YANGON UNIVERSITY OF ECONOMICS

MASTER OF PUBLIC ADMINISTRATION PROGRAMME

A STUDY ON DISASTER RISK REDUCTION AND MANAGEMENT IN COMMUNITY

(Case Study: Bilin Township, Thaton District, Mon State)

YIN MAR NAY WIN

EMPA – 76 (16th BATCH)

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(Case Study: Bilin Township, Thaton District, Mon State)

A Thesis submitted as a partial fulfilment of the requirements for the degree of Master of Public Administration (MPA)

Supervised by:

Daw Soe Yu Hlaing
Lecturer
Department of Applied Economics
Yangon University of Economics

Submitted by:

Yin Mar Nay Win
Roll No (76)
EMPA (16th Batch)
(2017 – 2019)

AUGUST, 2019

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This is to certify that this thesis entitled "**A Study on Disaster Risk Reduction and Management in Community (Case Study: Bilin Township, Thaton District, Mon State)**" submitted as a partial fulfillment towards the requirements for the degree of Master of Public Administration has been accepted by the Board of Examiners.

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   Department of Applied Economics
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AUGUST, 2019

ABSTRACT

The major objectives of the study are aim to identify the current status of disaster risk reduction and risk management and to examine the knowledge disaster risk performance of household in Bilin Township. This study used the qualitative and quantitative methods use on primary data and secondary data of documents reviews. A sample survey of 7 villages in Bilin Township, Thaton District, Mon State was conducted household survey to assess the disaster knowledge, household preparedness plan and emergency planning in community. According to the survey, it is found that the whole community disaster knowledge need to be improve. Moreover, these disasters risk need to reduce develop community disaster preparedness planning and mitigation activities. The community early warning information receive regularly only through from village leader and they have hard to receive from media channels and telecommunication lines. Cause of lack of infrastructure assets like as the electricity and telecommunication in Bilin Township. On the other hand, as the township level, disaster management committee members must be aware of disaster management policies and guidelines thus to be apply in their responsibilities. Furthermore, emergency fund allocation and relief aid materials more requirements while use in emergency time. In conclusion a township level of disaster risk reduction and management system is failing for response system. If these systems established implements in ground level, the government staff members and local community's disaster management skills could be more improved in future.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURE

LIST OF ABBREVIATIONS

AADMER	-	ASEAN Agreement on Disaster Management and Emergency Response
ASEAN	-	Association of Southeast Asian Nations
CBDRM	-	Community Based Disaster Risk Management
CBDRR	-	Community Based Disaster Risk Reduction
CCA	-	Climate Change Adaptation
CCDRR	-	Climate Change Disaster Risk Reduction
CDPP	-	Community Disaster Preparedness Plan
CO2	-	Carbon Dioxide
DDM	-	Department of Disaster Management
DMC	-	Disaster Management Center
DMC	-	Disaster Management Cycle
DMH	-	Department of Meteorology and Hydrology
DMTC	-	Disaster Management Training Center
DRM	-	Disaster Risk Management
DRR	-	Disaster Risk Reduction
DRRWG	-	Disaster Risk Reduction Working Group
EMS	-	Early Management System
EWS	-	Early Warning System
GAD	-	General Administration Department
INGOs	-	International Non-Governmental Organizations
IPCC	-	Intergovernmental Panel Climate Change
MAPDRR	-	Myanmar Action Plan for Disaster Risk Reduction
MCCDDM	-	Myanmar Consortium Capacity Development on Disaster Management
MRCS	-	Myanmar Red Cross Society
MSWDRR	-	Ministry of Social Welfare Relief and Resettlements
NCDP	-	National Center for Dialogue and Progress
NDMWC	-	National Disaster Management Working Committee
NGOs	-	Non – Governmental Organizations
RRD	-	Relief and Resettlement Department
SDG	-	Sustainable Development Goals
SSWG	-	Sub Sector Working Group

TFI	-	Training for Instructors
UN	-	United Nations
UNDP	-	United Nations Development Programme
UNDRR	-	United Nations Disaster Risk Reduction
UNISDR	-	United Nations International Strategy for Disaster Reduction
UNOCHA	-	United Nations Office for the Coordination of Humanitarian Affairs
WASH	-	Water and Sanitation Hygiene

CHAPTER I
INTRODUCTION

1.1 Rationale of the Study

The ASEAN Region is peopled by a diverse population of about 600 million and also the most natural disaster prone region in the world. More than 50% of global disaster mortalities occurred in the ASEAN region during the period of 2004 to 2014.During this period, the region contributed to more than 50 percent of the total global disaster fatalities, or 354,000 of the 700,000 deaths in disasters worldwide. The total economic loss was US$91 billion. About 191 million people were displaced temporarily and disasters affected an additional 193 million people. About one in three to four people in the region experienced different types of losses. There was an increase in the rate of disaster mortality from eight (during 1990 to 2003) to 61 deaths per 100,000 people (during 2004 to 2014) (ASEAN Agreement on Disaster Management and Emergency Response (AADMER) Working group, 2016).

Floods, Storms, Earthquakes and Landslides were the most frequent hazards that devastated many cities and communities' different parts of the region in the current decade. Between 2000 to 2009, disaster events that affected the ASEAN peoples accounted for 14% of the world total number of disasters. Flood was the most frequent hazard but Earthquakes caused the most adverse impacts in terms of loss of lives, number of injured and number of people made homeless. Direct and indirect economics disaster losses suffered by affected member states influence the region's: economics competiveness, prosperity, food security, political stability and quality of life of its people. Myanmar ranks first on list of most at risk – Asia Pacific countries in 2012. The country is vulnerable to a wider range of hazards, including floods, cyclones, earthquakes, landslides and Tsunamis. The likelihood for medium to large –scale natural disasters to occur every couple of years is high, according to historical data. These events represented serve losses for the population, hindrance to development interventions, they did also result in increased collaboration between the Government,

the international community and local organization, as well as greater preparedness and response interventions. (UN Office for the Coordination of Humanitarian Affairs, 2013)

Myanmar is exposed to a wide range of natural hazards, triggering different types of small scale to large-scale disaster across the country's territory. Myanmar's vulnerable to hazard is compounded by socio – economic factors: wide spread poverty and poor infrastructures are at the heart of the country's relatively low capability to recover from a significant event, be it natural or man-made. These risk are being further exacerbated due to processes attribute to climate change and variability.

Myanmar is a country in transition - after nearly 50 years of military rule the first multi-party elections since 1960 are slated for late 2015. Since the military started relinquishing control of the government in 2010, political and economic relationships with the world have improved dramatically and the majority of trade and other economic sanctions imposed by the Europe countries, United State of America, Australia etc. have been eased. Myanmar's new road to development may be hindered by the high risks posed not only by natural disasters, but also by climate changes. There is significant need for continued investments in community-based disaster risk reduction in Myanmar. (Pyae Thet Phyo, 2016)

Mon State is highly exposed to Flood, Cyclone, Strong Surge, Strong Wind and heavy rain in rainy season. Disaster experiences of Flood (1997), Cyclone (2008) and Flood (2018) in Bilin Township is one of the township of Thaton District, had a worse result in infrastructure, public transportation, farming and crop acres was destroyed. After flooded, with the efforts of township authorities and supporting of Emergency Aid agencies the villages and ward were being response and recovery. During the phase of recovery provided livelihood assistant, cash for assets and WASH implementation activities implemented in short term period however did not implement disaster risk reduction activities as an intervention for community resilience for disaster.

Therefore, natural disasters like Cyclone, Storm Surge, Tsunami and Flood are threatening the livelihoods, infrastructures and lives of communities in Bilin Township. Thus, community-level disaster preparedness, mitigation, early warning, response plans, and longer-term disaster risk reduction are critical. The recent political opening in Myanmar presents a long-awaited and promising chance to building community capacity for disaster risk reduction (DRR) among vulnerable households that have been deeply and frequently affected by natural disasters in recent years. The Republic of the Union of Myanmar is committed to disaster risk reduction and it has systems and

procedures at National, State/Region, District, Township, Wards and Village Tracts levels for Disaster Management. (National Disaster Management Committee, Republic of the Union of Myanmar, 2017)

1.2 Objectives of the Study

The major objectives of the study are -

(1) To identify the current status of disaster risk reduction and risk management

(2) To examine the knowledge disaster risk performance of household in Bilin, Township

1.3 Method of Study

This study is descriptive method with primary data and secondary data. The secondary data are collected from the Department of Disaster Management, Township General Administration Department as well as from published books and internet web sites related the disaster risk reduction and climate change as the secondary source. A survey understands with a sample of 251 households not only a quantitative approach the household interview method and qualitative approach Key information interviewed collected key person of stakeholders from Bilin Township and multi simple random sampling method has been used.

1.4 Scope and Limitations of the Study

This study was focused on disaster risk reduction and risk management in township level, especially focus on disaster prone areas of villages household, stakeholder's roles and responsibilities in Bilin Township. This research paper is intending to study the knowledge and performance of disaster preparedness, management and functions of stakeholder concerned in operating the disaster response. The scope of study is emphasized on current procedure of the response on natural disaster management and what are the improvement of quality and accountability of disaster management. There are household from both villages and township stakeholder's. To achieve the objectives is conducted (7) villages in Bilin Township, in Thaton District and the sample size is 251 respondents of household from seven villages in Bilin Township. Actually, risk reduction measures are very difficult to get the full capacity due to modern technology and human complex disasters are very limited in theoretically.

1.5 Organization of the Study

This research study is organized by five chapters. The first chapter is introduction which contains Rationale of the study, Objective of the study, Method of Study, Scope and Limitations of the Study and Organization of the Study. The second chapter is Literature review of Global Climate Change and Disaster, Sustainable Development Goals and Climate Change, Type of Hazard, Disaster Risk Management and Disaster Risk Reduction. Third chapter show about the Natural Disasters Past and Event in Myanmar, Climate Change and Disasters in Myanmar, Hazard Profile of Myanmar, Disaster Risk Reduction in Myanmar, Myanmar Action Plan for Disaster Risk Reduction and Disaster Risk Management Policies and Disaster Management Training Center in Myanmar. The fourth chapter is Survey analysis, Survey Profile, Survey design, Demographic Characteristics of the respondents, Knowledge concerning with Disaster Risk Reduction and Management, Disaster Preparedness of Response, Disaster Response Plan of respondents, Implementations of stakeholders in Disaster Risk Reduction and Management. And the last chapter is condition its deals with Findings and Recommendations for the further disaster management.

CHAPTER II
LITERATURE REVIEW

2.1 Global Climate Change and Disasters

Climate Change is now affecting every country on every continent. It is disrupting national economics and affecting lives, costing people, communities and countries dearly today and even more tomorrow. Climate Change is within a period of millions of years from the time of the century change changing climate statistics there are two form of climate change or climate events. The first, climate change as a possible change is a specific region may be spread across the Earth changes. Second, now a day, the climate change due to human activity, because of climate change others factors are changing the world's climate. The changes are not displayed or not to resist change factors. "Global warming" or "Humanity activity to global warming", known as the general. Time for much of the measured temperature information, available statistics from the origins can view the temperature history. (UN Secretary-General António Guterres at the opening of the Climate Action Summit, 2019)

The significant impacts of climate change, which include changing weather pattern, rising sea level, and more extreme weather events. However, these factors can change of disappear due to the sea and the huge ice mass of 0 and other factors cause climate changes very slowly, the recovery was discreetly. Therefore, to change the climate system is full- screen or external bother centuries need to take the time needed to 0. The greenhouse gas emission from human activities are driving climate change and continue to rise. Climate change is a global challenge that does not respect national borders. Emissions anywhere affected people everywhere. It is an issue that requires solutions that need to be coordinated at the international level and it requires international cooperation to help developing countries move toward a low –carbon economy. According to address climate change, countries adopted a global agreement in Paris December in 2015. (United Nations Framework Convention on Climate Change, 2015)

Global warming and climate change cause disaster across the world. Disaster is the serious disruption of the functioning of society, causing widespread human, material or environmental losses, which exceed the ability of the affected communities to cope using their own resources. Disaster occurs when a hazard impacts on vulnerable people, the combination of hazard, vulnerability and inability to reduce the potential negative consequences of risk results in disaster. All kinds of disaster, natural disaster, technological and manmade disasters may cause substantial and significant property damage or destruction of socio economics life. Natural disaster is naturally occurring physical phenomena caused either by rapid or slow onset events which can be geophysical (Earthquake, Landslide, Tsunamis and Erosion), Hydro and Metrological (Cyclone, Storms and Flood), Climatological (Extreme temperature like as El Nino, Drought and Forest fire), Biological (Animals plagues, diseases like as H5N1, H1N1). Technological or Manmade disaster (complex emergencies/ conflicts, displaced population, industrial accidents, transport accidents and manmade fire). Moreover, range of challenges such as climate changes, unplanned urbanization and under-development/poverty as well as the threat of pandemics, that will shape humanitarian assistance in the future. These aggravating factors will result in increased frequency, complexity and severity of disasters. (The United Nations Internal Stategy for Disaster Reduction, 2009)

2.2 Sustainable Development Goals (SDG) and Climate Change

As the developing country to be developed necessarily imply that they are sustainable for these country the main goal is to rid their society of issues such as social inequalities, waste management and environmental responsibility. Especially lack of financial resources to carry out and plan sustainable developed. Sustainable development is often not possible in war-torn countries as there are other priorities on hand. Natural occurrences, such as disasters earthquakes and tsunamis can pose a threat to sustainable as they can shift the flow of water and destroy certain elements of infrastructure. The government conflict between immediate profit and investment toward sustainable technologies. And then corruption and lack of efforts at a municipal level of developing countries. (The Organization for Economic Co-operation and Development (OECD), 2010)

Sustainable Development Goals (SDGs) has been defined as development that meets the needs of the present without compromising the ability of future generations

to meet their own needs. Which are one and inseparable, reflect the three dimensions of the sustainable development: the economics, social and ecological aspects. According to reference of Sustainable Development Goals (13) Climate Change: Take urgent action to combat climate change and its impacts indicate cause of climate change occurs disasters to reduce in developing country.

