Chapter I

Introduction

1.1 Background

Disasters cause loss of lives, properties, livelihoods and developmental gains and also in the event of disasters, resources set aside for development are deviated to relief, rehabilitation and recovery works. As a result, disasters have an adverse long term social and economic impact on societies especially the poor since the poor are more vulnerable to any kinds of disaster. Under this context, Disaster risk reduction becomes an integral part of development and poverty alleviation measures.

There has been a paradigm shift in disaster management in recent years and now focus is on mitigation and preparedness which calls for pro active approach as investment in pre-disaster activities is much more economical than post-disaster measures.

The government of Myanmar recognizes the importance of disaster management in national building and issues orders to set up institutional arrangements for disaster management at various administrative levels including township level[1]. The township is the key in Myanmar administrative system as it provides a crucial link between communities and sub national level institutions. Also, most of the government departments have representation at township level, and also parliamentarians are elected on township based constituency. Thus, in the light of above, township level is the key for disaster risk reduction and response also. Therefore, the government of Myanmar had also developed a Guideline on Township Disaster Management Plan.

Hlaingbwe Township, one of seven townships of Kayin State belongs to Hpa An district and it is situated in the low lying plain which shape looks like a frying pan and also zigzag flowing by rivers of Thanlwin, Hlaingbwe, Maepa, Tahpan results flooding every year. As per directives of Kayin State Disaster Preparedness Committee and Hpa An District Disaster Preparedness Committee, Hlaingbwe Township Disaster Preparedness Committee drafted Hlaingbwe Township Disaster Management Plan in April 2011 and revised it in May 2012.

Apart from Hlaingbwe Township Disaster Management Plan drafted by Township Disaster Preparedness Committee (TDPC), there are other disaster management plans at Hlaingbwe Township and they are:

[1]National Standing Order On Natural Disaster Management (Order no. 20 and 46), the Government of Myanmar

- Hlaingbwe Township Flood Disaster Management Plan drafted by Township Disaster Preparedness Committee (TDPC) on June 2012
- Hlaingbwe Township Fire Disaster Preparedness Plan drafted by Township Fire Department in December 2012
- Shwegone Village Tract Disaster Management Plan drafted by Shwegone Village Tract Disaster Preparedness Committee in July 2012, and
- Search and Rescue and Disaster Management Plan drafted by Hlaingbwe Army Deployment, South East Command in January 2012.

Even though these documents are complimentary to each other, there is a need to call for vertical and horizontal integration of these plans. To further this aim, Hlaingbwe Township Disaster Preparedness Committee pursues to review and revise the existing TDMP incorporating internal and external best practices of disaster management plans.

1.2 Goal and objectives

The goal of Hlaingbwe Township Disaster Management Plan is to protect lives, properties, livelihoods, and developmental gains of Hlaingbwe Township against the damaging impact of disasters, with a particular focus on regular flooding. This goal will be achieved through the following strategic objectives guiding the current review and revision of the TDMP:

- To provide baseline data of Hlaingbwe Township which are very useful for Hlaingbwe township disaster management planning;
- To thoroughly assess disaster risk of Hlaingbwe Township through undertaking hazard, vulnerability and capacity assessments so that identification of effective ways to reduce the effects of disaster risk are contextualized to local condition,
- To lay down an institutional mechanism where coordination among various stakeholders of Hlaingbwe Township in disaster management can be enhanced;
- To work out plans to mitigate the risk of, to prepare in advance of , coordinate the response to, and the recovery from, disasters affecting the Hlaingbwe Township, especially flooding;
- To develop indicators, process and other measures for monitoring, review and updating of the TDMP;

The main objective of each chapter becomes the objectives of reviewed and revised Hlaingbwe Township Disaster Management plan, for instance, the main objective of

chapter two (Hlaingbwe Township Profile) is to provide base line data of Hlaingbwe Township which are very useful for Hlaingbwe township disaster management planning and this main objective of chapter two becomes the first objective of this reviewed and revised Hlaingbwe Township Disaster Management Plan.

1.3 Approach and Methodology for the Review and Revision of the existing Hlaingbwe Township Disaster Management plan

The overall approach to be followed for reviewing and revising of existing Hlaingbwe Township Disaster Management Plan is underlined by inclusive participation. The aim of the approach is to ensure sustainability of the intervention and ownership of the Hlaingbwe Township Disaster Management Plan by the Hlaingbwe Township Disaster Preparedness Committee and all other concerned stakeholders of Hlaingbwe Township.

Not only the quality output but also quality processes are emphasized in reviewing and revising of the existing Hlaingbwe Township Disaster Management Plan. Hence, every consultation meeting on reviewing and revising of TDMP are held together with capacity building session on DRR with members of Hlaingbwe Township Disaster Preparedness Committee and all other concerned stakeholders.

The Hlaingbwe Township Disaster Management Plan also aligns with the Government of Myanmar's key documents on Disaster Management:

- Disaster Management Law, Standing Order on Natural Disaster Management,
- Myanmar Action Plan on Disaster Risk Reduction;
- Guideline on Township Disaster Management Plan;
- Kayin State Disaster Management Plan; and
- Kayin State Standing Order on Natural Disaster Management.

The adopted methodology for review and revision process of existing Hlaingbwe Township Disaster Management Plan has broadly seven steps as follows:

- At first, organise a wider-consultation workshop with Hlaingbwe Township Disaster Preparedness Committee and other stakeholders on the review and revision of existing Hlaingbwe Township Disaster Management Plan
- Constitute a Task Force to review and revise the existing Hlaingbwe Township Disaster Management Plan
- Review the existing literatures on Township Disaster Management Plan and related documents of Hlaingbwe Township by the Task Force.

- Hold a series of Task Force meetings to draft the revised Hlaingbwe Township Disaster Management Plan;
- In drafting the revised Hlaingbwe TDMP, level of hazards exposed to, level of vulnerable condition prevailed, and level of local Government Institutional DRR capacities are assessed to get risk profile of the township.
- Then plans and activities to reduce vulnerabilities and increase capacities especially for flooding disasters are worked out for further actions. In other words, action plans proposed in the revised TDMP are to address capacity gaps of Hlaingbwe Township Disaster Preparedness Committee for four phases of disaster management namely mitigation, preparedness, response, recovery and rehabilitation. Mainly capacity gaps are identified in terms of human resources, skills, assets, and coordination.
- Impart Disaster Risk Reduction Concepts through workshops in and between Task Force meetings
- Table the revised draft Hlaingbwe Township Disaster Management Plan to wider audience for further comments and inputs, and incorporation of the received comments and inputs into the Plan
- Finalise the revised Hlaingbwe Township Disaster Management Plan and wider dissemination of the Plan to all concerned stakeholders

1.4 Guiding Principles

The review and revision process of the existing Hlaingbwe Township Disaster Management Plan is guided by four principles: implementability, mainstreaming, decentralisation, and standardization. On the other hand, every activities and tasks to be planned in the Hlaingbwe TDMP are looked into as per implementability, mainstreaming, decentralisation, and standardization aspects.

- **Implementability:** Usefulness of any plan including Township Disaster Management Plan is measured by its degree of implementability. To make Township Disaster Management Plan (TDMP) implementable, the TDMP must be practical and contextualised into local conditions otherwise the TDMP will be a mere paper document which lies in the drawer.
- **Mainstreaming:** Disaster Management is a cross-cutting issue and it calls for involvement of all line departments and other agencies. Put another way, risk reduction should be included into development functions of multiple local government departments and agencies, aiming to produce a resilient culture of prevention through sustainable developments. The TDMP being the master document on disaster management at township level would be more effective if

departmental disaster management plans and agency specific disaster management are to be linked with the TDMP for coordinated and effective mitigation, preparedness and response.

In other words, mainstreaming is a synonym of integration, and integration of disaster risk reduction at TDMP can be mainly approached on two different levels called **Horizontal Integration and Vertical Integration.**

Horizontal Integration is the process of establishing a common purpose for all stakeholders with roughly equal standing. As for a TDMP, horizontal integration mean inclusion of public and private agencies as well as the general public on disaster risk reduction programs. Where horizontal integration occurs among roughly co-equal peers and relies heavily on consensus building through collaboration efforts, V**ertical Integration** is much more hierarchical and relies on more directive methodologies. And, effective disaster management at township level also calls for strong **vertical integration of** various levels of government administrative mechanism such as national, state and region, district, township, village tract and village.

And also, **Vertical Integration** emphasising link to village tracts and villages through community based disaster risk reduction programs would strengthen the aspect of decentralisation.

- **Decentralisation:** the first responders to disasters are local communities, not NGOs and central government, and they are in the best position to execute immediate rescue and relief actions since they understand local condition better than outsiders. Decentralising disaster management is the key to make it effective. As recent studies reveal, the percolation of risk reduction down to local levels has cut disaster related losses mush faster. In other words, This TDMP is to strengthen a local government system as the backbone of country's disaster management programme.
- **Standardization:** Standardization in terms of approach, methodology, disaster management terminologies, and response mechanism further improves the value of TDMP. The standardised TDMP would make the TDMP as a more user friendly reference document.

1.5 Hazard Profile of Myanmar and of Kayin State

Myanmar is exposed to an arrange of hazards and its costal regions are prone to a number of hydro meteorological hazards such as cyclone, storm surge and tsunamis while major parts of the country are at risk from earthquakes and fires. The rainfall-induced flooding is a recurring phenomenon across the country while some parts of the country are exposed to landslide and drought risks. As per the data from 1998 to 2007 fires constituted about 71% of reported disaster events, followed by floods (11%), storms (10%) and others (8%) including earthquakes, tsunami and landslides[2].

Due to climate change, lately Myanmar has been experiencing disasters at close interval and eight major disasters occurred during the last five years namely 2008 (cyclone Nargis in delta region), 2010 (flood in northern Rakhine), 2010 (cyclone Giri in Rakhine coastal region), 2011 (earthquake in Shan state), 2011 (strong storm in Pyapone area), 2011 (flash flood in Magway region), 2012 (floods across the country), and 2012 (earthquake in Mandalay region). As per UNOCHA report for 2012, Myanmar ranked first in its disaster risk index for the Asia-Pacific region.

The Cyclone Nargis of May is the most devastating disaster in the living memory of Myanmar. It destroyed over 800,000 houses and 1,400 schools as well as 783,000 hectares of farmland. The human toll of the cyclone is estimated at 84,537 deaths and 53,836 missing with around 2.4 million people severely affected, losing homes and livelihoods.

Flood is the main hazard that Kayin state is exposed to since Kayin state is zigzagged by some major rivers namely Thanlwin, Jaing, Attayan, Thaungyinn, Hawngthayaw, Zami, Hlaingbwe, and some creeks. Torrential rains further compounded by high tidal is the major cause of the flooding in Kayin state. As a result, rainfall-induced flooding is a recurring phenomenon across the Kayin state while some parts of the Kayin state is exposed to landslides. As per hazard profile of Myanmar, Kayin state falls into seismic category zone II for Earthquake, which is moderate zone, and the Kayin state also experiences regular thunder storms.

As per recent trends, flooding has been occurring at close intervals in Kayin state, causing damage to paddy fields which is the main livelihood in Kayin state, river bank erosion, damages to houses, livestock, roads, bridges and others, health problems due to unclean waters etc. Under the context of present prevailing situation of climate

[2]Hazard Profile of Myanmar, the Government of Myanmar

change and environmental degradation, Kayin state is more likely to face the rainfall-induced floods in coming years.

1.6 Overview of Institutional Arrangements for Disaster Management in Myanmar

The Government of Myanmar has established institutional arrangements for dealing with disasters and has systems and practices for disaster prevention and preparedness. The recently reconstituted National Disaster Preparedness Central Committee (NDPCC) chaired by Vice President (2) is the 23 member apex body for Disaster Management in Myanmar. The Union Ministers for Home Affairs and for Social Welfare, Relief and Resettlement are Co-Chairs. And also, an Advisory Committee comprising of government and non government representatives have been constituted to provide technical inputs to NDPCC.

Along with NDPCC, the nine-member National Disaster Preparedness Management Working Committee and ten sub-committees on specific themes have also been reconstituted at national level to implement the activities laid down by NDPCC.

The Disaster Preparedness Committees have been constituted at Regions and States respectively, and these committees are chaired by either Chief Minister or relevant Minister of the Regions and States.

District, Township and Village Tract levels Disaster Preparedness Committees under the Chairmen of District, Township and Village Tract Administrators have also been constituted respectively but as for Village Tract levels are concerned, only a very few Disaster Preparedness Committees are so far constituted.

Disaster Management Law has been in the process of enactment, and once if it is enacted, it would become a legal document binding all institutions and levels of government in Myanmar on disaster management. Drafting of the rules and regulations under the Disaster management Law is also in progress since effective implementation of the Disaster Management Law calls for detailed lay-out of the legal framework. Depending on the progress in developing rules and regulations at national level, the review and revision of the TDMP will seek to integrate these into the TDMP.

Standing Order on Natural Disaster Management (SO) was published in 2009, and the SO in the absence of disaster management law, had served the blue print as far as disaster management in Myanmar is concerned. It was issued with the aim of ensuring that once disaster strikes, emergency relief and rehabilitation work are carried out as per the prepared plan. However, it is critical that SO are contextualised to the local

situation in each township, and the current review and revision of the TDMP will seek to prioritise SO for Hlaingbwe township.

Myanmar Action Plan on Disaster Risk Reduction developed by the government of Myanmar is the National DRR Strategic Action Plan and MAPDRR has identified 65 DRR projects under 7 components linking priority actions from with HFA and AADMER which Myanmar is committed globally and regionally respectively. Development of TDMPs and their regular review and updating is part of implementation of component 4.2 of MAPDRR.

1.7 Rationale for review and revision of existing Hlaingbwe Township Disaster Management Plan

Hlaingbwe Township Disaster Preparedness Committee (TDPC) has been constituted under Chairman of Township Administrator. The composition of the TDPC committee includes representatives from township level departments and civil society. In order to assist the Hlaingbwe Township Disaster Preparedness Committee, Sub- Committees have been constituted in line with national level sub committees. The Hlaingbwe Township Disaster Preparedness Committees have prepared Hlaingbwe Township Disaster Management Plan in April 2011, and reviewed and revised it in May 2012.

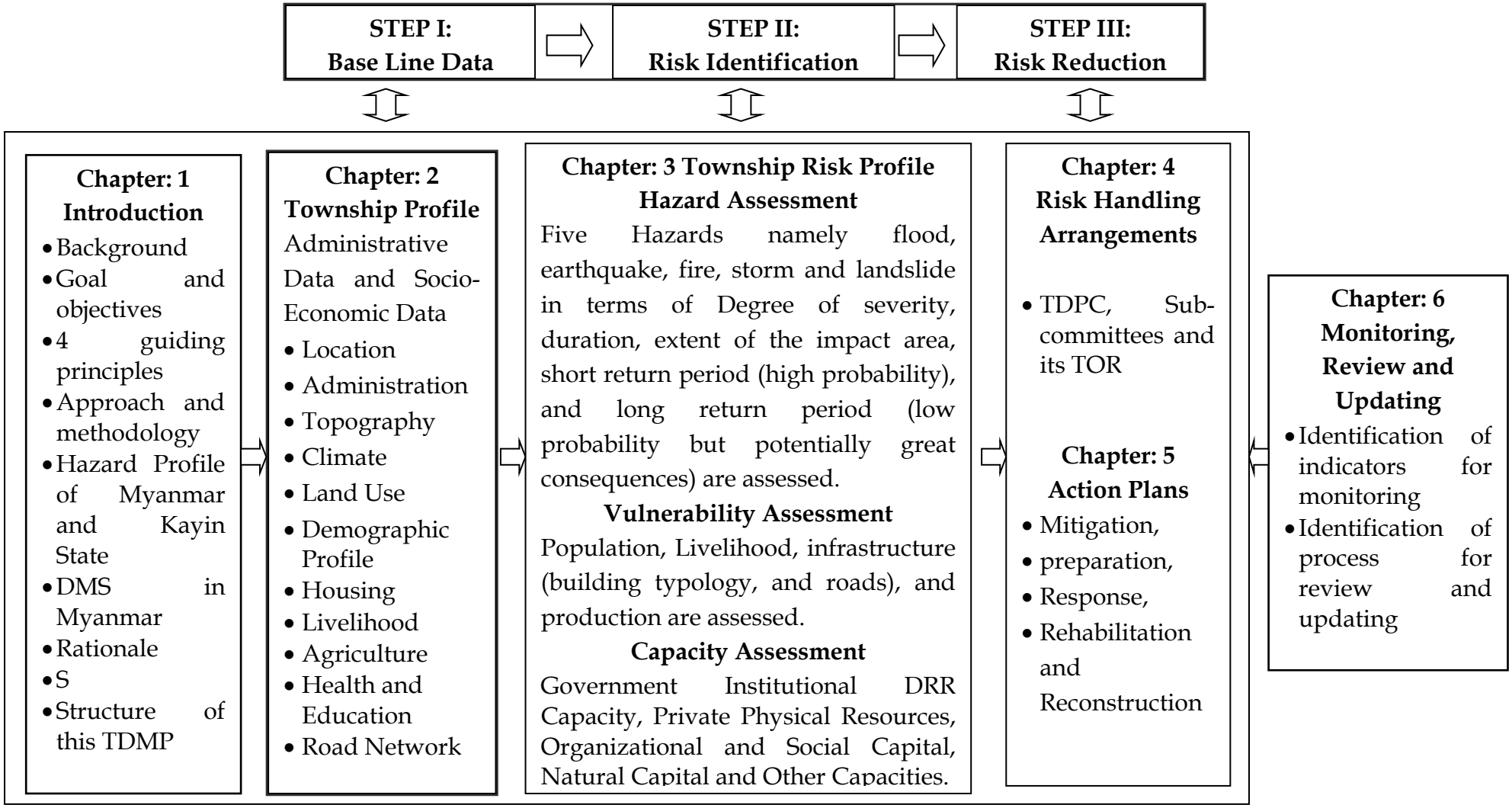
The followings are the reasons for review and revision of existing Hlaingbwe Township Disaster Management Plan:

- **Living document:** Any plan including TDMP is a living document and the TDMP should be seen as a dynamic document and it should be revised and updated at periodic interval, at least once in a year. It is important to mention that Plan has always scope for improvement and lessons learnt from the past disasters and mock drills should guide revision of the plan. Standing Order on Natural Disaster Management (SO) No. 22 (f) also mentions the need to update natural disaster preparedness and emergency actions plan on regular basis.
- **Wider consultation:** Process is equally important to output itself in disaster management since disaster management is a responsibility of government that cuts across the duties and functions of multiple government departments and agencies. As such, all government departments and other agencies such as MRCS, NGOs, business groups, professional bodies, civil societies etc, should be involved in planning and implementation of the TDMP. The consultation with all concerned stakeholders during planning also helps to ensure smooth implementation.

