DISASTER RISK MANAGEMENT IN AFGHANISTAN: EXPLORING THE POSSIBLE IMPLICATIONS OF CLIMATE CHANGE.

A Thesis By

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ABSTRACT

Afghanistan is prone to intense and recurring natural hazards, the country has a typical inland climate, arid and semiarid steppe with hot summers and cold winters the cycles of dry and wet season pose serious problems in the country and often caused disaster in the obscence of prepartory measures with high level of vulnerablity and greatest lack of adaptive and coping capacities.

Afghanistan is a signatory to the Sendai Framework for Disaster Risk Reduction (2015-2030) and Hyogo Framework for Action 2005-2015 (HFA). However, the disaster risk reduction and resilience strategy has not been incorporated in to Afghanistan National Development Strategy (ANDS) a strategy and policy paper for Security, Governance, Economic Growth and Poverty Reduction.

This thesis investigates disaster risk management in Afghanistan, exploring particularly the possible implications of climate change on natural disaster.
In this study the researcher focuses on the following issues:

1, Natural hazards and disaster risk profile of Afghanistan.

2, Climate change and its implication on disaster occurrence in the country.

3, Legal and institutional arrangement for disaster risk reduction (DRR) and resilience building in Afghanistan and their effectiveness.

4, Review the role and functions of ANDMA, gap analysis and provide specific recommendations to improve DRR activities and resilience building in the country.

The method used for the research and writing this thesis report consist of the field visit, interviews with relevant authorities and affected communities, and revision of policies, scientific literature and reports related to disaster management in Afghanistan.

Author Declaration

No portion of this work referred in this thesis has been submitted in support of an application or another degree or qualification of this or any other university or other institute of learning.

Abdul Maruf KHALID

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Table of Contents

LIST OF FIGURES

LIST OF TABLES

ACRONYMS

AGS	Afghanistan Geo Base System
AMD	Afghanistan Meteorological Department
ANDMA	Afghanistan National Disaster Management Authority
ARCS	Afghanistan Red Crescent Society
AWCC	Afghan Wireless Communication Company
BMP	Best management practices
CEU	Central European University
CH	Central Highlands
CRED	Centre for Research on the Epidemiology of Disasters
CSO	Central Statistics Office
DRR	disaster risk reduction
EIA	Environmental Impact Assessment
EM-DAT	Emergency Events Database
IDPs	Internal Displaced Population
GDP	Gross Domestic Product
GIS	Geographic Information Systems
IDMC	Internal Displaced Monitoring Center
ISAF	International Security Assistance Forces
KM	Kabul Municipality
KUTEI	Kabul Urban Transportation Efficiency Improvement Project
MAIL	Ministry of Agriculture Irrigation & Livestock
MOPW	Ministry of Public Works
MRRD	Ministry of Rural Rehabilitation and Development
NEPA	National Environmental Protection Agency NRC
OCHA	Office for the Coordination of Humanitarian Affairs

RCP	Representative Concentration Pathway
RCM	Regional Climate Model
TI	Transparency International
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNFAO	United Nations Food and Agriculture Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNISDR	United Nations International Strategy for Disaster Reduction
UNU-EHS	United Nation University-Institute for Environment and Human Security
USAID	United States Agency for International Development
MAIL	Ministry of Agriculture, Irrigation and Livestock
MEP	Monitoring and Evaluation Plan
MEW	Ministry of Energy and Water
WFP	World Food Program
WMO	World Meteorological Organization

1. INTRODUCTION

This thesis investigates disaster risk management in Afghanistan, exploring particularly the possible implications of climate change on natural disaster management, effectiveness of disaster risk reduction policies and institution capacities to implement DRR strategies in the country.

Afghanistan is a country located along the Indo-Eurasia tectonic plate an active seismic zone, simultaneously the country is exposed to hydro-meteorological hazards such as flood, landslides, avalanches and droughts, climate change furthermore increases the level of vulnerability to natural disaster in the country (SAARC 2017).

The combination natural hazards with climate change implications and socio-economic factors including poor infrastructure, population growth, rapid urbanization, war and political instability increase risk of natural or manmade disasters and both form of disasters are described below:

Natural disaster: occurs in the absence of preparatory measures to avoid or mitigate the risks of natural hazards in a vulnerable community. the most common types of natural hazards in Afghanistan are listed as earthquakes, landslides, avalanches, floods and droughts (ANDMA).

Manmade disasters: These are the disasters that occur due to the consequence of technological or human hazards such as explosions, fires, transport accidents, accident in the mining sectors, fire accidents, epidemic disease and drug addictions and more importantly terrorism in the context of Afghanistan an analytical study on cost of war by Neta C. Crawford from Boston

University indicates that only between 2001to 2015 about 26,270 civilians have been killed by direct war-related violence and more than 29,900 civilians have been injured in Afghanistan which could be classified as manmade disaster (Crawford 2015).

The potential impact of changing climate on hazards and extreme events is un deniable and many researchers discussed the links between climate change, hydro-meteorological hazards and natural disasters However, due to the influence of religious scholars in Afghanistan who consider natural hazards as punishment from God, scientific approaches and discussion of natural and human-induced causes of disasters remains a taboo.

There is evidence from observational data that weather and climate extremes have changed since 1950 due to the human impact on the climate system (IPCC 2012a). also, the record of Emergency Events Database (EM-DAT) indicates that the number of climate-related disasters mainly the floods increased globally between the year 1980-2011 as shown in figure 1 (EM-DAT).

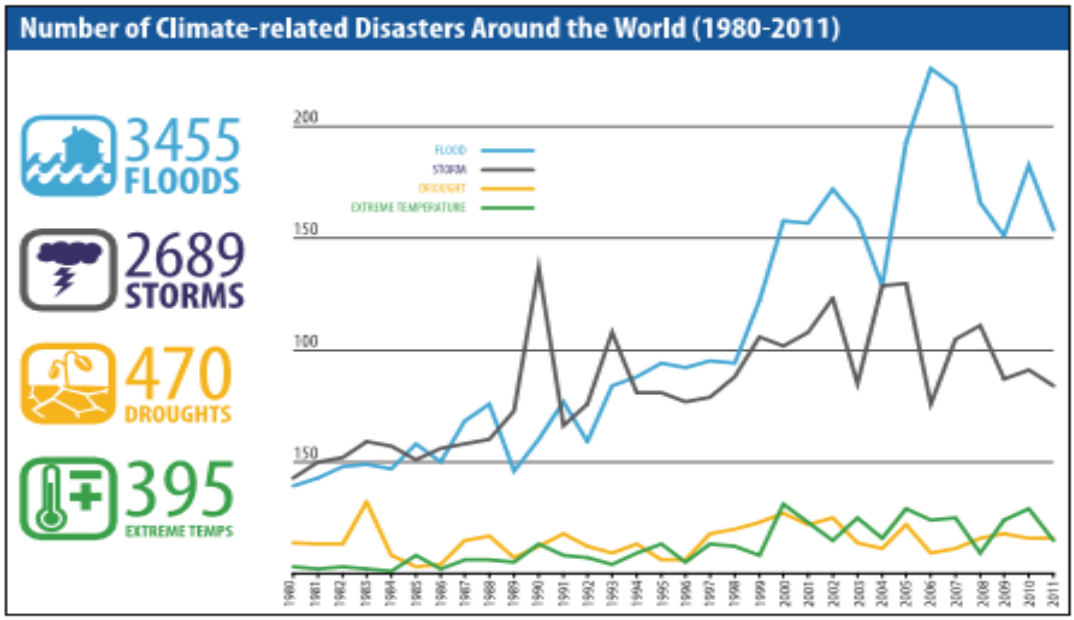

Figure 1: Climate related disasters around the world (EM-DAT 2017)

1.1. Problem Statement

Afghanistan is prone to multiple, predictable and recurrent natural hazards which are rapidly increasing due to climate change.

The country is ranked to differed types of natural hazards as follow:

"Twelfth on the seismic risk index, twenty-second on the drought risk index, twenty-fourth on the flood risk index, thirtieth on the landslide risk index and eighty-second on the severe storm risk index" (MRRD 2014).

Climate change is serious issue in Afghanistan specially people in central highlands, are witnessing the negative impacts of global warming and melting of glaciers which are the source of water for drinking, farming and producing energy through Micro Hydro Power (MHP) stations therefor lack an effective action plan which includes adaptation and mitigation measures to combat climate change is disastrous for the country.

As per a report published by the Ministry of Rural Rehabilitation only in 2012 there were 383 natural disaster incidents across 195 districts in the country which resulted in 4,790 deaths, affected 258,364 people and destroyed 29,374 homes (MRRD 2017).

The concept of Disaster Risk Reduction (DRR) is overshadowed by many other problems such as the ongoing war against terrorism, unemployment, corruption, and poverty. DRR activities are restricted to 'response phase' of disaster management whilst attention on disaster prevention and recovery remained very limited or non-existent.

Public awareness on natural hazards, disasters and climate change is very

limited most of the people in Afghanistan see the natural hazards, disaster and climate change from a religious prospective which consider it a punishment from God, whilst even at schools and universities the curriculum doesn't include the above-mentioned subject and the way forward its management.

1.2. Research Objectives and Questions

The main research questions and objectives of this study are the following:

1. What are the main challenges for disaster risk management in Afghanistan?
2. How has climate change impacted the natural disasters and their management in the country?

The objectives of the research include the following:

1. Identification of the root causes of natural disasters in Afghanistan;
2. Identify and analyze the impacts of climate change on natural disasters.
3. Review the laws, policies and institutional arrangements related to disaster management;
4. Identify the main challenges to disaster risk reduction (DRR) and resilience building in Afghanistan;
5. Conduct a gap analysis of DRR process in Afghanistan and formulate recommendations for strengthening natural disaster management.

1.3. Thesis Structure

This thesis investigates the root causes of natural disasters in Afghanistan and assesses the implication of climate changes for natural disasters and their management in the country.

The thesis consists of five chapters.

In **Chapter 1**, the researcher provides an introduction to the study purpose, research questions, and thesis structure.

Chapter 2 covers the literature on natural disasters, risk profile of the country, climate change and its implication on natural disasters. The researcher also provides a review of the relevant literature on natural hazards and the disaster risk reduction (DRR) concept.

Chapter 3 presents research methods and applications used for identifying, measuring and analyzing natural hazards and disaster occurrence.

Chapter 4 discusses potential impact of changing climate on hazards and extreme events management, review the legal, policy and institutional frameworks for DRR process and resilience building in country.

Chapter 5 presents a discussion of the results, a gap analysis and conclusions.

2. LITERATURE REVIEW

2.1. Introduction

This chapter reviews the literature about natural hazards, the science and policies related to natural disasters, disaster risk profile of Afghanistan and explores the possible implications of climate change, environmental scarcity, the socio-political factors and other determinants that contribute to the occurrence and severity of natural disasters in the country.

The chapter also describes disaster risk management and discusses the role of key stakeholders, including politicians, academia and local approaches in the DRR process.

2.2. Natural hazards and disasters

To describe the natural disaster and activities associated with disaster risk reduction and management, it is important to understand the natural hazards, vulnerability, coping capacity, adaptation, mitigation, resilience, critical infrastructure, early warning system, disaster preparedness and prevention, disaster response, reconstruction and recovery.

There are some basic definitions of the terminologies associated with natural disasters to promote a common understanding by the public scientist and practitioners engaged in DRR related activities which are discussed below:

Disaster: Professor Himayatullah KHAN from Institute of Information Technology, Pakistan in his recent paper on disaster management cycle defined disaster as “combination of hazard, vulnerability and insufficient capacity or measures to reduce the potential chances of risk” (Khan *et al* 2008).

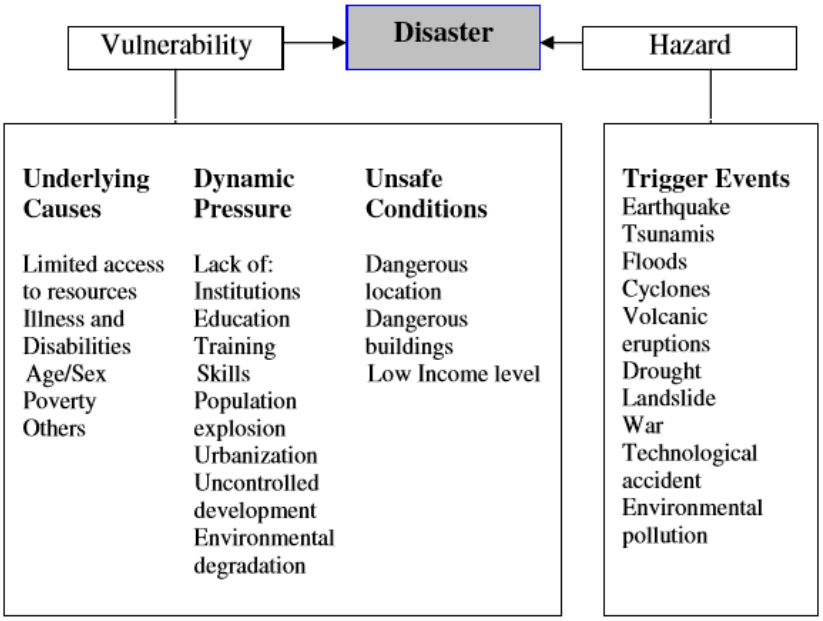

Figure 2: Disaster components (Khan et al, 2008)

Scientist largely agree that disasters are not beyond human control and argue that disasters caused by nature can have human origin – including global climate change (Guzman [n.d]).

Disaster sociologist Carr (1932) who investigates disasters from the social prospective claims that not every windstorm, earth-tremor, or rush of water is a disaster if the ships rides and the houses resist earthquake (Carr 1932).

Risk is a "measure of the expected losses due to a hazard event occurring in a given area over a specific time period. Risk is a function of the probability of particular hazardous event and the losses it would cause." (Khan *et al*. 2008).

Natural hazards: UNISDR defines a natural hazard as a "natural process or phenomenon that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption or environmental damage" (UNISDR 2015).

Natural hazards are divided into sudden and slow-onset.

The Sudden-onset hazards include, geological hazards (e.g., earthquakes, mudslides) and hydro-meteorological hazards (e.g., floods or droughts), the slow-onset hazards include droughts, coastal erosion, and poor air quality, etc. (UNEP 2012a).

Even some of the predictable and manageable natural hazard caused disasters in Afghanistan due to high vulnerability and very limited coping capacity and poor infrastructures. for instance, almost every year the avalanches and mudslides took the life of hundreds of people and affect communities across the country (Chabot 2015).

Vulnerability: The International Federation of Red Cross and Red Crescent Societies (IFRC) define the vulnerability as “the diminished capacity of an individual or group to anticipate, cope with, resist and recovery from adverse impact of natural or manmade hazards” (IFRC).

Understanding vulnerability is an important element to design and develop robust and credible measures, and for the development of management practices to mitigate the potential adverse impact and improve resilience through adaptive actions.

According to the 2016 world risk report Afghanistan is ranked 4th among the top 15 countries with the highest vulnerability worldwide as shown in Table 1 (UNU-EHS 2016).

