. Road accident
 - f. Earthquake
 - g. Epidemiological disaster
 - h. Other (specify).....
6. Please explain the most vulnerable disasters in your area.
-
7. How is the road construction carried out in the district?
- a. Manual
 - b. Using heavy equipment with detail survey
 - c. Using heavy equipment without detail survey
 - d. Haphazardly
8. Is dozer helpful in rural road construction?
- a. Useful
 - b. Partially
 - c. Not useful
9. Does the use of dozer give more benefit or loss to the community?
- a. Benefited then how.....
 - b. Loss than how.....
10. What is the condition of constructed road?
- a. Has side drainage
 - b. Has maintained slope gradient during construction
 - c. Has no side drainage
 - d. Has not maintained slope gradient during construction
11. What are the changes you feel in your surroundings after dozer development
-

Part 2

Objective 2: Identify impacts of Dozerization on development sustainability in Panchthar District.

1. Please explain the visible changes after dozer-driven development in this district.
-

2. Please explain what the immediate reactions of the local and district level authorities were before and after increased dozer use.

.....

3. Please explain the most vulnerable disaster this district before and after increased dozer use.

.....

4. Please explain the immediate reactions of the authorities after the disaster.

- a. Quick response of the scene
- b. Evacuation of students
- c. Panic and confusion
- d. Curious onlookers
- e. Other (specify)

5. Please explain your role during the disaster such as the following.

- a. Co-ordination of the exercise
- b. Sounded the alarm
- c. Contacted the emergency numbers
- d. Evacuation
- e. First aid
- f. Other (specify)

6. Please explain the immediate impacts of the disaster such as the following.

- a. Destruction of property
- b. Loss of life
- c. Human injuries
- d. School closure
- e. Other (specify)

7. Please explain the disaster management plans of district?

If yes, what are its core highlights?

.....

8. How often are the plans reviewed by local authorities?

.....

9. How frequently have you organized training and mock drills?

.....

10. How frequently have your local government organized workshops/seminars for local people?

- a. Very frequent
- b. Frequent
- c. Rarely
- d. Never

11. Please mention the training conducted for disaster management in the district during your tour of duty.

.....

Part 3

Objective 3: Determine the security and disaster management concerns of dozer development in Panchthar District.

1. How deeply familiar with disaster preparedness tools such as evacuation?
2. How were security forces involved in the disaster response in district and which one played a prominent role?

- a. Nepal Police
- b. Nepali Army
- c. Armed Police Force

3. Please explain past experiences with the social conflict in this district after the disaster.

.....

4. Please explain possible social unrest during the disaster response.

.....

5. Please explain how often the rural roads repair and maintain by the local government or other government authorities such as the following? (Only for LDMC).

- a. Very regular
- b. Regular
- c. Rarely
- d. Immediately after disaster
- e. Never

6. Please explain the roles of disaster management committee during the disaster (only for DDMC team).

.....

7. Please explain how early warning mechanisms in your district are placed.

.....

8. Please explain how disaster management types of equipment (e.g., First aid kit, fire extinguisher, rope, shovel, emergency light, stretcher, go-go bag, etc.) are provided by the local government. (Only Cluster Heads to answer)

.....

9. Please explain how district placed safety guidelines during the disaster.

.....

Part 4

1. How the road Construction is carried out in the District/Local level (Contractors to answer) (Contractors/DDMC to answer)

- a. Manual
- b. Using heavy equipment with detail survey
- c. Using heavy equipment without detail survey
- d. Using heavy equipment with the help of operator (Driver engineer)

2. What is the condition of constructed road? (Contractors/Individual/Stakeholders)

- a. Has side drainage
- b. Has maintained slope gradient during construction
- c. Has no side drainage
- d. Has not maintained slope gradient during construction

3. What is the status of landslides (induced by new construction) along the constructed road?

- a. No landslides are induced due to construction of road
- b. Landslides are increasing

4. In what frequencies the landslides are occurring

- a. Occur all the time
- b. Occurs when it rains
- c. No landslides are observed