There is no country that is not experiencing the drastic effects of climate change. Greenhouse gas emissions are more than 50% higher than in 1990. Global warming is causing long-lasting changes to our climate system, which threatens irreversible consequences if we do not act. The annual average economic losses from climate – related disasters are in the hundreds of billions of dollars. This is not to mention the human impact of geo – physical disaster, which are 91% climate – related, and which between 1998 and 2017 killed 1.3 million people, and left 4.4. billion injured according to the reference of Economic, Loss, Poverty and Disaster from 1998 to 2017, UNDRR report. (Wallemacq, 2018)

The goal aims to mobilize US$ 100 billion annually by 2020 to address the needs of developing countries to both adapt to climate change and invest in low-carbon development. Supporting vulnerable regions will directly contribute not only to Goal 13 but also to the others SDGs. These actions must also hand in hand with efforts to integrate disaster risk measures, sustainable natural resource management, and human security into national development strategies. It is still possible, with strong political will, increased investment, and using existing technology, to limit the increase in global mean temperature to two degrees Celsius above pre – industrial levels, aiming at 1.5 °C, but this requires urgent and ambitious collective action reference from IPCC (Intergovernmental Panel Climate Change) special report. (Intergovernmental Panel on Climate Change, 2018)

The rising greenhouse gas emissions, climate change is occurring at rates much faster than anticipated and its effects are clearly felt worldwide. While there are positive steps in terms of the climate finance flows and the development of nationally determined contributions, far more ambitious plans and accelerated action are needed on mitigation and adaptation. Access to finance and strengthened capacities need to be scaled up at a much faster rate, particularly for least developed countries and small island developing States. Based on the report of the Secretary – General, Special edition: progress towards the Sustainable Development Goals, increasing greenhouse gas emissions are powerful by climate change. Greenhouse concentrations more reached globally averaged of CO2

gas in 2015 from 400.1 (ppm) increase to 405.5(ppm) in 2017. According to SDG goals (2015 – 2030) mission need to be raid reductions by as soon as possible to reduce CO2. Moreover, 1998 – 2017 direct economic losses from disaster were estimated at almost $3 trillion and climate related and geographical disasters claimed an estimated 1.3 million lives according per Economic Losses, Poverty and Disasters (1998 – 2017) by UNISDR report (Begum, Volum 10, Part A, December 2014).

The Paris Agreement had ratified 185 parties in April 2019 according to this agreement 183 parties had communicated their first nationally determined contributions to the secretarial of the United Nations Framework Convention on Climate Change, while 1 party had communicated its second. The differentiation of responsibilities under the Convention is also expressed by Article 4.7. This states that the extent to which developing country Parties will effectively implement their commitments "will depend on the effective implementation by developed country Parties of their commitments under the Convention related to financial resources and transfer of technology and will take fully into account that economic and social development and poverty eradication are the first and overriding priorities of the developing country Parties" (United Nations of Climate Change, 2015).

2.3 Type of Hazard

UNISDR, 2009 defines it as a potentially damaging physical event, phenomenon and/or human activity which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation. Dangerous phenomenon, substance, human activity or condition 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. A natural hazard is a threat of a naturally occurring event will have a negative effect on humans. This negative effect is what we call a naturally disaster. In other words, when the hazardous threat actually happens and harms humans, we call the event a natural disaster. As long as such an event affects people it may lead to a disaster. Many type of hazard are natural, biological, Hydrology and Metrological and technological hazard. Thus, a hazard is generally a potential threat to humans and their welfare, it can trigger a disaster.

Natural hazard is a 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. Natural hazards are a sub-set of all

hazards. The term is used to describe actual hazard events as well as the latent hazard conditions that may give rise to future events. Natural hazard events can be characterized by their magnitude or intensity, speed of onset, duration, and area of extent. For example, earthquakes have short durations and usually affect a relatively small region, whereas droughts are slow to develop and fade away and often affect large regions. In some cases, hazards may be coupled, as in the flood caused by a hurricane or the tsunami that is created by an earthquake.

Biological hazard is a process or phenomenon of organic origin or conveyed by biological vectors, including exposure to pathogenic micro-organisms, 05 toxins and bioactive substances that may cause loss of life, injury, illness or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. (Examples of biological hazards include outbreaks of epidemic diseases, plant or animal contagion, insect or other animal plagues and infestations).

Hydro meteorological hazard Process or phenomenon of atmospheric, hydrological or oceanographic nature 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. In hydro meteorological hazards include tropical cyclones (also known as typhoons and hurricanes), thunderstorms, hailstorms, tornados, heavy rain, strong wind, coastal storm surges, floods including flash floods, drought, heatwaves and cold spells. Hydro meteorological conditions also can be a factor in other hazards such as landslides, wildland fires, locust plagues, epidemics, and in the transport and dispersal of toxic substances and volcanic eruption material.

Socio natural hazard the phenomenon of increased occurrence of certain geophysical and hydro meteorological hazard events, such as landslides, flooding, 28 land subsidence and drought, that arise from the interaction of natural hazards with overexploited or degraded land and environmental resources. This term is used for the circumstances where human activity is increasing the occurrence of certain hazards beyond their natural probabilities. Evidence points to a growing disaster burden from such hazards. Socio-natural hazards can be reduced and avoided through wise management of land and environmental resources.

Technological hazard is a hazard originating from technological or industrial conditions, including accidents, dangerous procedures, infrastructure failures or specific human activities, that may cause loss of life, injury, illness or other health impacts, property damage, loss of livelihoods and services, social and economic

disruption, or environmental damage. Examples of technological hazards include industrial pollution, nuclear radiation, toxic wastes, dam failures, transport accidents, factory explosions, fires, and chemical spills. Technological hazards also may arise directly as a result of the impacts of a natural hazard event. (The United Nations International Strategy for Disaster Reduction, 2009)

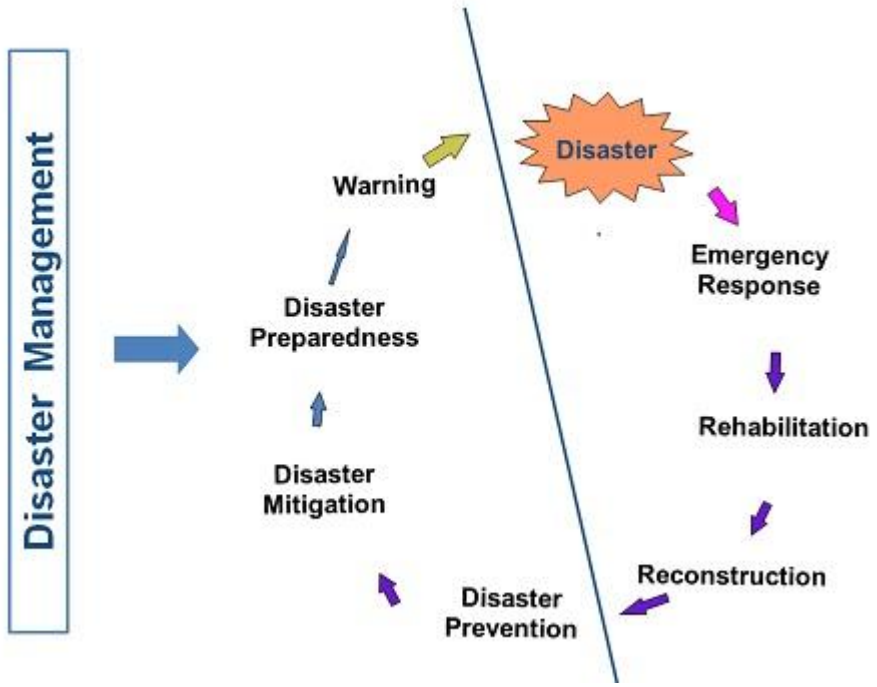
2.4 Disaster Risk Management

Disaster Risk Management is collective terms all activities that contribute to increasing capacities. Especially focus on the before, during and after implementation activities of disaster. Encompasses a board range of activities designed to help at risk persons avoid or recover from the impact of the disaster. Disaster Management is the responsibilities of all sectors of government. Disaster Management should use resource that exist for a day to day purpose. Community also responsible for their own safety.

Disaster risk management plans set out the goals and specific objectives for reducing disaster risks together with related actions to accomplish these objectives. They should be guided by the Sendai Framework for Disaster Risk Reduction 2015-2030 and considered and coordinated within relevant development plans, resource allocations and programme activities. National-level plans need to be specific to each level of administrative responsibility and adapted to the different social and geographical circumstances that are present. The time frame and responsibilities for implementation and the sources of funding should be specified in the plan. Linkages to sustainable development and climate change adaptation plans should be made where possible. In this process collective term for all activities that contribute to increasing capacities, covers activities before, during and after a disaster and encompasses a broad range of activities designed to help at risk persons avoid or recover from the impact of the disaster. (The United Nations Internal Strategy for Disaster Risk Reduction, 2015)

Disaster Risk Management to express with DMC (Disaster Management Cycle):

Figure (2.1) Disaster Management Cycle



Source: http://disasterriskmanagement.blogspot.com/2009/02/

Community based disaster risk management is an approach and process of disaster risk management in which at risk communities are actively engaged in identification, analysis, treatment, monitoring and evaluation of disaster risks in order to reduce their vulnerabilities and enhance their capacities. This means that people are the important role of the heart of decision making and implementation of disaster risk management activities.

2.5 Disaster Risk Reduction and SANDAI Frame Work

Disasters cannot be eliminated although can be mitigate risk, reduce damage and save more lives by preparedness plan. Since 2000, almost one million killed more than two billion affected. More than, one trillion dollars lost due to disasters. But only 1% of international aid money was spent to reduce the impact of disasters when 10% would protect development gains and thousands of lives and billions of dollars. Every one dollar spent on preparedness saves seven dollars in response. (Ki-moon, 2015)

Disaster Risk Reduction is aimed to at preventing new and reducing existing disaster risk and managing residual risk, all of which contribute to strengthening resilience and therefore to the achievement of sustainable development. Disaster Risk Reduction is the conceptual frame work of elements considered with the possibilities to minimize vulnerabilities and disaster risk through a society, to avoid (prevention) or

to limit (mitigation and preparedness) the adverse impact of hazards within the broad context of sustainable development. Especially disaster risk reduction is focus on before disaster early warning, preparedness, mitigation and prevention.

Disaster risk reduction especially included before disaster preparedness, mitigation, prevention and early warning. This concept and practice of reducing disaster risks through systematic efforts to analyses and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events. Disaster preparedness the knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions. Mitigation the lessening or limitation of the adverse impact of hazards and related disasters. The adverse impacts of hazards often cannot be prevented fully, but their scale or severity can be substantially lessened by various strategies and actions. Mitigation measures encompass engineering techniques and hazard – resistant construction as well as improved environment policies and public awareness. Prevention the outright avoidance of adverse impacts of hazards and related disasters through action taken in advance. Examples include dams or embankments that eliminate flood risks, land-use regulations that do not permit any settlement in high risk zones, and seismic engineering designs that ensure the survival and function of a critical building in any likely earthquake. (Inter-Parliamentary Union and United Nations International Strategy for Disaster Reduction, 2010)

Especially, Sendai Framework for Disaster Risk Reduction 2015-2030 was adopted at the Third UN World Conference in Sendai, Japan, on March 18, 2015. And its Framework included the seven global targets, the reduction of disaster risk as an expected outcome, a goal focused on preventing new risk, reducing existing risk and strengthening resilience, as well as a set of guiding principles, including primary responsibility of states to prevent and reduce disaster risk, all-of-society and all-of-State institutions engagement. In addition, the scope of disaster risk reduction has been broadened significantly to focus on both natural and man-made hazards and related environmental, technological and biological hazards and risks. Health resilience is strongly promoted throughout.