Table 1: The countries with highest vulnerability worldwide (UNU-EHS 2016)

The 15 countries with the highest **vulnerability** worldwide		
Country	**Vuln. (%)**	**Rank**
Central African Republic	74.80	1.
Eritrea	74.23	2.
Chad	72.86	3.
Afghanistan	72.12	4.
Haiti	71.85	5.
Liberia	71.54	6.
Niger	70.80	7.
Sierra Leone	69.69	8.
Madagascar	69.52	9.
Guinea-Bissau	68.99	10.
Mozambique	68.28	11.
Guinea	68.21	12.
Burundi	67.98	13.
Sudan	67.37	14.
Zimbabwe	67.24	15.

Capacity: “It is the strengths and resources available to anticipate, cope with, resist and recover from disasters.” (UNISDR)

Coping Capacity: Coping capacity which also referred as adaptive capacity is the ability of communities to respond to disasters (GFDRR 2017).

Disaster preparedness: “Refers to measures taken to prepare for and reduce the effects of disasters. That is, to predict and, where possible, prevent disasters, mitigate their impact on vulnerable populations, and respond to and effectively cope with their consequences” (IFRC 2017).

Disaster Response: It is the second phase of the disaster management cycle which includes efforts to minimize the hazards created by a disaster such as warning/evacuation, delivery of rescue teams, provision of food and medical services, sheltering, assessment of damages and immediate repair of public infrastructures such as water supply, electricity etc.

Reconstruction and Recovery (R&R): It is the process of repairing the damages and provide assistance to communities for returning to normal life. The R&R process is quite essential and decision maker shall focus resilience measures to avoid recurrence of similar incidents in the future.

Adaptation: It is the mechanism to changes slightly over time and becomes better suited to changing environment and it is one of the most effective way to cope with climate change (Pinter. L lectures 2017).

Mitigation: Mitigation includes all actions to eliminate or reduce the potential risks which can harm vulnerable communities. the mitigation and adaptation are two effective methods that can be used together to avoid or decrease vulnerability of communities to climate change and natural disasters (Pinter. L lectures 2017).

Resilience: The capacity to overcome natural disasters.

Munich RE group define resilience as “ability of individuals, societies or socio-economic systems to cope with the sudden impact of crises or disasters, and to restore as quickly as possible their ability to function and their capacity to act” (Munich RE 2018).

2.3. Disaster Risk Profile of Afghanistan

This section elaborates the existing natural hazards, their geographical distribution and vulnerability of communities, and elaborate the role of environmental, social and other determinants in disaster occurrence.

The mountainous landscape and generally arid climate in Afghanistan expose the country to natural hazards and negatively affected by the climate change implications.

In Afghanistan the exposure of people and assets to natural hazards and disaster has increased due to ongoing conflict and political instability, weak institutions, rapid urbanization and poor planning in the country while, climate change furthermore increases the frequency and severity of natural hazards (ANDMA 2017).

According to ANDMA offcials country has experienced 130 disaster events between the 1980-2010 (Interview with Wais A. B July 2, 2017).

A report published by the World Bank group indicates that more than 50 percent of the population in Afghanistan lives at risk from at least two of the natural hazards such as droughts, floods and earthquakes (World Bank, 2012).

According to the World Risk Report (2016) Afghanistan is ranked the first for the lowest coping capacity, fourth for the highest vulnerability, and fifth with greatest lack of adaptive capacity.

Afghanistan stand at position 41 with a risk index of 9.5% against world risk ranking as shown in Figure 2, which indicates that any small trigger or shock can easily lead to disaster due to high vulnerability and low coping capacity (UNU-EHS, 2016).

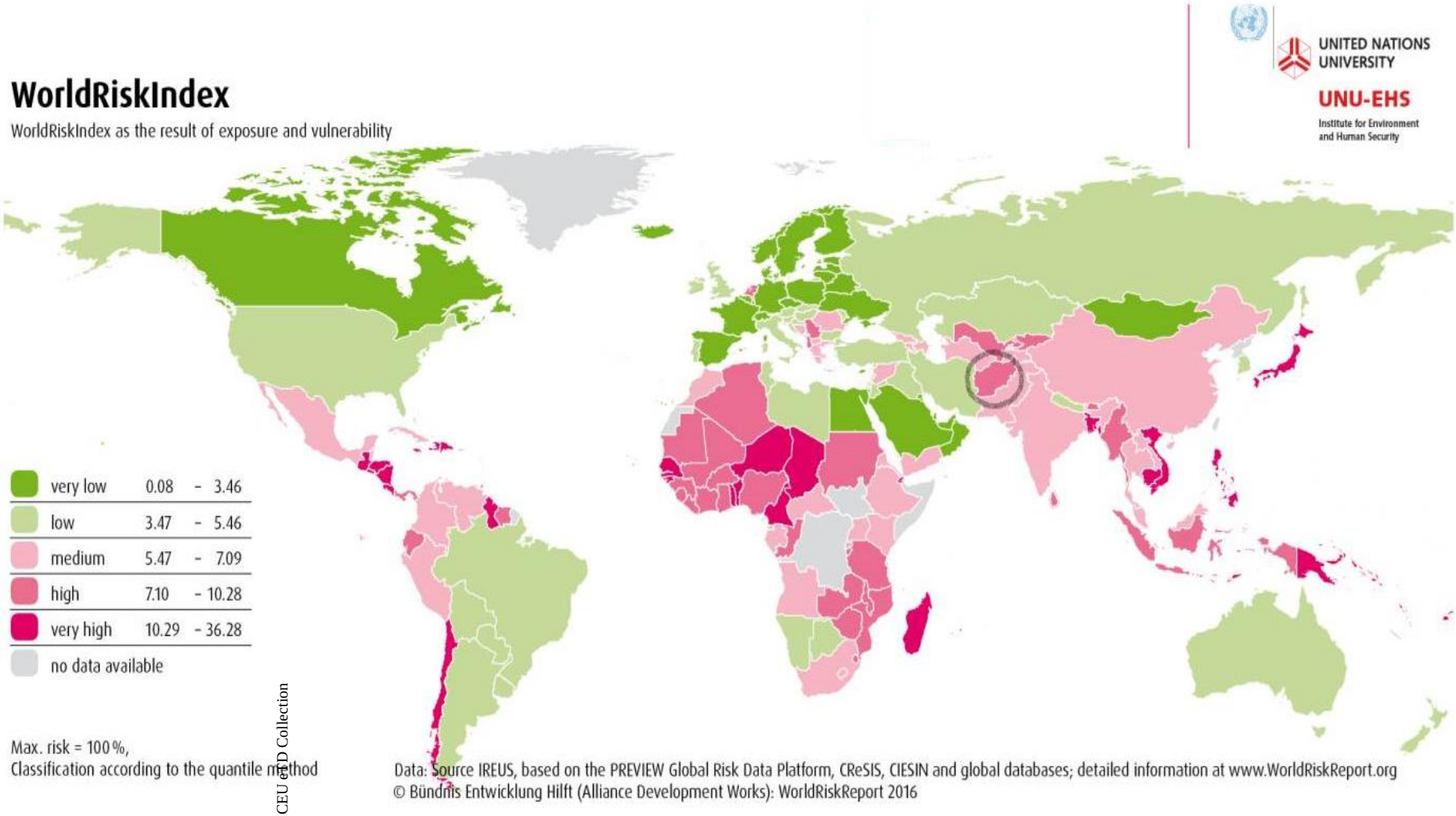

Figure 3: Countries exposed to risk of natural hazards (UNU-EHS 2013)

The Hazards are categorized in four maim categories - Geological, Hydro-meteorological, Technological and Biological Hazards. The sub-types of hazards in these four categories are shown in Table-2.

Table 2: Different types of natural hazards (SAARC 2017).

Geological Hazards	Hydro-meteorological Hazards	Technological Hazards	Biological Hazards
• Earthquakes	• Floods • Flood induced Landslides and Mudflows • Sandstorms • Extreme Heat and Cold • Avalanches • Droughts	• War • Chemical and Industrial Accidents • Fires • Major Building Collapse • Air, Road Accidents	• Epidemics • Pest Attacks

A report publish by ministry of rural rehabilitation and development shows that between the year 1970 to 2012 the earthquakes caused the highest loss of life (9,236 out of 20,237 killed), Drought affected the most people and flooding caused the most economic damage (OCHA 2012)

Percentage distribution of reported disaster in Afghanistan for 1970-2009 which has been registered by EM-DAT is shown in the figure 3:

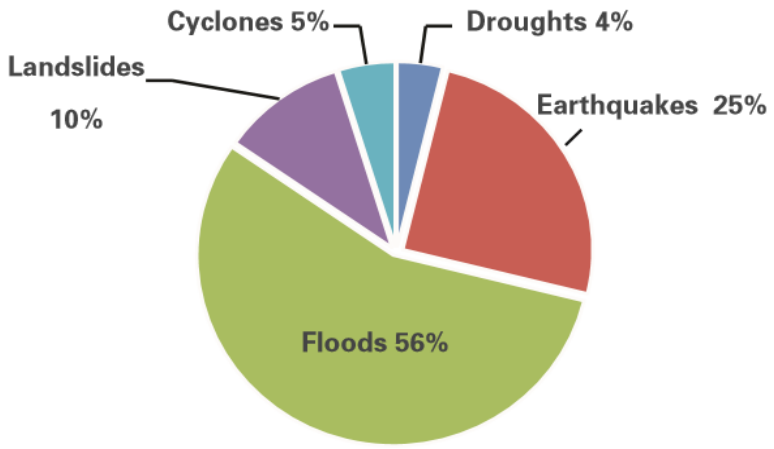

Figure 4: Percentage distribution of reported disaster (EM-DAT 2010).

Afghanistan is among top 10 countries for disaster deaths from1996-2015 as shown in Figure 4.

Figure 5: Countries with the highest average annual death rate from natural disaster (UNISDR 2015)

The most common types of disasters due to natural hazards are listed in Table 3 for the period of three years (2012-2014).

Table 3: Natural Disaster in Afghanistan 2012-2014 (UNOCHA 2014)

	Affected families			Deaths			Houses destroyed		
	2012	2013	2014	2012	2013	2014	2012	2013	2014
Flash Flood	22,156	10,749	13,948	134	110	162	7,745	2,990	
Flood	10,748	7,111		56	85		2,317	1,504	8,128
Heavy Rainfall		3,925	1,981		51	23		878	
Avalanche	1,275	207	6	165	15	0	99	21	
Earthquake	731	7002		76	21		134	1,845	
Extreme Weather	1,532	12		9	1		2	0	
Extreme Winter	2,075	660	516	22	15	0	20	157	
Landslide and Mudflow	1,440	123	550	17	6	255	225	39	
River Bank Erosion			112			0			
Other			96			2			
Total	**39,957**	**29,789**	**17,209**	**479**	**304**	**442**	**10,542**	**7,434**	**na**

na = not available.
Source: 2012-13 United Nations Office for the Coordination of Humanitarian Affairs (OCHA) pers. comm. 2014 International Organization for Migration (IOM) Rapid Assessment data for period to 17 July 2014.

As shown in the table destruction of houses are very high because mud brick is the most common construction material in Afghanistan which has little ability to withstand flooding also the location of houses in vulnerable areas with no flood protection measures.

The rural population which account for 80% of total population are at a greater risk of natural disaster due to food insecurity, limited access to basic public services and poor-quality infrastructure. For instance, while 39% of people in urban areas have no access to safe water, the number is 69% in rural areas (MRRD 2017).

The rural roads are kind of critical infrastructure that are crossing narrow paths and places with high exposure to natural hazards in mountainous terrain to connect rugged mountain villages with provincial center becoming impassable under sheets of snow during the long harsh winter and remained the communities in near isolation in some of the most inhospitable terrain in the world (World Bank 2010).

The level of exposure of Afghanistan to various types of natural hazards is shown on Figure 5.

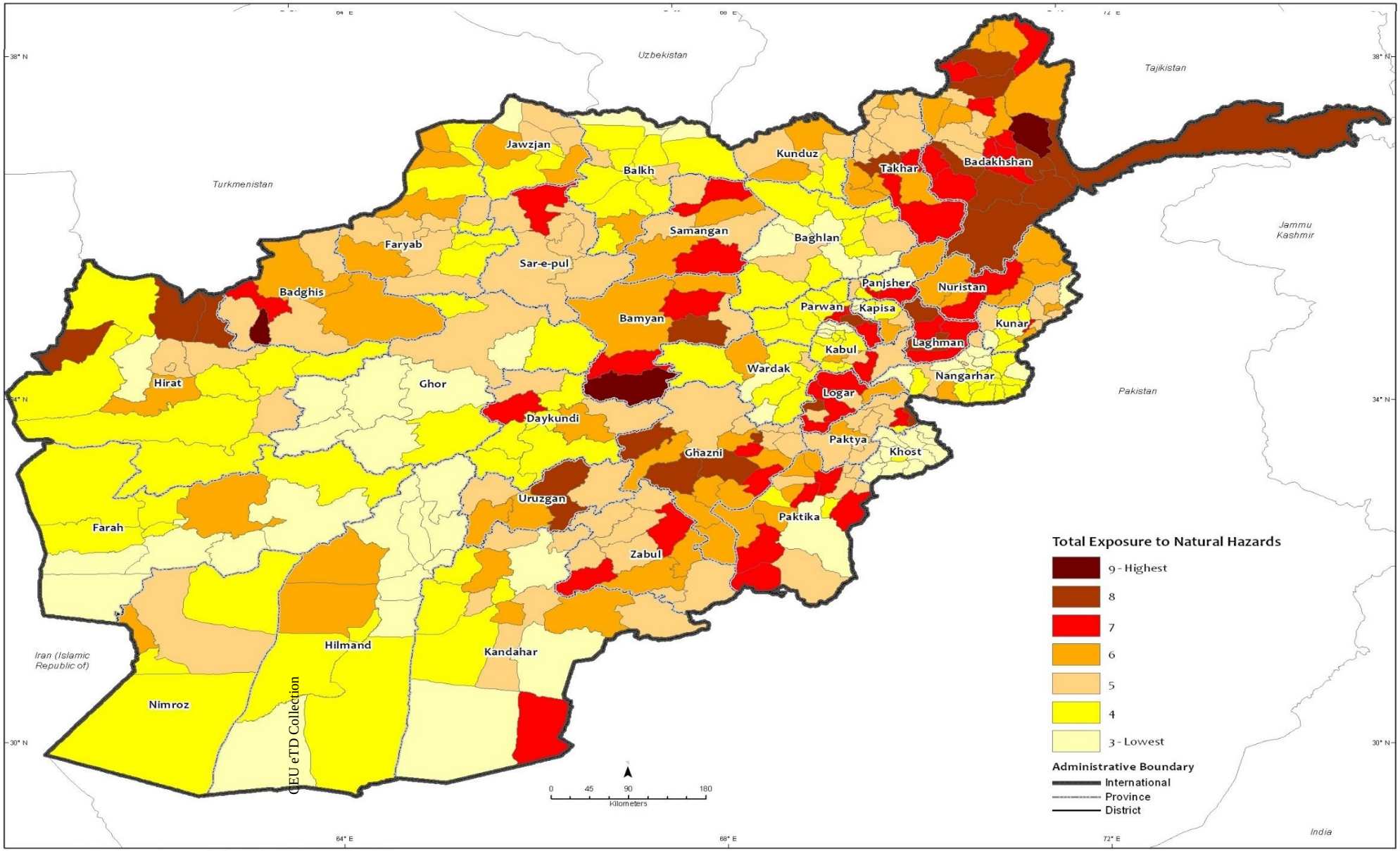

Figure 6. Level of exposure Afghanistan's different provinces to natural hazards (WFP 2013)

2.3.1. Earthquakes

Afghanistan is located along the active Indo-Eurasian tectonic zone and it is ranked twelfth on the seismic risk index of the world. The North-Eastern part of Afghanistan often hits by medium and large-scale earthquakes (ANDMA).