- **Need of more detailed Disaster Risk Assessment:** Also there is need to improve the existing Hlaingbwe Township Disaster Management Plan specially inclusion of disaster risk profile of Hlaingbwe Township to improve effectiveness of the plan. Hazard, vulnerability and capacity of Hlaingbwe Township would be thoroughly assessed so that plans are worked out as per local condition.
- **Guideline on TDMP:** The national Guideline on Township Disaster Management Plan provides a standard template for structuring TDMP, and the existing Hlaingbwe TDMP will be reviewed and revised in line with this Guideline, adjusted to local context.
- **Needs of vulnerable and special groups:** Several studies has confirmed that women, aged, children, migrants and mobile population, physically and mentally challenged are the worst affected during disaster. The Hlaingbwe TDMP should pay focus on the needs of these vulnerable groups.

1.8 Structure of the reviewed and revised Hlaingbwe Township Disaster Management Plan

Conceptually, this reviewed and revised Hlaingbwe Township Disaster Management Plan is structured into three steps as follows. The first step is collection of base line data, the second step is identification of risk, and the third step is reduction of identified risk. The outputs of step one become the inputs of step 2 and so on.



Chapter 2

Hlaingbwe Township Profile

2.1 Location

Hlaingbwe Township is located between 16° 40′ and 17° 15′ north latitudes and between 96° 14′ and 98° 28′ east longitudes, bordering Thailand in the east and north, Hpa-An township and Hpapun township in the west, and Kawkareik township and Myawaddy township in the south.

Hlaingbwe Township having an area of approximately 1672.41 square mile (1,069,916 acres) has an east- west extend of about 45 miles, where it is the broadest, and a north-south extend of about 65 miles. Hlaingbwe town is 24 miles 4 furlongs away from Hpa-An town.

2.2 Administration

Hlaingbwe Township is one of the seven townships of Kayin state and it falls under Hpa-An district. Administratively, Hlaingbwe Township is divided into three administrative areas namely Hlaingbwe Township (Main), Paingkyon Sub Township and Shan Ywa Thit Sub Township. Combined, these three administrative areas have a total of 13 wards and 72 village tracts, and the 72 village tracts comprise of 363 villages.

Table 2.1 Administrative Units of Hlaingbwe Township

Administrative areas	Wards	Village Tracts	Villages
Main Hlaingbwe Township	4	36	151
Paing Kyon Sub township	5	27	153
Shan Ywa Thit Sub township	4	9	59
Total	13	72	363

There are 30 township level government entities representing 17 ministries and 3 administration organizations at Hlaingbwe township and a list of government department and agencies at Hlaingbwe township is annexed.

Figure 2.1 Location Map

2.3 Topography

Hlaingbwe township is located in the central part of the Kayin State. Elevation of the land increases towards the east from the west since it is situated between Thanlwin river in the west and Dawna mountain range in the east. On average, land areas of Hlaingbwe township is higher than 20 feet from the mean sea level. Hlaingbwe township is predominantly hilly land, and a lot of rivers and creeks such as Thanlwin river, Thaungyin river (south to north), Hlaingbwe, Dha Jaing, Maepa, Tahpan, Mayin, Pata, Makaing, Yinbaing are also zigzaggedly flowing. As a result, most settlements

including Hlaingbwe town are situated in the low lying plains and the shape of which is like a frying pan.

Figure 2.2 Land Elevation Map

2.4 Climate

The climate is described as tropical and therefore it experiences the typical wet and dry seasons. The average annual rainfall is 185 inches and the minimum temperature is 20° C and the maximum temperature is 43° C over the last five years. Flooding in the wake of monsoonal activity is a constant threat and is experienced on a regular basis. Although generally not life threatening, the loss of livelihood assets and health issues has economic consequences for the Hlaingbwe Township and extended delays can cause supply issues such as breaking down of essential public goods flows thereby creating direct and indirect socio-economic and health issues.

2.5 Land Use

The forests are dominant feature of land cover in Hlaingbwe Township. Forty five percent of the total land area is covered by uncultivated land in addition to seventeen percent of evergreen forest and eighteen percent of deciduous forest.

Agriculture is the principle economic activity of Hlaingbwe Township and twenty percent of the total land areas of Hlaingbwe Township are occupied for agriculture production sector. Among the three administrative areas, thirty four percent of the land area in main land Hlaingbwe is designated for agriculture. A negligible portion of the total land area of Hlaingbwe Township belongs to scrubland.

In comparison with other land use, the total area for uncultivated land is very large and forty five percent of the total land area is occupied for uncultivated land.

Table 2.2 Land Use Distribution in Hlaingbwe Township

Administrative Areas	Land Use Type	Land Use Distribution (Acres, %)					Total
		Cultivated land	Deciduous Forest	Evergreen Forest	Scrubland	Uncultivated Land	
Hlaingbwe	Area (%)	112,813 (34.04%)	49,928 (15.06%)	94,806 (28.61%)	115 (0.03%)	73,758 (22.26%)	331,420
Paingkyon	Area (%)	90,160 (21.53%)	100,320 (23.96%)	76,255 (18.21%)	771 (0.18%)	151,268 (36.12%)	418,774
Shan Ywa Thit	Area (%)	6,896 (2.16%)	47,438 (14.84%)	5,598 (1.75%)	95 (0.03%)	259,695 (81.23%)	319,722
Total	Area (%)	209,869 (20%)	197,686 (18%)	176,659 (17%)	981 (0.00%)	484,721 45%	1,069,916

2.6 Demographic Profile

Total population of the Hlaingbwe township as per 2012 data is 257,337 which accounts for 14.25 population of the Kayin state which is 1,818,500 in 2012. Out of it, 17,006 (6.6% of total population) is urban and 240,331 (93.4%of total population) is rural. Male population is 124,954 and female is 132,383. Population in the age group of below 18 is 151,870 and of above 18 is 105,467. Major ethnic groups who reside in Hlaingbwe township are Kayin (82%), Bamar (6.7%), Shan (3.8%), Mon (1.4%) and others (6.1%).

Hlaingbwe township has 42,980 households, of which urban households are 2,589 and rural households are 40,391. These households are made up with 43,199 families, of which 2,720 families and 40,479 families belong to urban and rural respectively.

The sex ratio is defined as number of female per 100 males and sex ratio of Hlaingbwe township in 2012 is 92.32. In comparison to all Myanmar (98.89) and Kayin state (98.04) of 2010, the sex ration is relatively low in Hlaingbwe township.

The density of population is a very important tool to measure pressure of population on the land. It is defined as the number of persons living per square mile. Density of population in this Hlaingbwe township is 316.7 per square mile as compared to 155 in Kayin state and 229 in all Myanmar.

Literacy refers to a person who can read and write with understanding in Myanmar language. The literacy rate is 98.7% as against 97.65% of the Kayin state and 95.01 % of all Myanmar.

2.7 Housing Infrastructure

Hut (bamboo type) is the most common housing infrastructure in Hlaingbwe township. This type of infrastructure occupied 59 percent of the total housing infrastructure in Hlaingbwe township. The second most common type is wood accounting for 34 percent and brick-nogging housing which are common in urban areas of Hlaingbwe town, Paingkyon town and Shan Ywa Thit town accounts for 7 percent.

But in urban areas of Hlaingbwe township (Hlaingbwe town, Paingkyon town and Shan Ywar Thit town), brick nogging and wood type are more visible than that of bamboo type. Table 2.3 indicates urban hosing infrastructure of Hlaing Township.

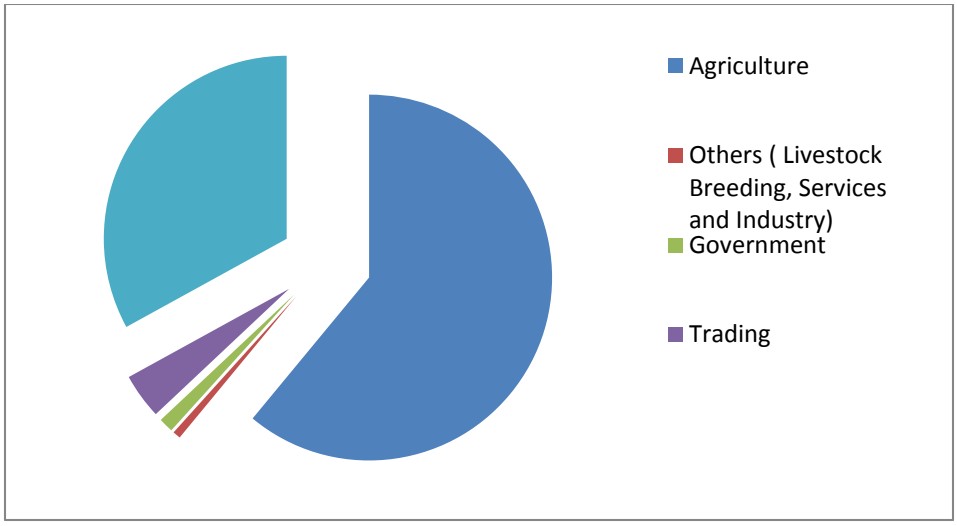
Table 2.3 Urban housing infrastructure In Hlaingbwe Township

Urban area	Structure Type	Housing Infrastructure Typology			Total
		Brick-nogging	Wood	Bamboo	
Hlaingbwe town	Number	264	946	560	1,770
	(%)	(15)	(53)	(32)	(100)
Paingkyon town	Number	225	382	151	758
	(%)	(30)	(50)	(20)	(100)
Shan Ywa Thit town	Number	2	56	3	61
	(%)	(3)	(92)	(5)	(100)

2.8 Livelihood

61 percent of the people in Hlaingbwe Township earn their living from agriculture, 1.3 percent in government service, 4 percent in trading, negligible portion of community engages in livestock breeding, services and industry, and the remaining 33 percent earn their living from casual works that are not recognized in terms of individual job category, such as street vendor, house maid etc.

Figure 2.3 Livelihoods Characteristic of Hlaingbwe townships



2.9 Agriculture

The main livelihood activity of Hlaingbwe Township is agriculture. Paddy is the main crop occupying around 66% of the total agriculture land. In addition, Hlaingbwe township farmers also produce groundnut, sesame, sunflower, rubber, corn, mung bean, pigeon pea, sugarcane and other seeds and crops.

Table 2.4 Crops Yield of Hlaingbwe Township

Crops	Crops Yield in 2011-12 as per administrative areas			Total
	Main Hlaingbwe township	Paingkyon sub township	Shan Ywa Thit sub township	
Paddy	6,055,947	4,954,649	401,609	11,412,205
Groundnut	270,425	241,056	990	512,471
Sesame	53,470	56,581	1,010	111,061
Sunflower	7,081	1,074	-	8,155
Rubber	484,992	168,192	33,984	687,168
Corn	-	94,359	-	94,359
Mung bean	4,181	10,409	-	14,590
Pigeon pea	616	1,244	-	1,860
Sugarcane	92,749	10,926	816	104,491

Note: amount (unit) of Paddy, Groundnut, Sesame, Sunflower, Corn, Mung Bean and Pigeon Pea are in Bucket; Rubber in Pound; Sugarcane in Ton.

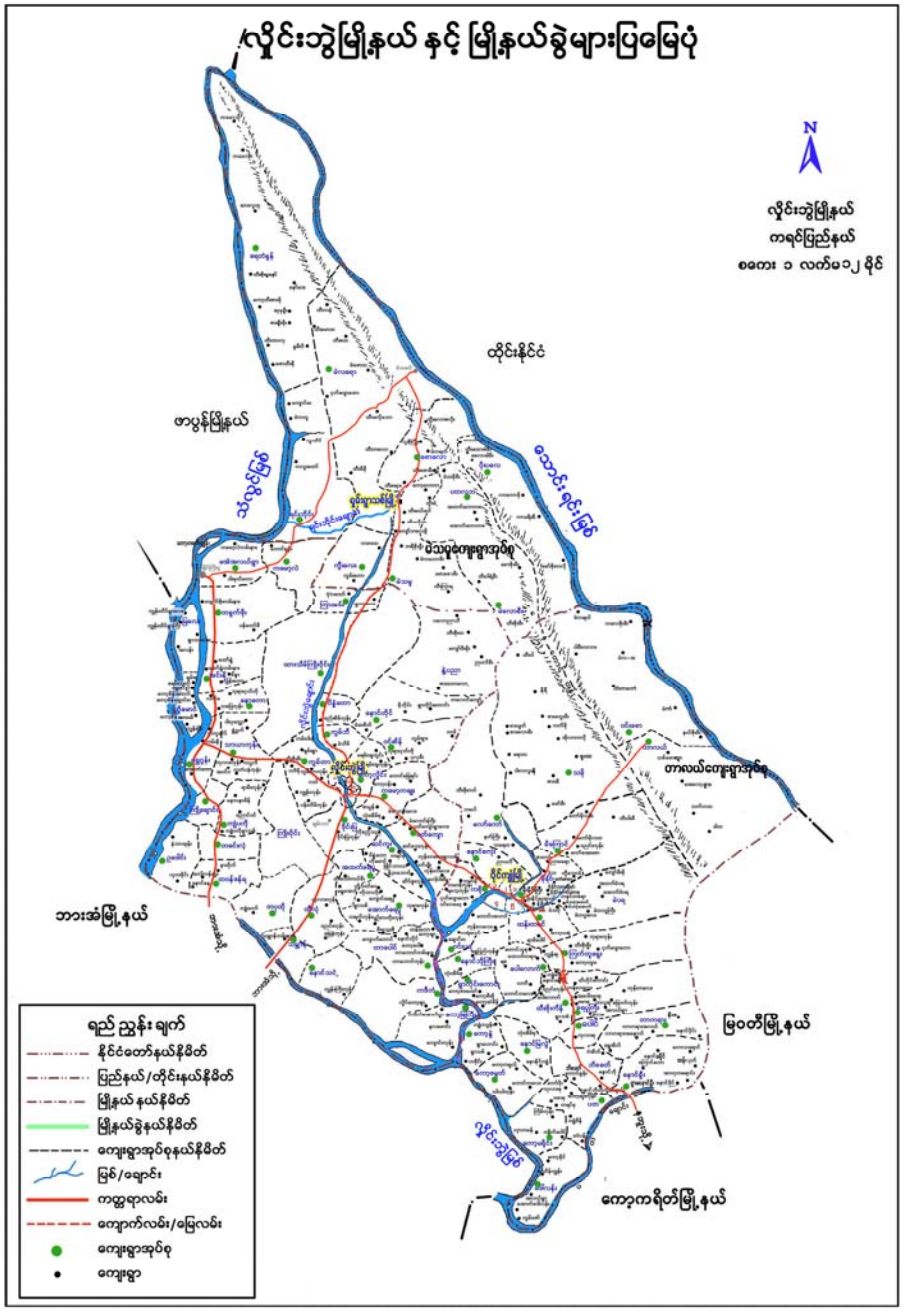
2.10 Health and Education Services

According to Hlaingbwe township Health department, there are a total of 47 healthcare facilities in the Hlaingbwe township and they can be further broken down by their types into: 5 hospitals, 1 maternal care center and 41 rural health centers. Six doctors, 40 nurses and 7 health assistants are looking after these 47 healthcare facilities of Hlaingbwe township. Since total population of Hlaingbwe township is 257,337, ratio of doctors, nurses and health assistants to populace are 1:42890, 1:6433 and 1: 36762 respectively.

Table 2.5 Number of Healthcare Facilities in Hlaingbwe township

Administrative Area	Healthcare Facilities			Total
	Hospital	Rural Health center	Maternal care center	
Main Hlaingbwe township	3	22	1	26
Paingkyon sub township	1	17	-	18
Shan Ywa Thit sub township	1	2	-	3
Total	5	41	1	47

Figure 2.4 Locations of Health Centers in Hlaingbwe Township



There are 220 primary schools, 13 middle schools, 6 high schools and 2 other education entities in the Hlaingbwe Township, enrolling 41,176 students with 1,163 teachers, in 2012.

Table 2.6 Number of Education Facilities in Hlaingbwe township

Administrative Area	Education Facilities			
	Primary	Middle	High	Others
Main Hlaingbwe township	135	10	3	2
Paingkyon sub township	60	3	1	-
Shan Ywa Thit sub township	13	-	1	-
Myaing Gyi Ngu town	12	-	1	-
Total	220	13	6	2

2.11 Road Network

The main modes of transport are through motor car, motor cycle, bicycle, bullock cart and on foot. The roads in Hlaingbwe Township can be classified into four classes: bitumen roads, stony roads, dirt roads and waterways. Some of stony roads and most of dirt roads which mostly connect villages are often closed or unusable during wet season. The roads in towns are maintained by township development affairs department and others by public works.

Table 2.7 Details of Main Road Network In Hlaingbwe Township

Routes	Road types and its length in miles			Total miles
	Bitumen road	Stony road	Dirt road	
Hpa An - Hlaingbwe	24 miles 4 furlong	-	-	24 miles 4 furlong
Hlaingbwe – Shwegone	6 miles 1.5 furlongs	5 miles 6.5 furlongs	-	12 miles
Hlaingbwe - Paingkyon	9 miles 5 furlongs	-	-	9 miles 5 furlong
Hlaingbwe – Shan Ywa Thit	-	-	20 miles	20 miles
Hlaingbwe town	3 miles	-	-	3 miles
Total	**43 miles 2.5 furlongs**	**5 miles 6.5 furlong**	**20 miles**	**69 miles 1 furlongs**

In wet season, Hlaingbwe – Paingkyon waterways are accessible through Hlaingbwe creek and Da Gyaing creek and it takes 3 hours by mechanized boats, and also Hlaingbwe – Kya Inn waterways are accessible through Hlaingbwe creek and it takes 2 hours 30 minutes by mechanized boats.

Chapter 3

Hlaingbwe Township Disaster Risk Profile

3.1 Overview

There are several ways by which Disaster Risk Profile can be described. Special attempts are made to customize the contents of this chapter for non technical DRM professionals, government departments and even the communities at risk. Hence, simple language is used and no statistic tools are applied and only expert judgment based on historical data are used.

Disaster Risk Profile is the final result of disaster risk identification process which involves an assessment of Hazards, Vulnerability and Capacity. The process of conducting risk identification is based on a view of both the technical features of hazards such as their location, intensity, frequency, and probability; and also the analysis of the physical, social, economic and environment dimensions of vulnerability and exposure, while taking particular account of the coping capabilities pertinent to the risk scenarios.

3.2 Hazard Assessment

Hazard assessment is an essential first step of the overall risk identification or over all risk assessment process. It involves gathering and analyzing of basic information and observation data on meteorological, hydrological, geological, or technological hazards in terms of their nature, frequency and magnitudes.