The Sendai Framework also articulates the following: the need for improved understanding of disaster risk in all its dimensions of exposure, vulnerability and hazard

characteristics; the strengthening of disaster risk governance, including national platforms; accountability for disaster risk management; preparedness to "Build Back Better"; recognition of stakeholders and their roles; mobilization of risk-sensitive investment to avoid the creation of new risk; resilience of health infrastructure, cultural heritage and work-places; strengthening of international cooperation and global partnership, and risk-informed disaster policies and programs, including financial support and loans from international financial institutions. There is also clear recognition of the Global Platform for Disaster Risk Reduction and the regional platforms for disaster risk reduction as mechanisms for coherence across agendas. monitoring and periodic reviews in support of UN Governance bodies. (The United Nations Office for Disaster Risk Reduction, 2015)

Activities and measures taken in advance to ensure effective response to the impact of hazard, including the issuance of timely and effective early warnings and temporary evacuation of people and property from threatening location. Mitigation is the collective term used to encompass all actions taken prior to the occurrence of a disaster (pre-disaster measures) including preparedness and long-term risk reduction measures.

2.6 Early Warning System for Disaster Risk Reduction

Early Warning is used in many fields to describe the provision of information on an emerging dangerous circumstance where that information can enable action in advance to reduce the risks involved. Early warning systems exist for natural geophysical and biological hazards, complex sociopolitical emergencies, industrial hazards, personal health risks and many other related hazards. The symbol and method of EMS can very on type of hazards and risks, some common symbols and methods are river gauges, hazard mappings, signboards, giving warning with bells or drums, loud speakers, hand speakers, SMS, Walki Talki, email and internet, radio, TV, etc: (National Institute of Disaster Management, 2014)

A system developed, managed and maintained by the community itself. In this process the empowering of the people community will be in the center. The role of supporting organizations will be to facilitate active and meaningful participation of all community members. Ultimately the EWS will be owned by the community. Early warning systems (EWS) are an essential component to BCDRM (Community-Based Disaster Risk Management). Early warning systems provide communities with

relevant, topical information on environmental conditions so that communities can assess levels of risk and make informed decisions to protect their safety. Furthermore, most, if not all, of these EWS are self-monitored by the villagers themselves, which empowers communities and insures that the community itself is a key stakeholder in the EWS initiative.

2.7 Review on Previous Studies

There are four research papers review for this thesis. Among them, there are research papers carried out by former MPA students and one is a post graduate thesis from a foreign university.

Myo Tint (2009), he did study the one year of the event of Cyclone Nargis, management and preparedness of disasters in Myanmar. This study the role of Myanmar National Disaster Preparedness Central Committee, its plans and program, the important of building resilience of nations and committees to disasters. In this research study, included the coordination and cooperation between the government and community in disaster management and responses was relatively improved.

Ko Ko Maung (2010), he also studied the natural disaster, people have to knowledge on disaster risk reduction, how to prevent from and how to mitigate in future possible disasters. People could be understood the hazards and epidemics of infectious diseases and natural disasters. Mitigation preparedness and advocacy are important in Disaster Risk Reduction. National governments noted that a concept of recovery and response on DRR is to keep on right track of DRR and investing in ICT for early warning system for Disaster Risk Management is accepted.

Ko Ko Aung (2011), the study community should be aware of hazard and potential negative impact to which they are exposed and able to take specifics actions to minimize the threat of loss or damages. The geographic location of a community is an essential determinate in the selection of disasters on which the system should focus their community education. For example: coastal communities need to be educated and prepared for the possibility of a tsunami, while a mountain community can be educated to respond to an early warning system for landslides.

Another studied was carried out by Myat Htet Aung Min (2017), his studied in disaster responses, Myanmar people always took part actively, either in cash or in kind or in work force, and these are the culture needed to be preserved. However, all the responders, government or CSO or private donors, try to help disaster affected people

as much as possible on their own way but not as a coordinated fashion. There was no management system to bring all the responding entities together for better efficiency and effectiveness.

Benjamin D. Wallace (2016) did his study on disaster risk reduction and climate change adulation planning in New York City in which the potential for increased risk in coastal cities is an important part of both disaster risk reduction (DRR) and climate change adaptation (CCA). One of the finding the developing countries and developed countries different resilience of CCDRR. Indeed, rich cities are better protected than poor one and flood look risk are in developing countries. Vulnerabilities in cities with some of the lowest resilience can derive from inequality, poor infrastructure, environmental degradation, and climate vulnerability, with many of these cities also having low adaptive capacity. Moreover "Negative impacts of climate change and natural hazards have a multiplying effect on bad governance, as evidenced by the increasing incidence of conflicts that are intertwined with natural disasters".

CHAPTER III
DISASTER RISK REDUCTION AND MANAGEMENT IN MYANMAR

3.1 Natural Disaster Past and Event in Myanmar

Myanmar is the largest country in mainland Southeast Asia, with a land area of 676,000 square kilometers. Similarly, Myanmar is exposed to a wide range of natural hazards, triggering different types of small scale to large –scale disaster across the country's territory. A total of 27 natural disasters have been recorded between 1980 and 2010, causing the death of approximately 140,000 people, and affecting the lives and livelihood of 3.9 million people; an average of 125,000 people a year. By far the most devastating natural disaster in Myanmar's history, Cyclone Nargis tore through the Delta region in May 2008, affecting 2.4 million people and claiming the lives of 135,000." It is estimated that around 870,000 people in Myanmar live in areas that are exposed to Cyclones, and a similar proportion are vulnerable to earthquakes, with two fault lines running through the country across some densely populated areas. Furthermore 400,000 people are vulnerable to flooding and 390,000 are exposed to drought.

Moreover, Myanmar "the most at risk country "in Asia – Pacific according to the UN Risk model. These risk are being further exacerbated due to processes attribute to climate change and variability. Since 1977, the Department of Meteorology and Hydrology (DMH) of Myanmar has been collecting metrological and hydrological data and has documented concerning changes in patterns in recent years such as the shortening and intensification of the monsoon; an increase in sea surface temperature and an overall increase in heat and drought indices. (United Nations Office for the Coordination of Humanitarian Affairs, 2012). Similarly, it is a disaster prone country in the region of ASEAN and more than 450,000 people have been displaced by natural and human made disasters in the country in last 5 years. Myanmar is prone to almost all types of nations such as Earthquake, Tsunami, Floods, Landslide, Cyclone, Strong wind, Thunder and Lighting, Soil Erosion, Fire (Forest fire and Men made fire) and

Drought as the multi hazards. The existing risk can increase many fold due to climate change and skewed development. Our Economic Policy envisions people –centered, inclusive and continuous growth; hence it is important to imbibe "resilience" into our development interventions in letter and spirit. It is equally important to prepare for disaster response, rehabilitation and reconstruction.

Myanmar regular experiences of Cyclones, Storms surges, Floods, Landslide, Earthquakes, Drought and Forest Fire. Over the last 10 years, Myanmar has been impacted by two major earthquakes, three severe cyclones, floods and other smaller – scale hazards. According to reference of UNOCHA's report Myanmar ranks first of most at risk Asia – Pacific countries in 2012. The Country is vulnerable to a wide range of hazards, including floods, cyclones, earthquakes, landslides and Tsunamis. The likelihood for medium to large –scale natural disasters to occur every couple of years is high, according to historic data. While these events represented severe losses for the population, hindrance to development interventions, they did also result in increased collaboration between the Government, the international community and local organizations, as well as greater preparedness and response interventions. The historic disaster record from 2002 to 2013 Cyclones affected over 2.6 million people, Flood affected over 500,000 people and two major's earthquakes affected over 18,000 people in Myanmar.

- May 2008 (Cyclone Nargis): The Cyclone Nargis left some 140,000 people dead and missing in the Ayeyarwaddy delta region. An estimated 2.4 million people lost partiality or completely, their homes and livelihoods.
- June 2010 (Floods in northern Rakhine State): The floods killed 68 people and affected 29,000 families. Over 800 houses were completely destroyed.
- October 2010 (Cyclone Giri): At least 45 people were killed, over 100,000 people became homeless and some 260,000 were affected.
- March 2011 (6.8 Earthquake in Shan State): Over 18,000 people were affected. At least 74 people were killed and 125 injured. Over 3,000 people became homeless.
- October 2011 (Floods in Magway Region): Nearly 30,000 people were affected to varying degree. Over 3,500 houses and some 5,400 acres of croplands were destroyed.

- August 2012 (Floods across Myanmar): The floods in different states and regions displaced some 86,000 people and affected over 287,000 individuals.
- November 2012 (6.8 Earthquake in northern Myanmar): At least 16 people were killed and 52 injured, with over 400 houses, 65 schools and some 100 religious building damaged due to the earthquake.
- May 2013 (Tropical Cyclone Maharsan): Some 120,000 people in Rakhine were evacuated to safer locations in advance of a predictable cyclone with support from the Government. While the storm eventually impacted Bangladesh, the impact on Myanmar was limited.
- Aug 2013 (Flash across Myanmar): The floods in different states and regions displaced some 20,000 people. Kayin State was the worst affected with over 9,500 people initially displaced in Hpa-An, Hlaingbwe and Paingkyon Township.
- July to August 2015 (Cyclone Komen and Flood): In 12 States and Regions affected population 170,000, dead 132 people and damaged of farmlands – 1,400,00 acres, crops – 667,221 acres and destroyed livestock.
- 13 April 2016 (6.9 Mawlike Earthquake): The magnitude is heavy but location near Sagaing Division focused in forest no major damage casualties.
- July 2016 (6.8 Eartjquake in Bagan): The affected pagodas and temple are damaged in Bagan, Salay, Sagaing, Myauk U and 4 people were killed.
- June to September 2018 (Flood): over 268,438 people have been evacuated in Bago Region, Kayin and Mon States in the southeast and Magway Region in Central Myanmar. 12,000 acres of farmland damaged. (OCHA, Relief and Resettlement Department, UN, 2016)

The El Nino impact is expected to end in June 2016. According to the Myanmar DMH (Department of Meteorology and Hydrology), since mid-February 2016, Myanmar has been experiencing a severe impact of El Nino including extreme temperatures, unusual rainfall patterns, dry soil, high risk of fires and acute water shortages. (United Nations for the Coordination of Humanitarian Affairs, 2016)

3.2 Climate Change and Disasters in Myanmar

Climate change is happening, it is largely caused by human activities, and it presents a serious threat to nature and people now, and in the future. Without ambitious

mitigation efforts, global temperature rise this century could exceed 4 degrees Celsius above pre-industrial levels, with catastrophic impacts. Myanmar's climate change is over time due to global warming as well as deforestation, soil erosion and drill. Scientists agreed that human activity is forcing climate to change, by emitting gases that trap heat in the atmosphere and cause global warming. The impacts of these changes are felt all over the world.

In Myanmar these changes have massive consequences. In the past six decades, the effects of climate change have already been observed in Myanmar. Increased temperatures changes in rainfall patterns and altered monsoon seasons influence the way storms form and winds blow, causing intense rain too transfer to floods. In 2008, Myanmar experienced a cyclone of unprecedented destructive power by Nargis. Cyclone Nargis was just terrible, Myanmar people are not experienced anything like it. Cyclone Nargis claimed the lives of over 130,000 people and left millions homeless. In 2015, heavy rain caused chaos and destruction in Hakha, the Capital of Chin State. (The Government of the Republic of the Union of Myanmar, 2019)

Unusually heavy rain fell in a short amount of time causing major landslides. By the end of the rain, most of the town which was built on steep terrain, was gone. But changes in climate also have silent yet profound and destructive consequences. These consequences are now affecting in Myanmar's population. Due to the climate change effects on agriculture, livelihood, education, health and infrastructure on developing country. Agriculture has become more difficult and water is less available in some regions.