The Centre for Research on the Epidemiology of Disasters in its Emergency Events Database (EM-DAT) which maintain information on the occurrence and effects technological and natural disasters shows that during the last three decades (1980-2012) in Afghanistan form total 128 natural disasters cases 26 of them were due to earthquakes (EM-DAT 2017).

The figure below shows the countries with the number of earthquakes disaster occurrences between 1974-2003 (EM-DAT 2017)

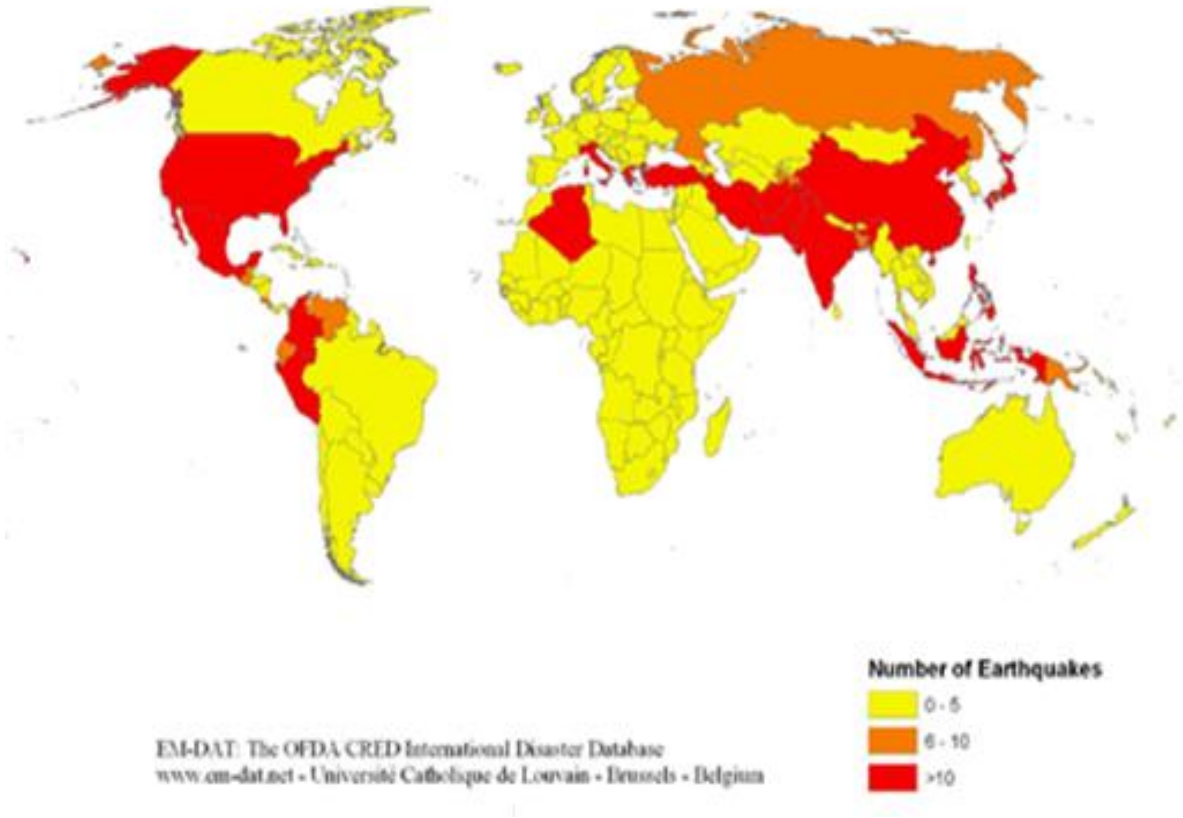

Figure 7: Earthquakes disaster by country 1973-2003 (EM-DAT)

The seism-tectonic map which is presented in Figure-7 shows the earthquakes prone areas and surface-rupturing faults in Afghanistan

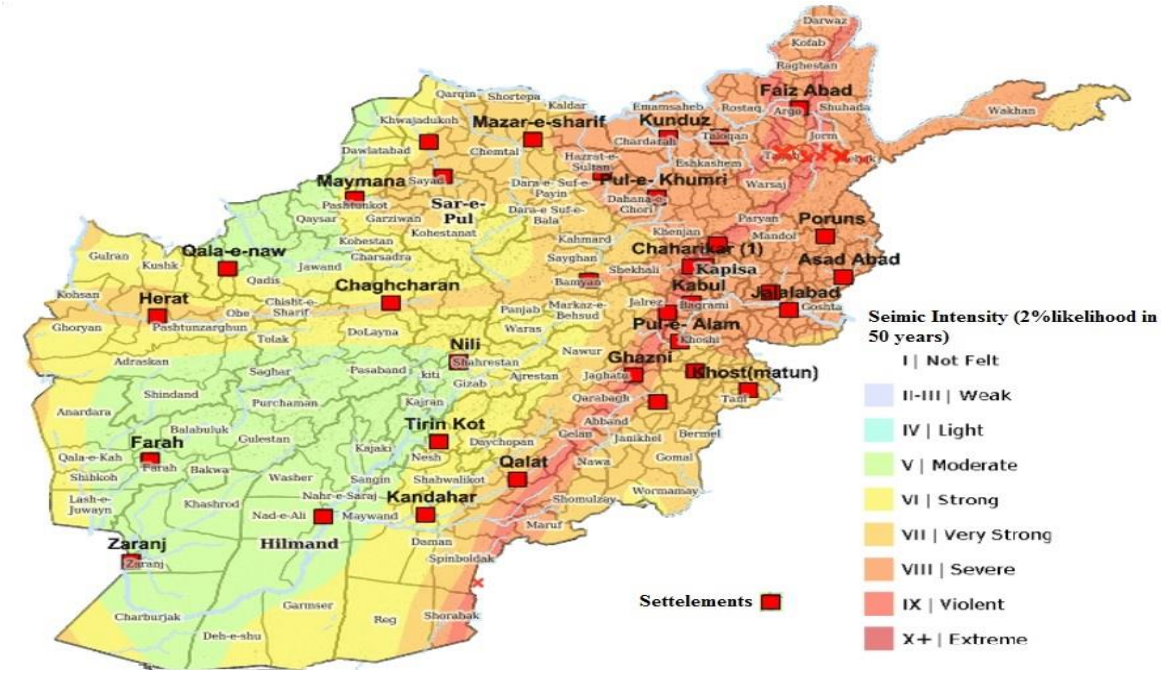

Figure 8: Tectonic region and settlement area of Afghanistan (USGS 2017)

Table 2 which shows the major earthquakes and related casualties marked Takhar province with the highest number of earthquake-related fatalities.

Table 4. Major earthquakes in Afghanistan (ANDMA 2016).

Date	Place	Magnitude	Deaths	Injuries
1991-01-31	Hindu Kush	6.4	848	200
1998-02-20	Takhar Province	5.9	2,323	818
1998-05-30	Takhar Province	6.5	4,000–4,500	10,001
2002-03-03	Hindu Kush	7.4	166	Some
2002-03-05	Hindu Kush	6.1	1,000	200
2009-04-16	Kabul	5.5	22	NA
2012-06-11	Baghlan Province	5.4, 5.7	75	NA
2013-04-24	Jalalabad-Mehtar Lam	5.5	18	NA
2015-10-26	Jurm - Badakhshan	NA	399	2,536

The record of EM-DAT shows that since 1980 more than 10,000 people have been killed in Afghanistan due to earthquakes and the country is among top 10 countries in the world with the highest mortality rate per habitant refer to figure x which shows the mortality rate per 100,000 habitants between 1996-2015 (UNISDR 2016).

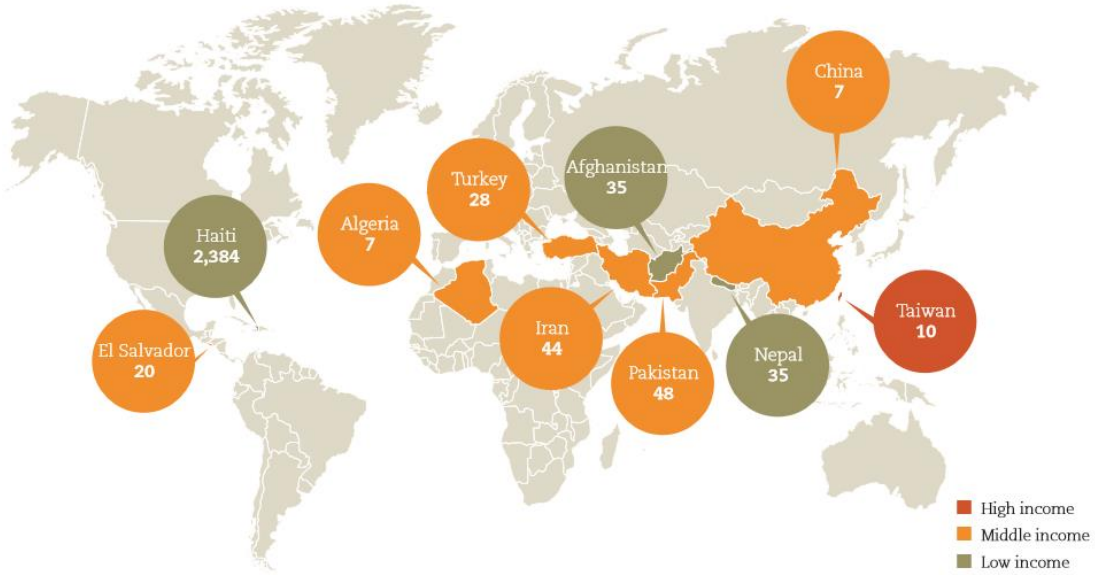

Figure 9: Countries with highest mortality rate due to earthquakes (UNISDR 2016)

Rapid urbanization following the return of more than three million Afghan refugees from neighboring countries after the collapse of Taliban regime in 2001 and internal displacement of rural population due to conflict, drought and limitation of livelihood resources in rural areas increased demand for housing in in major cities (Azimi and McCauley 2002).

Consequently, there was huge private investments in the housing sector with no proper housing strategy, limited capacity and resources to monitor construction processes, corruption and engagement of warlords in these businesses many of the houses and multi-story buildings were built without engineering design and consideration of construction standards.

According to Kabul Municipality almost two-thirds of the city's population lives in "informal settlements" meaning they have built their residences without consideration of urban planning and design protocols and standard construction practices (KM 2017).

Th hillsides in Kabul which were designed as a green belt for the city became informal settlement zones, highly vulnerable to earthquakes and landslides.

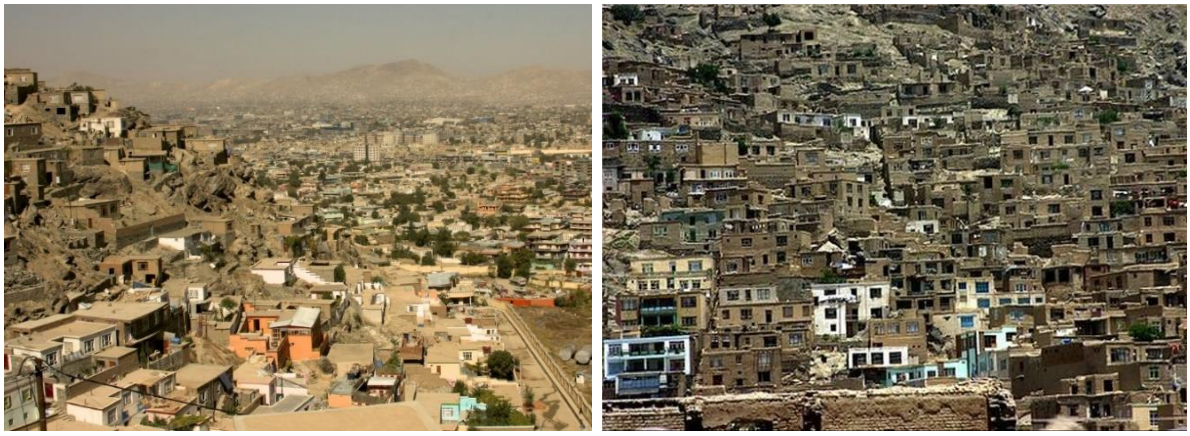

Figure 10. Informal settlements in the hilly side Kabul city (Getty images 2017)

2.3.2. Flooding

Flooding is one of the most disastrous natural hazards in Afghanistan that lead to disasters and it is increasing due to climate change impacts and other factors such as topography land cover and lack of flood protection structures.

While floods are common in all parts of the country the North-East region has the highest number of flood incidents especially along Hindu Kush mountains range that are fed by the snow and glaciers melting and heavy rains (Interview with Barmak, W. A. July 2, 2017).

According to ANDMA's disaster preparedness division head almost 60

percentage of Afghanistan mainly then north and western provinces are prone to flooding and if we consider the winter flooding 21 out 34 provinces of the country are vulnerable to flood risks (Interview with Kohdamani, A. June 28, 2017).

ANDMA has estimated that around 100,000 people negatively affect by flooding each year while, the average annual damage as a result of flooding is calculated around $54 million and the figure could increase to over $500 million in case of large flooding (ANDMA 2014).

For instance, on 24 and 25 April 2014 devastating flash floods in 10 Northern provinces of the country affected 67,000 people and caused destruction of houses, public infrastructure, and roads also Thousands of hectares of agricultural land and crops were also destroyed (ADB 2014)

Figure 11: Flash flood in Baghlan, Afghanistan (COAR Report, 2014)

A report published by Asian Development Bank (ADB) listed the most severe flooding between 2010-2014 as follows (ADB 2014):

Between April to June 2014 total number 363 flooding incidents reported in 27 out of 34 provinces of the country which killed over 160 people, destroyed

6,800 homes, displaced 16,000 and affected around 125,000 people.

In 2013 several flooding incidents recorded in different part of the country including East and Southeastern and Northern provinces (Badakhshan, Baghlan, Balkh, Faryab, Jawzjan, Kunduz, Samangan, Sar-e- Pol, and Takhar).

In 2012 Accumulation of snow across the Hindukush mountainous region caused severe flooding in Kabul, Baghlan, Takhar, Badakhshan and Kunduz, and Sar-e-Pol provinces.

In 2011 Herat province experienced devastating seasonal flooding.

In late July/ early August 2010 severe flooding incidents reported due to heavy rainfall in 12 provinces mainly Eastern and Central region of the country.

ADB published report which includes interviews with people in Samangan and Balkh provinces indicates that according to public view the flooding in 2014 was at the order of 1 in terms of severity from total 15 major flood events in these provinces for the last 100 years (ADB 2015).

Table 5 shows flood incidents between 2012 and 2014 from the database of the International Organization for Migration (IOM).