As per location, topography, climate, settlement plan, past disasters of Hlaingbwe township, it is assessed that hazards that Hlaingbwe township exposed to are flood, storm, fire including forest fire, earthquake and landslide, of which flood is the main hazard that Hlaingbwe township is prone to.

Hlaingbwe Township is not exposed to hazards which are usually associated with the coastal regions such as cyclone, tsunami and storm surges since it has no coastline of its own and is relatively far away from the nearest coastal areas. Hazard Assessment Table at Village Level is annexed.

3.2.1 Flood Hazard Assessment

Flooding is one of the major hazards in Myanmar, accounting for 11% of all natural disasters, nationwide second only to fire. Over 2-million people are exposed to flood hazard in Myanmar every year. In recent years, floodings become regular phenomenon

in Myanmar, for instance, northern Rakhine flood in 2010, Magway flash flood in 2011, and flooding across the counry including Kayin state in 2012.

As for Hlaingbwe township, although floods in the past not life threatening but led to **evacuation of communities** to safer places, loss of properties and of livelihood assets, damage to critical infrastructure such as roads and bridges, economic loss and health related problems such as diarrhea, cholera etc.

Hlaingbwe Township receives practically all its rainfall between mid-May and September, during which, flooding is common. Riverine floods are common in Hlaingbwe township particularly, affecting human settlements and land which located along the four main water ways of the township, namely Thanlwin river, Hlaingbwe creek , Maepa creek and Dha Jaing creek . Flash floods are frequent in upper reaches of these river systems, which are Dawna mountainous areas but fortunately human settlement and land utilization in upper reaches of the river systems in the Hlaingbwe Township are very sparse or non existent.

A combination of heavy precipitation and high tide which comes up from Gulf of Martaban through Thanlwin and Jaing rivers make flooding unavoidable in HlaingbweTownship since collision of upstream water flow and high tide makes water level rise and floods the adjacent communities. And also siltation of water basins makes main river systems of Hlaingbwe Township narrow and shallow, which in turn increases the likelyhood of flooding. Floodings in urban areas of Hlaingbwe are casued by a combination factors such as cloudbursts in the upstream, poor infiltration rates and inadequate built infrastructure such as blocked drains.

Administratively, Hlaingbwe Township as a whole is divided into three areas, and these three subtownships are Hlaingbwe Township (main), Paingkyon Sub Township and Shan Ywar Thit Sub Township. Riverine flooding occurs only in Hlaingbwe Township (Main) and Paingkyon Sub Township since these two areas are situated in low lying plains along and among the rivers and creeks. The flooding zone in Hlaingbwe township as a whole can be divided into three areas: (1) some areas along Than Lwin River which flows in the west and north-west corner of Hlaingbwe township; (2) some areas along upper part of Hlaingbwe Chaung, which include Hlaingbwe town as well as low-lying villages surrounding Hlaingbwe town and (3) some areas along lower part of Hlaingbwe Chaung including some villages along Paing Kyon Chaung which meets Hlaingbwe Chaung at Chaung Wa village of Win Paya Village Tract, and these areas cover villages in south-west Pyaing Kyone subtownship and south Hlaingbwe township (main).

Hlaingbwe Township (Main) consists of 4 wards and 36 village tracts which are sub divided into 151 villages, ***of which all 4 wards and 43 villages situated in 19 different village tracts are frequently affected by flooding***. Paingkyon sub-township consists of 5 wards and 27 village tracts totaling 153 villages, ***of which 3 villages from two village tracts frequently experience floods.***

Normally, flood inundation period is 3 to 5 days but in some areas, it takes as long as one month for flood waters to recede. Flooding produces both negative and positive impacts. For those working in fishing industry, the overflowing rivers are welcoming events as they bring fresh fish stock and also facilitate the fish spawning process. And also, flooding help clean the farm land and replenish the ground with nutrient thereby creating alluvial soils which are good to grow some crops such as groundnuts and mustard in winter season.

Table 3.1 Recent Short-Return Floods in Hlaingbwe Township

No.	Date	Location	Impacts
	27 July to 2 August, 2013	• Some wards and some villages from Hlaingbwe township (main) and Paing Kyone sub township	• 4 people dead • 21 houses valuing 342 lakhs kyats damaged, and one school valung 11 lakhs kyats damaged • 375 households totaling population 1,099 from Hlaingbwe town affected and evacuated • 344 households totaling population 2,382 from villages of Hlaingbwe township (main) affected and evacuated • 171 households totaling population 579 from Painkyone sub township affected and evacuated • 7,371 paddy acres out of cu;tivated paddy 36,870 acres were flooded and 15 paddy acres were totally damaged • 3 miles 2 furlong Bitumen raod damaged (3 miles bitumen of Mae Sa Meit- Naung Taind- Hku Baing road plus 2 furlong of Hlaingbwe town) • 6 bridges damaged • In Hlaingbwe township (main), 3 Baffalos,

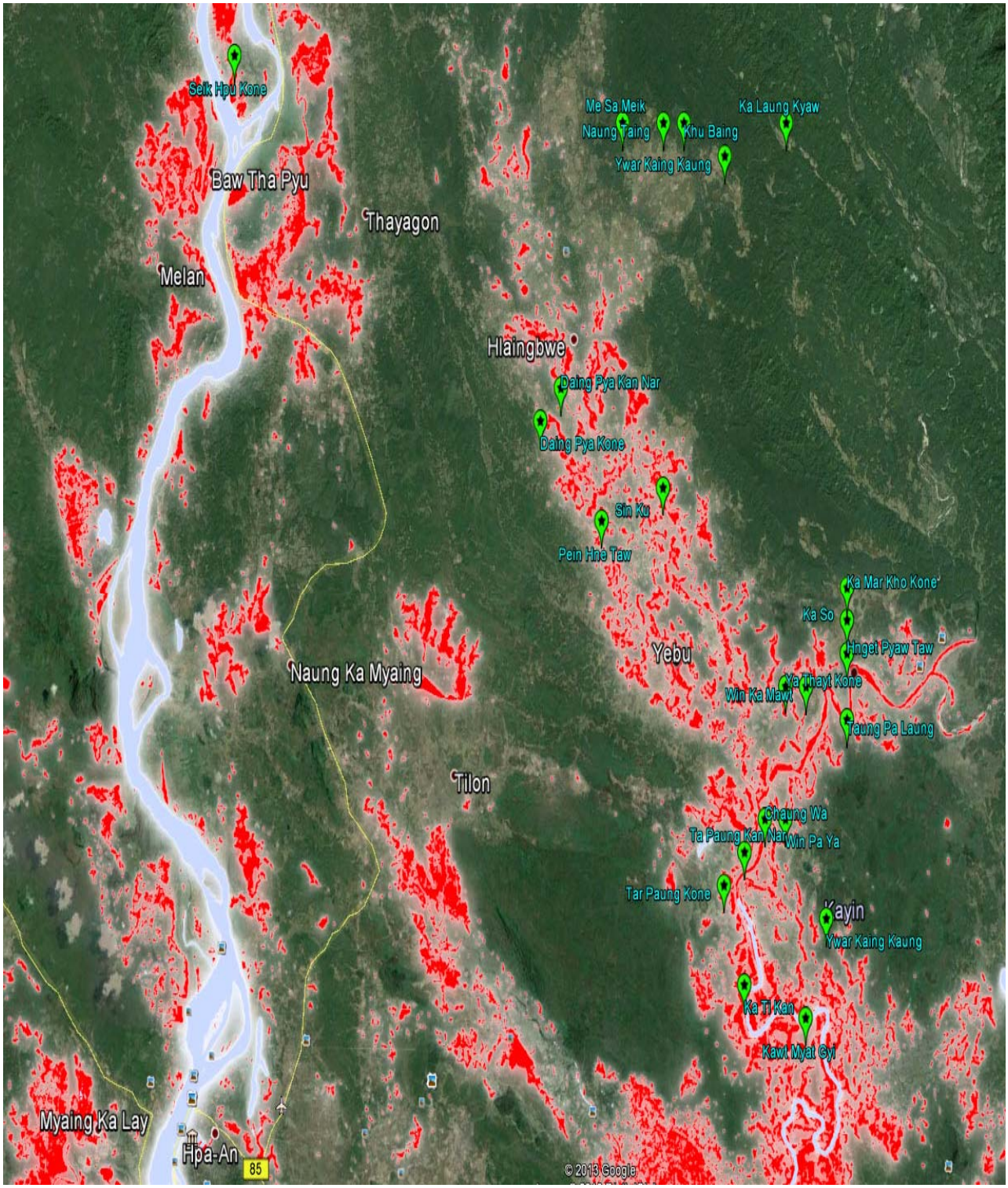
			13 cows, 8 pigs, 20 goats, 9 ducks, 1181 chickens dead • In Paingkyone sub-township, 10 Baffalos, 81 cows, 18 pigs, 16 goats, 21 ducks, 325 chickens dead, and 275.5 rice baskets, and 2515 paddy baskets damaged. • 13 health care centers were flooded.
1	2012	Low lying plains of Hlaingbwe town (wards A, B, C and D)	85 household affected and evacuated; 6 small bridges damaged; 300 acres of paddy field submerged and damaged; loss of livestock; bitumen road damaged; Thanlwin river bank eroded and houses collapsed; 10 people hospitalized etc.
2	25-26, June, 2011	Low lying plains of Hlaingbwe town (wards A, B, C and D)	67 households totaling population 404 affected and evacuated;
3	22-27 July 2011	Shwe Gun Village	313 households totaling population 1,876 affected and evacuated;
4	2005	Hlaingbwe town, Shawe Gun VT, Sin Ku VT, Kyoet Chaung VT	Paddy fields damaged, barn and paddy bank damaged, furniture damaged, damaged crops.

A short return period flood hazard map has been produced, indicating areas of Hlaingbwe Township which have high probability of frequent flood (areas which had been experienced a flood at least once in five years are defined as areas which have high probability of frequent flood, usually called "short return floods"). The short return period flood hazard map is appropriate for use in making immediate disaster risk management and mitigation plans.The "long return period flood" hazard map is not produced in this reviewed and revised version of the TDMP, mainly because the data does not exist. In contrast to the short return period flood hazard map, the long return period flood hazard map means low probability but potentially greater impact, higher damage level and other negative consequences, and it is useful for major development such as construction of important infrastructure (e.g., airports, sea ports, power plants,

dams, etc.). Figure 3.1 and 3.2 illustrate the short return period flood hazard map for 2012 and 2013 respectively.

Figure 3.1 Flood Hazard Map (Short Return Period), August 2012

Figure 3.2 Flood Hazard Map (Short Return Period) August 2013



3.2.2 Earthquake Hazard Assessment

Myanmar is located on one of the two main earthquake belts of the world, know as the Alpide Belt. The Alpide Belt starts from the northern part of Miditerranean and then extends eastwards through Turkey, Iran, Afghanistan, the Himalayas, and Myanmar to finally Indonesia. Recent Shan earthquake in 2011 and Sagaing earthquake in 2012 have highlighted that Myanmar is also earthquake-prone.

There are three major seismotechnically important faults in Myanmar namely Kabaw Fault along the Kabaw valley in the western Myanmar, the well know Sagaing Fault in central part of Myanmar, and the Kyaukkyan Fault in the eastern part of Myanmar. A part from these three main important faults, there are numeraous named and unnamed faults between and among these three major faults, for instance, Hpapun-Wan Chao Fault and Three Pagoda Fault etc. which lie in the south east part of Myanmar particularly Kayin state and Mon state.

Major earthquakes in Kayin state particularly Hlaingbwe township have not been very frequent historically but the seismic hazard in the area cannot be ignored since these areas falls under areas of Hpapun-Wan Chao Fault Zone and Three Pagoda Fault.

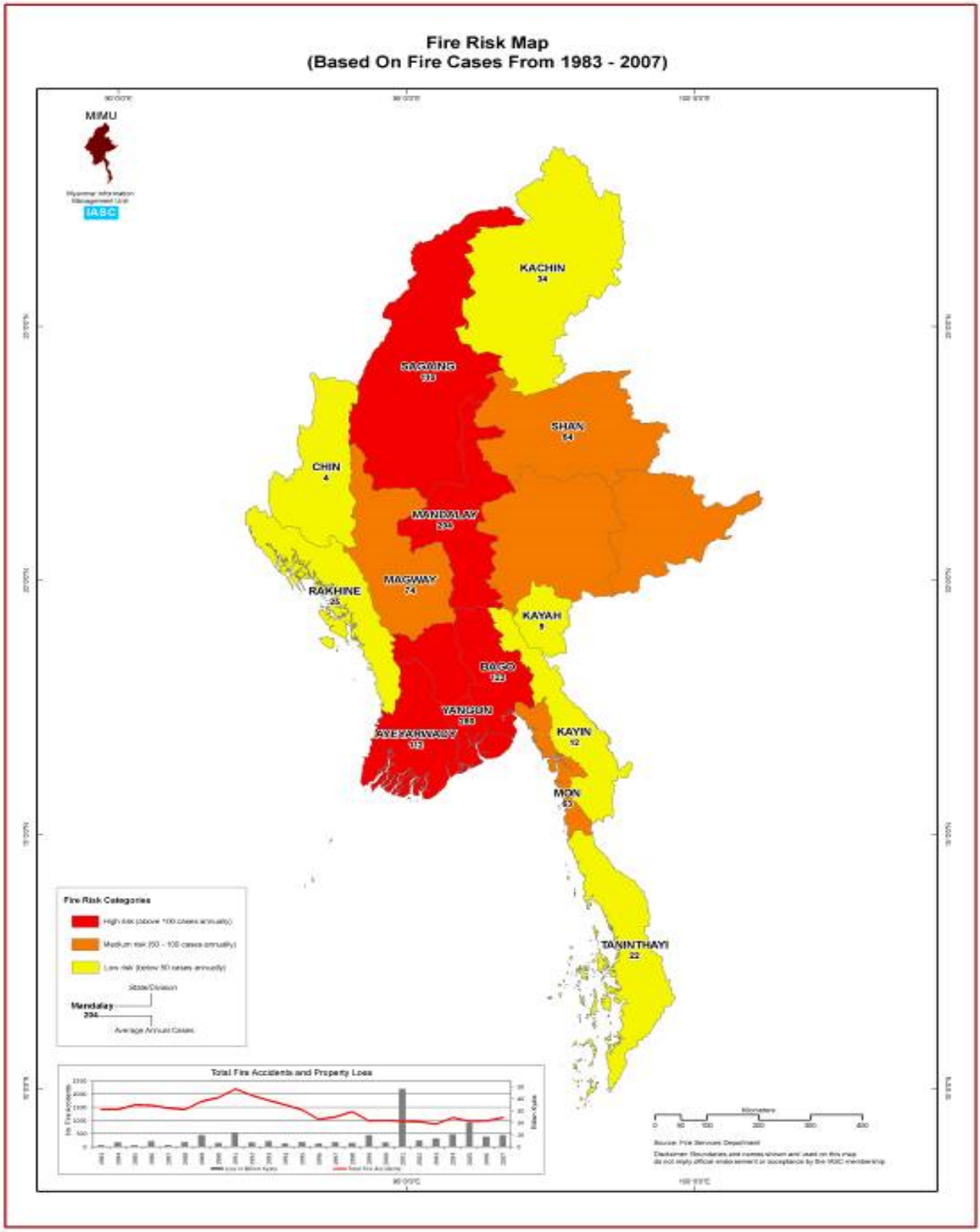
Recent earthquakes such as Shan Earthquake in 2011 and Sagaing Earthquake in 2012 which occurred in rural areas where most of dwellings are non engineered structures had highlighted that rural areas are also very vulnerable to moderate and high intensity earthquakes.

3.2.3 Fire HazardAssessment

Myanmar has suffered serious incidences of fires and according to the ranking of disasters in the past ten years, fires rank at the top list with 73% of total disasters. Major cause of fire has been kitchen related fire and negligence, and other casues are arson and electrical fire. Fire led to loss of human lifes, cases of injury, animals, guttingdown of factories and gowdowns and overall impacting people.

High incidences of fire in Myanmar occur in hot season which is mid-Februrary to mid-May and second follows in winter season which is mid-October to mid-February. Based on fire Cases from 1983-2007, fire risk of Kayin state belongs to a very low category which is below 50 fire cases annually.

Figure 3.3 Fire Risk Map



As perHlaingbwe Township Fire Department, 93% of total housing in the Hlaingbwe Townshipis constructed by using inflammable materials such as bamboo and wood. Hlaingbwe town is more vulnerable to fire due to a number of reasons such as clustered settlement, unaccessible streets by fire vehicles, shortages of water resources especially in dry season, and stocks piles of diesel, petrol etc,. And also, rising tempetature trends combined with scarcity of water resources especially in dry season further increase vunerable to fire.

Table 3.2 List of Past Fire Disasters in Hlaingbwe Township

No.	Date	Location	Impacts
1	5th May, 2013	Ta Khwet Hpoe	5 houses burnt down causing loss of 61.5 lakhs
2	2000-2010	Hlaingbwe town	Two fire cases causing loss of 8 lakhs.
3	February, 2013	Naung Taing village under Naung Taing VT	Rubber plantation gutted down due to negligence.
4	March, 2013	Naw Kaw Village under naw Kaw VT	Forest fire broke out due to negligence.
5	1982	Hlaingbwe town	350 houses gutted down due to negligence.
6	1980	Hlaingbwe town	900 houses burnt and gutted down due to insurgency.

3.2.4 Other Hazards Assessment

So far, flood hazard, earthquake hazard and fire hazard had been assessed. A part from these hazards, Hlaingbwe Township has been facing some small scale disasters which can be termed as localized disasters namely storm, and landslides. And also, every year, snake bite and thunder strike had caused loss of some human lives in some areas of Hlaingbwe Township. Snake bite and landslide are mostly limited to mountaineous areas and places near to mountaineous areas. Storm and thunder strike are mostly experienced in pre rainy season and post rainy season.

The Villages of Hlaingbwe Township(Main) are more vulnerable to storms than other parts of the township since land elevation is low in the Hlaingbwe Township (main)

areas and there are not natural windbreaks such as hills, mountains and forest. The same applied to thunder strike also since thunder strike is more dangerous in places wherethere are no long standing vegetation. Hence, most part of Hlaingbwe Township (Main) and some part of Paingkyon Sub Township are more vulnerable to thunder strikes.

Shellfish infestation phenonmenon becomes regular problems for some of flooded villages and it is a secondary hazard produced by primary flood hazard. Flooding brings shellfishes that eat away paddy.