In central Myanmar's dry zone most people make a living from agriculture, growing things like beans, tomatoes, onions and sesame. But changes in climate are forcing many to adjust their way of life the farmers are used to plant twice a year. Now because the rains come later the farmers can only plant once a year. The land located in central zone most of the villages are in a flood plain. This once productive eco - system is now suffering the effects of climate change too. Climate has changed significantly. Myanmar's weather professional began noticing the change in late 1990.

Before the weather was pretty stable. Now days, the climate is hotter and summer is really hot. And when the cold season comes, it's not that cold. It's get a bit cooler in December, but only for about nearly ten days. A shorter wet season and more intense periods of rain mean that this plain is now experiencing unseasonal flooding. Most of the experiences of Myanmar has faced a flood disaster almost yearly and

biggest ever. The monsoon rains normally arrive in May however in recent years, they have been arriving much later. Climate change meant that the rains came in November, these years the rain was so heavy that farmer's crops were ruined. In an already dry zone, water shortages are becoming more of a problem.

Further temperature increases were mean more water evaporation, shorter rainy seasons and less time for communities to harvest rain water. Coastal areas are also exposed to the unrelenting rise in sea levels. The sea is eroding the coastline where mangroves have been degraded, and are encroaching on villages close to the shore. Soil in the area has become salinated, do not grow and the water in many of the water collecting ponds in unfit for drinking. Most of the villagers/towns have faced and they were solved by bought their drinking water or well-wishers donated for these areas. By mid-century, sea levels many rise up to 40 cm along parts of Myanmar's coastlines. In the Delta Region, this may result in the loss of kilometers of low- lying areas. Agriculture also no longer be possible in salty water and soil. Mangrove swamps, along the coast used to protect the land from erosion and the effects of tropical storms. Many of these swamps have now gone/damaged. Farmers are earning less, many of the younger generation are leaving the villages. In search of better opportunities to help support their families. Yangon receives thousands of people every year. Climate change is contributing to slow but steady urbanization. This puts more pressure on basic urban services and housing. Finding decent jobs is also a challenge. After the Nargis the people which from Delta area comes to Yangon to find works. The workers were difficulties because of wages are low. When these young people leave from their villages they often give up school too. Lack of skills, education and vocational training limit their access to jobs and income.

Women were particularly affected they left from school when they come to Yangon. This is why Myanmar should adult fast to climate change and there are solutions (for example – 35% of houses are made from non-durable materials. In coastal areas, 90% of them cannot resist strong winds or cyclones.) Houses should be constructed in a better way. UN/INGos conducted the training/workshop for carpenters for capacity strengthens how to build stronger homes for disaster affected areas. When the end of implementation activities the participants adapted their houses the same way before the rainy season starts. Protecting the environment protects people too.

Mangroves protect coastlines from the effects of intense storms. And they provide a habitat for fish, they also prevent erosion from rising sea levels and strong

waves. It is critical that mangroves are maintained and reforested. Trees also help to maintain hills and prevent erosion and landslides. A forested area is cooler than bare land. People, especially the elderly person would be affected by heat waves if they have trees. With new techniques, farmers could be adjusted to the new climate. Seeds that resist high temperatures and high salinity could be used. Use of water wisely would also help to adapt to climate change. Rainwater harvesting for example or irrigation would improve people's lives when temperature increase. Women are the strengths of the community with more economic and education opportunities, they would be a great resource adapting to climate change. The title of climate change is rising. We should more aware today. If we prevent to disasters and develop despite climate change. Everyone, the government, private companies, and the people must act now. (Alliance, 2017)

3.3 Hazard Profile of Myanmar

Myanmar has multiple potential hazards which include Cyclone, Storm surge, Foods, Landslide, Earthquake, Tsunami, Drought, Fire and Forest Fire. Its coastal regions are exposed to cyclones, storm surges and tsunamis while major parts of the country are at risk form earthquakes and fires. The rainfall-induced flooding is a recurring phenomenon across the country while some parts of the country are exposed to landside and drought risks. Based on the records of the natural disasters in Myanmar happened from 2000 to 2012, the occurrences of fires constitute about 73% of reported disaster events, followed by floods (11%), storms (12%) and others (4%) including earthquakes, tsunami and landslides. The Cyclone Nargis (2008) was the worst natural disaster in the history of Myanmar. (Center for Excellence in Disaster Management and Humanitarian Assistance, 2017)

Hazards in the country are diverse. A vast coastal region exposes the country to cyclones, tropical storms, storm surges and tsunami. Rainfall-induced flooding is a recurring phenomenon across the country. All of Myanmar is at risk from earthquakes, while the country's hilly regions are also exposed to landslides. Myanmar is one of the earthquake prone countries since it is located along the Alpide earthquake belt. The deadliest earthquake happened in Myanmar is the magnitude 7.3, 1930 (Bago Earthquake) causing 500 people deaths in Bago. and 50 deaths in Yangon with large amount of damages. However, the largest earthquake happened in Myanmar is the magnitude 8.0, 1912 Maymyo earthquake. The prominent Mediterranean-Himalayan earthquake belt,

which is accounts for about 15 percent of the world's earthquakes, runs below Myanmar. Still, fire is the most frequent disaster in Myanmar, accounting for 73 percent of disaster events. Urban fires generally occur in the central part of the country during the hot dry season. (Asia Disaster Preparedness Center (ADPC), 2009)

3.4 Disaster Risk Reduction in Myanmar

Myanmar's vulnerability to hazards is compounded by wide-spread poverty and poor infrastructures. The combination of hazard vulnerability and low capacity makes Myanmar the "most at risk country" in Asia-Pacific according to the UN Risk Model. Therefore, it is exposed to a plethora of natural hazards, including earthquakes, fires, drought, floods, landslides, cyclones and tsunamis. A total of 27 natural disasters have been recorded between 1980 and 2010, causing the death of approximately the lives and livelihoods of 3.9 million people. During 2002-2012, three cyclones affected over 2.6 million people, floods affected over 500,000 people, two major earthquakes affected over 20,000 people. (Ministry of Social Welfare, 2015)

3.4.1 Disaster Risk Reduction Working Group in Myanmar

The disaster risk reduction working group was formed in 2008 during the early recovery phase of Cyclone Nargis to support the Government and communities to promote disaster resilience in Myanmar. Since then, the DRR WG has evolved as one of the most diverse and dynamic networks in the country, currently comprising of 53 agencies including the UN, international NGOs, local NGOs and professional organizations' working for DRR. The DRR WG is led by an 11-member Steering Committee which includes three UN agencies, three international NGOs, three local NGOs, the Myanmar Red Cross Society and one professional organization. The DRR WG Chair is selected from the Steering Committee and currently UNDP is the chair. Director General of Relief and Resettlement Department (RRD), the focal department for disaster management as well as the secretariat of the National Disaster Management Working Committee (NDMWC), is the honorary chair of the DRR Working Group. The DRR Sub-Sector Working Group (DRR SSWG) which is co-chaired by the RRD and UNDP, includes a member from an international organization, a local NGO, a professional organization and the Myanmar Red Cross, which are also members of the DRR WG. In 2013, the DRR WG developed its 2014-18 Strategic Framework and Plan which aims to

- strengthen the policy and institutional framework for DRR;
- build capacities of government officials to implement DRR and mainstream DRR into development;
- support the government to develop a community-based disaster risk reduction framework and a public awareness strategy on DRR;
- engage with and strengthen capacities of local NGOs working on DRR;
- build partnerships with the private sector and academia and
- strengthen the internal coordination of the DRR WG so that effective support is provided to the government.

At the DRR WG retreat in January 2014, the DRR WG prioritized different activities to formulate an Annual Work plan for implementation in 2014 (Myanmar Information Management Unit (MIMU), 2014).

3.4.2 Natural Disaster Management Law in Myanmar

Myanmar Disaster Management Law was enacted in July 2013, and the subsequence Disaster Management Law in 2015. The Law includes the provisions for formation of disaster management bodies and their duties and responsibilities for all phases of disaster, establishment of disaster management fund at national and Region/ State level. The Law also provides the guidance to carry out the measures of disaster risk reduction along with the development plans in the country. The rules for implementation of Myanmar Disaster Management Law has been also drafted by the Ministry of Social Welfare, Relief and Resettlement in consultation with disaster risk reduction experts and Myanmar Disaster Risk Reduction Working Group composed of (56) international and national organizations, led by UNDP. The objectives of the Disaster Management Law are follows:

(1) To implement natural disaster management programmes systematically and expeditiously in order to reduce disaster risks;
(2) To form the National Committee and local bodies in order to implement natural disaster management systematically and expeditiously;
(3) To coordinate with national and international government departments and organizations, social organizations, other non-government organizations or international organization and regional organizations in carrying out natural disaster management activities;
(4) To conserve and restore the environment affected by natural disaster;

(5) To provide health, education, social and livelihood programmes in order to bring about better living conditions for victims.

In order to reduce damage and losses that are likely to be used by natural disasters, the following functions were also down in the Natural Disaster Management Law,

(6) Preparatory and preventive measures for natural disaster risk reduction in pre-disaster period;

(7) Emergency responses including search and rescue during natural disaster;

(8) Rehabilitation and reconstruction activities for improving better living standard in post disaster period and conservation of the environment that has been affected by natural disaster *(The Republic of the Union of Myanmar, 2013),* (Natural Disaster Management Law, 2013).

3.4.3 Myanmar Environmental of Conservational Law

Myanmar Environmental Conservation Law was enacted on 30 July 2013. It covers formation of Environmental Conservation Committee, Duties and Responsibilities of the Ministry, establishment of Environmental Management Fund, stipulation of Environmental Quality Standards, Environmental Conservation and management of Urban Environment, conservations of Natural Resources and Cultural Heritage. (Ministry of Environmental Conservation and Forestry, 2012)

3.5 Myanmar Action Plan for Disaster Risk Reduction

Resilience is key to sustainable development as disasters wipe out development gains of several decades in a matter of hour and day as demonstrated by the Cyclone Nargis of 2008 and the floods of 2015 in Myanmar. The Country is prone to almost all types of hazards ranging from earthquakes to floods and from cyclones to fires. Climate change and skewed development can increase the existing risks by many floods, if it is not addresses in comprehensive and systematic manner.

The Government of the Union of Myanmar developed the Myanmar Action Plan on Disaster Risk Reduction, 2017 (MAPDRR, 2017) through an inter-agency Task Force mechanism in a wider – consultative mode over 2016-2017. The process involved a series of thematic discussion at National level and consultations at sub-national level to bring ground issues.

MAPDRR, 2017 is a comprehensive and unified action plan for disaster risk reduction with prioritized interventions across Myanmar till 2020. With a long – term vision and considering deep- rooted underlying drivers of disaster risk, it has set overall target for 2030. It aims to provide a base for mobilizing and leveraging, primarily, national and external resources and will provide a basis for result-oriented outcomes. The vision of MAPDRR 2017, "Protected lives, economy, heritage and environment, through inclusive approach, towards sustainable development in Myanmar".

The action plan has identified 32 – priority actions under the four pillars namely Risk information and awareness. Risk governance; Risk mitigation; and Preparedness for response, rehabilitation and reconstruction. Each priority action has identified objectives, activities, outputs, duration and lead ministry department. Also, other departments and partners to support the lead agency have been identified. The priority actions to strengthen policy framework and systems for long-term risk reduction. A number of development policies and interventions are in nascent stage and it offers a window of opportunity for disaster and climate risk informed development to avoid creating new risk. Preparedness for disaster response, rehabilitation and reconstruction is key for addressing existing risk.