Table-5 Flood incidents record 2012-2014 (IOM 2014)

Region	Provinces	2012	2013	2014	Average Incidents	Average Incidents/ province	Average % of Total
North East	Badakhshan, Baghlan, Kunar, Kunduz, Nuristan, Panjshir, Takhar	113	106	66	95	13.6	29%
North West	Balkh, Faryab, Jowzjan, Samangan, Sar-e Pol	59	28	100	62	12.5	19%
Central	Bamyan, Kabul, Kapisa, Logar, Wardak, Parwan, Urozgan	26	45	127	66	9.4	20%
East	Laghman, Nangarhar	11	79	14	35	17.3	11%
West	Badghis, Farah, Ghor, Herat	44	47	3	31	7.8	9%
South East	Ghazni, Kandahar, Khost, Paktia, Paktika, Zabul	17	15	21	18	2.9	5%
South West	Daykundi, Helmand, Nimruz	4	33	32	23	7.7	7%
	Total	274	353	363	330	9.7	100%

Urban flooding in the major cities of Afghanistan is often caused by intense local rainfall in combination with inadequate drainage systems.

For instance, flooding in Kabul city is mainly due to its geographical location which is surrounded by mountains and downstream areas of the city is almost flat and sediment transferred from steep upstream hillsides have raised up the river bed and lack of a sewage system and proper canalization for storm water causing the river to overflow during heavy rainfalls.

Figure 12: Flooding in Kabul Afghanistan in March-April (KUTEI 2016)

The main factors which contribute to destructive flooding and natural disaster incidents in Afghanistan include the following points:

- Afghanistan's topography, climate, and land cover of its mountainous regions put the mountain valleys of the country prone to flooding. Heavy rains in the spring and early summer coupled with snowmelt causing extensive flash flooding and damage villages, roads, bridges, and farming areas close to the rivers.

- Lack of flood protection infrastructure and no effective operation and maintenance program for the existing infrastructure.

- Poorly built infrastructure, in most cases no hydrological assessment is taking place for road and bridges also ignoring construction standards during implementation phase of the projects.

- Land use pattern change and increasing settlements in flood prone areas are also counted as important driver of flood risk specially in the urban area which also lacks proper drainage system for surface water run-off.

- Some areas which were used as water pond and highly contribute to conservation of ecosystem of Kabul have been changed to residential or commercial area, also the construction of streets and lanes the site drains were built in concrete form, which block the surface and limit groundwater recharge.

- Lack of public awareness of the type of floods, their cause, when floods can be expected (early warning). How it can affect farming and irrigation facilities, intakes and structures is considered another issue which increases vulnerability to flood hazard.

- Lack of support services from the government for extended periods of time makes the rural communities highly self-reliant of their capacity to recover from disasters such as flooding at small scales. For instance, cleaning and rebuilding the irrigation structure and drinking water intakes could be expected several times in a year. However, in case of extreme or even repeated small scale events immediate action and support from the central government is needed.

2.3.3. Land Slides

Land slide is one of the most sever type of natural hazards in Afghanistan particularly in north-eastern provinces of Badakhshan and Takhar. The land slides are often triggered by an earthquake or resulted from hydro-meteorological extreme events.

Catastrophe of land slides in Badakhshan province in 1998 caused thousands of casualties, burying entire villages also in 2014 a landslide in Abe-Barik village in Badakhshan province killed hundreds of people, affected 1000 families, and destroyed 300 houses as shown in figure 12 (ANDMA 2017).

Figure 13: Landslide in Ab-barik Village, Argu district Badakhshan, Afghanistan (ANDMA).

According to Afghanistan National Disaster Management Authority (ANDMA) estimates the cost of the 2014 floods and landslides reached $800 million. which covers private properties and public infrastructure but does not include the value of lives lost.

The landslides and rockslides triggered by heavy rains not only block the roads and caused causalities but also threaten food security especially during the winter season due to rugged terrain and poor road network in the country.

Figure 13 shows the blockage of Kabul-Jalalabad highway and local road in Kunar

province.

Figure 14: Landslide along the highway and district road in Afghanistan (Pazhwok 2016).

2.3.4. Drought

The food insecurity, access to potable water and malnutrition also continues to be a serious and growing problem in the country the years of drought jeopardized Afghanistan's food supply, putting millions in danger of starvation (WFP 2015).

The World Food Program (WFP) has estimated that around 5 million Afghans have little or no access to food as years of the drought coupled with other climatic hazards has caused almost total failure of rainfed agriculture.

Drought is a clear sign of climate change which frequently occurs in Afghanistan According to ADB drought record database drought which cover small areas of the country returns every three to five years, whereas droughts covering large areas happen every nine to eleven years (ADB 2014).

Droughts recorded in 2000, 2006, and 2008 affected 2.6 million, 1.9 million and 280,000 people only in Afghanistan, while neighboring countries were also affected (ANDMA). The figure shows drought frequency in South-Asia region which indicate Afghanistan is more prone to drought in regional context:

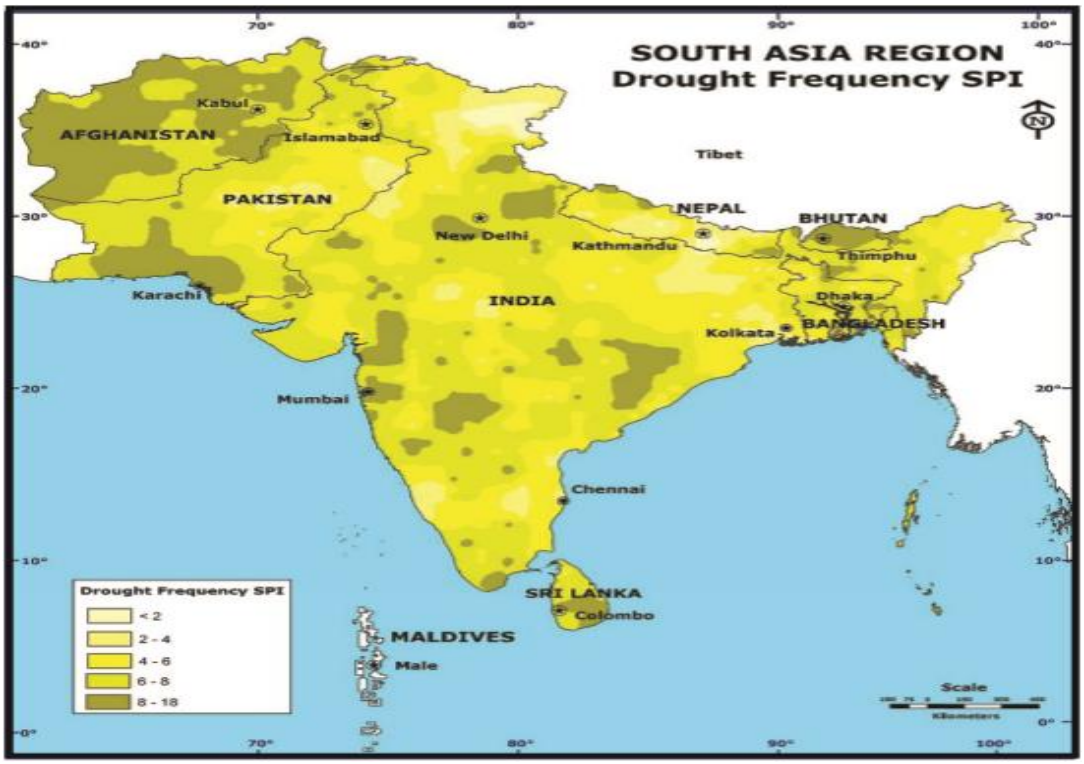

Figure 15: Drought Risk in South Asia Region (RMSI 2010)

Drought frequently occurs in Herat, Ghor, Uruzgan, Ghazni, Faryab, Jawazjan, Balkh, Samangan, and Sar-e-Pul. provinces and remaining provinces are at medium risk of drought (ADB 2014).

Since the early 1960s, the country has begun witnessing an increased frequency of drought, the mean annual temperature has increased by approximately 0.6° C since 1960 with spring rainfall decreasing by around 2.7 mm per month (UNEP 2016).

Based on a 'running anomaly' of average precipitation records analysis drought between 1997 to 2004 was reported as one of the most severe droughts in climatic history of Afghanistan (ADB 2014).

According to FAO and WFP report the years of drought and intensifying economic problems have jeopardized Afghanistan's food supply, putting millions in danger of

starvation, as per the WFP report an estimated 5 million Afghans have little or no access to food, and there is limited job as the drought has caused almost total failure of rainfed agriculture (WFP 2015).

Prolonged drought in Afghanistan negatively affect the agriculture sector which accounts for up to 40 percent of the country's gross domestic product (GDP), the mean of livelihood for almost 80 percent of the population.

The national adaptation action plan for 2016 compared agriculture production in 2005 with 1970 and shows the decrease in different crops such as wheat (75%), rice (85%), maize (85%), potatoes (50%) and average decrease of (60%) in other crops (NAP 2016).

In addition to the impact on cereal production the drought has also affected the livestock status in Afghanistan the continued decimation of the livestock population has had catastrophic livelihood consequences for the Kuchi nomads and a serious adverse impact on livestock-holding farmers (Vincent 2016).

Figure 16: Catastrophe of livestock due to drought in Afghanistan (ANDMA 2018)

The recent drought has severely affected the livestock as minister of agriculture and livestock asked the government and donor community to fund the immediate livestock protection through fodder/feed support program for two months an overall demand of USD 550 million to continue fodder / feed support program for the next 10 months in 34 provinces of Afghanistan (IFRC 2018)

2.3.5. Avalanches

Avalanches are rapid gravity-driven masses of snow that move down in mountainous slopes. Some of the factors that may affect likelihood of an avalanche include weather, temperature, slope steepness, slope orientation (north or south), wind direction, terrain, vegetation and property of the snowpack (NSIDC 2018).

The central region of Afghanistan is highly prone to avalanches and debris flow, an estimated 10,000 km of roads (15 percent of all roads) are exposed to avalanches, including key transport routes like the Salang Pass (Palma 2017).

Figure 18 gives an overview of the avalanche areas and the population exposed to the risks of avalanches in Afghanistan.

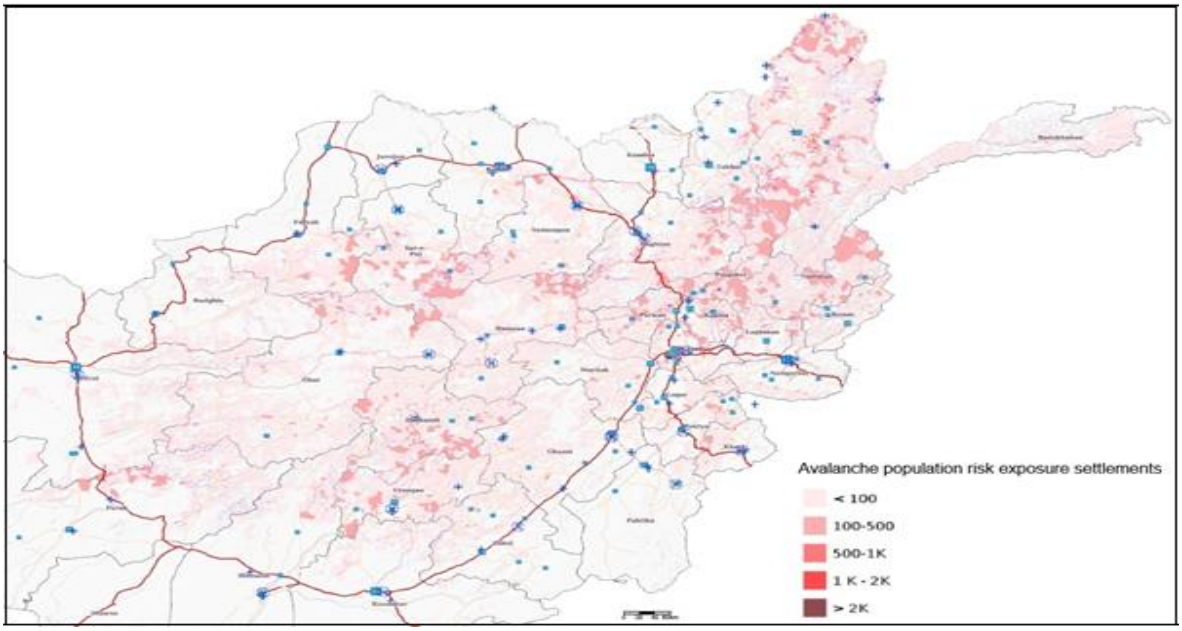

Figure 17: Avalanche areas and risk exposure Afghanistan (iMMAP 2015).

According to Global Facility for Disaster Reduction and Recovery (GFDRR) almost two million people roads are exposed to the risk of avalanches in Afghanistan (GFDRR 2017).

Avalanche is a predictable and manageable natural hazard in developed countries however, in Afghanistan it is one of the most devastating hazards which takes the life of hundreds of people every year as between the year 2000 to 2015, over 153,000 people were affected by avalanches (GFDRR 2017)

The avalanches in 2017 have killed over 135 people, injured hundreds of others and have destroyed over 300 houses in different part of the country (The guardian 2017).

Panjshir avalanches in 2015 have killed 168 people, which is higher than total number of fatalities due to avalanches in 2015 worldwide (Chabot 2015).

Avalanches in Salang pass are taking place every year and mostly the passengers are the victims of these avalanches because the road to nine Northern provinces is crossing this area, for instance the avalanche in 2010 killed 186 passengers and dozens we injured, which was the largest loss of life from snow avalanches since World War I (Chabot 2015).

Figure 18: Avalanches in Salang (2010) & avalanche in Panjsher (2015) (ANDMA 2017).

2.4. Climate change in Afghanistan:

The United Nations Framework Convention on Climate Change (UNFCCC), defines climate change as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods." (UNEP 2009).

Climate change is clearly visible in Afghanistan specially in the central highlands, the Western and Northern provinces, and its negative impacts are demonstrated through the melting of the Pamir/Hindu Kush glaciers in Northeastern part of the country.

A recent report published by the National Environmental Protection Agency and UN Environment divide the country into five climatic regions as follows (NEPA and UNEP 2016):

1. The Hindukush region in the Northwest mainly cover Badakhshan province, this region includes the highest and most mountainous parts of Afghanistan, receives the highest amount of precipitation and considered as a major water source.

2. The Northern Plains (North) with a main altitude of 600 m and mostly covered by grasslands.

3. The Central Highlands in the middle of Afghanistan is characterized by deep valleys and mountain ranges of up to 6400 m altitude.

4. The Eastern Slopes (East) region is covered by forests and allows agriculture since the area is influenced by the moist air masses of the Indian monsoon.

5. The Southern Plateau (South) is mainly arid desert, although along the Helmand rivers and in the marshlands, agriculture is possible.