Table 3.3 Recently Experienced Localised Disasters in Hlaingbwe Township

No.	Date	Harzard	Location	Impacts
1	Every year	Shellfish infestation(Kha Yu)	Kawt Hlaing VT and War Goke Taw village under Ka Mawt Le VT	Paddy field damaged due to shellfish bite
2	Setptember, 2011	Thunder strike	Inn No Theik Pan VT	Two personsand 10 buffalos dead.
3	Every year	Snake bites	Kaw Myat Gyi and Ka ti Kan VTs	At leaset one or two person died due to snake bites almost every year
4	2012	Storm	Hpa Yar Ngoke To under Win Sein VT	One wayside public rest-house (zayat) damaged
5	2010	Storm	Naung Taing	One house and a monastery community hall damaged.
6	2009	Storm	Win Sein village under Win Sein VT	Two house damaged
7	2008	Thunder strike	Win Sein village under Win Sein VT	Three person dead and 4 cows dead

3.2.5 Harzard Assessment Conclusion

In total, mainly, five hazards namely Flood, Earthquake, Fire, Storm, and Landslide have been looked into for Hlaingbwe Township Risk Profile. Among theses five hazards, flooding is by far the greatest natural disaster risk faced by Hlaingbwe township, with frequent flooding occuring along the major river systems flowing through Hlaingbwe Township and its two sub-townships. In the latest flooding in August 2013, villages across Hlaingbwe township were affected. The negative impact of flooding far exceeds that of other possible disaster like fires, storms, landslide, and highly infrequent earthquakes and earth tremors. Hlaingbwe's substantial risk of short-return floods should be the priority for the development of mitigation, preparedness, disaster management, and recovery actions at township level.

3.3 Vulnerability Assessment

Vulenerability is a concept which describes factors or constraints of an economic, social, physical or geographic nature, which reduce the ability of a community to prepare for and cope with the impact of hazards.

The nature of vulnerability depends on the nature (scale, intensity and duration) of the hazard to which various "elements" are exposed. These "elements" include people, household and settlement structures, community facilities and services (houses, roads, bridges, schools and clinics), livelihood activities and assets (jobs, crops, livestock, equipment), and the physical environment (hills and mountains, valleys, trees, paddy field embankments). Some properties of one of the above element make it more vulnerable to certain types of hazard than to other hazards. For example, buildings constructued with local materials will be more vulnerable to the hazard like storm, flood and fire than to drought. Similarly a person engaged in agricultural sector would be more vulnerable to a hazard like flood than that of a person employed in community services (e.g. teacher) or business sector (small traders). Therefore, it is important to understand the vulnerability of different sectors of a particular place to take appropriate mitigation, preparedness, disaster management, and recovery (rehabilitation) measures and actions.

There are a few methods for assessing vulnerabilities to multiple hazards. As mentioned earlier, to make it simple and understandable by all stakeholders, a few simple criteria are adopted to assess vulnerabilities of Hlaingbwe Township to multiple hazards. These main criteria include population, livelihood, building typology, and

production. These are the main elements in society and in the community in Hlaingbwe township that are in danger of damage or destruction by natural disaster.

Although there can be multiple factors impacting on vulnerability in hazard-prone areas, as mentioned above, the following 4 factors have been identified in Hlaingbwe township:

1. Population
2. Livelihoods
3. Infrastructure
4. Production

3.3.1 Vulnerability related to Population

Population vulnerability is one of the prime criteria in assessing overall vulnerability of the Hlaingbwe Township. There are several dimensions of populations such as age group balance, gender balance, education and level of awareness, location of village, all of which have an impact on the level to vulnerability to natural disaster.

Age balance and Gender Balance: it is evident from analysis of past different natural disasters (those injured or killed; those recovering) that women and children are more vulnerable than men. And also, if proportion of elderly people in the village is high compared to other groups, it means that a greater proportion of the total population is threatened by a natural disaster. This is so because elderly people generally have a lack of physical strength, and as pensioners or unemployed persons are likely to lack of money to recover from disaster if their houses and assets are damaged. Especially in areas of high out-migration (within Myanmar or to Thailand and or Malaysia), many villages have disproportionately large elderly populations. Apart from lack of strength and financial resources among the elderly, it also means that fewer young people are available in the village to assist the whole community (and especially the elderly) to cope with the negative impact of a disaster, i.e preparation just before disaster strikes, immediate recovery, and longer-term recovery. Children are also more likely to be vulnerable to disaster. In Hlaingbwe township, village-level data on age group breakdown can be useful to identify villages where the elderly population are higher than the average, and ensure that DRR programming is prioritised at these locations; having a list of such villages locations would enable Hlaingbwe township authorities to target such villages with community disaster preparedness. At the same time, it is essential that DRR programming by the government and supporting agencies focuses on building the resilience of female and child members of local communities.

Education and Awareness: Generally, level of education within communities is crucial in taking decisions to ensure their resilience to disasters. Communties whose populations are better educated are less vulnerable to disasters, as they may be better able to appreciate the risk of disaster, receive and retain DRR information disseminated through local awareness-raising campaigns, and take precautionary measures to protect themselves against hazards. Reducing risk and vulnerability to disasters requires people understanding how they can best protect themselves, their property and their livelihoods, and these can be achieved through awareness raising initiatives such as trainings, educative talk shows, print media and other means.

Location of village: Hlaingbwe Township is made up of 13 wards and 72 village tracts (363 villages) and most of its populous wards and village track are situated in the locations which are exposed to at least two or three hazards out of five hazards assessed. For the purpose of this document, a proxy indicator for village population number ("populous" villages) is whether the enrollment of students is over 300 in their respective schools. According to this measure, out of a total of 363 villages in Hlaingbwe township (listed in the annexes), including Myaing Gyi Ngu areas, there are 4 wards, 1 town and 38 villages in Hlaingbwe township where enrollment of students in their respective schools is over 300. A list of wards and villages of Hlaingbwe Township which schools' enrollment are more than 300 students, and the numbers of hazards they face,is shown in Table 3.4.

Table 3.4 List of the Most Populous Wards and Village Villages in Hlaingbwe Township

No.	Most Populous Wards and Villages	Hazards Exposed to	No. of Hazards
Hlaingbwe township (Main)			
1	Ward – A (Hlaingbwe town)	Flood, Fire, and Storm	3
2	Ward – B (Hlaingbwe town)	Flood, Fire, and Storm	3
3	Ward – C (Hlaingbwe town)	Flood, Fire, and Storm	3
4	Ward – D (Hlaingbwe town)	Flood, Fire, and Storm	3
5	Ka Mawt Ka Chuu	Flood, Fire, and Storm	3
6	Win Sein	Fire, and Storm	2

7	Kun Bi	Fire, and Storm	2
8	Pein Hne taw	Fire, and Storm	2
9	Kun Tar	Fire, and Storm	2
10	Daing Pya	Fire, andStorm	2
11	Ah Htet Yae Pu	Fire, andStorm	2
12	Auk Yae Pu (Ko Tar Hoe)	Fire, andStorm	2
13	Hti Lon	Fire, and Storm	2
14	Tar Paung (Kaw Pawt)	Flood, Fire, and Storm	3
15	Tar Paung (Kyaut Taung)	Fire, and Storm	2
16	Patkyaw Ywar Gyi	Fire, and Storm	2
17	Kyar Inn	Fire, Storm, and Landslide	3
18	Ka Mawt Le (Kyaung)	Fire, Storm, and Landslide	3
19	Ka Mawt Le (Ma Ae) (Ah Lel) - Ma Ae	Fire, and Storm	2
20	Shwe Gun	Flood, Fire, and Storm	3
21	Ko Maung	Flood, Fire, and Storm	3
22	Mya Lay (Ah Lan)	Fire, and Storm	2
23	Inn No Theit Pan	Fire, and Storm	2
24	Kyon Pa Ko	Flood, Fire, and Storm	3
25	Kyoet Chaung	Flood, Fire, and Storm	3
26	U Daung	Fire, and Storm	2
27	Thar Yar Kone (Wagoke Taw)	Flood, Fire, and Storm	3
28	Thar Yar Kone (Kat Pa Li)	Flood, Fire, and Storm	3
29	Ta Khwet Hpoe	Fire, and Storm	2
Paingkyon sub township			
30	Paingkyon town	Fire, and Storm	2
31	Naung Boe Gyi	Flood, Fire, and Storm	3
32	Kawt Nwet	Flood, Fire, and Storm	3
33	Daw Lan	Flood, Fire, and Storm	3
34	Tar Ka yar	Fire, and Storm	2
35	Hti Hpoe Kein	Fire, and Storm	2
36	Tar Lel	Fire, and Storm, Landslide	3

37	Paung	Fire, and Storm	2
Shan Ywar Thit sub township			
38	Kwee Lay	Fire, and Landslide	3
Myaing Gyi Ngu Area			
39	Myaing Gyi Ngu	Storm	1
40	Sone Nant Thar Myaing	Storm	1
41	Myat Lay Myaing	Storm	1
42	Hlin Hlwan Myaing	Storm	1

Table 3.4 also indicates that 4 wards and 11 villagesout of flooded 4 wards and 46 villages happen to be the most populous wards and villages, meaning 30% of the flooded areas belong to the most populous wards and villages of Hlaingbwe Township. In other words, 30% (4 wards and 11 villages) of these flooded areas should be given priority in flood disaster preparedness. And also automaticaly, all these most populous wards and villages are also more vulnerable to fire hazard than that of other less populous wards and villages because more density of population than other areas of the township.

3.3.2 Livelihood Vulnerability

While anaylising livelihood vulnerability for Hlaingbwe township, it is evident that vulnerability to flood hazard is more than that of the other hazards like earthquake, fire, storm, and landslide etc. This is because a substantial number of people are engaged in the agriculture by occupation. People engaged in different sectors include agriculture 61%, government 1.3%, industry and trading 4%, others 33%, and negligible percentage in livestock breeding, service and industry.[3]

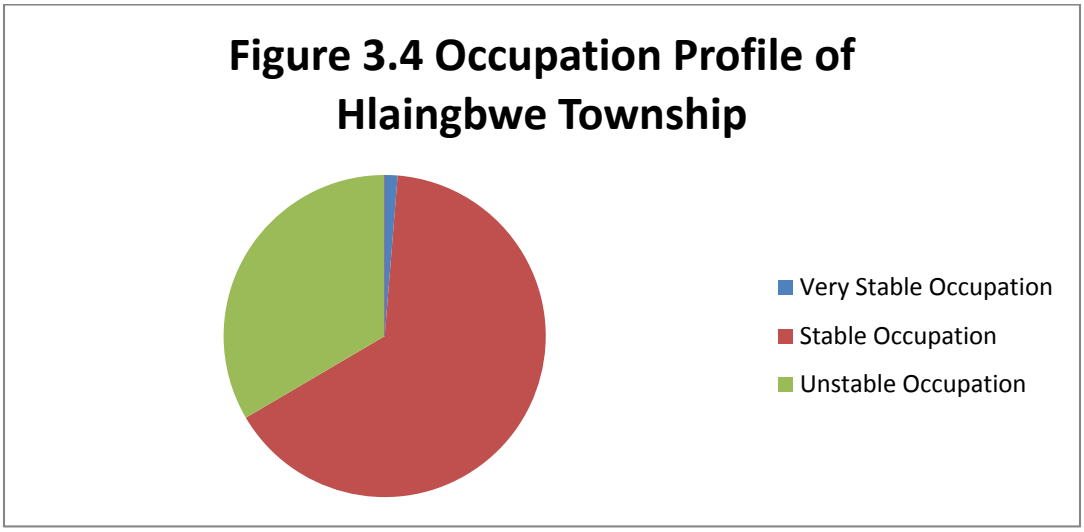
Employment scenario is an important factor for assessing the vulnerability of the community. In this plan, the two main aspects – occupation and income – are taken into consideration to assess the employment scenario with the Hlaingbwe Township and how it affects vulnerability. Classification of occupation is presented in Table 3.5 as follows.

[3]Hlaingbwe Planning Department, 2013.

Table 3.5 Classification of Occupation

Very stable Occupation	Stable Occupation	Unstable Occupation
Government	Agriculture and Forestry Trade and small Business Private Transport Services Saw mill Professional, Retired and Pensioner Industry and Workshop House maid	Wage Labour (skilled and unskilled) Agriculture Labour Street Vendor

It is recorded that total 151,400 working-age persons are employed in Hlaingbwe township in 2011-2012, of which 1,985 persons are government employees (very stable occupation); 98,014 persons employed in "stable occupations"; and 51,401 persons employed in unstable occupations. It is observed that the number of persons engaged in highly stable occupations is almost negligible in Hlaingbwe Township, accounting only 1.3%. The majority of the working-age population, 65.7%, are engaged in stable occupations such as agriculture and forestry, selling, and trading. A significant number, around 33 percent, are engaged in unstable occupations such as wage labour in agriculture, street selling, and other daily casual labour. Unstable employment usually includes household members of low-income settlements. Households involved in unstable employment are particularly vulnerable to natural disaster, due to poor living conditions, poor education/awarenes, and inability to recover quickly using their own resources. Occupation Profile of Hlaingbwe Township is presented in the Figure 3.4.



3.3.3 Infrastructure Vulnerability

Infrastructure vulnerability is analysed by looking at two key factors, namely building typology and road accessibility in the context of Hlaingbwe Township.

Building Typology: Construction methods and materials of houses of Hlaingbwe Township need to be analysed as one element impacting on vulnerability to natural hazards. This is the physical aspect of vulnerability which is determined by assessing the construction typology of all dwellings (brick or wood or bamboo type), and how these typologies either reduce or increase vulnerability. Hlaingbwe Township is dominated by hut and wooden structure of housing. About 59% of the houses are hut (made of local available materials, including bamboo and nipa palm) followed by 34% constructed of wood and 7% brick-nogging types of structures. The presence of high number of weak structures like huts and wooden houses make it highly vulnerable to the hazards like earthquake, fire, flooding and strong winds.

Road Accessibility: The road acessibilty is important since linkages (such as road and river) can enable timely and safe evacuation of populations at risk during or before the hazard incidences, and also timely external help for search and rescue, and relief operation for the disaster affected community after disasters.The main connectivity between and among villages of Hlaingbwe Township has been through roads and waterways. In both cases (roads and waterways), all-weather accessibility is very low. Water ways are mostly accessible only in rainy season, and roads are mostly accessible only in dry season. Hpa An-Myaing Gyi Ngu road, Hpa An-Hlaingbwe road, Hlaingbwe-Shwe Gun, Hlaingbwe-Paingkyon road are all weather tar roads. Table 3.6 indicates a list of village tracts which lie along the all weather roads.

Table 3.6 All Weather Acessible Road Routes

All Weather Accessible Road Routes	Total Miles	Village tracts Connected
HpaAn - Myaing Gyi Ngu	44 miles 5 furlongs	1.Ta Wun Hpan Ya*, 2.Ta Khin Lone, 3. Kyon Pa Ko*, 4.Kyoet Chaung*, 5. Shwe Gun*, 6. Naw Kaw, 7.Inn No Theik Pan*, and 8.Ta Kwet Hpoe*.
HpaAn – Hlaingbwe	24 miles 4 furlongs	1. Nawng Tha Nge 2. Than Ban, 3. Hti Lon, and 4.Daing Pya*.
Hlaingbwe-Shwe Gun	12 miles	1. Kun Tar*, and 2. Tar Yar Kone*
Hlaingbwe- Paingkyon	9 miles 5 furlongs	1. Ka Mawt Ka Chu *, 2. Pat Kyaw, and 3. Ka So
Total	90 miles 6 furlongs	17 Village Tract

Footnote: Village Tracts marked by asterisk sign (*) indicate that some of its villages are prone to flood hazard.

Hlaingbwe Township is comprised of 72 village tracts (363 villages), and of which only 17 village tracts having 77 villages are accessible through all weather roads. Within these 17 village tracts, 10 village tracts (having 18 villages) are prone to flood hazard. And also there is a number of dirt or mud roads which connect between and among villages, and in extreme weather condition, these roads are not easily accessible. Waterways are another main mode of connectivity within Hlaingbwe township and there are two main rivers (Thanlwin and Hlaingbwe rivers) flowing across Hlaingbwe township. Thanlwin river in the west, flowing north to south also serves as a boundary with Hpapun and Hpa-An townships. Hlaingbwe river flows through central Hlaingbwe township from north to south and is also the main waterway; however, only the lower part of this river is be accessible in dry season. All the flood prone villages totaling 4 wards and 46 villages are located along these main two river system.

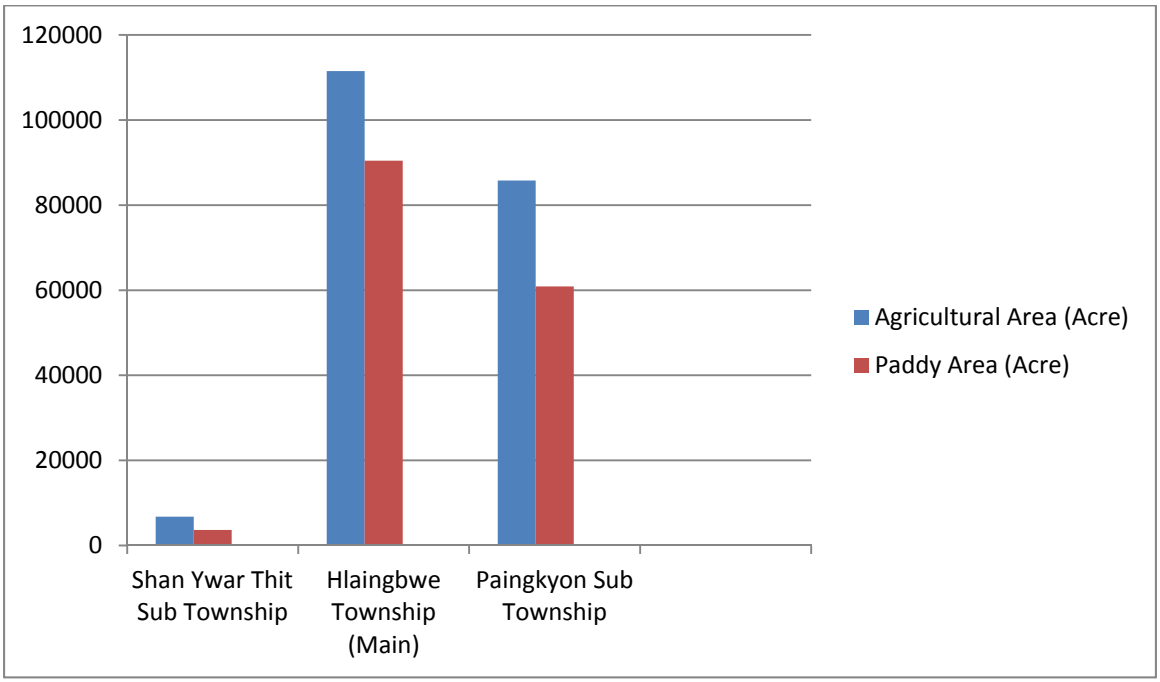
3.3.4 Production-relatedVulnerability

As most other parts of the country, Hlaingbwe Township is an agriculture-based township. The breakdown of Hlaingbwe Township's GDP for the 2011-2012 financial year shows the agriculturesector making up 50% of the local economy, industry 17%, and service 33%[4].