The action plan has laid out robust implementation, funding, monitoring and evaluation mechanism to realize the vision of the MAPDRR, 2017. The identified lead ministry department will spearhead the implementation of respective priorities. A high –level MAPDRR Steering Committee will be the main coordinating body and NDMC will provide oversight and strategic guidance. The priorities will be funded through internal as well as external sources. A multi-layer monitoring and evaluation mechanism has been planned at various stages of the execution. It is important to remember that the disaster risk created over years and decades requires coordinated, systematic and long-term interventions by all stakeholders including government, development partners, private sector, civil society organizations and community. (The Government of the Union of Myanmar, 2017)

3.6 Disaster Risk Management Policies and Disaster Management Center in Myanmar

Myanmar Disaster Risk Management Policy objective is to provide overarching edifice for a comprehensive disaster risk reduction approach for Myanmar that seeks to

achieve the judicious balance of mitigation, preparedness, response and rehabilitation and reconstruction. And inductivities' activities are –

- Constitute a drafting group to lead drafting of the Myanmar DRR policy
- Consult with line departments, region/ state and development partners to identify needs and approaches for DRR in Myanmar
- Stock take of DRM policies of different countries
- Draft Myanmar DRR Policy covering all four phases: mitigation, preparedness, response and rehabilitation and reconstruction
- Policy will cover issues related to relocation in the context of imminent disasters, relief distribution, needs of vulnerable groups, human trafficking. DRR funding, engagement of external partners, environmental issues and DRR, urbanization in context of DRR, resilient development, etc.
- DRR policy will be an integrated policy and will have links with the 12-point economic policy, NCDP, Myanmar climate change strategy and action plan, Myanmar's social protection strategic plan and Myanmar's financial inclusion roadmap, etc.
- Enactment of Myanmar DRR policy and its wider dissemination

Myanmar ranks as the most at risk country in Asia and the Pacific according to the inform Risk Model. The country is exposed to a wide range of natural hazards, triggering different types of small to large-scale disaster across its territory. Myanmar is one of the 168 countries that endorsed and proactively implemented the Hyogo Framework for Action (HFA) aiming at "Sustainable reduction of disaster losses, in lives and in the social, economic and environmental assets of communities and countries' and is committed to implement the SANDAI frame work for Action (2015 – 2030). As a member of Association of Southeast Asian Nations (ASEAN), Myanmar is signatory to the ASEAN Agreement on Disaster Management and Emergency Response (AADMER), which come into force in 2009. Cyclone Nargis and its impacts in 2008 increased the Government's awareness of the need to plan and prepare for future disasters and adopt a comprehensive risk reduction strategy, which led to the formulation of the Myanmar Action Plan for DRR (MAPDRR), endorsed in 2012. Among other key elements MAPDRR recognizes the need to enhance the capacities for DRR at all levels, and identifies a range of activities related to capacity development, including the establishment of a Disaster Management Training Center. In June 2013,

the Relief and Resettlement Department (RRD), under the Ministry of Social Welfare, Relief and Resettlement (MSWRR) organized a Consultation Workshop on "Developing Capacity Building Strategy through the Establishment of Disaster Management Training Center' and presented its plan towards establishing the DMTC. DMTC was opened on 4th December 2015 in Hinthada Township, Ayearwaddy Division. As the coordinating agency for disaster management in the country, RRD, established the DMTC to provide technical support on Disaster Management to Ministries, Departments and others institutions at Region/ State and Lower administrative levels. The training center is located in Hninthada Township; Ayearwaddy Region was opened by Honorable Minister of Social Welfare. Through the Disaster Management Training Center, RRD has planned to achieve the following activities.

1) To upgrade the capacity of people who implement Disaster Management activities
2) To publicize widely to realize Disaster Management
3) To produce Disaster Management Experts
4) To conduct multiplier trainings
5) To be able to do Disaster Management Research
6) To upgrade as International Disaster Management Institute in further.

In addition, the RRD envisage following role for the training center. (i) Act as the technical advisory body to Sub- Committees of National Disaster Preparedness Center Committee (ii) Collaborate with similar institutions in ASEAN and other countries for research and development.

According to DMTC policies and planning have been conducted meeting with Technical Advisory Group and mapping for Institutions which can have technical linkages with DMTC and Technical capacity assessment of National, State/Regional and Local Officials including Sectoral departments, Universities, Academic and Research Institutions, and LNGOs carried out. Initiated development of Capacity Development Strategic Plan for DMTC. Basic Disaster Management Course revised and Training materials for participants and facilitator guide book developed training for instructor's manual development (ADPC). Inclusive DRR course developed by technical partners and CCCM, IOM, Specialized course on Community Based Disaster Risk Management six more courses approved by RRD under development. Training workshop was organized to conduct feasibility assessment of DMTC

certification/accreditation process for short and long term courses involving in partnership with National universities and other relevant organizations. Provided training Aids and Library Support including books and list of references for Disaster Management Training Center.

Disaster Management Training Center provided develop clear criteria and conditions for selection of master instructors. Training for Instructors (TFI) and English language support courses. Basic Disaster Management Course (I) and (II) supported by Myanmar Consortium Capacity Development on Disaster Management partners (ACTED, ADPC, American Red Cross, UN- Habatit, Help Age, HANDICAP, IOM, Seed ASIA, UNICEF, UNDP and ASDA organizations). DMTC organized the inclusive DRR course ToT Training on BDMC. And specialized courses to develop core trainers. The first ToT course on CBDRM ongoing. The adapting of national level curriculum for state regional level course started. Moreover, research and education also developed by these methods.

DMTC community mobilization awareness and mobilization activities were conducted develop and revised IEC materials for eight hazards pamphlet which were developed in 2016 with collaborative support from DRR WG members and MCCDDM consortium. 8 hazard pamphlets are Cyclone, Flood, Earthquake, Fire, Thunder Strom, Landslide, Drought and Tsunami. These documents used for Public awareness multiple means of communication ie. IEC materials, photo display, audio visuals and organizing awareness campaign as part of International DRR Day commemoration. (Department of Disaster Management, 2017)

3.7 National Disaster Management Committee and Work Committee

The National Disaster Management Committee as the Chairman lead by Vice president and Union Minister for related departments participated by the members to support the disaster responses in Myanmar. (Appendix Table A-1)

CHAPTER IV
SURVEY ANALYSIS

4.1 Survey Profile

Bilin Township is located under the Thaton District in Mon State. Township area is 1,995 km square mile and total population is 181,075. North latitude 17° 10 minute, 17° 15 minute, East Longitude 97° 0.8 minute and 97° 15 minute located above (30) of the water sea upper level. Township area is (835) square mile wide, its situated in East Phar Pon Township, Kayin State, West- Kyaik Hto Township, South- Thaton Township and close with in North - Bago District and Shwe Kyin Township. Major economic is farming, Agriculture and minor economic is general workers (especially they are migrant working to Thailand and border areas). The public transportation most of the people are using road way by car and some are using by train transportation. (Bilin Township Map Appendix A-2)

The Bilin township main prone hazard are Flood, Strom and minor hazard are Fire and Strong wind as occurs as usual by seasonal. According per disaster historical time line founded Flood (1997), Cyclone (2008), Strong Wind (2017) and Flood (2018) occurred in Bilin Township. In 2018 flood disaster, infrastructure (Road, Housing and others building, crop, animals, fish pond and plantations acres) had damaged estimated the totally amount of (2785.51) millions. The climate change situation temperature is higher than the previous year. Currently years' the native people are notice that heat temperature is more increased in Bilin Township. Deforestation cause of effects continuous problems are happened dry ponds (drinking/domestic) water shortage in summer season. In rainy season, due to heavy rain flood disaster has occurred in pre – moon soon. Although, moon soon period is very short ponds and well are not enough water storage for summer season. These problems are based on the climate change of side effects. Moreover, the water level is raising in recently in Bilin township. The Bilin river also deterioration and water drainage system is too block and bad. The following table shows about the characteristic of Bilin Township including village tracts, number of villages and totally respondents.

Table (4.1) Sample of the Study Areas

No	Village Tracts	Village Name/ Ward	No of HH	No of Population	Sample HH
1	Nat Gyi	Ywar Ma	95	592	40
2		Kayin Su	85	389	41
3		Shan Su	75	432	40
4		Shwe Laung Inn	120	728	30
5		Pyin Thar	98	363	22
6	Da Hnyin Kone	Da Hnyin Kone	131	572	38
7		Hpa Yar Seik (West)	67	367	40
Total			**671**	**3443**	**251**

Source: Survey data (2019)

4.2 Survey Design

In this study, it has been chosen a quantitative and quantitative case study approach which is need to understand what the representative of the local community think about of the disaster knowledge, Household preparedness, response plan and to know about the stakeholder's implementations activities. Primary data were collected from Nat Gyi Ywar Ma, Kayin Su, Shan Su, Shwe Laung Inn, Pyin Thar, Da Hnyin Kone and Hpa Yar Seik (West) of Bilin Township in Mon State through Key Informant Interview and questionnaires with field survey. There are three different type of field survey concerning with the disaster knowledge, household preparedness, response plan and management in community. Data collection period was started from Jun 2019 to July 2019. Secondary data has been collected in form of documents the 2014 Myanmar Population and Housing Census data, Township Government Administration Department report, Mon State profile of UNHCR, etc. Quantitative data were collected through delivery the well – constructed questionnaires to the respondents. Data entry is based on excel data base and for the analysis used by SPSS (16) to run descriptive analysis. Because of the data quality are more consistent and reliable with research.

4.3 Survey Results

To achieve the identified aim and objectives of this study, an extensive study was carried out at the study of disaster risk reduction and management of community in Bilin Township. This chapter therefore presents analyzed results of the research conducted on 251 respondents from households and KII interview of stakeholders in Bilin Township. The analyzed data is presented in tables in frequencies and percentages where applicable.

4.3.1 Demographic Characteristics of the Respondents

According to the study characteristics of the respondents of the Bilin Township are presented by survey targeted villages, Gender, Age, Religious, Headed of HH and Education level. The details information will be described the following tables.

Table (4.2) Characteristics of the Respondents

Biography of Interviewee	Description	No of the Respondents	Percent
Gender	Male	56	22.3
	Female	195	77.7
	Total	**251**	**100.0**
Age	Over 60	37	15
	Under 30 and 30	58	23
	31 to 60	156	62
	Total	**251**	**100**
Education	(1)Illiterate	5	2
	(2) Monastery Education	6	2.6
	(3) Basic School	47	18.7
	(4) Middle School	101	40.2
	(5) High School	65	25.9
	(6) Collage or Degree	27	10.8
	Total	**251**	**100**
Religious	Christian	6	2.4
	Islam	16	6.4
	Buddhist	229	91.2
	Total	**251**	**100**
Disability	Yes	69	27.5
	No	182	72.5
	Total	251	100

Source: Survey data (2019)

According to table (4.2), based on the survey result the percentage of the male respondents (22%) and Female respondents (78%) thus, as the finding Female respondents is higher than the Male respondents. The respondents age groups, over 60 (15%), Under 30 and 30 (23%) and 31 to 60 (62%). Based on the result 31 to 60 age level is higher than the other age level. Moreover, education level of most people are finished by middle school by percent (40%), High school (26%), Basic school (19%), Collage level (11%) and others (4%) are monastery education and non-education. Most of the people are Buddhist religious due to the respondents replied Buddhist (91%), Islam (6%) and Christian (3%) on each in Bilin Township. Among them the survey villages disability persons are only 27% based on the survey result.

4.3.2 Knowledge Concern with DRR in Bilin Township

In this survey participants were asked about community disaster awareness and knowledge. Their concern about of disaster, disaster experiences occurred in their villages (past and future) happened to know about for it.

Table (4.3) Understanding and Knowledge of DRR

Statement	Yes	No		Don't Know		Don't Answer		Total	
	No.	%	No.	%	No	%	No.	%	No.	%
Do you think now have you stay home is fusibility faced in disaster?	239	95.2	7	2.8	3	1.2	2	0.8	251	100
Do you concern on disaster?	247	98.4	3	1.2	0	0	1	0.4	251	100
How do you think disaster are more occurred in now?	231	92	16	6.4	3	1.2	1	0.4	251	100
Do you know have occurs within 5 years face disaster in your village?	182	72.5	11	4.4	58	23.1			251	100
The previous 5 years have you faced disaster in your village?	227	90.4	23	9.2			1	0.4	251	100
How do you think prepared-ness plan for disaster?	167	66.5	77	30.7	3	1.2	4	1.6	251	100
Do you think some people are more effected of disaster?	226	90	21	8.4	4	1.6			251	100
Mean	127	86%	23	8%	12	5%	2	1%	152	100%

Source: Survey data (2019)

From above table (4.3), show that the understanding and knowledge of the respondents 86% are generally understand on disaster knowledge and 8% lack of disaster knowledge. The respondents 5% don't know about of the disaster risk, cause and factors of disaster situation. 1% of the respondents don't answer on these questionnaires these person older people and they don't participate in any village activities. According the previous year of flood disaster experience, the respondents are notice their villages flood disaster affected by seasonal and currently year more occurs. Some respondents are not interest in this situation moreover they don't know some are more effected of flood disaster (example: Disable, Older person, children and pregnancy women). And then, they don't know aware disaster preparedness plan before disaster based on their result.

4.3.3 Disaster Preparedness and Mitigation Plan of Household Condition

As per survey results, in community level how do preparedness plan which are considering for vulnerable people and what plan to mitigate accompany with their participation, community's interest and type of disaster preparedness plan. Therefore, these conditions are show the following table.