5. Are the landslides repeating in the area?

- a. Yes
 - b. No
 - c. Don't know
6. Do you think disasters related to landslides are increasing after the dozerization?
- a. Yes
 - b. No
 - c. Don't know
7. How is the debris managed? (Disaster Management Committee to answer)
- a. Managed well
 - b. Not managed
 - c. No problem of debris
8. Is there any significant loss due to the construction induced disaster?
- a. Yes
 - b. No
9. What kind of significant loss is observed?
- a. Loss of life
 - b. Loss of property
 - c. Environmental lost
 - d. All the above
10. Do you notice any cultural loss due to road constructions in the area?
- a. Yes
 - b. No
 - c. If yes, please specify...
11. Do you think dozer-development is environment friendly?
- a. Yes
 - b. No
 - c. Don't know
 - d. If no, please specify how

12. Is there any change of habitant of wild animals after dozer-development?
- a. Yes
 - b. No
 - c. Don't know
 - d. If yes, please specify

FGD Questions

1. How much road(km) is constructed in your municipality/ward in the last decade?
2. What is the status of migration in your community?
3. What disasters have you come across?
4. What is the daily life after the road construction?
5. How quick is the response by the security forces during disaster?
6. How frequent the occurrence of the landslide after the road construction?
7. Has the landslide repeated itself in the same place?
8. Do you think the landslide increased after dozer use?
9. What kind of losses you have faced caused by landslide?
10. Has the road construction effected your cultural aspect?
11. Mention if any other issues.

APPENDIX 'B'

(Referred to page no 25)

Respondent Interview & FGD Consent Letter

Dozer and Development in Panchthar District, Nepal

IRB Approval: ...

APF Command & Staff College, Sanogaucharan, Kathmandu

Dear...

Thank you for your participation in this focus group, which is a component of thesis of my APF Command & Staff course, intended for better understanding in the topic of Dozer and Development in Panchthar District, Nepal.

Its primary goal is to obtain information regarding the development pathways that have been practicing in access road to the rural areas of Panchthar District. A series of discussion question will be asked and recorded. You may withdraw from participation at any time or refuse to answer that make you uncomfortable. All recordings will be used as primary data.

Your responses are confidential, and your names will never appear in the thesis or pseudonyms will be used as identification if required. The written notes and official transcripts will be kept for two years at the university with my advisor, Dr. Naresh Rimal.

This study has been approved by the Institutional Review Board-TU, MSDPS. For any study related issues, you can contact DS coordinator DSP Binod Raj Khanal, APF Command & Staff College, Sanogaucharan, Kathmandu at 009779851045778. If you have any other questions or concerns, please do not hesitate to contact SSP Krishna Dhakal at 009779851187700) or via email: callmedhakal@yahoo.com

Thank you. Your cooperation is highly appreciated.

SSP Krishna Dhakal

Student Officer

6th Command and Staff Course

APF Command & Staff College, Sanogaucharan, Kathmandu

APPENDIX ‘C’

(Referred to page no 46)