The main crops of the township include paddy, groundnut, sesame, sunflower, rubber, corn, mung bean, pigeon pea, sugarcane and other seeds and crops. Among agricultural products, the paddy/rice takes up about 66% of the total agricultural land. For this Township Disaster Management Plan, paddy is a key production sector to be anlysed to assess the overall vulnerability of production sector, because of the significant contribution of paddy farming to local GDP. The paddy cultivation areas of Hlaingbwe township account for 154,948 acres out of a total of 204,063 acres of land cultivated for agricultural purposes in Hliangbwe township as a whole. Hence, paddy cultivation accounts for 76% of all cutivated agricultural land in the township. Within the three administrative areas of Hlaingbwe township, paddy cultivation cultivation area of Shan Ywar Thit Sub Township accounts for 3,637 acres out of the total agricultural area of 6,755 acres (54%);Hlaingbwe Township (Main) is 90,440 acres (81%) out of its total agricultural area of 111,516 acres; and,in Paingkyone Sub Township, paddy cultivation takes up 60,871 acresout of its total agricultural area of 85,792 acres (71%). Figure 3.5 indicates areas of paddy cultivation by three administrative areas.

[4]Hlaingbwe Township Planning Department, 2011-2012

Figure 3.5 Areas of Paddy Cultivation



In terms of area, Hlaingbwe Township-Main (331,420 acres) is smaller than Paingkyon Sub Township (418,774 acres) but in terms of paddy cultivation area, Hlaingbwe Township-Main (90,440 acres) is greater than that of Paingkyon Sub Township (60,871 acres). 94% of flood prone villages are also situated under the administrative areas of Hlaingbwe Township (Main).

The impact of regular hazards such as flooding on paddy farming has a serious negative effect in the township and state economy, due to the significant contribution of paddy farming to township GDP, with extended water inundation period resulting in damage to crops. However, there is no data available on the financial value of losses incurred in paddy farming and overall GDP in Hlaingbwe as a result of regular flooding.

3.3.5 Vulnerability Assessment Conclusion

Giving flood being the main hazard which Hlaingbwe Township exposed to, its vulnerablity conditions had been assessed in aspects of population (age, gender structure, education, awareness, and location), livelihoods, building typology, road infrastructure, and production. Hlaingbwe Township being a rural township of a

developing country has been facing a number of vunerable factors, of which, some such as age balance, education etc still require some detailed breakdown study. To summarize some of the findings on vulnerable conditions prevailing Hlaingbwe Township,

- 4 wards and 11 villages out of 4 flooded wards and 46 flooded villages would be more vulnerable since they belong to the list of most populous wards and villages of Hlaingbwe Township.
- Approximately 33 percent of township population is very vulnerable since these people are engaged in unstable occupation such as wage labour, agriculture labour, street vendor etc.
- Road accessibility is generally poor in rural areas outside of the main towns and lack of all weather raods would hamper response efforts in the event of future disaster, especially floods.
- Paddy is the main agricultural crop in Hlaingbwe, taking up about 66 percent of agriculture land in Hlaingbwe Township. Long flood inundation periods during flooding season have a large effect on paddy production thereby affecting the township economy.

3.4 Capacity Assessment

Capacity Assessement and Vulnerability Assessment are head and tail of the same coin; in simple logic that if there is more capacity, there will be less vulnerability, other way round, less capacity means more vulnerability. In other words, the severity of disaster impact it would cause would depend on the vulnerability and capacity balance of a particular community.

All of DRR interventions aim at to reduce vulnerabilities and increase capacity. In order to analyse the capacity of Hlaingbwe Township in terms of Disaster Management, some criteria which are in line with the context of Hlaingbwe Township are selected. Table 3.7 shows a list of the criteria that has been used for capacity assessment of Hlaingbwe Township in terms of Disaster Management.

Table 3.7 List of Criteria Used for Capacity Assessment of Hlaingbwe Township in terms of Disaster Management

Criteria	Indicators	Level of Capacity	Comments
1. Government institutional DRR capacity at Hlaingbwe Township	1. Presence of DRR policies, Institutional arrangements for disaster management at various levels (township, ward, village tract and village levels). 2. Availability of Resources especially in terms of DRR buget and human resources/skills in Disaster Management. 3. Government Physical resources (3.1 Infrastructure support facilities; 3.2 Telecommu-nication equipment, 3.3 Shelters for temporary housing; 3.4 Availability of stock piles of relief items such as food and non-food; 3.5. Disaster response equipment such as boats and fire-engines.	Less capacity in cases where there are: 1. No strong existing institutional arrangements for responding to natural disaster, poor vertical and horizonal integration in terms of disaster preparedness within and between different levels of government. 2. Small or negligible DRR budgets, and no expertise/skills on disaster management. 3. Few physical resources including vehicles, telecommu-nication equipment, shelters for temporary housing, availability of relief items (food and non-food) which can be used of disaster management.	Long-standing presence of disaster-management institutions and procedures means that local authorities are better prepared to manage a response to disaster. High level of physical resources which can be used for disaster management shows that government institutions are prepared to respond to disaster.

2. Private Physical Resources	Means of transportation (vehicles including boats, trucks); resources owned at the household and community level.	Less capacity if household & community has few physical resources including basic equipment and information which can be used to save lives.	Household and community-level resources is an essential part of the response to disaster, in addition to the responsibilities of local authorities.
3. Civil Society Organizational and Social Capital	No. of social groups and organizations in township with DRR programmes, including MRCS; Inclusion of social groups in township contingency plan.	Less capacity if communities have no social group or if non-government organisations are not included in township contingency plan.	Strong social capital means that government has a partner in its disaster preparedness and response functions.
4. Natural Resources Capital	Amount of agricultural land per household as a resource for income generation before and after disaster, enabling households to make purchases essential for preparedness and recovery.	The more land is owned by a households affected by disaster, the more likely they are to have financial and other resoures to prepare for and recover from disaster.	Availability of information on ownership of land is a useful indicator of household-level preparedness and recovery capacities in the event of disaster.
5. Other Capacities 5.1 Work Diversification	Members of Household working in different sectors.	Less capacity to prepare for and recover from disaster in cases where households depend on a single income or income from a single	More work diversification provides income stability thereby resilience during disasters, and ability to invest

		sector.	in adaptation and preparedness.
5.2 Education and Health facilities	Existence and number of schools and RHCs/hospitals which can be utilized for disaster management activities, e.g. evacuation, treatment of injured persons, etc.	Less capacity for disaster response in cases where schools and RHCs/hospitals are few or non-existent.	Response to natural disaster is better where facilities are available (such as schools, RHCs) and can be converted into temporary shelters and places where health of those who are evacuated can be looked after by health staff etc.

3.4.1 Government Institutional DRR Capacity at Hlaingbwe Township

The existing DRR capacities including response capacities of Hlaingbwe Township Government Institutions are assessed under three headings as follows:

1. **Presence of DRR policies, Institutional Arangements for Disaster Management at various levels (township, ward, village tract and village levels):** National and Kayin State governments lay down DRR framework through developing and issuing standing orders and disaster management plans, but it is observed that involvement of concerned parties in those disaster management plans especially at sub national and local levels are not up to the mark. And also DRR capacity of different level government staff of Kayin State have been occasionally promoted through DRR capacity building programs which are initated by Relief and Resettlement Department in close collarboration with Kayin State Government and humanitarian agencies, but participation of all concerned parties in those capacity building programs are limited due to their prior engaged administrative works and limited funds.

Relief and Resettlement Department (RRD), a focal department for disaster management at national and sub national level is not present at township level, and as s result, there is only some kind of ad hoc or loose institutional arrangements for disaster management at township level, and also these arrangements are not well and properly oriented and handed down to all stakeholders, and stakeholders for disaster management at township level can include township level government departmemts, members of TDPC and sub committees, civil societies, administrators of wards and village tracts and villages, public and communities etc.

2. **Avalability of Resources:** As any other developing countries, most of Myanmar Townships including Hlaingbwe Township has chanllenges especially to DRR technical skills and DRR budgets which are the main enabling factors for mainstreaming and decentralization. Mainstreaming and decentralization are the two indicators through these two lens DRR interventions are measured. There are no separate funds allocated for disaster management, and also there are limited skills and experts on disaster management especially on mainstreaming, mock drills, linkage between climate change and disaster, CBDRR etc. No DRR budget and limited DRR tehnical skills have all round negative impacts on other dimension of disaster management capacities. For example, as lack of skills and financial resources, it is understandable that most townships from Myanmar including Hlaingbwe Township had not yet initiated Community Based Disaster Risk Reduction (CBDRR) Programs. Hence, DRR decentalisation efforts beyong township level have a long way to go since such efforts have been till now initiated only by the humanitarian agencies.
3. **Government Physical Assets and infrastructure:**As for communication set-up of Hlaingbwe Township, there is five post offices (Hlaingbwe, Shwe Gun, Paingkyon, Shan Ywar Thit, and Maying Gyi Ngu), four telegraph offices (Hlaingbwe, Shwe Gun, Paingkyon, and Shan Ywar Thit), and 1 exchange office. These communication set up could be used for public awareness raising campaigns. And also, there are 6 police stations (Hlaingbwe, Hti Lon, Shwe Gun, Paingkyon, Daw Lan and Shan Ywar Thit) which coomunication system can be utilized for emergemcy communication including before and during disaster events. But telecommunications equipment such as walkie talkie, loud speaker, hand speakers etc which can be very useful for disaster preparedness and emergency response operation are not procured yet for TDPC.

Other Governemnt Phsical resources such as infrastructure support facilities (vehicles, mechaised boats etc), and stock piling of of relief items such as food and non-food etc are also non existence for disaster management of Haingbwe Township. Even though as per past experience, schools, monasteries, and churches are used temporarily for shelters but proper temporary shelter management (retrofitting, establishing of waste management system, garbage disposal system and sanitation system) still needs to be strengthened and enforced.

Even though township level institutions are struggling to reach acceptable standard on disaster management but communities have some sorts of coping practices which are the results of past bitter disaster experiences, for instance, most of flood prone communities from Hlaingbwe Township have built their houses on the higher plinth level and or stilts etc.

3.4.2 Private Physical Resources

Two dimensions, transportation vehicles and communication set-up have been considered for assessing Private physical aspect of capacity in terms of disaster management context. There are hardly any physical resources particularly procured or set aside for the purpose of disaster management by the Hlaingbwe Township Government Insititutions but private owned physical resources such as motor car, line car, pony cart, mechanized boats and trishaws could be mobilized for disaster response if some arrangement between the township government and private physical resources owners are made as a part of disaster preparedness arrangements. Table 3.8 shows the list of privately owned transportation resources of Hlaingbwe Township.

Table 3.8 List of privately owned transportation resources of Hlaingbwe Township

Adminstrative Area	**Transportation Resources**			
	Motor Car	**Pony Cart**	**Mechanised boats**	**Trishaw**
Hlaingbwe Township (Main)	50 plus 50 line cars	11	23	35
Paingkyon Sub Township	15	No	20	No
Shan Ywar Thit Sub township	7	No	5	No
Total	**72 plus 50 line cars**	**51**	**48**	**35**

These privately owned transportation resources especially mechnised boats had been deployed for evacuation and fetching relief items by the flood affected communities themselves.

Compared to its population, hand phone coverage is still poor and having a list of these privately owned telecommunication assets can help TDPC to disseminate early warnings and disaster event related news to the local communities.

3.4.3 Civil Society Organizational and Social Capital

Administratively, Hlaingbwe Township is divided into three areas in which different minsitries have established its own township level offices for township level administrative works. List of Governement Departments present at Hlaingbwe Township is annexed. These township level departmental offices are the main responsible stakeholders for running of township level affairs including disaster management. Table 3.9 shows the number of Government Departments a long with their respective workforce strength for the 2012-13.

Table 3.9 List of Government Departments

Aminstrative Area	No. Of Departments	Workforce Strength		
		Officers	Others	Total
Hlaingbwe Township (Main)	30	30	1416	1446
Paingkyon Sub Township	15	15	435	450
Shan Ywar Thit Sub Township	15	10	115	125
Total		**55**	**1,966**	**2,021**

Strong Institutional Arrangments dedicated to Disaster Management would be an enabling factor to mobilize these Hlaingbwe Township Government Workforces. One of cost effective ways to strengthen institutional arragments for disaster management is enforcing inclusive disaster management process which calls involvement of all township level departments at every activities of disaster management.

The Villages of Hlaingbwe Township have a fairly well knit society with predominantly Buddhist population. The social cohesion is fairly high in the society, even though formal institutions are not common. The local monasteries and churches provide a variety of services to the villages including shelter in terms of disasters. The Civil Society Organizations are only few in numbers, and some of the well known Civil Society Organizations in Hlaingbwe Township are Myanmar Maternal and Child Welfare Association which is present in 55 villages, Myanmar Woman's Affairs

Federation which is present in 16 villages, Auxillary Fire Brigade, and Myanmar Redcross Society.

These mentioned Civil Society Organizations are sometime linked up with government administrative works as and when required. Table 3.10 shows some of the well known Civil Society Organizations in Hlaingbwe Township.

Table 3.10 List of Civil Society Organizations in Hlaingbwe Township

Aminstrative Area	Number of Civil Society Organization and their Workforce				
	Myanmar Maternal and Child Welfare Association	Myanmar Woman's Affairs Federation	AuxillaryFire Brigade	Myanmar Redcross Society	War Veteran's Association
Hlaingbwe Township (Main)	29,798	33,074	655	345	148
Paingkyon Sub Township	12,354	13,688	110	100	25
Shan Ywar Thit Sub Township	426	472	No	20	No
Total	42,578	47,234	765	465	173

These social capitals can be mobilized for disaster management only after some investment on them such as initiating tailor made capacity building programs for them and integrating them as part of TDMP.

Apart from these well know Civil Society Organizations, there are some local Civil Society Organizations which are active, and they are Karuna Social Foundation, Township Transportation Association, and Township Mechanised Boat Association. The donor (development) project created institutions such as World Vision, Save the Children etc., are mostly young less than 10 years and are in early phase of evolution.

These organizations as well as donor funded CBOs can play very important role in relief and rehabilitation activities immediately after disasters. The anaylysis indicates that there is a gap in CBO/NGO presence and reach to the communities. In the prevailing conditions of climate change, and chanllenges posted by recurrent disasters

like floods, there is urgent need for extending the reach of national and donor funded organization to deliver services to improve livelihoods and build capacities to undertake community based disaster preparedness and mitigation activities.

3.4.4 Natural Capital

Since majority of livelihoods are natural resources based, the land resources availability is used to assess the natural capital. The agriculture is mostly labour intensive. Table 3.11 shows Natural Capital per Household in Hlaingbwe Township.

Table 3.11 Natural Capital per Householdin Hlaingbwe Township

Admistrative Area	No. of households	Land Area (Acre)			Natural Resource Ownership (acre per HH)	
		Paddy	Agriculture	Total Land	Paddy	Agriculture
Hlaingbwe Township (Main)	26,662	90,440	111,516	331,420	3.4 acres	4 acres
Paingkyon Sub Township	11,917	60,871	85,792	418,774	5 acres	7 acres
Shan Ywar Thit Sub Township	4,360	3,637	6,755	319,722	0.8 acre	1.5 acres
Total	**42,939**	**154,948**	**204,063**	**1,069,916**	**3.6 acres**	**4.7 acres**

The average natural resource capital of Hlaingbwe Township per household in terms of paddy and total agriculture are 3.6 acres and 4.7 acres respectively where average family size of Hlaingbwe Township is 6 which is drived from total population (257,337) divided by total households (42,939). These figures indicates availability of natural resources and ownership pattern of Hlaingbwe Township and other words, it is the average natural resources accessibility by households of Hlaingbwe Township.

It also means that on average, one household with average family size of 6 possesses 3.6 acres of paddy land producing 262 buskets per year which is derived from 3.6 acres multiplied by average production rate per acre of Hlaingbwe Township (73 buskets), indicating having well enough food security at normal time by Hlaingbwe Township

Communities but in the event of late monsoon big scale flood, this food security can be deprived since all paddy fields would be flooded for considerable days.

3.4.5 Other Capacities

Work Diversification: Job Portfolio Profile or Work Diversification is another dimension through which response and recovery capacity is assessed. Work Diversification Concept encourages members of HH to work in different sectors which are not related to each other, if possible. The reason is that working only in one sector would bring catastrophic consequences if that sector is hit by disaster event.

In a series of qualitative discussion with government staff, it is learnt that at least a member of most of HH in Hlaingbwe Township are working in across the international border. This condition could ensure regular and stable income to the families, and this regular and stable income provides resilence during disasters, and ability to invest in adaptation.

Education and Health: There are 238 school establishments (primary school 220, middle school 13 and high school 6) in the 192 loactions of Hlaingbwe Township. Schools were built in safe locations through national budgets, they are engineered structures and resilient to disasters, and that is why in the past, these schools have been made temporary shelters when situation arises for such requirement.

Total 47 healthcare facilities of Hlaingbwe Townshiphave been being looked after by 6 doctors, 40 nurses and 7 health assistants. Ratio of doctors, nurses and health assistants to populace are 1:42890, 1:6433 and 1: 36762, which is calculated on total population, 257,337. These health facilities have been used for emergency treatment and in fact, Township Health Department had developed a Township Health Disaster Management Plan.

3.4.6 Capacity Assessment Conclusion

Capacity of Hlaingbwe Township for disaster management has been assessed in aspects of Government Institutional DRR capacity, Private Physical Resources, Civil Society Organizational and Social Capital, Natural Resources Capital (land holding pattern), Work Diversification, and Education and Health level.

Township authority is the driving force in running of township affairs including township disaster management activities. Hence, there is a need to assessthoroughly Government Institutional DRR Capacity at township level, and based on such assessment, activities and plan to address capacity gaps are to be identified for further implementation. It is assessed that there are needs to work out activites or action plans which strengthen the DRR capacities of various level administrative set-ups (township, ward, village tract and village levels), such as regular review and updating of TDMP, development of Village Tract DMPs, imparting of capacity building of disaster management to township level government departments and village tracts' administrators on DRR specific themes (mock drills, search and rescue etc.).And also, existing and required inventory resources TDPC for response and relief efforts should be identified, and ways to mobilize required resources should be suggested.

3.5 Risk Profile

For assessing this multi hazard risk profile of Hlaingbwe Township, risk has been considered as the a product of hazard, vulnerability and capacity, where the hazard is considered from the past records as well as trends, the vulnerability is determined through some criteria namely population, livelihood, infrastructure and production, and capacity is measured through Government Institutional DRR Capacity, Physical Resources, Organizational and Social Capital, Natural Capital, and other capacities (Work Diversification, and Education and Health level).

