Chapter 6

6. Floods

6.1 Introduction

In Myanmar, majority of big cities and towns, economically strategic places in the country, usually situate along four major rivers, namely Ayeyarwady, Chindwin, Sittaung and Thanlwin. The topography of the country varies from hilly and mountainous areas in the north and east, semi-arid dry zone in the central region, coastal area in the western parts and alluvial plains in the southern delta where Ayeyarwady flows into the Andaman sea.

Figure 16 Major Rivers and Cities

While the existing intricate river systems provide easy access of water transportation, creating prosperous urban centers along the waterways, the flooding in these rivers devastate the lives of the inhabitants[26]. Though water retaining and flood control structures are being built in areas considered vulnerable to floods, with the increased population in the big cities, development of living quarters and settlement lands has been encroaching upon natural catchment areas.

6.2 Flooding in Myanmar

Flooding has always been one of the major hazards in Myanmar, accounting for 11% of all disasters, second only to fire. Between 1910 and 2000, there were 12 major floods. The Ayeyarwady River basin alone, the largest in the country, covers 404,200 square kilometer of the country. Over 2 million people are exposed to flood hazard in Myanmar every year.

Flooding leads to loss of lives and properties, damage to critical infrastructure, economic loss and health related problems such as outbreak of water borne diseases when the lakes, ponds and reservoirs get contaminated. The country receives practically all its rainfall between mid-May and October, the rainy season, during which flooding and landslides are common.

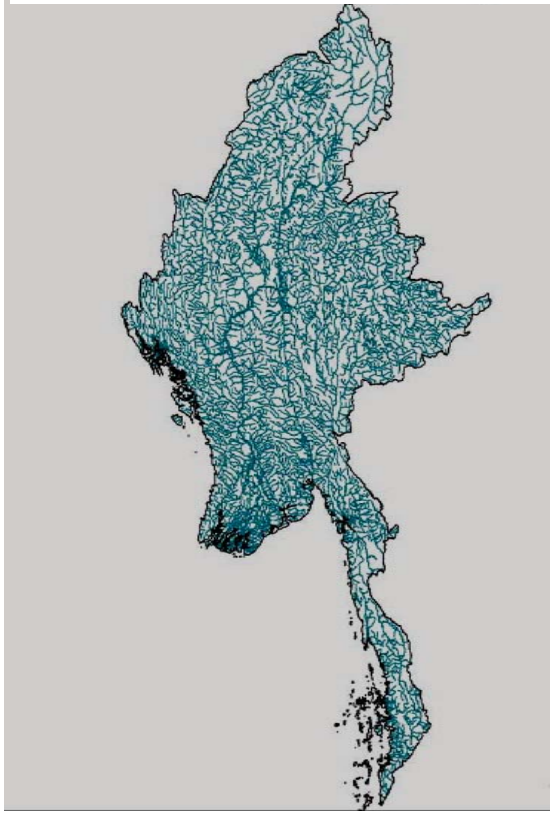
[26] "Figure 23 Source: www.mapsofwprld.com/myanmar/myanmar-river-map.html

In Myanmar, the threat of flooding usually occurred in three waves each year: June, August and late September to October with biggest danger arriving in August as peak monsoon rains occurred around that time.

Different types of floods can be seen in different areas of Myanmar:

- ***Riverine floods*** in the river delta;
- ***Flash floods*** in the upper reaches of the river systems, normally the mountainous areas, caused by the heavy rainfall striking at head water region for considerable period of 1-3 days.
- ***Localized floods*** in urban area due to a combination of factors such as cloudburst, saturated soil, poor infiltration rates and inadequate or poorly built infrastructure (such as blocked drains) and in rural areas due to the breakage of water resistance structures as dams, dykes and levees
- ***Flooding due to cyclone and storm surge*** in the coastal areas[27].

Figure 17: Distribution of rivers and Streams in Myanmar



Riverine floods are most common among all and they happen when the monsoon troughs or low pressure waves superimpose on the general monsoon pattern resulting in intense rainfall over strategic areas of the river catchments.