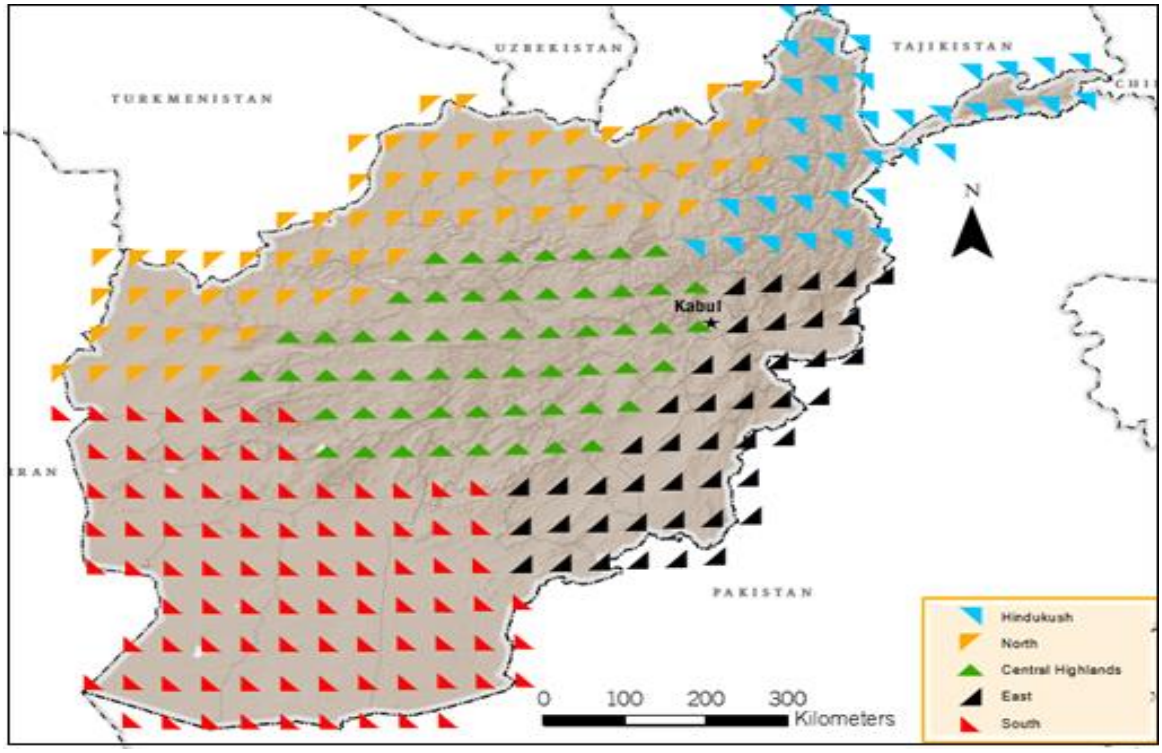

Figure 19: Climate Regions of Afghanistan (NEPA&UNEP 2016).

There is no doubt that climate change is taking place globally and emission of greenhouse gases (GHGs) are considered a key factor as data observation shows the weather and climate extremes have changed since 1950 due to the human impact on the climate system (IPCC 2012a).

Climate change is not unknown to Afghanistan: it is clearly visible in the central highlands, the Western and Northern provinces, and its negative impacts are demonstrated through the melting of the Pamir/Hindu Kush glaciers in Northeastern part of the country (UNEP 2017).

Afghanistan's in its Intended Nationally Determined Contribution submission to the UNFCCC indicated that the country's economy, stability, and food security are under threat due to climate change impacts (UNFCCC 2013)

To describe the current situation, future trends with climate change and its impacts the researcher focus on temperature and precipitation trends and potential impacts of climate change in the country.

2.4.1. Temperature trends and projections under climate change

UNEP and NEPA carried out a climate projection for Afghanistan for the period 2021–2050, using model outputs from the Coordinated Regional Downscaling Experiment for South Asia (CORDEX−SACORDEX) which is an international coordinated framework for regional climate change projections. The report indicates that in a moderate emissions scenario (RCP4.5) Afghanistan will experienced a huge increase in mean annual temperature higher than global mean projections as under this optimistic scenario of (RCP4.5) an increase of approximately 2.5°C until 2100 is projected in Afghanistan while the global average temperatures increase is projected 2 °C until 2100 (UNEP 2016).

For the (RCP8.5) which could be a pessimistic scenario, the models project an extreme warming of approximately 3°C until 2050, and further continuation of extreme increase of up to 7°C by 2100 which is very serious and alarming for Afghanistan comparing with mean global warming increase (UNEP 2016).

These projections show that climate change increases the level and severity of hydro-mereological hazards such as droughts and floods in most parts of Afghanistan which has already been under stressed by the climate change implication.

Figure-19 shows projected temperature increase in Afghanistan for a moderately optimistic emissions scenario (RCP4.5) for the period 2021 to 2050 (WFP 2016).

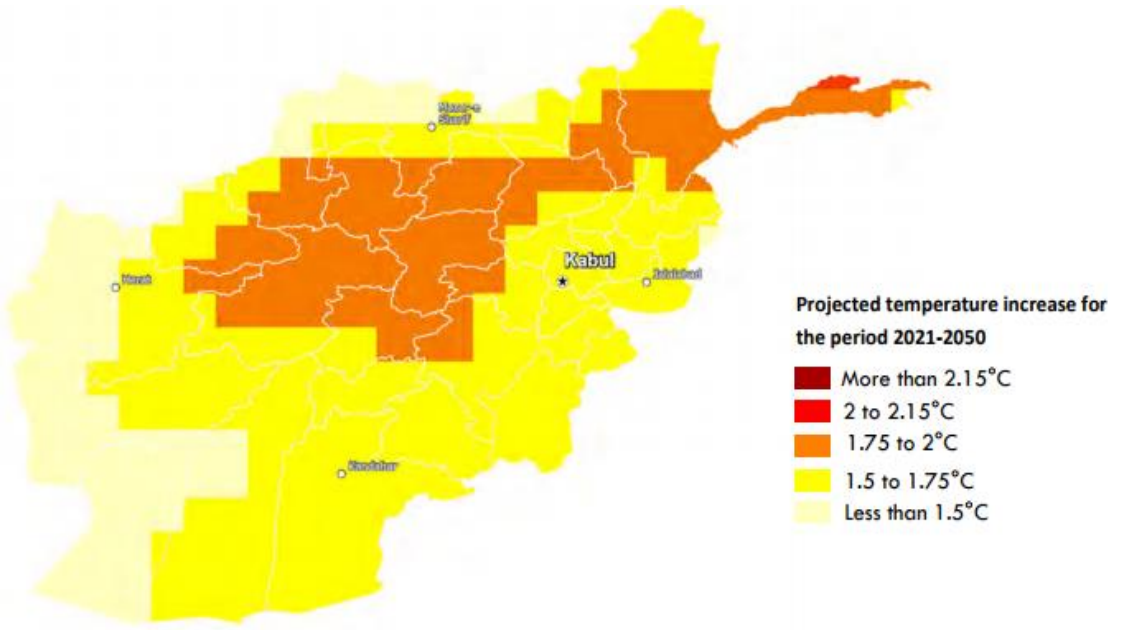

Figure 20: Projected temperature increases across Afghanistan for 2021-2050 (WFP 2016).

As shown in figure 21, the projection for Central highlands and Hindu Kush area shows 1.75 to 2 C increase however, the area have already witnessed global warming which leads to disasters, for instance, Flooding on July 12, 2018 in Peshghor village in Panjsher province due to melting of glaciers destroyed more than 250 houses and washed out the farm lands as shown in Figure 20 (ANDMA 2018).

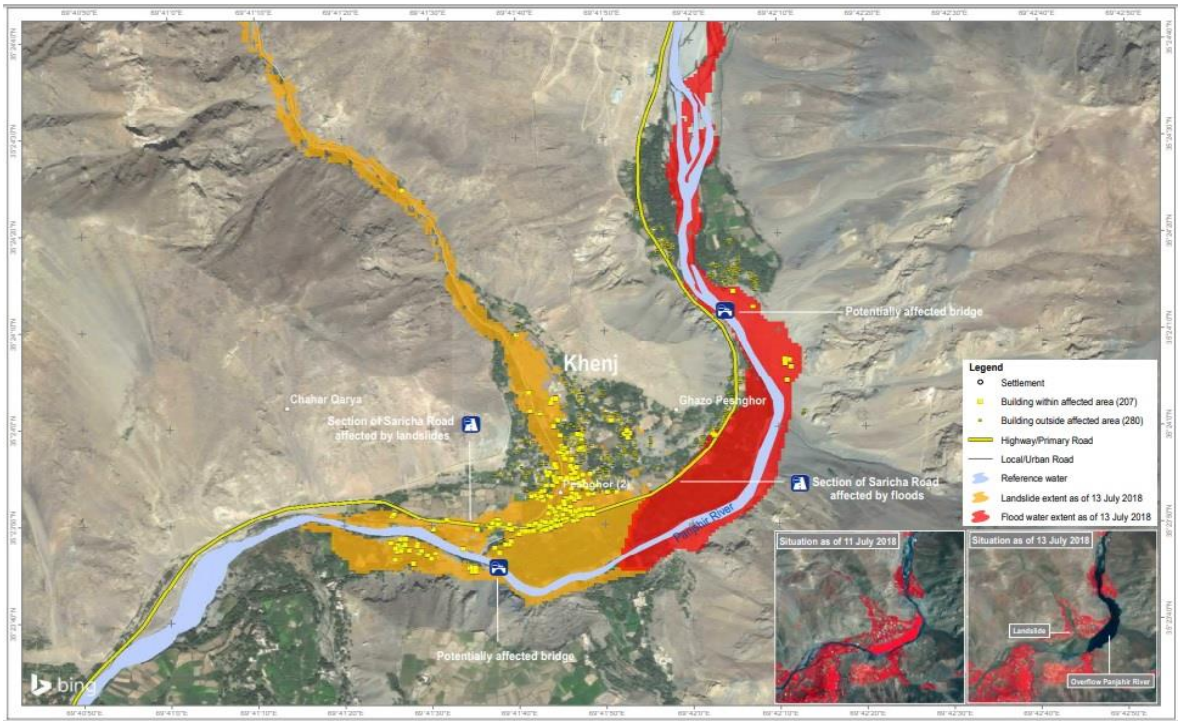

Figure 21: Aerial photo of flood affected area in Pishghor village of Panjsher (UNITAR 2018).

2.4.2. Precipitation trends and projections under climate change

Afghanistan has experienced slightly decrease in mean rainfall precipitation at an average rate of 2 percent per decade since 1960. As the change in winter rainfall (difference between 1950−1980 and 1981−2010) in different part of the country is presented in the figure 21. The winter precipitation which is considered from January to April (WFP 2016).

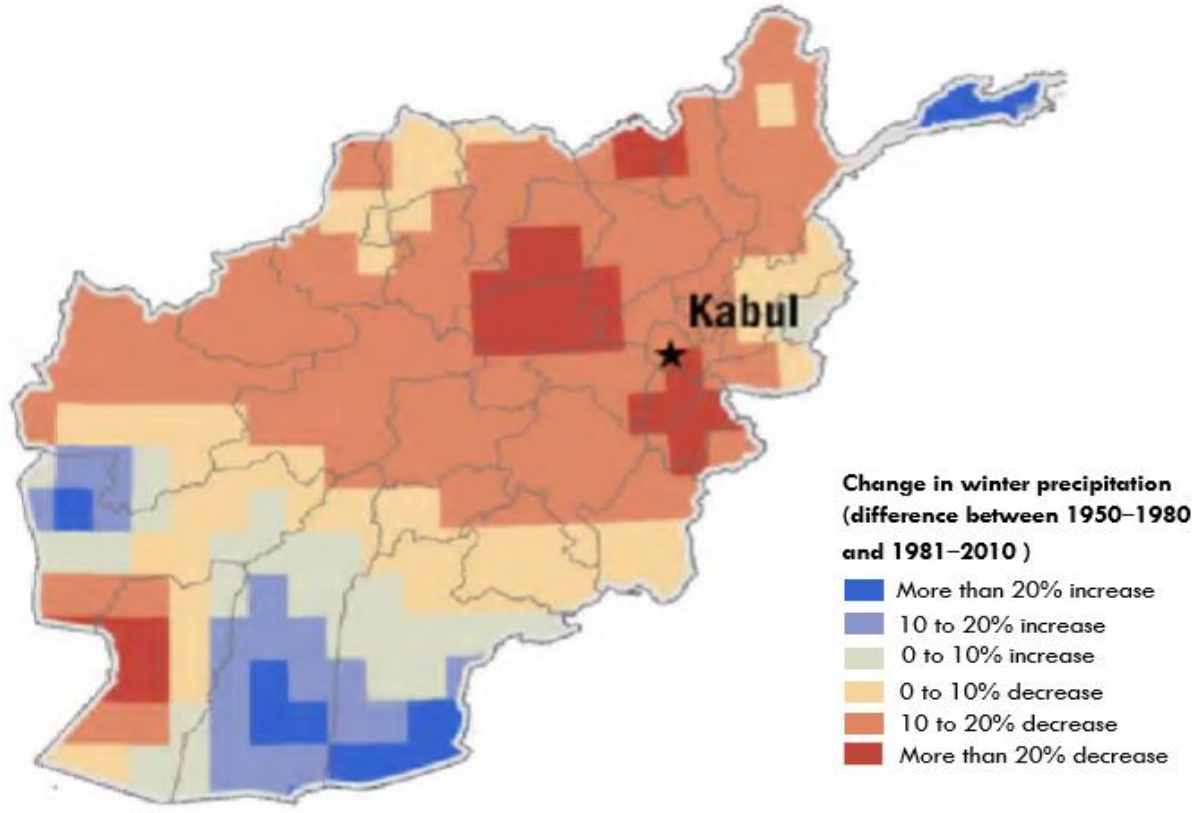

Figure 22: Change in winter precipitation in Afghanistan (difference between 1950-1980 and 1981-2010) (WFP 2016).

The slight decrease was observed mainly during the spring season which is a matter of concern for rainfed agriculture especially in the North and Central highlands and the Eastern provinces (IRA 2015).

According to a joint research by NEPA and UNEP the winter snowfall is expected to decrease in the Central Highlands potentially leading to reduced spring and summer flows in the Helmand, Harirud-Murghab, and Northern river basins and affect the livelihood in

downstream which depend heavily on these rivers and their tributaries (NEPA and UNEP 2015).

The projected change in winter precipitation between the years (2021-2050) as per the CORDEX model output under RCP4.5 is presented in the Figure 23.