Degree of Risk (risk level) due to a particular hazard to particular sector (Population, Livelihood, Infrastructure, and Production) is the result of interaction between Likelihood of a particular hazard and the Consequenes that hazard can cause on that particular sector. The risk level of Hlaingbwe Township is portrayed in qualitative terms (None, Low, Medium, High, and Very High) for each of the villages in Hlaingbwe Township.

There are 5 possible likelihoods namely almost certain, likely, possible, unlikely, and rare. Almost Certain means happens every year, Likely is may happen every year, possible is at least once in 3-5 years, Unlikely is once in every 10 years, and Rare is once in every 20 years. Consequences are defined with 5 possible impacts namely very minor, minor, moderate, major, and catastrophic. Figure 3.6 indicates risk profile framework, and Table 3.12 describes risk level in details.

Figure 3.6 Risk Profile Framework

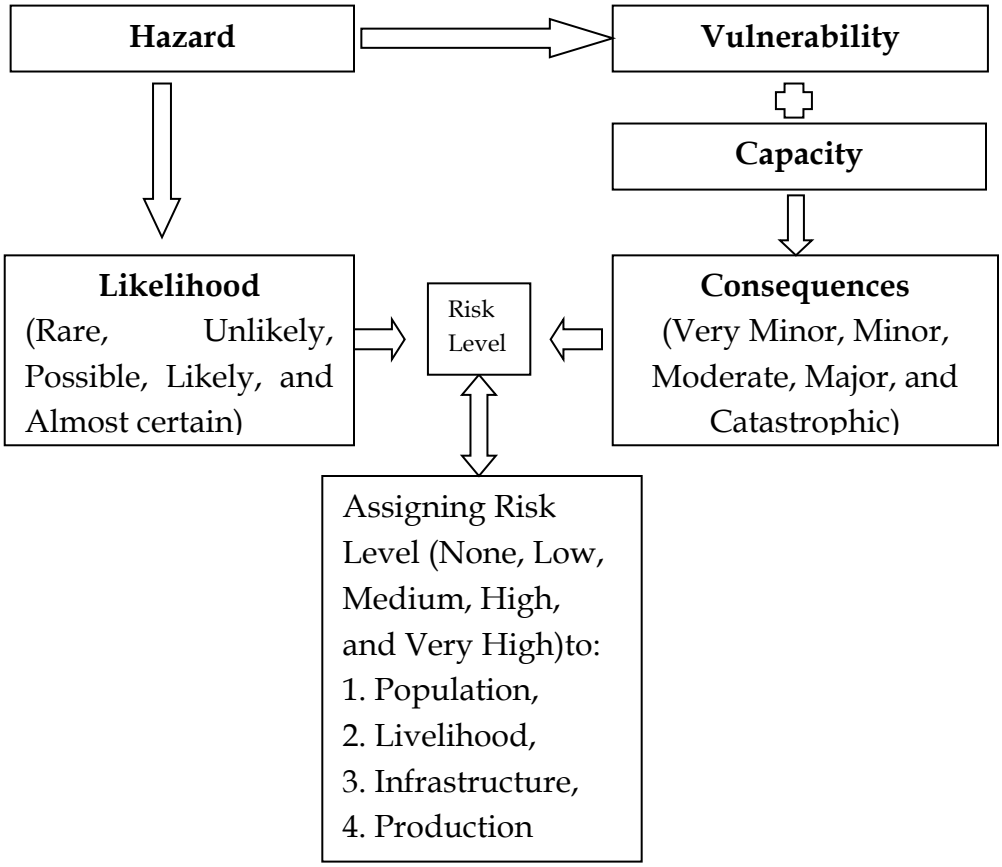


Table 3.12 Risk Level Description

Risk Level	Risk Level Description	Risk Matrix	
		Likelihood	Consequences
None	No Action Needed	None	None
Low Risk	Annual observation needed, measures could be taken	Unlikely	Very Minor
		Rare	Very Minor, and Minor
Medium Risk	Frequent observation and measures needed	Likely	Very Minor
		Possible	Very Minor, and Minor
		Unlikely	Minor, and Moderate
		Rare	Moderate, and Major
High Risk	Immediate Action needed with proper cosultation	Almost centatin	Very Minor, and Minor
		Likely	Minor, and Moderate
		Possible	Moderate, and major
		Unlikely	Major, and Catastrophic
		Rare	Catastrophic
Very High Risk	Immediate Action is Needed without any delay.	Almost centatin)	Moderate, Major, and Catastrophic)

Figure 3.7 Assigning Risk Level

Consequences						
	Catastro-phic	High Risk	High Risk	Very High Risk	Very High Risk	Very High Risk
	Major	Medium Risk	High Risk	High Risk	Very High Risk	Very High Risk
	Moder -ate	Medium Risk	Medium Risk	High Risk	High Risk	Very High Risk
	Mino r	Low Risk	Medium Risk	Medium Risk	High Risk	High Risk
	Very Minor	Low Risk	Low Risk	Medium Risk	Medium Risk	High Risk
		Rare	Unlikely	Possible	Likely	Almost centatin
		Likelihood				

Green color indicates low risk, yellow color indicates medium risk, brown color indicates high risk and red color indicates very high risk. In other words, risk level is low in green areas, and risk level is medium in yellow areas, risk level is high in brown areas, and risk level is very high in red areas.

3.5.1 Flood Risk

Risk Level	Sectors and No. of Villages subjected to various level of Flood Risk			
	Population	Livelihood	Infrastructure	Production
None or Very Low	101 (4 wards and 97 villages)	104 (4 wards and 100 villages)	101 (4 wards and 97 villages)	97 (4 wards and 93 villages)
Low	147 (5 wards and 142 villages)	220 (5 wards and 215 villages)	165 (5wards and 160 villages)	Nil
Medium	78	26	59	229 (5 wards and 224 villages)
High	35	15 (4 wards and 22 villages)	36	50 (4 wards and 46 villages)
Very High	15 (4 wards and 11 Villages)	Nil	15 (4 wards and 11 Villages)	Nil

3.5.2 Earthquake Risk

Risk Level	Sectors and No. of Villages subjected to various level of Earthquake Risk			
	Population	Livelihood	Infrastructure	Production
None or Very Low	Nil	372 (9 wards and 363 villages)	Nil	376 (13 wards and 363 villages)
Low	352	4 (4wards)	330	Nil
Medium	24 (13 wards and 11 villages)	Nil	42 (9 wards and 33 villages)	Nil
High	Nil	Nil	4 (4 wards)	Nil
Very High	Nil	Nil	Nil	Nil

3.5.3 Fire Risk

Risk Level	Sectors and No. of Villages subjected to various level of Fire Risk			
	Population	Livelihood	Infrastructure	Production
None or Very Low	Nil	101	Nil	334 (4 wards and 330 villages)
Low	334 (4 wards and 330 villages)	234 (4 wards and 230 villages(	335 (4 wards and 331 villages)	42 (9 wards and 33 villages)
Medium	Nil	41 (9 wards and 32 villages)	35 (5 wards and 30 villages)	Nil
High	37 (5 wards and 32 villages)	Nil	6 (4 wards and 2 villages)	Nil
Very High	5 (4 wards and 1 village)	Nil	Nil	Nil

3.5.4 Storm Risk

Risk Level	Sectors and No. of Villages subjected to various level of Storm Risk			
	Population	Livelihood	Infrastructure	Production
None or Very Low	Nil	Nil	116 (4 wards and 112 villages)	118 (4 wards and 114 villages)
Low	340 (4 wards and 336 villages)	340 (4 wards and 336 villages)	256 (5 wards and 251 villages)	258 (9 wards and 249 villages)
Medium	36 (9 wards and 27 villages)	36 (9 wards and 27 villages)	4 (4 wards)	Nil
High	Nil	Nil	Nil	Nil
Very High	Nil	Nil	Nil	Nil

3.5.5 Landslide Risk

Risk Level	Sectors and No. of Villages subjected to various level of Landslide Risk			
	Population	**Livelihood**	**Infrastructure**	**Production**
None or Very Low	264 (13 wards and 251 villages)	264 (13 wards and 251 villages)	264 (13 wards and 251 villages)	376 (13 wards and 363 villages)
Low	112 (112 villages)	112 (112 villages)	112 (112 villages)	Nil
Medium	Nil	Nil	Nil	Nil
High	Nil	Nil	Nil	Nil
Very High	Nil	Nil	Nil	Nil

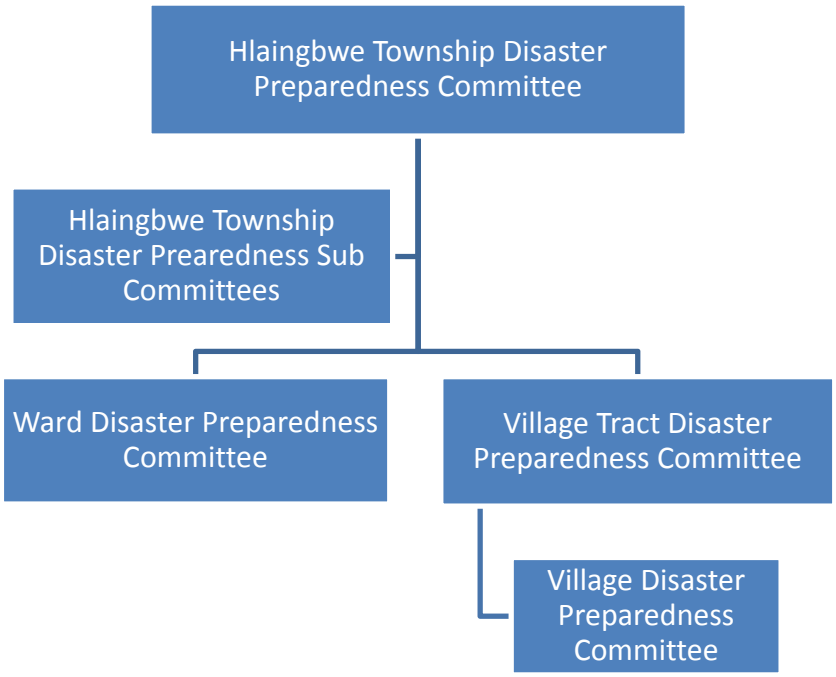
Chapter 4

Institutional Arrangements for Disaster Management in Hlaingbwe Township

4.1 Overview

The institutional arrangements for disaster management are a legal framework for disaster risk reduction. It is a legally mandate body in respect of disaster management, and its main duties are to lay down policies, issue guidelines, develop and implement plans etc,. There is an institutional system for disaster management in the country at all administrative levels from national to the local. Figure 4.1 shows an overview of institutional arrangement for disaster management in Hlaingbwe Township.

Figure 4.1 an Overview of Disaster Management System in Hlaingbwe Township



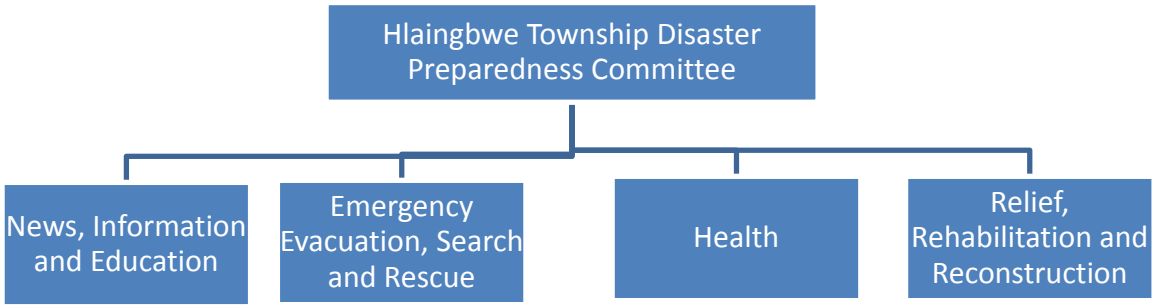
As most of other parts of the country, there is a need to strengthen the vertical integration of disaster management in Hlaingbwe Township since Hlaingbwe Township Institutional Arrangement for Disaster Management is not, as now, systematically established yet beyond township level, with exception of Shwe Gun Village Tract. And also horizontal integration of disaster management has gap to

improve but some of the departments such as Health Department and Fire Department have prepared their own township level departmental Disaster Management Plans.

4.2 Hlaingbwe Township Disaster Preparedness Committee and its Roles and Responsibilities

Hlaingbwe Township Disaster Preparedness Committee (TDPC) is an apex body for disaster management. In lieu of local context, four sub committees are constituted for effective implementation of disaster management activities laid down by TDPC. These four sub committees are: 1. News, Information and Education, 2. Emergency Evacuation, Search and Rescue, 3. Health, and 4. Relief, Rehabilitation and Reconstruction. Figure 4.2 indicates Hlaingbwe Township Disaster Preparedness Committee and its Sub-Committees.

Figure 4.2 Hlaingbwe Township Disaster Preparedness Committee and its Sub-Committees



The Hlaingbwe Township Disaster Preparedness Committee (TDPC) consists of the following functionaries:

1.	Township Administrator, GAD	Chairman
2.	Commander, Township Police Force	Member
3.	Township Manager, Myanmar Agricultural Department	Member
4.	Township Staff Officer, Land Records Department	Member
5.	Township Staff Officer, Immigration Department	Member
6.	Township Staff Officer, Forestry Department	Member
7.	Township Engineer, Public Works	Member
8.	Township Education Officer, Basic Education Department	Member
9.	Township Staff Officer, Health Department	Member

10. Executive Officer, Township Development Committee	Member
11. In Charge, Myanmar Tele-Communications Department	Member
12. Township Staff Officer, Township Planning Department	Member
13. Township Staff Officer, Township Rural Development Dept	Member
14. Township Transportation Association	Member
15. Myanmar Maternal and Child Welfare Association	Member
16. Myanmar Woman's Affairs Federation	Member
17. Myanmar Red cross Society	Member
18. Administrators of Ward/Village Tract Administration	Member
19. World Vision	Member
20. Save the Children	Member
21. Deputy Township Administrator, GAD	Joint Secretary
22. Township Staff Officer, Fire Brigade Department	Secretary

Township Administrator, Township Fire Department Officer and Deputy Township Administrator are assigned as the Chair, Secretary and Joint Secretary of the TDPC respectively. Some of Civil Society Organizations and of Humanitarian Agencies existing and operating in Hlaingbwe Township are also included as members of the TDPC.

The Township Administrator designated as the chair of the TDPC is the key responsible person in strengthening the Hlaingbwe Township Institutional Arrangement for Disaster Management. His or her commitment in letter and spirit on township disaster management will determine the far reaching impacts of this township disaster management plan. Some of his or her main roles are to oversee the coordination and operation of disaster management activities in partner with both national and international agencies, and also to provide liaison between Non-Government Organisations and the TDPC. The Chairperson is responsible for presiding at all meetings of the TDPC unless absent.

The Secretary and Joint Secretary of the TDPC (Secretaries) are to help the chair in term of township disaster management through collaboration, coordination with government departments, civil society organizations and humanitarian agencies on different aspects of disaster risk reduction. The Secretaries, especially, Head of Township Fire Department is responsible for maintaining the operational readiness of the TDPC and also responsible for advising the Chairperson and the TDPC on disaster related matter, both during normal times and during disaster activations.

In fact, TDPC exists to assist Township Administrator. This TDPC shall meet at least once in six months under the Chairmanship of the Township Administrator.

Roles and Responsibilities of the TDPC are categorised into 3 phases of disaster management, Before, During and After Disaster.

Before Disaster

- Providing policy decisions when required;
- Reviewing and revising of the TDMP annually;
- Ensuring effective inter departmental coordination between all township departments;
- Supervising and coordinating the before disaster activities of various subcommittees;
- Ensuring the formulation of disaster prevention plans in wards and villages, and inspecting their implementation;
- Ensuring mainstreaming of DRR into township level departmental development works;
- Initiating DRR capacity building programs in close collaboration with Relief and Resettle Department, Kayin State Government and DRR Working Group;
- Formulating and implementing procedures for mitigating and preventing the impact of flooding, storms and natural disasters, and making preparations, rescue and supplies, and rehabilitation in line with the policy and guidelines laid down by the authorities;
- Compiling of Dos and Don't for different hazards which are prone to Hlaingbwe Township and formulating programmes to educate the people and achieve their participation in making preparations for an prevention of the impact of flooding, storms and natural disasters;
- Organizing of mock drills in which TDPC and its Sub Committees are involved in to check effectiveness and practicability of the respective plans.
- Formulating policy guidelines for coordination on issues considered to require external assistance.
- Determining activities to mitigate disaster risks such as building dams, and raising the level of roads;

During Disaster

- Designating and assigning duties to departments and agencies that need to be involved depending on the extent of the natural disaster;
- Supervising and coordinating the during disaster activities of various subcommittees;
- Providing supervision during natural disasters and during rescue and resettlement activities;
- Providing supervision on implementation of different levels (the township, Ward//Village Tract, and village) Disaster related Committees' activities in order to prevent loss of life, damage to property and possessions, loss of farmland, crops, cattle and livestock animals and destruction to state-owned enterprises caused by natural disasters;
- Keeping the state government informed about disaster situation;
- Coordinating the activities of the lateral agencies like military.

After Disaster

- Making arrangements to obtain information on a timely basis from wards and village tracts concerning the natural disaster situation, losses and damage, and the status of protection activities and reporting real-time to higher authorities;
- Making detailed submissions to higher level agencies and departments concerning the necessary assistance for search and resettlement activities and providing supervision for systematic distribution of assistance that has been obtained;
- Providing supervision for prompt distribution to victims of financial and material assistance from the State and local donors;
- Supervising and coordinating the after disaster activities of various subcommittees especially with Rehabilitation and Reconstruction Sub Committee;
- Working with the international non-government agencies concerned to handle the assistance from the national management committee;
- Reviewing disaster related activity reports received from sub committees and provide appropriate directions.

4.3 News, Information, and Education Sub Committee and its Roles and Responsibilities

This News, Information, and Education Sub Committee is concerned with raising public awareness, fetching and dissemination of early warning, communicating risk, and updating of disaster data. Its members include the following functionaries:

1. General Administration Department	Chairman
2. Basic Education Department	Member
3. Tel Communication department	Member
4. Fire Department	Member
5. Myanma Radio and Television	Member
6. Relevant Wards'/Village tracts' Administrators	Member
7. Myanmar Red Cross Society	Member
8. Information and Public Relations Department	Secretary

Roles and Responsibilities of this News, Information and Education Sub Committee in the 3 phases of disaster management (Before, During and After Disaster) are:

Before Disaster

- Setting up a prediction and early warning system for flooding, storms and natural disasters;
- Installing warning flags (green, yellow and red) in designated areas of each ward/village, installing marker posts to indicate the danger level of water, and providing oversight to ensure the use of warning systems (loudspeakers, alarm systems);
- Designing of Public Awareness Program and Raising awareness among the people of the prevention activities against flooding, storms and natural disasters;
- Setting up a communications system for use during emergencies and making rehearsals and inspections periodically;
- Compiling contact details such as telephone numbers, mobile phone numbers, fax numbers, terminology for communication equipment, and frequencies used by responsible persons of the Kayin State, districts, townships, wards and villages for distribution to responsible persons;
- Maintaining and updating of Disaster Data;
- Setting up a communications system for use during emergencies and making rehearsals and inspections periodically.