Table (4.4) Disaster Preparedness and Mitigation Plan of Household Condition

Statement	Yes		No		Don't Know		Don't Answer		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
During in disaster (or) emergency have prepared disaster preparedness plan in your family?	207	82.5	44	17.5					251	100
Do you prepared disaster preparedness plan in your village?	115	45.8	97	38.6	39	15.5			251	100
In planning program have you involved yourself or involved your family?	31	12.4	84	33.5	136	54.2			251	100
The community have interesting in disaster risk reduction planning?	111	44.2	136	54.2	4	1.6			251	100
The vulnerable people are involving or not in disaster preparedness plan in your community?	107	42.6	4	1.6	140	55.8			251	100
Do you prepared disaster preparedness plan in your family or community during emergency?	215	85.7	33	13.1	3	1.2			251	100

Table (4.4) Disaster Preparedness and Mitigation Plan of Household Condition (Continued)

Statement	Yes		No		Don't Know		Don't Answer		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Have you prepared early warning system in community?	178	70.9	70	27.9	3	1.2			251	100
Do you experiences drill simulation exercise on community?	44	17.5	155	61.8	52	20.7			251	100
Have you involved in simulation exercise?	36	14.3	8	3.2	207	82.5			251	100
Disaster what are the support from disaster preparedness plan for you?	41	15.3	2	0.8	207	82.5			251	100
When received the early warning have you prepared in your community?	177	70.5	69	27.5	5	2			251	100
Have you implement activity for vulnerable people in community	166	66.1	9	3.6	76	30.3			251	100
Mean	119	47	59	23	29	30			251	100

Source: Survey data (2019)

According to the table (4.4) statements, most of the respondents 47% have plan to ready preparedness plan while their facing in disaster situation. Average, 23% not prepared before disaster and 30% of respondents don't know to do household preparedness in their community. Based on the result summarization, the villages are need to be aware disaster preparedness plan in their community level. And then, the vulnerable people include their implementation activities. Due to the drill simulation exercises practice in villages the residents aware their evacuation route, move to safety place before face in disaster and prepared food, non-food items also. Sometime, the

vulnerable people (Children, Older person, pregnancy women and disable) pre move to safety shelter or community center like as the Monastery, Camp and Shelter. Mitigation planning also necessary committee forming, coordination with the local authority and early warning information timely inform to the community level. According per result most of the people are considering for vulnerable people in this community. As the summary this community still in needed disaster knowledge, mitigation knowledge and more of aware on early warning system situation based on the survey results.

Table (4.5) Type of Disaster Preparedness Plan in Community

Statement	Description	No of respondents	Percent
Which are prepared for planning?	Move to safety place	88	35
	Protect important certificate	40	16
	Saving	28	11
	Assist to vulnerability people	20	8
	Keep dry food and water	10	4
	Don't answer	7	3
	Evacuation planning	5	2
	Others	53	21
	Total	**251**	**100**

Source: Survey data (2019)

According to the table (4.5) described that most of the respondents are answered as the preparedness plan many people of interests are move to safety place and second options they are protect their important certificate (especially their property – Home revenue, farm, ID card and others). Third option, some of respondents are prepared by saving money (this is emergency fund while face in emergency case like as health issues, economic and others). Others answered respondents many different ways of their option and they don't have any specific method and their solving very general. Some are very specific way their evacuation planning for their family prepared transportation route way, dry food package, drinking water, medicine and safety shelter (Strong building monastery, Camp and their relative home).

Table (4.6) Early Warning System in Community in Bilin Township

Statement	Early warning	No of Respondents	Percent
Type of receiv early warning?	Inform people to people	63	25
	Radio	45	18
	Telephone	35	14
	TV	28	11
	Don't answer	50	20
	Alarm	22	9
	Others (heavy rain, watch water)	8	3
	Total	**251**	**100**
Who are responsible for early warning?	Village leader	135	54
	DMC	30	12
	Messenger people	18	7
	Early warning committee	18	7
	Villagers	15	6
	Don't Know	15	6
	Others (government staff, by self)	20	8
	Total	**251**	**100**
If you stay in home while face in strong wind what to do?	Stay at home	75	30
	Move to Safety Home	40	16
	Pray	40	16
	Move to highland	25	10
	Run	23	9
	Looking forward family members	20	8
	Move to public shelter	18	7
	Others (go to relatives home)	10	4
	Total	**251**	**100**

Source: Survey data (2019)

According to the table (4.6), most of the respondents are receiving early warning information from people to people by directly communicate way. Some of the people are aware early warning information listen by radio, television and telephone communication. Although, most of the villages are not available telecommunication lines are out of services areas and electricity not access in these areas. Some of the village are located in high land areas. And a few respondents result river side located villagers are self-aware by watching of heavy rain, water level raising like as others. Related the early warning information, village leader is responsible person based on the result of respondents. Second level, disaster management committee also included in responsible person. As a special method messenger people using inform to early warning information in some villages (brown areas). Among them, some of the respondents are government staff, they are aware of early warning information received from right way like as the radio, media channel and their respective office officially announce. If the respondents are stay in home while face in strong wind what they response, ask them most of the respondents are answered move to safety home depends on situation different ways. Secondary, they will be staying in home and praying respect to Buddhist or their respective religious. Some are not considering for safety plan target they will be run from their home. Among them some people are aware move to safety shelter, monastery and camp.

4.3.4 Performance of the Stakeholders in Disaster Risk Reduction and Management

Township disaster management committee were founded by experiences of 2018 (flood disaster). Flood response team lead by GAD and each of township departments staff are included as members of the Township Disaster Management Committee. According to reporting system township GAD send step by step to upper level of District and State. Under the township disaster management team included sub groups of supporting, damage and loss assessment team, search and rescue team, information and publishing team also participated in group members. They are assist under the lead of township General Administration Department. As the preparedness plan, difficult of transportation rote to highland (10) villages already send rice, oil, salt, dry noodle, canned fish and drinking water this year. If disaster happen working together with General Administration Department, Thahton District. Moreover, coordination with also others organizations and society groups in Bilin Township. As

the strengths of township disaster management committee recently move to camps, arrange for camp management, providing for dry food, timely response for affected people. The weakness boats are not enough to use in rescue activities. While the flooding telephone and internet line are not available to use in time cause of electricity cut out in this flooding areas. Response team members are very limited thus why evacuation center management are very poor. Yangon – Mawlamyine highway also cut off at Bilin township in Mon Stat by a mountain torrent and tidal water. Due to transportation impacts relief items timely not arrive to evacuation centers. As the planning try to more systematic management of response team and evacuation planning.

Department of Disaster Management office opened started on March 2018 in Bilin Township. Disaster Risk Reduction implementation activities lead by DDM and coordinating with township GAD. Township level already has planned for the disaster management policies and guidelines if disaster happened working together with Thaton District and State Government (Mon). Early warning information reported to township GAD through to village level from village authority informs to village tracts leader and villagers. In the community level township and villages are temporarily formed for the disaster response team depends on disaster situation. Disaster talk show for sharing knowledge lead by DDM by monthly in village level. Flood disaster simulation exercise done in one ward in township level. IEC, Pamphlets and others presented on notice board. Moreover, the spillway and drainage system renovation mini construction to reduce flood disaster in rainy season. The relief and response budget also cannot be covered as well. The funding was allocated for using in response from District/ State. DDM team main challenges staffing structure is weak just only three staff for implementation activities. Moreover, vehicle, materials and others are needed to be run of the relief and response activities. Early warning information some villages are difficult of communication language of ethic group translate by understand people for those.

Bilin river danger level monitored by Department of Meteorology and Hydrology in Bilin Township. Normally in regular time they are monitoring three times at 6:30 AM in morning, at 12:30 PM in evening and 6:30PM in evening time in day by day. Although, water level is raise close to dangerous level monitored per hour and reported to township GAD and related to the departments. DMH also participated in township disaster management committee member. Monitoring for disaster information

leading by township GAD guidance to village tracts and village level step to step. The disaster knowledge level are different villages and township level. DMH team has capacities for monitoring and forecasting weather – related extreme events. The strengthens are informed early warning timely in widely community for each of disaster information. The level of disaster awareness and knowledge of risk factors to reduce risk reduction level are different of township and community level. The main challenges are establishing effectively early warning system needed to modern appliances and technological.

Search and rescue team lead by Fire service department in Bilin Township. Under the rescue team included police, red cross and in ward committee members participated. To monitor the risks of disaster situation temporary group form water guard in each ward and villages. During in disaster the affected people evacuated to safety place and evacuation centers. Fire service department reporting to District and State level of Fire Service Department. Fire early warning providing using with loudspeaker to the wards. They have difficulties moving to the safety place/ camps. The strengthens the evacuation activity lead people are experienced participated. As the challenges some of the people are lack of disaster knowledge although inform they don't move to safety place or center. Fire service department are always ready to evacuation activities and monitoring the early warning of disaster. Some of local people are less of interesting and participation to attend the meeting and training program. The weakness evacuation team some participants has not driven boat, strings and technical are still needed for upgrade. Life jackets, Rings for rescue and rescue aid items also need to fill.

MRCS team supported distribution, health care services and relocation for the flood affected people. And working together with evacuation team move to safety places and evacuation center. MRCS team also participated in DMC team disaster policies and guidelines don't know at all. The response activities implemented lead by township GAD. The volunteers are assisted to provide food distribution, health care service and others. Although they also need to be advance training related the disaster relief and response. Township disaster management team weak for team work activities. Most of the all members are good participation while the implementing weak of the link with together working. Township disaster management committee to be strengthens need to be training, workshop and simulation exercise. The relief items are needed to use in disaster response. Early warning information send to connect with

telephone, viber, Facebook messenger and official letter to villages. Some of the villages are located very far from township they don't asset with telephone line. The best way is informer use for communication to provide the disaster and important message/information.

Information and Relatives Department information providing to the people early warning information and during in disaster do and don't distribute by pamphlets, inform with notice board. Communication staff also participated in township disaster management team lead by township GAD. Although participate as the committee members don't know disaster management policies and guidelines at all. Most of the members are acted according to instruction of chairman of relief team. Communication team working together with other departments normally, during in disaster more closed working with them. Township party lead develop webpage in social media line specially to provide related the each of sectors implementation activities to informing including early warning information day by day activities. Department's challenges to announce the information use loudspeaker rent from vendor, staff need to be advance training for capacity building.

Planning Department also participated in township disaster management committee lead by GAD. All of the department's staff included as the commit members although need to be strengthens to assist in emergency time. Under the disaster management team include sub group by search and rescue team, distribution team and early warning team. But these team members are don't know the disaster management policies and guidelines at all. They are coordination and cooperation with related department lead by Township General Administration Department. As the local community's disaster knowledge need to be more understand preparedness plan for their families. Local government first priority is transportation of rehabilitation of road assets cause of Bilin township is located beside in Yangon – Mawlamyine High way road.

Township parties also provided food and Non Food Items for the flood affected people. According per previous flood experiences, committee forming temporally by ward in Bilin Township. The volunteers are very active supported in emergency time. Although these volunteers need to be capacity building for their technical strengthen and rescue aid materials. These committee members are just only alive in disaster response time and others time they are assist social activities like as the volunteers work.

CHAPTER V
CONCLUSION

5.1 Findings

Myanmar is highly vulnerable to climate change and lacking resilience, making it extremely vulnerable to destruction. Climate change and global warming will cause drought and water shortages in the central region, and the change in sea level will lead to a rise in water level in the delta and coastal region, increasing the risk of flooding. Drastic changes in weather conditions can have a huge effect on Myanmar and wipe out any humanitarian, political and economic progress. Therefore, Myanmar is in dire need of long-term international support and flexible funding to respond adequately to natural hazards.

Bilin township temperatures are more increased from the previous years, heavy raining is more and water level is also increase recently. Due to Deforestations, the temperature is higher, most of the ponds are dried (drinking/ domestic) water were shortages in summer season. As the Bilin township major disaster are flood, cyclone and minor disaster are strong wind and fire disasters occurs as usual in seasonal. Recently year, most of the villagers are faced flood disaster in seasonal per year. Bilin river is also deterioration and drainage system is also block and bad.

In Bilin Township, villages most of the people's religious are Buddhist (91%), Muslim (6%) and Christian (3%) on each and these respondents are answered most of the disasters are occurs by Naturally (73%), by human (19%), don't know (7%) and (1%) of people answered cause of God is punishments on human being. According to the respondents' survey result summary of occurs disaster are Flood, Cyclone, Human diseases (Flu, Diarrhea) and some are Tornado, Erosions, something like that others. Moreover, while the face in disaster the vulnerability of affected people was elderly person, children, disable, poor people and others are included pregnancy women and under five mothers.