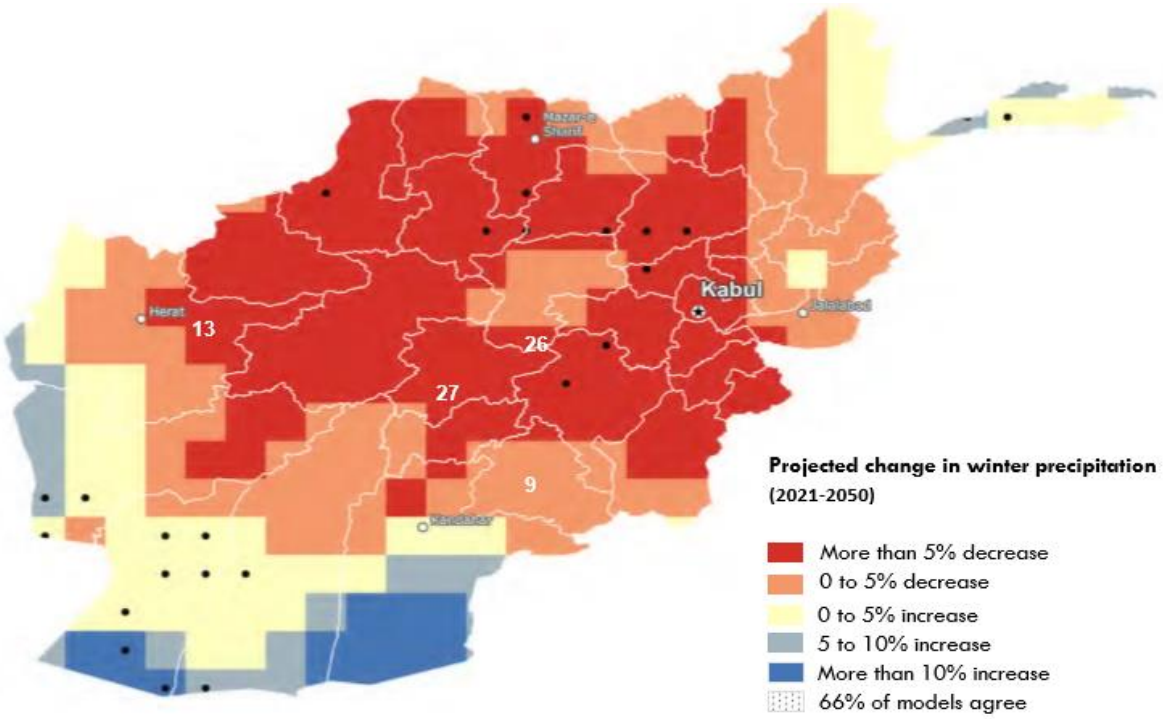

Figure 23: Projected change in winter precipitation in Afghanistan for 2021-2050 (WFP 2016).

2.4.3. Climate change impacts in Afghanistan

Climate change is negatively affecting basic human physical and physiological needs such as access to food and water, clean air, health care, shelter and recreation (Kowarsch and Gosele 2012).

Afghanistan has already witnessed impacts of climate change in of the form of hydrometeorological hazards such flooding, drought, extreme events, water table dropdown, glaciers melting, deforestation and desertification.

Climate change impacts on temperature and precipitation affect health and wellbeing of

people, increasing poverty, and rendering both the humanitarian needs and responses in Afghanistan (UNEP 2009).

Kabul as one of the fastest-growing cities in the world with a population increase from 1.5 million in 2001 to around 6 million in 2015 is facing several problems due to climate change impacts for instance between the 1960s and early 2000s, groundwater levels in several part of the city fell by 6-7 meters and have continued to plummet, (KM 2017).

Afghanistan's in its Intended Nationally Determined Contribution, Submission to the UNFCCC indicated that Afghanistan's economy, stability, and food security under threat due to climate change impacts (UNFCCC 2013)

Climate change pose significant threat to agriculture sector and conventional crops becomes less and less viable in some areas due to drought and desertification, which leads the rural population increasingly be driven to alternative livelihood options including the production of less water-intensive poppy which directly link to political instability and conflict in the country (NEPA 2016).

A research paper published by the European Union Institute for Security Studies, "A New Climate for Peace" (Rüttinger *et al.* 2015), highlighted the risks associated with climate change in Afghanistan as follow:

- Competition on local resources and affect the availability and prices of food.
- Migration and loss of livelihood
- Disaster due to extreme weather events
- Raising transboundary water management issues

The Food and Agriculture Organization of United Nation (FAO) reported that climate change has already marginalized agriculture sector in Afghanistan which is the main

sources of livelihood more than 80 percent population while, 36% of the population live below the poverty line (FAO 2012).

Temperature and precipitation changes affect health and wellbeing of people, increasing poverty, and rendering both the humanitarian needs and responses, forestry cover change and water availability across the country.

According to Initial National Communication document of Afghanistan submitted to United Nations Framework Convention on Climate Change (UNFCCC) the country lost an average of 29,400 hectares of forest per year between 1990 and 2000, which annual average deforestation rate was calculated 2.25%, and it has further increased to 2.92% per annum between 2000 and 2005 currently the forest occupies less than 2% of county's total area, the changes in forestry cover from 1977 to 2002 presented in Figure 24 (UNFCC 2013).

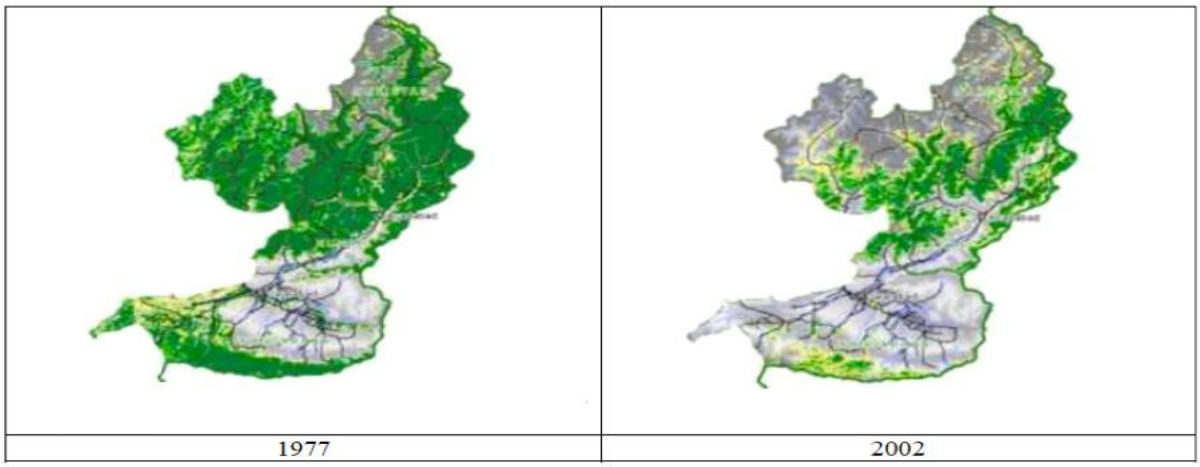

Figure 24: Forestry cover change in Afghanistan between 1977 to 2002(UNFCCC 2013)

Temperature and precipitation change also makes the life challenging in narrow valleys of the country where farming is made possible by seasonal snow melt flowing from high mountain peaks an aerial view of one of the narrow valleys in the Koh-e Baba as shown in the figure 25 below:

Figure 25: Aerial view of a narrow valley in central highland region (UNEP 2016).

3. CONCEPTUAL FRAMEWORK AND RESEARCH METHODS

3.1. Introduction

To identify the main challenges for disaster risk management and explore implication of climate change on natural disaster management in Afghanistan the researcher has used different methods for data gathering and analysis which includes revision and assessment of existing policies and organizations involved in DRM, research paper and publications on DRR and climate change in Afghanistan, field visits and interviews with affected communities, government officials and civil society representatives.

The field study was undertaken from May 2017 to July 2017, which includes field visits and interviews with ANDMA officials in Kabul and some provinces taking in to account the security circumstances and other limitation factors.

The researcher used inductive methods, which consist interviews, focus group discussions, field visits to areas which have experienced natural disaster or exposed to natural hazards such as earthquakes, flood, drought or avalanches.

The main approach employed for this study is qualitative assessment of natural disaster preparedness and management in Afghanistan.

3.2. Conceptual framework

Afghanistan is prone to different types of natural hazards and has often experienced natural disasters which have very severe consequences even without climate change, however climate change adds to the severity of impacts and may overwhelm the abilities of government and communities in disaster response.

The conceptual correlation between the climate change intensity and natural disaster management capacity is presented in the figure below:

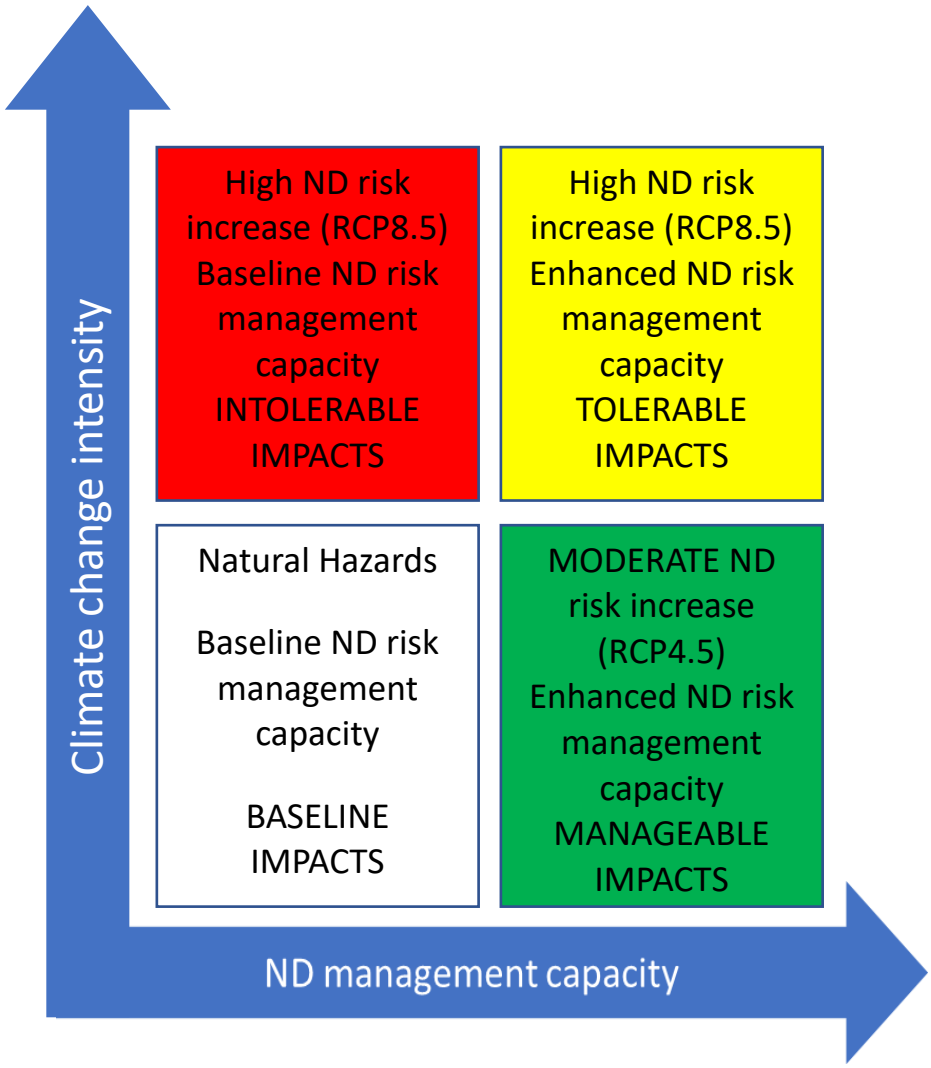

Figure 26 : Conceptual correlation between Climate change intensity and ND Management (Pinter 2018)

The concept of natural disaster management helped the researcher to focus on the following points.

- Disaster risk profile of Afghanistan
- Climate change and its possible implication on natural disaster in the country
- Reviewing of the disaster risk management mechanism (refer figure 26)
- Problem identification, gap analysis

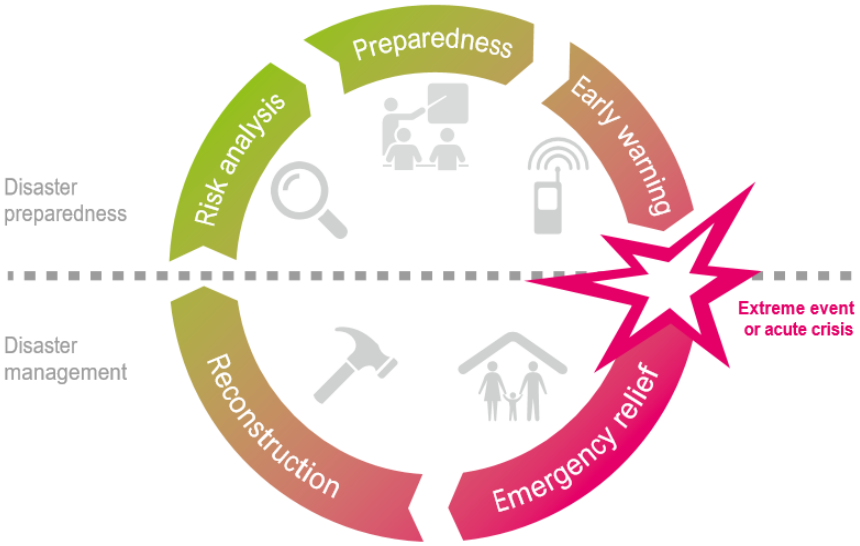

Figure 27 : Disaster Management Cycle (UNE-EHS)

The researcher used the concept of cycled under different scenario of climate change as well as disaster management cycle to triangulate and conceptualize the data generated from the field study for analysis and identification of problems associated with disaster management in Afghanistan.

3.3. Research methods

Using the research method involves interactive and participatory methods of data collection; in this method the researcher has more freedom to interact with participant and present a report which includes discussion with different groups with prospective (Kerkhof *et al*, 2002).

The objective of this study is to recommend measures that contribute to improve resilience, reduce the risk of natural disaster by undertaken mitigation and adaptation measures for reducing the climate change impacts.

Although Afghanistan is prone to multiple hazards and often experiences ND disasters, not many researchers investigate natural hazards and disasters in this country, due to lack of

academic paper the researcher for this study used different methods for data collections and analysis which includes semi-structured interviews with different groups and review of available secondary data mainly published by the government of Afghanistan, UN and international organizations.

3.3.1. Semi-Structured Interviews

Semi-Structured interview is used in this thesis research because it is open and widely used in social science researches to allow bringing new ideas however, it has a framework of concept to be explored (Edwards. R and Holland. J. 2013). for instance, the interviews with government high rank authorities such as minister and parliamentarians were more open, and its flow and directions were modified according to the responses of the interviewees.

The interview protocol was different for the officials engaged in DRR activities and people from affected communities. (Refer to annexes I, II for interview questions and annex III for the list of interviewees).

Semi-structured interviews helped the researcher gain perspective of disaster prone and affected communities, Governmental officials (mainly ANDMA and NEPA authorities), Academia and NGOs representatives.

Respondents were divided in to two categories:

1. Governmental officials from ANDMA / NEPA staff in Kabul and some provinces, parliamentarians, and NGOs engaged in disaster risk reduction activities.
2. People from disaster prone or affected communities, academia and civil society.

To ensure that important data was not missed, in addition to written note phone recording is used when permitted by the interviewee during the interviews.

The time frame for interviewing government officials, NGO representatives and community elders was not fixed. While a typical interview was 30 minutes long, some took 90 minutes or longer and most of interviews were completed in one session.

3.3.2. Review of secondary data

The researcher collected secondary data from several sources, including reports published by the government of Afghanistan (ANDMA and NEPA as key organization dealing with environmental and disaster related activities), data available through the internet, books, publications, international and local media, reports, by NGOs and UN Agencies such as United Nation Environmental Program (UNEP), United Nations International Strategy for Disaster Reduction (UNISDR), United State Agency for International Development (USAID), The World Bank and Asian Development Bank websites, etc.