During Disaster

- Ensuring the information from the early warning system reaches the grassroots levels in a timely manner;
- Making arrangements to set up an auxiliary communications system if necessary in addition to the present communications system to ensure continuous access to forecasts from the Department of Meteorology and Hydrology during emergencies.
- Coordinating with other Sub Committees if necessary

After Disaster

- Monitoring the situation and update the relevant authorities;
- Screening and releasing information for press releases, and making documentary photographs and videos;
- Making evaluations for effective information and educational activities;
- Conducting of rapid damage and need assessment.

4.4 Emergency Evacuation, Search and Rescue Sub Committee and its Roles and Responsibilities

This Emergency Evacuation, Search and Rescue Sub-Committee is meant for the periods of immediate before disaster, during disaster and immediate after disaster. Its members consist of the following functionaries:

1. General Administration Department	Chairman
2. Township Transportation Association	Member
3. Township Police Force	Member
4. Basic education Department	Member
5. Religious Department	Member
6. Relevant Ward/Village tract Administrator	Member
7. Myanmar Red Cross Society	Member
8. Fire Department	Secretary

Roles and Responsibilities of this Emergency Evacuation, Search and Rescue Sub-Committee in the 3 phases of disaster management (Before, During and After Disaster) are:

Before Disaster

- Making a study of vulnerable areas to disasters (flooding, storms, tsunamis, fire hazards and earthquakes) and of vulnerable populations to designate areas for safe evacuation
- Assessing and stockpiling relief supplies for immediate distribution, vehicles, machinery and fuel and food supplies for survival and other material requirements;
- Formation and training of special task forces for search and rescue of victims during disasters especially for earthquakes and fires;
- Making a list of tools and equipment for evacuation and search and rescue activities;
- Forming task forces through bilateral coordination to carry out search and rescue activities in case of disasters along the border areas;
- Making a list of transport vehicles, vessels and machinery for an emergency use, arranging vehicles and transport for the assigned duties;
- Making a list of access roads and auxiliary approach routes, including the condition of the roads and bridges and the availability of detours in case of damage or destruction;
- Making a study of navigable water channels;
- Making a list of helicopter pads;
- Making preparations for coordination between government departments, local and international non-government organisations in emergency search and rescue activities;
- Formulating security plans in case of emergency.

During Disaster

- Giving directions to evacuate villages to selected sheltered areas and providing supervision for the evacuation;
- Supervising the stage by stage evacuation giving priority to the sick, the elderly, children, women and important documents;
- Organising, coordinating, implementing and training to rescue disaster victims and save the lives of survivors;
- Putting in place of security measures in disaster affected areas;
- Giving directions to ensure continuous communications between the rescue leader at the scene of the incident and the higher authorities;
- Making timely transfers to a safer place for necessary health care as soon as search and rescue activities are completed;

After Disaster

- Providing camp (shelter management) under the guidance of the TDPC
- Providing security cover to temporary shelter, on VIP visits and for transport of supplies
- Helping and Coordinating with other Sub Committees if necessary.

4.5 Health Sub Committee and its Roles and Responsibilities

This Health Sub Committee is to look after the health of disaster affected people and communities and its members consist of the following functionaries:

1.	Health Department	Chairman
2.	Development Affairs Department	Member
3.	Myanmar Maternal and Child Welfare Association	Member
4.	Myanmar Woman's Affairs Federation	Member
5.	Myanmar Red Cross Society	Member
6.	NGOs	Member
7.	Traditional Medicine Department	Secretary

Roles and Responsibilities of this Emergency Evacuation, Search and Rescue Sub-Committee in the 3 phases of disaster management (Before, During and After Disaster) are:

Before Disaster

- Developing Emergency Health Care Plan;
- Provide health education, dissemination of information on health care, hygiene, clean water;
- Conducting necessary training for emergency health care such as first aid training to search and rescue teams and community volunteer groups
- Stockpiling necessary medicines and making arrangements for storage and distribution;

During Disaster

- Setting up and operating emergency hospitals/clinics and mobile hospitals/clinics in disaster affected areas;
- Providing emergency medical assistance and treatments to emergency patients;
- Assessing and estimating the impacts and the needs on health care and diseases;

After Disaster

- Taking measures for the prevention of infectious diseases;
- Ensuring access to clean drinking water and cleaning wells and ponds;
- Monitoring health situation on hygiene, clean water, and potential causes of water born diseases;
- Preparing health reports on situation for submission to TDPC, district and state level health department;
- Coordinating and facilitating with concerned NGOs to provide health care to the victims;
- Providing psychosocial support to the victims.

4.6 Relief, Rehabilitation and Reconstruction Sub Committee and its Roles and Responsibilities

This Relief, Rehabilitation and Reconstruction Sub Committee aims at bringing communities and other resources back to normalcy. Its members consist of the following functionaries:

1. General Administration Department	Chairman
2. Public Works	Member
3. Agriculture Department	Member
4. Industry Crops Development Department	Member
5. Myanmar Agricultural Development Bank	Member
6. Tel Communication department	Member
7. Forest Department	Member
8. Basic education Department	Member
9. Health Department	Member
10. Land Records Department	Member
11. Livestock Breeding and Veterinary Department	Member
12. Electric Power Department	Member
13. Development Affairs Department	Secretary

Roles and Responsibilities of this relief, rehabilitation and Reconstruction Sub-Committee in the 3 phases of disaster management (Before, During and After Disaster) are:

Before Disaster

- Stockpiling of emergency relief items (tents, food supplies, drinking water, etc.);
- Retrofitting of critical infrastructure such as schools and health facilities etc.,
- Providing technical recommendations for risky factories, workshops, buildings, roads and bridges, putting in place an early warning system and making emergency plans.

During Disaster

- Reporting to the management committee regarding the requirements in real-time to obtain guidance;
- Making assessments of the victims' needs and making requests to fulfil those needs;
- Opening relief camps;
- Assisting other sub committees as and when required.

After Disaster

- Clearing debris and carrying out salvage activities;
- Making detailed reports to higher authorities to obtain the required assistance in rescue and resettlement activities and providing supervision for systematic distribution of the assistance obtained;
- Making arrangements for prompt distribution of funds and materials donated by the State and local donors to victims;
- Coordinating with various subcommittees for prompt distribution to victims of assistance and supplies from international non-government organisations;
- Reconstruction of houses, schools, hospitals, clinics and public buildings such as markets and offices;
- Making rehabilitation activities for the disabled and providing psychological support;
- Rehabilitation of livelihood activities;
- Providing emergency relief supplies (tents, food supplies, drinking water, etc.);
- Coordinating and carrying out repairs, construction, education, health, agriculture and other rehabilitation activities.

Chapter 5

Mitigation, Preparedness, Response, Recovery and Rehabilitation Measures

5.1 Introduction

The activities of disaster management can be considered as comprising three stages of disaster, namely: before the disaster time, during disaster time, and after disaster time.

- **Before -Disaster Time (Mitigation and Preparedness):** These activities include measures leading to disaster prevention and risk reduction. The two types of measures that can be implemented before a disaster are: (1) mitigation measures and (2) preparedness measures. Before disaster time include non disaster time and immediately before disaster time. Both are long-term measures undertaken to reduce the overall risks (damage and loss) of disasters.Mitigation measures are intended to reduce the overall negative effect of a disaster by reducing its impact. Mitigation measures are usually structural and refer to engineering works (bridges, protective dykes, embankments), safe building design and construction, and retrofitting. Flood Preparedness describes a wide range of activities identified and planned well in advance of floods, in order to reduce potential impacts on the community, economy and other resources. Preparedness measures are specifically aimed at preparing people and communities to better manage whatever negative impact of a disaster that cannot be reduced by mitigation measures. Preparedness measures are usually non-structural and are focused on the ability to predict, respond to and cope with the negative effect of disasters. Preparedness measures refer totrainings for government officials, planning, awareness raising, land use planning and zoning, legislation, strengthening institution and organizations, and advocacy on disaster and development issues, among others.

- **During Disaster Time (Emergency Response):**Emergency Response refers to emergency activities undertaken during the disaster situations to minimize negative impacts of disaster (e.g. floods). Emergency Response contains two major components: emergency operations and logistics management. The effectiveness of flood response is based on how clearly the roles and responsibilities of key emergency response actors are understood by the key players who will perform key functions during emergency. Key functions during

emergency response include evacuation of communities, provision of relief (food, water medicines), mobilization of search and rescue operations, and immediate damage assessment. Emergency response operations should be carried out in line with agreed Standard Operating Procedures contained in a *Hlaingbwe Township Disaster ManagementContingency Plan.*

- **After Disaster Time (Recovery and Rehabilitation):** These activities include recovery and rehabilitation programs in disaster affected areas. These are activities designed to bring communities and other resources back to normal and help people return to their original (pre-flood) social and economic engagements.Recovery and rehabilitation measures meansrestoration, reconstruction and long-term community rehabilitation, and can include actions such as (1) post-disaster damage assessment to identify specific recovery needs after the disaster is over; (2) environmental cleaning, which involves a cleaning-up process has to be undertaken immediately after the flooding recedes with the intention of preventing any outbreak of diseases or any further injury caused by debris; and (3) Restoration of basic infrastructure, which is aimed at repairing important local infrastructure (roads, bridges, education facilities, electricity supply, and communications infrastructure) as soon as possible after the disaster.

Combined together, all the above measures (Mitigation Measures, Preparedness Measures, Emergency Response Operations, Recovery and Rehabilitation Measures) are also called as Disaster Risk Management measures.So far especially in Chapter 3, we had assessed risks which Hlaingbwe Township exposed to in respect of five hazards namely flood, earthquake, fire, storm and landslide. In doing so, we had analysed three components of risk which are hazard, vulnerability, and capacity. To reduce vulnerabilities and increase capacities of Hlaingbwe Township in respect of different disasters especially flood, targeted DRM Measures relevant to the local context need to be undertaken. These different Disaster Risk Managementmeasures need to be carried out through the institutional arrangementsfor disaster management as described in Chapter 4 of this TDMP.

In this Chapter, a total of 21 priority DRMmeasures as per three stages of disaster (mitigation/preparedness, emergency response, and recovery/rehabilitation)are identified as possible priority actions in Hlaingbwe Township. The majority of the proposed DRM Measures are mostly focus on flood preparedness and response, since flood is the main hazard to which Hlaingbwe township is exposed. An important assumption during the identification of these 21 priority DRM is that resources to

implement at least some of the activities are readily available or can be made available. If implemented, these DRM measures would increase the capacity of Hlaingbwe Township authorities to manage flood risk and thus make a significant contribution to reduce vulnerability to flooding amongcommunities throughoutHlaingbwe Township.

5.2 DRM MEASURES FOR NON-DISASTER TIME IN HLAINGBWE TOWNSHIP

5.2.1 Mitigation Measures

Identification of the key hazard risk mitigation activities in the Hlaingbwe Township Disaster Management Plan is a prerequisite to help relevant sub committees and line agencies to initiate proper actions. The Mitigation Measures identified and proposed for further take ups are mentioned in below:

1. ***Produce a detailedFlood Risk Map of Hlaingbwe Township,*** consolidating all available data from previous floods and showing all at-risk villages. The map could be produced with technical support from UN's Myanmar Information Management Unit (MIMU) in Yangon. This Flood Risk Map (A2 size)would assist Hlaingbwe Township Authorities to better target mitigation/preparedness, emergency response and recovery/rehabilitation activities proposed in this Township Disaster Management Plan. This Flood Risk Map would capture key facilities such as (1) Rural Health Centres, Rural Health Sub-Centres and hospitals, (2) location of schools and monasteries that could be identified as centres for evacuation, and (3) the main transportation routes and access roads to flood-prone areas.

2. ***Conductan assessment of small infrastructure improvements***that could have a positive impact on reducing flood risk in priority flood-prone village tracts of Hlaingbwe Township.This should include a township-wide assessment of flooding patterns, and the causes/mechanisms of different types of flooding (e.g. flash-flooding versus slow-onset flooding), with the aim of making recommendations for suitable flood mitigation schemes/measures. The assessment should identify the locations that are regularly flooded, patterns in how long flood water remains stagnant at different locations before receding, and audit of drainage infrastructure (culverts along roads, village canals) at both the village-level and township levels.Infrastructure improvement needsidentified during the assessment could also include tarring and raising the level of low-lying roads; strengthening embankments around agricultural lands; constructing

footpaths and pedestrian bridges; building culverts along roads and strengthening jetties;retrofitting and renovating public buildings such as schools and health centres, especially those designated as collective centres for purposes of evacuation; constructing small village-level canals for improved flood water drainage; and improving the safety of water sources (e.g. raising the level of wells and constructing higher embankments around village ponds).The assessment can be conducted in cooperation with the Kayin State Government, the Ministry of Construction (Department of Public Works), and the Ministry of Transportation (Department of Meteorology and Hydrology). The findings of the assessment would provide guidance for targeted physical infrastructure investment aimed at flood mitigation, and the identified needs should be integratedinto ongoing rural development and poverty reduction programs in Hlaingbwe Township.

3. ***Participatein an assessment of the quality of flood-proofing techniques in construction practices within Hlaingbwe Township.*** Flood proofing can be defined as minor or major adjustments, or modification to existing structures and contents, that are designed or adopted to reduce flood damages and these flood proofing measures can be applied to public structures such as hospitals and health care centres, pagodas and churches, as well as individual houses as they are often used as temporary shelter during floods. A assessment would involve studying the flood-proof construction of village water wells, designs of village toilets and sewerage systems, settlement patterns within village tracts, and houses built with local traditional materials. The assessment would also assess flood-proof construction practices/methods in other parts of Myanmar, as well as good techniques in use worldwide. The assessment would contain a set of recommendations that could be integrated into national building codes, training on DRR for local villages and craftsmen, and land use/settlement planning in Hlaingbwe Township including pilot demonstrations.

4. ***Conduct regular clearing of bridges and de-clogging of local canals.*** Since Hlaingbwe town is surrounded by creeks, blockages of water flow under bridges are one of the factors contributing to the flooding in Hlaingbwe town. The involvement of the public in the clearing of bridges and canal de-clogging could be mobilized annually before onset of rainy season; this measure can be led by the Department of Development and supported by the township General Administration Department.

5. ***Conduct as assessment of livelihoods adaptation strategies among villagers in flood-prone communities of Hlaingbwe Township.***While there is relatively little injury and the loss of life resulting from flooding in Hlaingbwe township, annual flood-water inundation destroys the livelihoods of local people involved in farming and other livelihoods. In some cases, floods have resulted in a positive impact, for example coverage of the floodplain with alluvial soil rich in nutrients which enables alternative crops to be grown successfully (e.g. peanuts). This assessment would examine the positive and negative impacts of flooding in Hlaingbwe township on livelihoods and poverty, with the aim of making recommendations on how rural livelihoods can be strengthened and adapted to annual flooding.

6. ***Pilot and testflood-resistant paddy seeds in Hlaingbwe township,*** based on an initiative already underway by Hpa-An Township Department of Agriculture and Irrigation. Cooperate with a small number of highly flood-prone villages to run a pilot project using flood-resistant seeds, with the involvement local paddy farmers. Explore possibilities for expanded use of flood-resistant seeds across flood-prone areas of Hlaingbwe township, involving advocacy and training among local farmers, and assistance to farmers to procure and store flood-resistant seeds.

5.2.2 Preparedness Measures

All the activities which are concerned with the ability to predict respond to and cope with the effect of disasters are called Preparedness Measures, and these are activities which have to be discharged before disaster. Preparedness Measures which are relevant tothe disaster risk context Hlaingbwe Township areas follows:

7. ***Developa Hlaingbwe Township Disaster Management Contingency Plan.*** An essential element of the Hlaingbwe Township Disaster Management Plan should be a *Hlaingbwe Township Disaster Management Contingency Plan*. The *Contingency Plan* should present detailed standard operating procedures (SOPs) for all emergency response operations immediately before, during and immediately after disaster. The disaster management functions of all key government departments participating in the TDPC (health, fire, police, education, etc.) with a role in emergency response operations in Hlaingbwe township should be clearly defined, and the sequence and order of emergency response actions should be explained in detail.Integrate responses at village level into the

Contingency Plan. There are many international best practices upon which Hlaingbwe Township could draw to develop its own plan. Conduct an annual orientation on the Contingency Plan prior to the rainy season, especially for government officers newly-posted in Hlaingbwe, and regularly update the *Contingency Plan.*

8. ***ExpandCommunity-Based Disaster Risk Reduction interventionsin the main flooded areas of Hlaingbwe Township.*** According to the analysis in Chapter 3, the three most flood-prone areas of the township are: (1) some areas along Than Lwin River which flows in the west and north-west corner of Hlaingbwe township; (2) some areas along upper part of Hlaingbwe Chaung, which include Hlaingbwe town as well as low-lying villages surrounding Hlaingbwe town and (3) some areas along lower part of Hlaingbwe Chaung. The most populous and the most flood-prone villages/village tracts in these three areas should be prioritised for expansion of CBDRR measures. This should be complemented by creating stronger disaster risk management cooperation between the village level and the township level in Hlaingbwe. The positive impact would be strengthened vertical integration of disaster risk management in Hlaingbwe Township.

9. ***Installa system of flood markers and rain gauges***in Hlaingbwe town and flood-prone village tracts across the township to strengthen local-level and township-wide early warning system.Flood markers can help communities to take timely protective action according to agreed-to danger levels. Secondly, systematic use of flood markers and rain gauges across Hlaingbwe town and later across the entire township would enable township authorities to collect data on flood waters and build up a database of multi-year information of flooding patterns.Focal persons for early warning should be trained at the community level to read information from flood markers and communicate it to the local communities and to Hlaingbwe Township GAD authorities. Hlaingbwe township authorities couldseek technical support form Department of Meteorology and Hydrology, Kayin State on the installation and maintenance of the equipment (flood markers, and rain gauges).