The historical disaster time line of Bilin township founded disasters Flood (1997), Cyclone (2008), Strong Wind (2017) and Flood (2018) occurred. Cause of the disaster, the infrastructure of bridge, housing, schools, farms, animals, plantation, ponds, monastery and transportation are damaged. Some of the villagers are located in highland areas people are concern of landslide and wards are located beside river bank will be faced erosion disaster. Government department's staff participated as the disaster management team members although they are not aware related the Disaster management policies and guide lines they don't know at all. Even though those these components policies and guidelines are would be in papers, people are not aware not successful to reach the goal.

According to individual survey result most of the people are experiences of flood disaster. They have prepared preparedness plan for keep their important certificates and dry food and drinking water also in during disaster. And then, concerning with early warning information all of respondents are answered that they received through by village leaders and provide to villagers local EWSs (loud speaker, traditionally alarm). Cause of no electricity in their villages can't receive early warning information from TV and other channels. Moreover, most of the villages telecommunication lines are not assets in community. Thus emergency time to receive the early warning information by timely difficult of villages far from Bilin Township. Some of the villages are located in high land areas more difficult they don't have any assets and use by only messenger (local people).

According to the survey findings, the respondents that each and every location should be prepared for community based disaster risk reduction planning and by local residents and community authority and found that cooperation and coordination is the best way for disaster risk reduction and management. To share their knowledge and experiences with others preparedness and prevention activities is very important for local community. To conduct drill simulation, saving, keep water and dry food for during in emergency use, small construction activities, safer shelter construction for disaster mitigation. Hazard assessment, vulnerability assessments and damage and lost assessments are will be support data collection for emergency purpose and conduct the awareness raising, training and workshop is need to be educated for the community. Moreover, in these implementation activities considered too involved the vulnerabilities people (eg: disable person, poor people, pregnancy, under 5 mother and elderly person) essential for those.

Concerning with the expected result of community knowledge and practice on disaster risk reduction need to be more practice to reduce mitigation in their villages. The respondents survey result they have household preparedness plan however they don't have any response plan. If they are staying their home face with bad weather or strong wind most of the people are replied they don't go anywhere and still in there.

5.2 Recommendations

Related the climate changes adaptations to protect the flood disaster to grow the trees plantation activities to implement informing to people in Bilin Township. the previous experience Township Disaster Management team actively participated in Flood disaster response lead by Township General Administration Department. However, the management team responded in supported role in response although disaster management policies guide lines need to be more understand. DMC team members to be strengthens needed for capacity building trainings, workshop and lesson learn workshop.

Search and Rescue team lead by fire service departments, rescue team and volunteers need to be technical support training. Moreover, rescue aid materials like as the belts, swim seal mask, rescue emergency suites, whistles, safety helmets, life string, emergency boat, life jackets and others. These materials are very important to rescue using in emergency time for team members. As the infrastructure electricity and telecommunication assets must be set up in each and every village in Bilin Township. According to the survey research, most of the villages are not available electricity for them. Early warning information to watch TV, media channels and telephone also. Currently now, some of the people are use social media like as the face book, viber and others. These application line support to get the early warning information for them.

Moreover, at the community level need to be forming disaster management committee to reduce the disaster risk reduction. DMC members assigned by sub group for early warning, search & rescue, first aid group and evacuation group. And small support activities need to be mitigation for community such as the renovation of evacuation center or school, small construction of bridges, foot path, small dike and hand pump provide multiple benefits to the vulnerable communities. These benefit availability of portable drinking water in times of flooding, prevent the flooding, shelter for vulnerable people in times

As the township providing support for financial, technical assistance, relief aid materials and DRR Campaign activities is important for the disaster risk reduction. At the community level community based disaster risk reduction plan, Township Disaster Preparedness Planning and Drill simulation exercises developed working together with community, government, UN/INGOs and Civil society. The capacity building should be continuing outside of the recovery operations and agreement of the authority and right way approach with local communities. These disaster preparedness planning and implementations activities for further development on disaster risk reduction sector in Myanmar.

Last recommendation water drainage system construct in ward, villages in Bilin Township. It is the most important use of good drainage system; it allows the free flow of water and in most cases prevents accumulation that can lead to flooding. Accumulated water over time lead to soil degradation which brings about a muddy ground surface which in turn will result in soil erosion farms in villages. Moreover, transportation route will affect the natural surface and sub-surface drainage pattern of a watershed prevent the flooding. Promote climate smart, efficient water management (example: micro irrigation, drip irrigation, rain water harvesting), including small and medium irrigation schemes. Township GAD, Planning Department and Agriculture Department should be implement the efficient water management and irrigation schemes for vulnerable community in Bilin Township.

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APPENDICES

Appendix A-1

Table A-1 Composition of National Disaster Management Committee

No	Ministries	Position
1	Vice president	Chairman
2	Union Minister for Home Affairs	Vice Chair
3	Union Minister for Social Welfare, Relief and Resettlement	Vice Chair
4	Union Minister for State Counselor's Office Ministry	Member
5	Union Minister for President's Office	Member
6	Union Minister for Defense	Member
7	Union Minister for Border Affairs	Member
8	Union Minister for Information	Member
9	Union Minister for Religious Affairs and Culture	Member
10	Union Minister for Agriculture, Livestock and Irrigation	Member
11	Union Minister for Transport and Communication	Member
12	Union Minister for Natural Resources and Environmental Conservation	Member
13	Union Minister for Electric Power and Energy	Member
14	Union Minister for Labor, Immigration and Population	Member
15	Union Minister for Industry	Member
16	Union Minister for Commerce	Member
17	Union Minister for Education	Member
18	Union Minister for Health and Sports	Member
19	Union Minister for Planning and Finance	Member
20	Union Minister for Construction	Member
21	Union Minister for Hotel and Tourism	Member
22	Union Minister for Ethnic Affairs	Member
23	Chief Ministers (All States and Regions)	Member
24	Deputy Minister for Foreign Affairs	Member
25	Chief of Staff (Army)	Member
26	Chief of Staff (Navy)	Member
27	Chief of Staff (Air)	Member
28	Permanent Secretary for Social Welfare, Relief and Resettlement	Secretary
29	Director General of General Administration Department	Joint secretary

Source: MAPDRR (2017), page – 77, Annex - A

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Appendix A-2

Bilin Township - Mon State

Funded by European Union Humanitarian Aid

Canada

N

HPAPUN

SHWEGYIN

KYAIKTO

HPA-AN

BILIN

THANATPIN

KAWA

THATON

Kyaikto

Bilin

Thaton

Baw Naw Khee (196082) (Baw Naw Khee)
Me Pa Li (Upper) (196072) (Me Pa Li)
Win Ka Lay (Lower) (196077) (Me Pa Li)
Nwei Taw (196090) (Ah Su Chaung)
Tar Oke Khee (196092) (Ah Su Chaung)
Paw Khee (196094) (Ah Su Chaung)
Kya Thaung Seik (196102) (Lay Kay)
Ah Su Chaung (196087) (Ah Su Chaung)
Me Pa Li (196071) (Me Pa Li)
Pi Ti (196079) (Pi Ti)
Dawt Zan (196088) (Ah Su Chaung)
Pyin Ma Pin Seik (196103) (Lay Kay)
Baw Naw Khee (196110) (Kyoe Waing)
Nat Gyi (196051) (Nat Gyi)
Kyoe Waing (196109) (Kyoe Waing)
Shwe Laung Inn (196054) (Nat Gyi)
Khaw Ti Khee (196070) (Me Na Thann)
Kyauk Taung Lay (196101) (Lay Kay)
Htwe Kyaw Hla (196067) (Me Na Thann)
Pyin Thar (196057) (Nat Gyi)
Pyin Thar (196037) (Me Lan Gaung)
Be Lin Noet (196063) (Me Na Thann)
Myint Kyoe (196100) (Lay Kay)
Kyauk Lone Gyi (196120) (Kyauk Lone Gyi)
Noet Khea (196059) (Me Na Thann)
Win Ka Lay (Upper) (196078) (Me Pa Li)
Ta Nyin Pin (196038) (Me Lan Gaung)
Chaung Kwayt (195986) (Win Thaung)
Me Lan Kyaung (196032) (Me Lan)
Lel Saw Lawt (196035) (Me Lan Gaung)
Win Thaung (195983) (Win Thaung)
Lay Kay (196099) (Lay Kay)
Nyar Hpoe Khee (196108) (Lay Kay)
Ka Ra Way Seik (Upper) (195987) (Win Thaung)
Me Lan Hpar Ka Du (196031) (Me Lan)
Kyauk Pon (195985) (Win Thaung)
Zee Kone (196075) (Me Pa Li)
Me Lan Auk (196033) (Me Lan)
Ka Ra Way Seik (Middle) (195989) (Win Thaung)
Me Lan Gaung (196034) (Me Lan Gaung)
Ka Ra Way Seik (Lower) (195988) (Win Thaung)
Nyaung Htouk (195980) (Hpoe War Thein)
Gon Hnyin Nwe (195981) (Gon Hnyin Nwe)
Yin Ohn (196029) (Yin Ohn)
Nei Char (196030) (Yin Ohn)
Kyauk Hpyar (196104) (Lay Kay)
Ma Yan Chaung (196115) (Kyar Kwin)
Kyar Kwin (196114) (Kyar Kwin)
Hpoe War Thein (195979) (Hpoe War Thein)
Kwin Ka Lay (196044) (Ah Hone Wa)
Ah Lu Gyi (195982) (Gon Hnyin Nwe)
Inn Waing Kone (196043) (Ah Hone Wa)
Paing Da Wei Auk (196112) (Paing Da Wei)
Ah Hone Wa Ah Nauk (196116) (Kyar Kwin)
Ah Shey Ywar Gyi (195968) (Ah Lu)
Ah Hone Wa (196041) (Ah Hone Wa)
War Hpyu Kone (195965) (Thea Hpyu Chaung)
Hpa Yar Ywar (196022) (Ta Nyin Kone)
Mar Li Kar (196024) (Ta Nyin Kone)
Ka Daing Sein (196048) (Hpa Yar Seik)
Thein Ngu (195961) (Thein Ngu)
Thea Hpyu Chaung (195962) (Thea Hpyu Chaung)
Ah Nauk Hpa Yar Seik (196023) (Ta Nyin Kone)
Hpa Yar Seik (196045) (Hpa Yar Seik)
Tha Pyay Nl (195964) (Thea Hpyu Chaung)
Paing Da Wei (196111) (Paing Da Wei)
Taung Thu Htay Kone (196046) (Hpa Yar Seik)
Kyauk Thu Htay Kone (196047) (Hpa Yar Seik)
Win Ta Pan (Upper) (196097) (Win Tar Pan)
Win Ta Pan (196095) (Win Tar Pan)
Win Ta Pan (Lower) (196096) (Win Tar Pan)
Nga Bat Chaung (195951) (Ma Yan Kone)
Tar Lan (195959) (Ma Yan Kone)
Ah Lel Ywar (195969) (Ah Lu)
Ah Shey Ywar Ka Lay (195967)
Bant Bway Kone (196026) (Ka Zaing)
Ka Di Pu (195990) (Ka Di Pu)
War Hpaw Kone (195998)
Win Za Loke Ywar Thit (196017) (Kya Khat Chaung)
Ma Yan Kone (195950) (Ma Yan Kone)
Baing Dan Gyi (195953) (Ma Yan Kone)
Ah Nauk Ywar Lay (195970) (Ah Lu)
Ah Lu Ah Nauk Ywar Gyi (195966) (Ah Lu)
Ka Zaing (196025) (Ka Zaing)
Ta Nyin Kone (196021) (Ta Nyin Kone)
Ka Di Pu Kone (195991) (Ka Di Pu)
Ywar Tan Shey (195955) (Ma Yan Kone)
Paing Dan Lay (195952) (Ma Yan Kone)
Kyein Hpan (195954) (Ma Yan Kone)
Kyaik Te (195963) (Thea Hpyu Chaung)
Yae Za Loke (196027) (Ka Zaing)
Kayin Ywar (195993) (Ka Di Pu)
Ah Yet Thi Ma (195949) (Ah Yet Thi Ma)
Win Pyan (195971) (Win Pyan)
Chaung Pyant (196028) (Ka Zaing)
Pan Di Kone (195995) (Ka Di Pu)
Myauk Ywar (196019) (Kya Khat Chaung)
Nyaung Thar Yar (195933) (Taung Sun)
Salt Thwar (195935) (Taung Sun)
Kyar Chay Khat (195997) (Ka Di Pu)
Thit Cha Taung (195996) (Ka Di Pu)
Ka Ka Te (195828) (Yun Da Lin Kone)
Kyee Pin (195932) (Taung Sun)
Sin Inn (195934) (Taung Sun)
Belin Kyoe (195994) (Ka Di Pu)
Tet Tu Kone (196002) (Dauk Yat)
Win Ka (195947) (Win Ka)
Inn Hpa Laung (195937) (Taung Sun)
Khe Mauk (196003) (Dauk Yat)
Wea Gyi (195975) (Kyauk Yae Twin)
Kyauk Yae Twin Shan (195978)
Shan Ka Lay (196014) (Kya Khat Chaung)
Yae Twin Hpyu (196016) (Kya Khat Chaung)
Kyauk Lone Gyi (195948) (Win Ka)
War Ta Ngar (195977) (Kyauk Yae Twin)
Taung Sun (195930) (Taung Sun)
Taung Gyi (195945) (Taung Gyi)
Kyauk Yae Twin (195973)
Kan Ni (195976) (Kyauk Yae Twin)
Dauk Yat (195999) (Dauk Yat)
Kin Ywar (195944) (Kin Ywar)
Yun Da Lin Kone (195936) (Yun Da Lin Kone)
Inn Byar (195914) (Ah Naing Pun)
Sin Su (195974) (Kyauk Yae Twin)
Shwe In Don (196000) (Dauk Yat)
Pauk Taw (195938) (Pauk Taw)
Ah Nan Kone (195929) (Yun Da Lin Kone)
Ah Naing Pun (195910) (Ah Naing Pun)
Zee Wun (196011) (Shwe Yaung Pya)
Ka Toe Sel (195940) (Pauk Taw)
Kawt Ka Mei (195927) (Yun Da Lin Kone)
Ka Beit Oke Hpo (195912) (Ah Naing Pun)
Taung Ka Lay (195913) (Ah Naing Pun)
Bu Tar Kone (196001) (Hnin Pale)
Kawt Ka Dut (195924) (Kawt Ka Dut)
Hnin Pale (195899) (Hnin Pale)
Thit To Kyun (195911) (Ah Naing Pun)
Ah Win Gyi (196009) (Shwe Yaung Pya)
Naung Ka Toke (196015) (Kya Khat Chaung)
Yae Hpyu Kan (195900) (Hnin Pale)
Zoke Thoke Ywar Gyi (195920) (Zoke Thoke)
Ta Bet Swea (195909) (Ta Bet Swea)
Shwe Yaung Pya (196006) (Shwe Yaung Pya)
Zoke Thoke Ywar Lay (195921) (Zoke Thoke)
Kyaung Ywar (195903) (Shwe Hlay)
Shwe Hlay (195902) (Shwe Hlay)
Kha Lauk Inn (196010) (Shwe Yaung Pya)
Zwe Ka Lar (195919) (Zwe Ka Lar)
Waing Pat (195917) (Mu Thin)
Mu Thin (195915) (Mu Thin)
Shan Chaung (195943) (Pauk Taw)
Ma Yan Kone Ywar Gyi (196007) (Shwe Yaung Pya)
Nyaung Pa Lin (195904) (Nyaung Pa Lin)
Ma Yan Kone Ywar Lay (196008) (Shwe Yaung Pya)
Mi Chaung Aing (196012) (Shwe Yaung Pya)
Than Pu Yar Pin Seik (195906) (Nyaung Pa Lin)
Nyaung Lan (195905) (Nyaung Pa Lin)
Zoke Ka Li (195922) (Zoke Ka Li)
Leik Khone (195907) (Leik Khone)
Leik Khone Ywar Lay (195908) (Leik Khone)