In the relative absence of academic papers and research, secondary data hugely helped the researcher to verify the reliability of the primary data collected and overall the completion of this study.

3.4. Limitations

While conducting the research and writing this thesis, the researcher faced a number of limitations as follows:

- Lack of academic papers regarding natural disaster risk management in Afghanistan meant that that the researcher mostly relies on articles and reports published by NGOs and data available through the Afghanistan National Disaster Management Authority (ANDMA).

- Access to baseline information is critical for research purposes however, in Afghanistan due to lack of data, bureaucracy and corruption it is difficult to collect some of the basic information such as hydro-mereological data, land cover change, drought and desertification statistics etc.

- ANDMA does not maintain a comprehensive database of natural disaster incidents in the country. Some NGOs that work on disaster management have their own databases which cover a specific geographic location, but coordination between ANDMA, NGOs and other relevant governmental organizations is very limited.

- Illiteracy and lack of awareness about natural hazards leads people mainly in rural areas to look at natural disasters and climate change from a religious prospective and discussion on ND or CC become a taboo, especially in conservative communities ruled by religious leaders. This was a big challenge for the researcher who wanted to have public opinion and discuss scientific approaches to climate change, natural hazards and DRR process.

- Limited consideration of gender perspectives within disaster prone or affected communities. Due to religious and local customs it is not possible to conduct interviews with women, unless the interviewer is female and have permission and support from the elders of the community.

4. NATURAL DISASTER MANAGEMENT IN AFGHANISTAN

4.1. Introduction

Afghanistan faces a heightened risk of being struck by natural hazards which often cause disasters due to lack of capacity its present baseline condition adding to that climate change will furthermore stressed the condition which will be even harder to manage especially under RCP 8.5.

Decades of war and political instability damaged the country's infrastructure adding to this the socio-economic factors, and limited coping capacity have increased the vulnerability of the local population to risks that even manageable natural hazards lead to disaster, illustrated for instance by the impact of the Salang pass avalanches in 2010.

Natural disaster management could be assessed easily if we look in to following points:

- Natural hazards and DR profile of the country.
- Possible impact of the climate change on disaster management.
- Legal and institutional arrangements and their effectiveness in DRM process

The natural hazards and DR profile of the country as well as the implication of climate change in disaster management have been discussed earlier, this chapter covers the legal and institutional arrangement for disaster risk management, challenges, opportunities and major causes which hinder DRR process and resilience building in Afghanistan.

4.2. Legal and Institutional Framework for Disaster Management

Disaster and state of emergency is addressed in article 143 of Afghanistan's Constitution (2004). Disaster Management Law (2012) defined the acitivities related to response, preparedness and risk reduction for natural and human-induced disasters (ANDMA 2017).

In 1971 for the first time the government of Afghanistan established a committee for disaster management which remain with the same portfolio and structure for three decades, however after collapse of Taliban regime in 2001 extensive restructuring took place in ANDMA and several documents adopted which lay down the conceptual and institutional framework for disaster management which are listed below (ANDMA 2017):

- The Disaster Management Framework (2003).
- The Afghanistan Disaster Management Plan (2003).
- National Disaster Management Plan (2010).
- Disaster Management Law (2012).

National Disaster Management Commission (NDMC) established under the direct supervision of the President or Vice President of Afghanistan and designates ANDMA as the secretariat for NDMC and mandated to coordinate and manage DRR. Figure 26 shows Institutional structure of disaster management in Afghanistan. (ANDMA 2017)

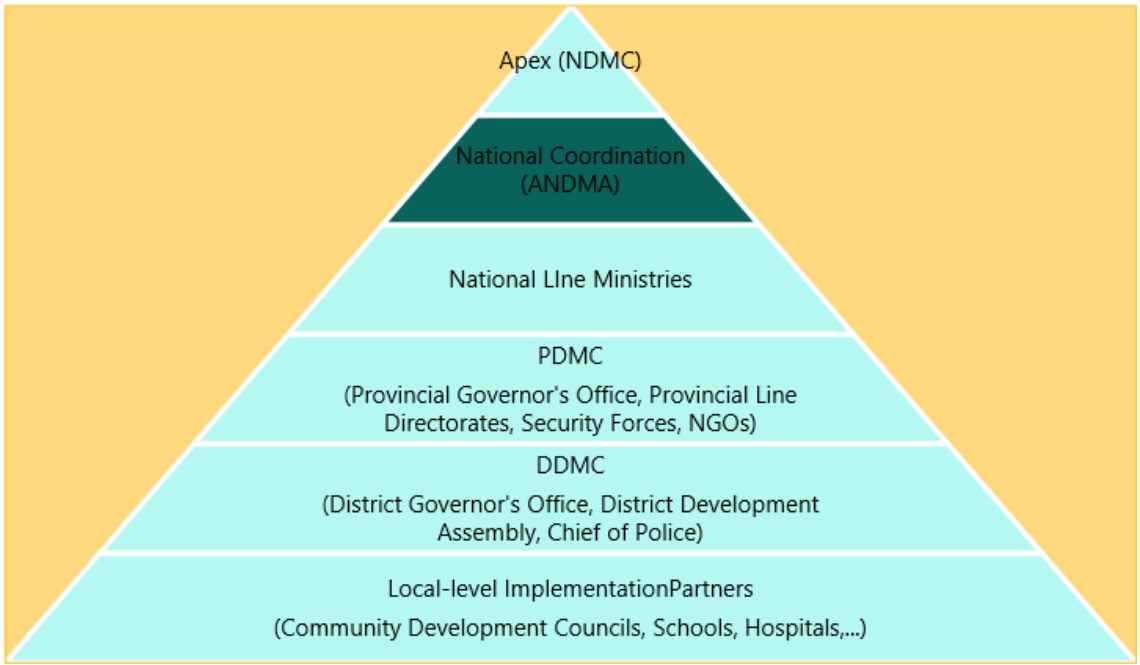

Figure 28: Disaster management structure in Afghanistan (NDMP 2010)

4.3. International Policies and Cooperation Opportunities

Afghanistan is party to a number of international and regional organizations that are involved in disaster risk reduction schemes.

Article 7 of the Afghan Constitution provides that the state observes international treaties that Afghanistan is a signatory of. However, not all treaties to which Afghanistan is a party have been translated into domestic laws. International treaties or conventions relating to disaster management that Afghanistan signed are listed below (IFRC 2012).

- ✓ Sendai Framework for Disaster Risk Reduction 2015-2030, Afghanistan is a signatory to the UN framework on disaster risk reduction and resilience which was adopted in Sendai in Japan in March 2015 and endorsed by the UN General Assembly.
- ✓ Hyogo Framework for Action 2005-2015 (HFA): Afghanistan is among the countries that are signatory to HFA and is committed to take necessary actions for reducing the risks of disasters and making its communities resilient.
- ✓ SAARC Agreement on Rapid Response to Natural Disasters: Afghanistan is a member of SAARC and a party to this agreement.
- ✓ Asia Pacific Disaster Response Fund (APDRF) : The APDRF is a fund managed by the ADB and designed to provide incremental grant resources to developing member countries (DMC) impacted by a major natural disaster. Since Afghanistan is a Member Country of ADB, it can receive assistance from APDRF
- ✓ Convention on Assistance in Case of a Nuclear Accident or Radiological Emergency Afghansitan is a signatory since February 2013.

4.4. Main challenges in Disaster Risk Reduction (DRR) in Afghanistan

Disaster management in Afghanistan is overshadowed by other priorities such as security, unemployment, and poverty. Even though natural disaster mainly drived by climate change impacts takes the life of hundereds of people and affects thousands of families each year.

Despite flow of huge investment through international community for state building, economic development and good governance litlle attention has been paid to DRR and resilience development.

Afghanistan is a a signatory to Sendai Framework for Disaster Risk Reduction (SFDRR) adopted in Sendai in Japan in March 2015 is centred on four priorities which are very well established but in Afghanistan due to ongoing conflict and urgent needs in other sectors DRR is not a high priority and the policymakers tend to allocate financial resources to other urgent needs such as security, education and public health.

Most of the legislative and sector policies which were prepared and promulgated during recent years do not support or contain elements of DRR and resilience (Interview with Barmak W.A. July 2, 2017).

The national budget does not have an allocation for DRR activities, although there is some funding for emergency response. On the other hand, there is limited awareness among policy makers about the risk reduction framework and its importance (Interview with Barmak. W. A, July 2, 2017).

Some of the most important constraint which negatively impact disaster risk management in the country are discussed in the sections that follow

4.4.1. Limited Institutional Capacity

Institional capacity can be defined as a measurment for how an institution respond to threats and challenges such as climate change.

Despite the flow of huge investments by the international community in development and social welfare, the government of Afghanistan was not able to adopt a resilience strategy and integrate DRR activities in development programs due to lack of instititutional capacity, political will and public awareness.

ANDMA and NEPA are the two institutions that are dealing with disaster management, environmental issues, sustainable development, DRR and resilience development in Afghanistan.

ANDMA as a nodel agency responsible for DRM in Afghanistan is not well prepared to implement DRR and resilience developmen in the country. Some of the main chllenges that limit capacity of ANDMA were highlighted during the interview of state minister for ANDMA with Ariana TV are listed below (Ariana News 2017):

- Organizational structure and professional capacity of ANDMA
- Allocation of minimum budget and resources for ANDMA.
- Lack of technical expertise and sufficient staff "In most of the provinces ANDMA has only 4 or 5 staff, and total number of ANDMA staff is less than 400 personel".
- Risk epxposure and high vulnerablity.
- Security challenges

For institutional capacity building and developing resilience strategy the government of Afghanistan shall consider establishing partnership with universities to conduct joint research works on the impacts of climate change and develop adaption and mitigation measures.

4.4.2. Coordination and limited usage of advanced technologies

ANDMA is the national body for multi-sectoral coordination and collaboration in Disaster Risk Reduction.

If we look at the mandate of ANDMA one of its core responsibilities is to coordinate and manage all operational elements relating to disaster preparedness, mitigation and response. However, ANDMA has not been successful in etbalishing an effective coordinating mechanism to deal with national and international organizations and engaged them in DRR activities and benefit from the services offered by these organizations.

For instance, the Group on Earth Observation (GEO) is an intergovernmental partnership that supports DRM by applying earth observations tehnologies to forcast and prepare for disasters, to mitigate the damage and to facilitate response and recovery. GEO has 104 member countries howevere, Afghanistan is the only country in South Asia which is not a member of GEO despite the huge need for technical support and geospatial information in DRM in Afghanistan (Douglas 2017).

United Nations Office for Outer Spaced Affairs (UNOOSA) is the United Nation platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) which offer technical support in case of disasters, satellite data or products derived based on satellite data free of cost however, ANDMA has not established a proper communication system to benefit the services offered by these or ganizations.

Coordination and communication with UN agencies and international organizations would enable ANDMA to recieve technical support, capacity building and application of new technologies for identification, and mitigation of natural hazards risks considering that application of new technology such as remote sensing and GIS for initial risk assessment

and hazard planning are very limited and needs to be expanded by provision of tools and trainings (Interview with Aziz, T. July 5, 2017).

4.4.3. Investment in DRR and Resilience Building

Investment in DRR and resilience building is very important to mitigate the impacts of disasters, reduce the cost for response and recovery and it is aligned with sustainable development goals (SDGs) as 10 out of 17 SDGs consist targets that are related to DRR (UNISDR 2015).

Decades of war coupled with climate change implications and exposure to natural hazards increases the risks of disaster in Afghanistan while, lack of investment or limited investment in DRR significantly increased the vulnerability and reduced the coping capacity and resilience to disaster.

For instance, in urban development and housing projects the principle of DRR and resilience is ignored by public and private investor and many of the building are constructed in earthquake zone or flood prone areas without proper engineering design and implementation of construction and safety standards.

Afghanistan is in reconstruction phase and it is very important to include DRR and climate adaptation scheme for all projects especially in housing and energy sector because climate change is happening which increase the risk of hydro-metreiological hazards, exterime events and disasters.

4.4.4. Lack of early warning system

An early warning system refers to the “provision of timely and effective information, through identified institutions, that allows individuals exposed to

hazards to take action to avoid or reduce their risk and prepare for effective response" (UNEP 2012a).

An early warning system integrates four main elements, including risk knowledge, monitoring and predicting, disseminating information, and response, and it is an important tool for DRM and safeguarding the population from different types of hazards, especially from hydro-meteorological hazards (UNISDR 2017).

Four decades of war not only hampered the development process, but also the damaged existing infrastructure. The Afghanistan Meteorological Department (AMD) is one of the institutions which was severely affected by the war. Most of the equipment used for weather forecasting was damaged during the Taliban regime (1996 to 2001) the AMD didn't operate, Equipment were damaged and over 100 years' worth of weather records were destroyed (Interview with Rasoli, J. June 26, 2017).

The Taliban banned weather forecasting as it was considered sorcery which is forbidden in Islam. This decision not only harmed the agriculture sector since droughts were not forecasted but also a plane Ariana Afghan Airlines crashed in to mountain on March 19, 1998 due to unexpected weather killing 45 people (Perreaux 2004).

After the collapse of the Taliban regime in 2001, the Afghanistan Meteorological Department reopened however, it was not fully operational due to the lack of equipment until 2003, when France financed the installation of several simple weather stations across the country (Interview with Mosawi. R.

June 26, 2017).

In 2013 the United States Agency for International Development (USAID) pledged financial support to a World Meteorological Organization (WMO) project, On 14 August 2017, The Afghanistan Meteorological Department (AMD) issued its first flood early warning for the South and Southeast region (WMO 2017).

The Afghanistan Meteorological Department (AMD) is now well equipped to forecast severe weather events and issue early warning (WMO 2017). However, a functioning early warning system is limited to obtaining information from weather stations and satellites, but also communicating this information to vulnerable communities such as avalanches prone areas which would have significantly reduced the number of fatalities.

For early warning system it would be very useful that telecommunication companies design and run an application in mobile phones with the following functionalities (Tejassvi 2014):

- Reporting system
- Emergency/Distress call
- Disaster Alert
- Geo-visualization system

4.4.5. Female engagement in DRR process

World Health Organization (WHO) research in different countries shows that women and men may suffer different negative consequences during and after a disaster therefor, women engagement in DRR activities is crucial (WHO 2002).

There is significant correlation between gender, livelihoods and disaster in the country and it is likely to be exacerbated by climate change. However, in Afghanistan gender sensitive data is largely missing.

In Afghanistan women's participation in DRR is very limited and they are not involved in decision-making process, which negatively affect their access to assistance in case of natural disasters (NAP 2016) For instance, if we consider the ANDMA its female staff is less than 5% in the provinces (Interview with Geyah.N. June 26, 2017)

The illiteracy, lack of social capital, freedom of movement, networks and influence in the government, no control over the land and other economic resources deprived women from financial independence are constraint to women empowerment in Afghanistan and promote resiliency in vulnerable communities (NAP 2016).

A survey conducted by Thomas Reuters foundation shows that Afghanistan is the worst place to live for women in the world, with 87% female illiteracy and a mortality ratio of 1600 in 100,000 live births since child marriage is common, especially among the rural population (Alpin 2016).

In most of disaster caused by earthquakes, flooding and avalanches the fatality rate of the women are higher than men especially in the rural areas where the houses are not resistant to earthquakes and flooding while, the women spend most of their times at home taking care of children (Interview with Khaled R. June 22, 2017).