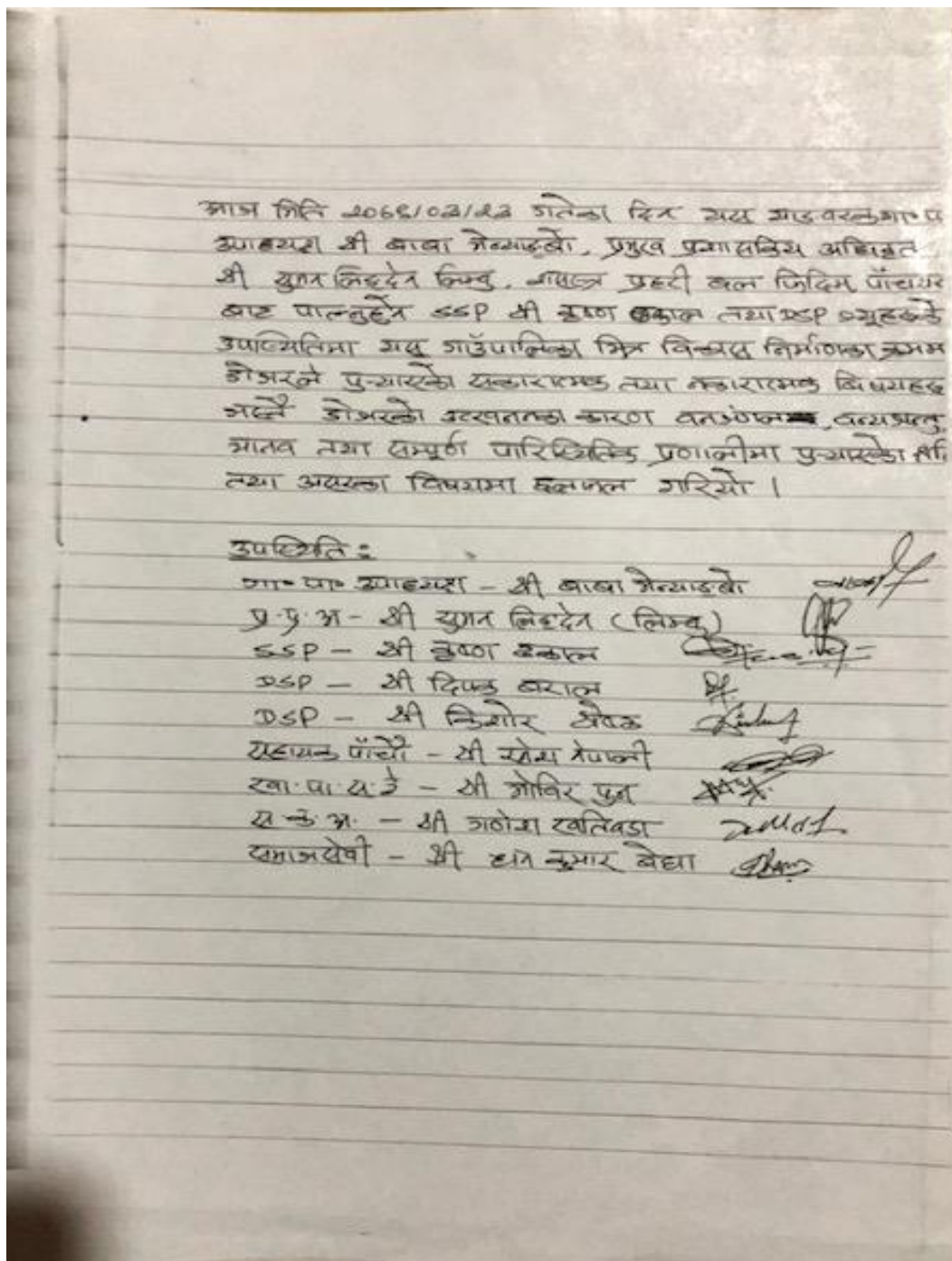
Thematic Summaries of Corresponding Interview Narratives

Thematic Summary	Participants Narratives
Loss of social capital (spiritual, cultural, and traditional practices)	<ul style="list-style-type: none"> • Because of the road access spiritual values set by our ancestors are gradually replaced by the western culture. • Culture heritages are destroyed while road construction, people are forced to migrate due to the risk of landslide disaster and many cultural and religious indigenous practices are left behind. • Although road accessibility offers educational opportunities and social services, including health care poor road access instead degrades livelihood opportunities.
Poor environmental management and assessment	<ul style="list-style-type: none"> • Haphazard road access degrades the environment, aesthetics, and tourism. • During road construction, the cutting of slopes and consequently spoil management result in erosion and landslide. Furthermore, it also causes water pollution to the nearby water sources.
Deficit of interagency coordination and evaluation	<ul style="list-style-type: none"> • Security agencies are engaged in disaster response and rescue, preparing the contingency plan for increased disasters in the area. • Poor construction compliance. • Security agencies mobilize resources for speedy action through coordination among all stakeholders, but the material resources provided by the local government are not sufficient.
Leading to poor and risky livelihood trajectories	<ul style="list-style-type: none"> • Road construction is making life easier by transportation facility and the reduced cost of food and utilities, but human life and local agricultural products are threatened. • Recently we lost 3 people’s life due to a landslide caused by poor road construction and the negligence of the contractor, the life of Falelung people is miserable. • People are forced to be displaced from their place of origin due to the consequences of the dozer-driven development further leading to loss of property, life, injuries, animals, and closure of schools
Increased recurrence of disaster	<ul style="list-style-type: none"> • Rural road construction makes transportation easy but making roads without proper engineering and ignoring the ecology of the villages puts them at risk of landslide disaster hence people are living in vulnerabilities. • Landslides are visible changes caused by using dozer in development. • The rural road network connects villages at the cost of risk of landslide and road accidents. The landslides and the road accidents made the area most vulnerable after increased dozer usage.

APPENDIX 'D'

(Referred to page no 24)

Meeting with Stakeholders



Focused Group Discussion



Key Informant Interviews



Meeting with the Stakeholders