Kilometers
0 2.25 4.5 9

Map ID: MIMU154v04
Creation Date: 3 May 2016,A1
Projection/Datum: Geographic/WGS84

Data Source:
BASE MAP - MIMU;Boundaries - WFP,modified by MIMU 2008;
Landcover - LP DAAC - MCD12Q1 2011 V.5 IGP (Type1)
Place name - Ministry of Home Affair (GAD)
translated by MIMU

Map produced by the MIMU - E-mail: info.mimu@undp.org
Website: www.themimu.info

Legend

- Village
- Town
- Road
- Railway
- Shore
- Township Boundary
- District Boundary
- State Boundary
- International Boundary
- Non-Perennial/Intermittent/Fluctuating
- Perennial/Permanent

Landcover
- Crop and Vegetation
- Forest
- Mixed Forest
- Grassland
- Shrubland
- Snow Ice
- Urban Build-up
- BareLand
- Wetland
- Water

Ting Kawk (166214) — Village Name
(Ting Kawk) — Pcode
Village Tract Name

Myanmar Information Management Unit (MIMU) is a common resource of the Humanitarian Country Team (HCT) providing information management services, including GIS mapping and analysis, to the humanitarian and development actors both inside and outside of Myanmar.

NOTE : Due to the limited space of label for Villages, some Village's name will not be appeared on this map.

Disclaimer: The names shown and the boundaries used on this map do not imply official endorsement or acceptance by the United Nations.

Appendix A-3

Guideline for questionnaire

Interviewer -

Village -

Village Tracts -

Township -

I. Demographic Characteristics		
1.	Name Male Female	
2.	Age	
3.	No. of Family members	
4.	Who is HH Leader ? Male Female Children(18> Under 18) Adult (19 to 60) Over 60 Don't No	1 2 3 4 5 99
5.	Have finished level of education in your family? No Basic school Middle school High school Collage/ Degree Monastery education Others _____ Don't Know	1 2 3 4 5 6 88 99
6.	Describe of your Religious? Buddhist Muslim Christian Hindu No relgious Others Don't answer	1 2 3 4 5 88 99

7.	Have disability person in your family?	Yes	1
		No	2
		Don't answer	99
II. Understanding and Knowledge of DRR			
8.	How do you think now have you stay home is may be face disaster?	Yes	1
		No	2
		Don't know	88
		Don't answer	99
9	Have your concerns on disaster?	Yes	1
		No	2
		Don't Know	88
		Don't answer	99
10	How do you think disaster is more occurs in now?	Yes	1
		No	2
		Don't Know	88
		Don't answer	99
11	Do you know have occurs within 5 years face disaster in your village?	Yes	1
		No	2
		Don't know	88
		Don't Answer	99
12	The previous 5 years have you face disaster in your village?	Yes	1
		No	2
		Others	88
		Don't Answer	99
13	Why are more occours disasters by something?	Natural	1
		Human	2
		Lord/ Traditional/ Conservative	3
		Don't know	99
14	Have you think some people are more effected the disaster?	Yes	1
		No	2
		Don't know	3
		Don't answer	99

III. Disaster Preparedness and Mitigation Plan HH Condition			
15	During in disaster (or) emergency have prepared disaster preparedness plan in your family?	Yes	1
		No	2
		Others	88
		Don't know	99
16	Do you prepared disaster preparedness plan in your village?	Yes	1
		No	2
		Don't Know	99
A	In planning program have you involved yourself or involved your family?	Yes	1
		No	2
		Don't know	99
B	The community have interesting in disaster risk reduction planning?	Yes	1
		No	2
		Don't know	99
C	The vulnerable people are invloving or not in disaster preparedness plan in your community?	Yes	1
		No	2
		Don't Know	99
17.	Do you prepared disaster preparedness plan in your family (or) community during emergency?	Yes	1
		No	2
		Don't know	99
18	Have you prepared early warning system in community ?	Yes	1
		No	2
		Don't Know	99
19	Do you experiences drill simulation exercise in community?	Yes	1
		No	2
		Don't know	9
A	Have you involved?	Yes	1
		No	2
		Don't know	9

B	In further while in disaster what are the support from disaster preparedness plan for you? Very supported	1
	Supported	2
	Little supported	3
	Not	4
	Don't Know	99
20	When received the early warning have you prepared in your community? Yes	1
	No	2
	Don't Know	99
21	Have you implement activity for vulnerable people in community? Yes	1
	No	2
	Don't Know	99
22	Whar are preparing for planning? Hazard analysis	1
	Vulnerability assessment	2
	Disaster preparedness plan in community	3
	Self preparedness/ HH preparedness plan	4
	Awareness raising, provide DRR knowledge to public	5
	DRR knowledge training to children	6
	DRR knowledge training to elderly people	7
	Disaster Management Committee forming/volunteer forming	8
	Participation of Local authority	9
	Drill silmulation exercise	10
	Early warning system	11
	Evacuation mapping	12
	Safety mapping	13
	Protect of property (certificate/ownership property)	14
	Saving	15
	Protect of Livelihood	16
	Types of livelihood sector	17
	Reconstruction HH building	18
	Rehabilitation HH building	19
	Store keep for Dry food/ Water and materials	20
	Mitigation planning for community	21
	Moving to safe building/ Shelter	22
	Assist to vulnerable people	23
	Others /	88
	Don't know	99

V. Early Warning System in Community		
23	Types of received Early warning ststem ? TV	1
	Radio	2
	Telephone	3
	Warning (Loud speaker/ Traditional wood/ ranging bell)	4
	people to people	5
	Door to Door	6
	Others	88
	Don't Know	99
24	Who are responsible for early warning? Disaster management committee	1
	Early warning committee	2
	Guard (workers from other village)	3
	Local authority/ Village leader	4
	Monastery/Church	5
	Government/ Officer	6
	Others	88
	Don't Know	99
25	If you are stay in home while face in strong wind Don't go stay at home	1
	what to do? Looking forward children	2
	Looking forward family memebers	3
	go to higher place	4
	go to Shelter (public building)	5
	go to more safer building / strong building	6
	pay respect to Buddhist	7
	Others	88
	Don't Know	99

Appendix A-4

Stakeholders Questionaries' for Disaster Risk Reduction

<table>
<tr><th colspan="2">Disaster Risk Reduction (DRR)</th></tr>
<tr><td>1.</td><td>What is the climate change situation and climate change related hazards in your area?
……
……...</td></tr>
<tr><td>2.</td><td>Have your disaster experiences? (Please describe of the history of type of disaster by years)
……
……...</td></tr>
<tr><td>3.</td><td>What are the impacts of most damaging hazards occurring in the community, infrastructure, environment etc?
……
……...</td></tr>
<tr><td>4.</td><td>How are risks identified and expressed?
……
……</td></tr>
<tr><td>5.</td><td>What is the level of awareness or disaster risk factors at the community level?
<table><tr><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>Don't Know</td><td>Low</td><td>Medium</td><td>High</td></tr></table></td></tr>
<tr><td>6.</td><td>What is the number of groups for disaster preparedness plan? (Disaster Risk Reduction Committee, Early warning, Search and Rescue committee, First Aid group, Fire Fighter group and Health committee)
……
……</td></tr>
<tr><td>7.</td><td>How is the Community Based Group formed for monitoring the risks of disasters?
……
……</td></tr>
<tr><td>8.</td><td>Are there existing laws, policies, and regulations governing disaster management, including risk reduction, and climate change adaptation from the State to the local (State/ district, community)? Describe them. Link with National level?
……
……</td></tr>
</table>

9.	Is there an institution that is in-charge of disaster management and climate change adaptation at the State/District and Township levels? What is it called? What is its composition? Describe its structures and functions, including working with other institutions to facilitate policy, if relevant. …… ……
10.	Describe the strengths and limitations of the institutions with regard to disaster management (response/relief, rehabilitation, reconstruction, preparedness, prevention and mitigation) and climate change adaptation. .... a. What are the local capacities for monitoring and forecasting weather-related extreme events? What are the challenges and recommendations? ....
11.	Are there disaster risk management and adaptation plans at the State/district and Township levels? (Ask to describe detail and is it include CCA plan?) .... a. What are the local level priorities (sectors, types of activities)? .... b. Are there local climate change and disaster vulnerability assessments (at a Township level)? .... c. Are climate change and disaster risks integrated into local development plans .... d. What are the main challenges in integrating climate and disaster risk into local development planning and implementation? How can these challenges be addressed? ....

12.	Is there an early warning system at the State/district and Township level? Is it functional? What channels are using for dissemination? List the channels of access climate information and early warning by government departments and community. .... a. Is there audience- and sector-specific information generation and dissemination? Please describe. (e.g. information tailored specifically for farmers, fishermen, small businesses, vulnerable groups like disabled people and women) .... b. Describe the warning formulation, timing and types of hazards community is informed about. .... c. What are the main challenges in establishing effective early warning system? How can these challenges be addressed? ....
13.	Are there NGOs and community-based organizations in the area? Name them. What work do they do in the area? Do they integrate DRR and Climate Change Adaptation in their work? …… …… …… …… …….

14.	What capacity building initiatives have been provided to the government disaster management in-charge at the district and community levels? What were these capacity building activities? Who conducted them? Did they include climate change issues? ....
15.	What disaster management and climate change adaptation activities have communities participated in? Who conducted them? …… …….