10. ***Developguidelines for the operation of evacuation centres in Hlaingbwe township.*** There are existing international-standard guidelines for "collective centres" for evacuation in case of natural disaster.Develop operational protocols

for the management of each designated evacuation centre,identify operational focal persons at each centre, and conduct trainings on the guidelines for staff and personnel (e.g. monks, teachers) at centres across Hlaingbwe township. Print copies of the guidelines and develop vinyl posters to display the guidelines at all designated evacuation centres. The guidelines on evacuation for Hlaingbwe township should also include support from the Hlaingbwe Township to assist flood-prone villages to agree on"inter-village evacuation" arrangements for cases where entire villages have to evacuate to other villages in cases of severe flooding, and to assist receiving villages to cope with an influx of persons displaced by flooding.

11. ***Createa township-level registry of all monasteries and government buildings*** (e.g. schools) in the three main flood-prone areas of Hlaingbwe Township that could act as centres for evacuation at the time of flooding. Designate monasteries and government buildings as official evacuation for purposes of evacuation, and designate officials to act as focal points at each centre. Indicate the maximum number of persons that could be accommodated at each designated collective centre. Erect signboards outside each collective centre to indicate that it has been designated as a site for evacuation. Conduct retrofitting (if required) and improvement of waste management, garbage disposal, and sanitation systems to improve each designated evacuation centre.

12. ***Create and manage stockpiles of food and relief items*** in anticipation of annual evacuations due to flooding. Since Hlaingbwe Town have been regularly experiencing floods and the flood-affected people and communities regularly need to be evacuated to safer places; as a result, there is a need to stock pile fuelwood, water, essential food items and medicines in advance, withthe exact quantities to be based on past record of needs as well as maximum number of people that can be accommodated at designated evacuation centres. Stockpiles of basic shelter kits could also be created in order to support families to return to and temporarily fix damaged houses. International and national NGOs could be requested to contribute to stockpiles in Hlaingbwe Town and/or at designated evacuationcentres.

13. ***Provide support to village tract and village administrators to conduct village-level early warning and evacuation mock drills*** on an annual basis, prior to the start of the rainy season. These exercises will develop the response-ability of local

communities and village authorities in an emergency situation, and build up/encourage local volunteerism. Conducting mock drills will also test the implementation of the *Hlaingbwe Township Disaster Management Contingency Plan* and the readiness of communities. Basic guidelines could be developed at township level on how to organize and carry out a village mock drill, and the exercises could be regularly organized according to these guidelines.

14. ***Establishan Emergency Operations Centre (EOC)***to coordinate and manageemergency response operationsin Hlaingbwe Township during a disaster.Effective emergency response operations include a range of activities such as search and rescue, first aid and medical referral/treatment, law and order and relief distribution.These functions involve multiple government departments such as Fire Services Department, Myanmar Police Force, Department of Health, Department of Meteorology and Hydrology, Transport Department and Relief and Resettlement Department, apart from Red Cross volunteers, UN Agencies and NGOs. As multiple agencies are involved in carrying out disaster emergency response operations, a coordinating body is required. An EOCis a physical facility (an office or a room)located inside the General Administration Department of Hlaingbwe township. The main purpose of an EOC is to act as a single point of contactto coordinate the overall response to an emergency/disaster immediately before, during and immediately after a disaster, according to the *Hlaingbwe Township Disaster Management Contingency Plan*. A critical function of an EOC is to direct the emergency response operationsof township-level government departments with a disaster response role, and to support effective communication with a range of actors, including with upper levels of government (Region/State and Union) as well as the lower levels (village tract), evacuation centres, emergency relief workers, the media and international and national NGOs participating in an emergency response.The EOC should be led by the Township Administrator as chairman of TDMC. To establish and operationalize an EOC in Hlaingbwe township, the following actions are required: (1) developing Standard Operating Procedures for the operation of an EOC, with the aim of supporting the effective implementation of the *Contingency Plan* and to ensure effective communication); (2) purchase equipment required for the EOC, e.g. computers, mobile phones, etc.; (3) identify Hlaingbwe government staff who will be part of the EOC team during an emergency and conduct training to the staff on their EOC functions.

15. ***Purchasemechanised boats to support transportation of emergency and relief teams*** in the event of widespread flooding. The main disaster Hlaingbwe Township faces is flood;during flooding, all the inland roads (whether all-weather accessible roads or not) become inaccessible, thereby slowing down evacuation, relief and medical care efforts.As a result, there is an urgent need to procure six mechanised boats to support transportation as part of emergency flood response operations.

16. ***Expand training on First Aid, and Search and Rescue.***In the event of annual flooding in Hlaingbwe Township, the current personnelfromHlaingbwe Township government department responsible forFirst Aid, and search and rescue operationsare unable to fully cope with the workload and the needs. As such, there is a need to recruit auxiliary personnelwho could performFirst Aid, and search and rescue operationsand offer training, as a means of increasing the total corps of staff able to offer these services. Prior to the recruitment and training of additional staff, an audit of the needs for First Aid and Search and Rescue should be conducted in Hlaingbwe township, including numbers of extra staff needed/the skills, as well as equipment and uniforms to be procured to operationalise additional teams. Supporting First Aid and Search and Rescue operations at village/village tract should also be considered.

17. ***Put into place a basic Geographical Information System (GIS)***at Hlaingbwe Township General administration Department to enable better analysis of annual flooding trends (i.e. flooding hotspots across the township) and mapping of emergency responseoperations and needs. An important output of a GIS system would be a regularly-updated flood-risk map that could inform emergency response planning and evacuation. A GIS system could also be valuable to identify locations where infrastructure is needed for mitigation purposes. Hlaingbwe TDMC should explore what GIS software packages would be most relevant to the Hlaingbwe township situation, as well as what data is/is not available to feed into a GIS database system, and how data could better be collected.Procure basic equipment for a GIS system (desktop computer, printer, software) and provide training to selected GAD and other staff to operate a GIS system.

18. ***Conductan annual review of the implementation of the TDMP.*** An annual review would aim: (1) to assess progress made to implement the action plan in this chapter, (2) to add new activities to the TDMP Action Plan, and (3) to make plans for the implementation of TDMP Action Plan over the next 12 months. Once completed, a one day orientation of the revised TDMP should be arranged for key departments/officials in Hlaingbwe Township to improve their awareness of the revised TDMP and to strengthen ownership of it. International and national NGOs with DRR capacity and working in Hlaingbwe township could be invited to the review and orientation exercises, which could be a useful forum for interaction between Hlaingbwe local authorities and organizations, as a basis for improved cooperation on DRR in the township.

5.3 Emergency Response Measures

The effective response to any disasters is based on three key components namely effective coordination, effective logistic management, and level of responsiveness of the community. Response to any disaster especially flood by the Hlaingbwe Township Authority should be implemented along clearly demarcated roles and responsibilities outlined in the TDMP's Contingency Plan.If implemented due time, Response Measures identified in below would enhance the existing response capacity of Hlaingbwe Township one step up.

19. ***Activate and implementthe Hlaingbwe Township Disaster Management Contingency Plan.***The Chairman of the Hlaingbwe TDPCshould activate the EOC and implementation of the Contingency Plan of Hlaingbwe township according to the agreed Standard Operating Procedures.

5.4 Recovery and Rehabilitation Measures

The primary aim of recovery and rehabilitation measures is to assist community to regain a proper level of functioning following a disaster, both initially and in the long run. There are six areas of recovery and rehabilitation namely:social, infrastructure (including services such as electricity and water supply), economy, environment, housing, and communications.

The extent of the recovery effort solely depends on the degree of severity of disaster, and therefore, it is hard to lay down specific recovery and rehabilitation action plans. The measures identified in below are the measures which need to be carried out after disaster as per Hlaingbwe Township context.

20. ***Produce anEmergency ResponseOperations Summary Report.*** As a way to effectively report on emergency response operations following a disaster in Hlaingbwe township (including lessons learned and shortcomings), the Hlaingbwe TDPC should develop a template for a report to summarize the most important information concerningemergency response operations in the Township. This report could include: (1) a summary of the main data and statistics (e.g. numbers of collective centres established; number of people in evacuation centres; amount of relief items distributed; number of affected villages; and data from affected villages, including total damage and loss); and (2) a summary of how the disaster response was carried out, based on a daily logbook of events and summary of EOC meeting minutes. In order to support the development of a Disaster Response Summary Report, the EOC should maintain a Emergency Response Logbook to capture some of the key information relating to a disaster response. This information should feed into the Union-level disaster management database.

21. ***Develop a comprehensive damage and loss Technical Assessment Report.***It is relatively low-cost to develop an effective system of reporting damage and losses resulting from natural disaster at township level. Effective and immediate reporting of damages and losses in flood-affected would have a positive impact on creating an instantaneous picture of the severity of a flood, and in mobilising emergency response operations and recovery/rehabilitation efforts to the most badly-affected locations across Hlaingbwe Township. There is a need to involve all. As such, a multi-sectoral Damage and Loss Assessment Reportform should be designed, involving the input of multiple government departments to ensure that the data field are correctly defined. Data from these Technical Assessment Reports would feed into master Damage and Loss Assessment Database to be managed by GAD at Hlaingbwe Township. The key statistics from this database could be incorporated into the Emergency Response Summary Report proposed above.

5.5 Summary of Identified DRR Measures

Measures	Lead Agency	Other Govt. Agencies	Potential Partners	Time
Mitigation				
1. Produce a detailedFlood Risk Map of Hlaingbwe Township.	News, Information and Education Sub Committee	GAD, and Land Record Department Agriculture Department, Forest Department, Education Dept, Health Dept, Religion Dept.	MIMU, UN agencies, and INGOs, IOM	Short Term
2. Conductan assessment of small infrastructure improvements.	Rural Development Dept, and TDPC	GAD, Public Works, Development Dept, Education Dept, Health	UN agencies, and INGOs	1 year
3. Participate in an assessment of the quality of flood-proofing techniques in construction practices within Hlaingbwe Township.	Public Works	GAD, Development Dept, Rural Development Dept	UN agencies, and INGOs	Medium
4. Conduct regular clearing of bridges and de-clogging of local canals.	TDPC	GAD, Township Development Dept, Public Works	Civil Society	Short Term
5. Conduct as assessment of livelihoods adaptation strategies among villagers in flood-prone communities of	Agri Dept, and Vetinary Dept	GAD and Rural Development	Kayin State Gobvernment and UN agencies, and	Long Term

Hlaingbwe Township.			NGOs	
6. Pilot and test flood-resistant paddy seeds in Hlaingbwe township.	Agri Dept	GAD and Land Record Dept	Kayin State Gobvernment and UN agencies such as FAO, WFP, and NGOs	Medium
Preparedness Measures				
7. Develop a Hlaingbwe Township Disaster Management Contingency Plan.	Emergency Evacuation, Search and Rescue sub committee	GAD, TDPC, and Fire Dept	UN agencies, and NGOs	Medium
8. Expand Community-Based Disaster Risk Reduction interventions in the main flooded areas of Hlaingbwe Township.	TDPC	GAD	UN agencies, and NGOs	Medium
9. Install a system of flood markers and rain gauges.	News, Information and Education Sub Committee	Kayin State DMH, Agri Dept, and Police	UN agencies, and NGOs	Short Term
10. Develop guidelines for the operation of evacuation centres in Hlaingbwe township.	Emergency Evacuation, Search and Rescue sub committee	TDPC, GAD, Health Dept, and Development Dept	UN agencies, and NGOs	Short Term
11. Create a township-level registry of all monasteries and government buildings (e.g. schools)	Emergency Evacuation, Search and Rescue sub committee	TDPC, GAD, Health Dept, and Development Dept	Civil Society	Short Term

12. Create and manage stockpiles of food and relief items.	Relief, Rehabilitation and Reconstruction Sub Committee	GAD	Ward and Village Tract's Administrators, Civil Societies	Short Term
13. Provide support to village tract and village administrators to conduct village-level early warning and evacuation mock drills.	TDPC	All sub committees	Ward and Village Tract's Administrators, Civil Societies	Short Term
14. Establish an Emergency Operations Centre (EOC)	TDPC	Emergency Evacuation, Search and Rescue	UN agencies and NGOs	Short Term
15. Purchase mechanised boats to support transportation of emergency and relief teams.	Emergency Evacuation, Search and Rescue,	GAD	Civil Societies, UN agencies and NGOs	Short Term
16. Expand training on First Aid, and Search and Rescue.	Health Sub Committee, and Emergency Evacuation, Search and Rescue Sub Committee	Fire Department, and Health Department	MRCS, UN agencies and NGOs	Short Term
17. Put into place a basic Geographical Information System (GIS).	TDPC	GAD	MIMU, UN agencies and NGOs, IOM	Short term
18. Conduct an annual review of the implementation of the	TDPC	All sub committees	UN agencies and NGOs,	Short term

TDMP.				
Response Measures				
19. Activate and implement the Hlaingbwe Township Disaster Management Contingency Plan.	Chairman of TDPC	TDPC	Ward and Village Tract's Administrators, Civil Societies	Short Term
Recovery and Rehabilitation Measures				
20. Produce an Emergency Response Operations Summary Report.	Relief, Rehabilitation and Reconstruction Sub Committee	TDPC	Ward and Village Tract's Administrators, Civil Societies	Short Term
21. Develop a comprehensive damage and loss Technical Assessment Report.	All government depts, and Relief, Rehabilitation and Reconstruction Sub Committee	TDPC	Ward and Village Tract's Administrators, Civil Societies	Short Term

Chapter 6

Monitoring, Review and Updating of the Hlaingbwe Township Disaster Management Plan

6.1 Overview

So far we have spent a lot of time in developing the Hlaingbwe Township Disaster Management Plan but often things didn't go as planned, and even the best careful detailed plan can deviate from the predicted paths. That's why we need to keep a close watch on how the developed Hlaingbwe Township Disaster Management Plan is being implemented. This chapter explains how the Hlaingbwe Township Disaster Management should be monitored, reviewed and updated.

6.2 Monitoring

Monitoring in term of Township Disaster Management Plan (TDMP) refers to measuring the progress made on TDMP implementation, with regards to inputs and processes, as well as outputs and outcomes. Output is the result of what comes out of the processing of an input. Inputs to the TDMP implementation are the resources you mobilized to carry out the activity, and these may be financial, human or other types of resources. Table 6.1 shows key points for monitoring.

Table 6.1 Parameters for Monitoring

No.	Indicators for Monitoring	Description
1	Inputs	Measuring the effectiveness and appropriateness of human, material and financial resources identified and deployed in the Township Disaster Management Planning.
2	Processes	Measuring the means of performance of various tasks identified in the TDMP.
3	Outputs	Measuring the immediate results achieved by the TDMP implementation.
4	Outcomes	Measuring the significant or lasting changes in people's lives brought about by TDMP implementation. Monitoring outcomes take time since it have to be monitored over a period of years.

In other words, as for the context of TDMP, monitoring can refer managing the implementation of the TDMP. During implementation of the TDMP it's necessary to check periodically whether the work is on track.

Conceptually, Hlaingbwe Township Disaster Management Plan has three steps, namely firs step is collection of Base Line Data, second step is Risk Identification, and third is Risk Reduction Step. The output of the first step becomes the input of the second step and so on.

Table 6.2 Monitoring Dimension of the Hlaingbwe Township Disaster Management Plan

No.	Main Components of TDMP	Monitoring Dimension
1	Monitoring Step 1: Collection of Base Line Data	Information of township Administrative Data mentioned in TDMP is till relevant or not
		Information of socio economic Data (land use, population, housing, livelihoods, agriculture, health and education, road network) captured in TDMP is till relevant or not.
2	Monitoring Step 2: Risk Identification	Information on hazards (likelihood, degree of severity, duration, extent of the impacted areas, nature captured in the TDMP has been changed or not due to various reasons such as climate change, development activities etc.
		Vulnerability of communities in respect of each criteria becomes worse or better.
		Whether capacity (resources) of communities and township authorities in respect of each criteria (township level institution DRR capacity, physical resources, social capital, natural resources capital, other capacities) increase or decrease.
		Assignment risk level (None or very Low, Low, Medium, High, and Very High) to each Ward and Village of Hlaingbwe Township in respect of four vulnerability factors

		(population, livelihood, infrastructure, and production) under five hazards is still relevant or not.
3	Monitoring Step 3: Risk Reduction: (Monitoring Institutional Arrangements for Disaster Management in Hlaingbwe township)	A number of meetings that TDPC and four sub committees held in a year, which are to be verified by meeting Minutes, instruction letters, report to District and State DPC.
	Monitoring Step 3: Risk Reduction: (Implementation of Mitigation Measures, Preparedness Measures, Response Measures, Recovery and Rehabilitation Measures)	Each of Mitigation Measures, Preparedness Measures, Response Measures, Recovery and Rehabilitation Measures identified are implemented or not. If not, why.

Each and every monitoring dimension of Hlaingbwe Township Disaster Management Plan is to be monitored through four monitoring parameters which are input, process, output, and outcome.

6.3 Review and Updating

This Hlaingbwe Township Disaster Management Plan is to be reviewed at least once annually and Order no. 22 (f) of National level Standing Order on Natural Disaster Management also clearly states a need to update natural disaster preparedness and emergency actions plan on regular basis. The review is to examine the effectiveness of the plan based on activation, exercise or recommendations from interested parties. Reviews are to be conducted by the Hlaingbwe Township Disaster Preparedness Committee.

When a review identifies a need to amend the plan, a Task Force (a small working group) is to be constituted. The Task Force should have limited members representing various departments and other stakeholders. If necessary, the Task Force should invite DRR experts from other sources such as DRR Working Group.

The draft of the revised TDMP (amendments) prepared by the Task Force is to be submitted to the TDPC and other relevant agencies for further discussion. Comments should be invited for further improvement, and all the relevant comments are to be incorporated.

When the TDMP is amended, each version of the TDMP is to be clearly identified with a version number and date in the header or footer on every page, for instance, version number of current Hlaingbwe TDMP is 3.0 and review date is October 2013. For minor and or administrative amendments, the number after the decimal point only should change, for instance Version 3.1. For amendments incorporating significant change or rewrite the primary version number should change, for instance Version 4.0.

A table is to be maintained in the front of the plan identifying versions and is to be updated whenever a new version of the plan is released.

Version	Date	Prepared By	Comments
1.0	11 April 2011	TDPC	The first version of the Hlaingbwe TDMP was developed as per guidance from Kayin State Government and in accordance with the SO.
2.0	20 May 2012	TDPC	Changes made to reflect current practices as outlined in the Kayin State Disaster Management Plan.
3.0	10 June 2013	TDPC with the help of IOM	More comprehensive version was developed with heavy reference to Guidline on TDMP incorporating internal and external best practices.
4.0 or 3.1			

The Secretary and Joint Secretary of Hlaingbwe Township Disaster Preparedness Committee is to ensure that the contact list in this plan and sub plans are checked for accuracy and updated as appropriate each six months.

A copy of the plan and sub plans excluding controlled annexure documents shall be made available for public viewing at the library run by Information and Public Relation Department. And also the plan will be reproduced and distributed to all members of the TDPC, its sub committees and other stakeholders.