4.4.6. Corruption

Corruption is one of the main challenges in Afghanistan that threatens the country's state-building process, undermining the government's legitimacy, stability, and rule of law. It also negatively affects service delivery during status and in disaster risk reduction.

The Corruption Perceptions Index (CPI) which measures the level of perceived corruption in the public sector assessed 176 countries and territories, ranking them using a scale of 0 (highly corrupt) to 100 (very clean), Afghanistan scored only 15 and it is ranked 169th in the list as one of the most corrupt country (TI 2016).

Table 8 shows the CPI score for Asian countries for 2012-2015 and demonstartes that Afghanistan is the worst performer of the group.

Table 6: Corruption Perceptions Index's scores (TI 2016)

Countries	**2015**	**2014**	**2013**	**2012**
Afghanistan	11	12	8	8
Bangladesh	25	25	27	26
India	38	38	36	36
Kyrgyzstan	28	27	24	24
Myanmar	22	21	21	15
Nepal	27	29	31	27
Pakistan	30	29	28	27
Tajikistan	26	23	22	22

Source: Transparency International 2016

Corruption permeates most government sectors specailly in post-conflict environment where disburemsnet of budget is considered to be an important factors to evaluate the quality of an institution and often it leads to awarding of contracts without any competitive bidding (Ewins et al., 2006).

According to the World Bank director, an estimated 35% to 40% of aid money is being wasted in Afghanistan (Duparcq, 2006).

4.4.7. SWAT Analysis

Strengths	Weaknesses
• ANDMA mandate covers all aspects of DRR and resilience. • National Disaster Management Commission (NDMC) is comprised of the President, Vice Presidents, all relevant ministries. • Clear strategic framework (Sendai) for achieving resilience in Afghanistan • Corresponds to approaches utilized by NGOs for local interventions.	• Lack of coherent resilience building strategy in government and donor funded projects. • Limited institutional capacity at ANDMA specially in provinces. • Limited resources allocated for ANDMA (human and financial) to effectively carry out its role. • Lack of early warning system and public awareness about the natural hazards.
Opportunities	**Threats**
• Afghanistan is in reconstruction process so integration of resilience strategy in all development programs would be more feasible. • International commitment for supporting reconstruction and resilience building in Afghanistan • Coordination and overview of all resilience activities in Afghanistan • Adoption of the concept may provide ANDMA with an attractive tool for stakeholders, and increase its credibility as coordinating agency	• Challenges in role of law and corruption in governmental organizations • Lack of support from other Ministries with ANDMA and NEPA. • Centralized DRR approaches • Weak local structures hamper effective delivery at Provincial and District level • Lack of women engagement in DRR activities and decision-making process. • Political will has been limited in the past and may further decline as other policy matters gain in importance.

5. DISCUSSION AND RESULT, GAP ANALYSIS AND CONCLUSION

5.1. Introduction

The researcher has conducted a total number of 30 interviews with ANDMA staff, relevant stakeholder and affected communities, the result of these interviews demonstrates that dominant feature of ANDMA's operations with regard to the four phases of disaster management is its focus on response with very little of no attention to prevention and recovery aspects of disaster management.

The only example for disaster prevention provided by ANDMA Kabul staff was a survey on vulnerability zones for rock slides, however it was not clear if the ANDMA has taking action for addressing the risk.

The element of risk assessment is often ignored in big infrastructure project for instance in Herat provinces, the recent completion of the Salma Dam in Chresht-e Sharif district introduces a significant infrastructure element that typically required comprehensive risk assessments and disaster preparedness plans. However, ANDMA did not list the dams as part of its responsibilities and there was no public awareness program to inform the people in the area about the risk of flooding.

Activities that fall under the recovery phase often remained limited to allocation of some compensation funds to citizens whose house and property had been destroyed during a natural disaster.

Interventions that aimed at prevention of natural disaster were almost non-existent, for instance, the regular flooding caused by the Amo river in northern provinces along the border between Afghanistan and Uzbekistan, the river causes annual cycles of flooding which destroy houses and erode agricultural land at the Afghanistan side. Uzbekistan in

contrast placed fortification measures which protect its land against the flooding, pushing the waters further towards the Afghanistan where not only the lack of flood protection is an issue but also the ANDMA and relevant authorities didn't manage to map the areas under risk of flooding, causing frequent dispute over compensation for land and properties (Interview with Shekib. S. June 12, 2017)

5.2. Analysis:

The finding of this research based on revision of data, the field visits and interviews indicate that DRM in Afghanistan is primarly event of disaster driven and largely limited to disaster response. ANDMA's current functions are shaped by a focus on preparedness and response, leaving DRR and resiliency widely uncovered however, there is a paradigm shift in DRM policies worldwide as shown in the table 6 (UNISDR 2014):

Table 7: Paradigm shift in Disaster Risk Management policies (UNISDR 2014).

	Old paradigm	HFA	New paradigm
Risk Perception	Exogenous	Exogenous	Endogenous
Problem Recognition	Need for effective response and recovery	Need for disaster risk reduction	Risk is embedded in development processes (with a focus on underlying factor
Main policy tools (examples)	Contingency plan, emergency drill	Early warning system, DRR investment such as levee construction	Land use planning, risk proof investment, Eco-system managemen
Required knowledge		Risk and loss assessment	Risk, loss and socio-economic impact assessments
Actors	DM Agency	DRM agencies within different levels of government, various stakeholders (public, private, NGOs)	More involvement of other stakeholders, especially private sector and local level actors
Link		Millennium Development Goal	Sustainable Development Goal, Climate Change Policy

The researcher has focused on ANDMA's operations, limitation and opportunities to highlights the gaps which hinder ANDMA's capability in addressing DRM more effectively, some of the main constraints for ANDMA to fulfil its mandate are listed as follow:

- Limited institutional capacity of ANDMA specially in the provinces has been identified as a constraint which affect the ANDM's ability to conduct advanced risk assessments or planning exercises.

- Lack of a consolidated risk profile of the country for developing and implementation of disaster risk reduction activities across the country, as well as lack of a comprehensive database for disasters incidents record and management.

- The strategy has not been developmed which could be an umberalla for all development programs implemented by different ministries however there were some individual cases for instance the ministry of rural rehabilitation and development (MRRD) have developed its own strategy for disaster management (2014-2017).

- Dominance of disaster response and the lack of focus on prevention and risk reduction is one of the main structural gaps in ANDMA's approach to disaster management.

- Fragmented governance arrangements, technical capacity, and topdown decision making limit public participation and negatively affect DRR proces.

- Resource mobilization and financial arrangements is an important element for implementation of disaster risk reduction activities with more focus on recovery and mitigation. Currently, there is no dedicated fund allocated towards the activities of

disaster management to reduce the risk of disasters in country, however, there is a limited amount of emergency response fund.

- ANDMA's involvement in policy development was found to be weak due to lack of both adequate professional staff and structures to coordinate with line ministries for integration of the DRR and resilience strategy in to development programs.

- Highly centralized system of administration, whereby the allocation of state resources is decided through a lengthy bureaucratic procedure limits the provincial ANDMA's delegation authority in disaster risk response.

  Remoteness of many settlements and poor transport connectivity specially during the winter makes disaster risk response process challenging and require proper arrangement in provinces.

- ANDMA's responsibility in case of conflict-related incidences is also debated amongst provincial officials, the focus of provincial ANDMA offices on natural disaster is contrasted by the shift towards security-related disaster activities in Kabul.

- Public awareness about the natural hazards to exclude the influence of religious and traditional prospective which are in contrasts with science that look in to disaster as intersection of natural hazards with built environment.

- Climate change and its implication on natural disaster incidents has been addressed by many researchers. however, a national strategy on climate has not been developed in Afghanistan and it is also indicated in initial national communication (INC) report which has been submitted to United Nations Framework Convention on Climate Change (UNFCCC 2013).

- Disaster risk reduction is (DRR) is mentioned in documents but often fails to be recognized as core element to be integrated in to development programs, actually it has been at the losing end in competition with some other goals such as security, employment, poverty reduction, health, food security (Vincent 2016).

- Promoting the hydro-meteorological services through investing in hydro-meteorological infrastructure to provide real-time access to data and forecasting systems is highly needed in Afghanistan because of its exposure to different types hazards, high vulnerability and low coping capacity.

- Female engagement in administration and disaster risk reduction activity is extremely limited in Afghanistan, although it is obvious that no disaster risk reduction and resilience target can be achieved if half of the population is ignored in DRR activities and decision-making process.

5.3. Conclusion and recommendations

The aim of thesis research was to address the main challenges which hinder disaster risk reduction approaches in Afghanistan by conducting a gap analysis at legal and institutional arrangement for disaster risk reduction and resilience building in Afghanistan.

Climate change adaptation and DRR should be should incorporated in national development strategy (ANDS) and should be included in educational curricula at schools and universities. Furthermore, the government should implement awareness programs on natural hazards, climate change, community-based adaption and DRR across the country.

Public awareness about climate change and DRR is very important so in addition to governmental organizations contribution of civil society is very essential because societal and environmental issues require public participation (Vincent 2016).

Keeping in to consideration that Afghanistan is a country prone to different types of natural hazards while it has the lowest coping capacity and high vulnerability due to several factors such as prolonged war, high illiteracy rate, un-employment, acute poverty, limited access to health and social welfare services, it is highly important to prioritize disaster risk reduction approach and resilience building in the country.

The impact of climate change has already felt in Afghanistan considering that natural resources are the mean of livelihood for most of Afghan and implication of climate change directly affected the water resource availability, food production decline, livestock decline, migration, drinking water access, health and education, for example drought in 2008 caused wheat production to decline by 40 to 55 percent countrywide (Interview with Farzam. M. K. June 16, 2017).

In Afghanistan traditional methods of construction is common without much influence of modern building codes except in major projects. the government of Afghanistan approved Afghanistan Building Code (ABC) in 2012 as a measure to tackle the building and urban overdevelopment crisis but lack of public awareness and enforcement of the building code remain a major problem in housing sector therefor, even a minor earthquake may cause a disaster (Interview with Shamal. S. July 7, 2017).

In conclusion, considering the disaster risk profile of the country, high vulnerability and limited coping capacity in the Afghanistan it is extremely important that government of Afghanistan incorporate the DRR and resilience strategy in its National Development Strategy (ANDS) and align all development efforts with Sustainable Development Goals (SDG).

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ANNEX I: Interview Questions

Name: Phone number (if available): Village:
District: Province:

Effect of Natural hazards and coping mechanism:

1, What is the most common natural hazard/human induced hazards in your area?

A, Flooding B, Drought C, Earthquake D, Conflict E, Others

2, What is your understanding about early warning system? In case of emergency such as flooding or avalanches, is there any early warning system in place in your community?

3, Where did you go for evacuation?

4, What was/is your source of drinking water?

5, What was/is the sanitary facility available to the household?

6, How do you cope with natural disaster and emergency?
e.g., use saving, sell asset, take a loan, receive assistance from ANDMA/NGOs etc.

7, How do you evaluate the DRR activities in your province? what do you suggest for increasing the coping capacity of vulnerable communities in your area?

8, What was/is the main sources of your income before/after the natural disaster?

9, Have there been any changes in your access to land/water, and if so, what are these changes, and what are the causes of these changes? Better or worse?

10, Have you seen any degradation of land/water? If so, why has there been a degradation of resources?

12, Have there been any changes in temperature and seasonal precipitation? and if so, what could be the causes of these changes?

13, Do you think there is a scarcity of resources in your village? Scarcity of what? Why is it a scarcity of resources? Do you think it is more or less scarcity now than before?

14, What do you think of climate change and how do you relate it with natural disaster?

ANNEX II: Interview Questions from GIROA officials

Name: Phone number (if available):

Position: District: Province:

1, What type of natural disaster take place in this province?

A, Flooding B, Drought C, Earthquake D, Avalanches E, Others

2, What is DRR principle and what type of activities are covered by your organization? (e.g., disaster preparedness, response, recovery)?

3, What type of natural disaster have you responded yet, what were the biggest challenges which hinder DRR activities?

4, Do you have any risk assessment and disaster management plan for your province?

5, Have you identified the most vulnerable communities in your province? Is there an early warning system in place?

6, What are the main challenges that hinder DRR activities and resilience building in your province? (e.g., technical capacity, resources, lack of coordination, others)

7, Have you seen any degradation of land/water? If so, why has there been a degradation of resources?

8, Have there been any changes in temperature and seasonal precipitation? and if so, what could be the causes of these changes?

9, Do you consider female engagement in DRR activities? Is there any special evacuation plan for women and children in case of any disaster incident? Is there storage of food, potable water, emergency kits and accommodation arrangement in your province?

10, What do you think of climate change and how do you relate it with natural disaster?

ANNEX III: Summary list of Interviewees (Officials)

1, Mr. Wais Ahmad Barmak State Minister for Disaster Management and Humanitarian Affairs and Head of ANDMA, Interviewed on July 2nd 2017.

2, Mr. Abdul Ahad Kohdamani Head of Risk Assessment Unit ANDMA Interviwed on June 28, 2017

3, Mr. Tarid Aziz Head of GIS unite for risk assessment ANDMA Interviewed on July 4, 2017

4, Mr. Mohamad Amin Director of ANDMA office in Parwan Interviewed on July 6, 2017

5, Habibullah Habib Professor at Faculty of Environmental Sciences and former chancellor of Kabul University Interviewed on July 8, 2017.

6, Mr. Jawid Rahil Executive director ast Panjsher governor office on June 24, 2017.

7, Mr. Jacob Rasouli fomer director at Afghanistan Meteriological Department Interviewed on June 26, 2017.

8, Mr. Reza Mosawi Director of Afghanistan Meteorological Department Interviewed June 26, 2017.

9, Mrs. Roshna Khalid head of Afghan women association in Parwan and former spokesperson of Parwan governor interviewed on June 22, 2017.

10, Mrs. Nadira Geyah director of women affairs Parwan province interviewed on June 22, 2017.

11, Mrs. Alya Attaie director of women affairs Panjsher province interviewed on June 24, 2017.

12, Mr. Sayed Hossain Seyar doctor at Parwan provincial hospital interviewed on July 6, 2017.

13, Mr. Hamidullah Bakhshi director of Panjsher ANDMA office Interviwed on June 24, 2017.

14, Mr. Kazim Homayon director of Policy and Planning at National Environmental Protection Agency (NEPA) Interviewed on June 21, 2017.

15, Mr. Naqibullah Sediqi Mr. Head of climate change division at National Environmental protection Agency (NEPA) interviewed on June 21, 2017.

16, Mr. Shakib Shamal Professor at faculty of geology at Kabul university interviewed on July 7, 2017.

17, Mrs. Sayira Shakib district governor of Faizabad in Jawzjan province interviewed on June 12, 2017.

18, Mr. M.Kabir Farzam director of Parwan agriculture department interviewed on June 16, 2017

19, Mr. Naqibullaj Sediqi, Advisor to ANDMA through Afghanistan Resiliance Consortium (ARC) interviewed on July 3, 2017.

20, Haji Abdul Wasim elder of community and head of Mahigir irrigation canal in Bagram disrtict Parwan province interviewed on July 10, 2017