- In ***Ayeyarwady*** and ***Chindwin*** rivers, the flooding occurs when intense rain persists for at least 3 days over northern Myanmar, the headwaters of the rivers. Most of the flooding in the lower Ayeyarwady and the delta is by Chindwin, when its flood coincides with upper Ayeyarwady floods.
- In ***Sittaung*** and ***Thanlwin*** rivers, floods are duly caused by rainfall associated with low-pressure waves (the remnants of typhoons and tropical storms of South China Sea) moving from east to west across the country.

[27] "Figure 2: Source: Power-point presentation by the Department of Meteorology & Hydrology at "National workshop on Communicating Risks", Yangon, Myanmar, 30-31 May 2006

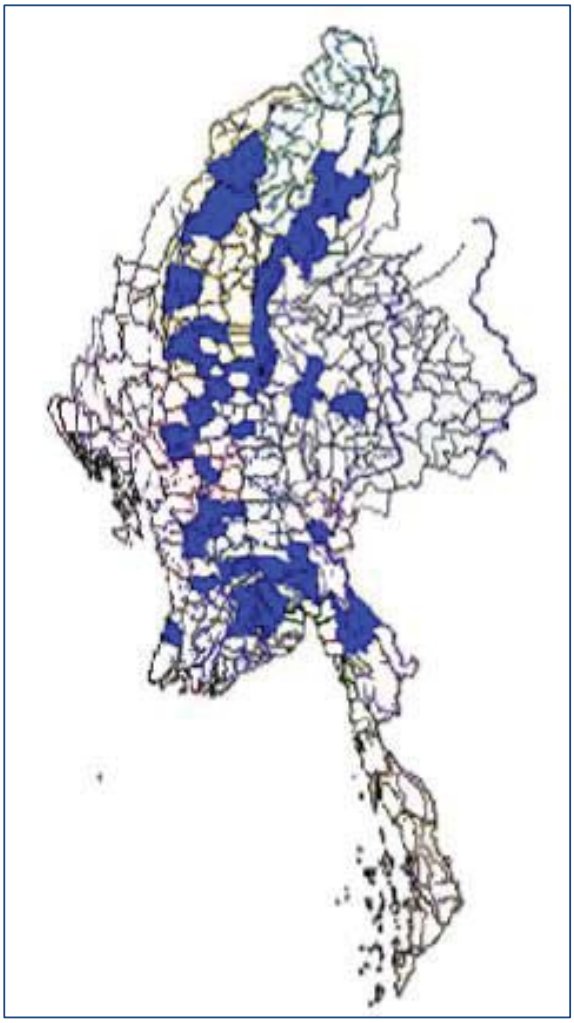
In addition to above mentioned four, other rivers as Bago and Dokethawady (tributary of Ayeyarwady) rivers also set off major floods.

However, annual riverine floods are considered natural phenomenon in the river basins that help clean the farm lands and replenish the ground with nutrients carried from upriver. For those working in fishing industry, the overflowing rivers are welcoming events as they facilitate the fish spawning process.

6.3 Flood Vulnerable Locations[28]

In general, the catchment areas of major rivers in the north and central zone are prone to riverine floods. The Southern Delta faces riverine floods when there is flood tide and high river water flow at the same period. In these areas, the lands are protected from floods by earthen dykes, but there were times when flood overpower the dykes and cause losses of lives and properties.

Figure 18: Flood prone areas in Myanmar



The mountainous and hilly in Kayin, Kachin, Shan, Mon and Chin States areas are threatened by flash floods. In Kachin State, at the confluences of the Ayeyarwady River, the snow in the higher altitude melt and flash floods occur quite frequently at the beginning of summer. Along the coastal region in Rakhine State, floods are secondary hazard generated by cyclones.

Furthermore, the Ayeyarwady River basin and the catchment occupy 60% of the country area traversing Chin, Kachin, Shan States and Mandalay, Magwe, Bago, Yangon and Ayeyarwady Divisions. Floods, in consequence, can occur over a wide range of region.

[28] Figure 25, Source: Power-point presentation by the Health Care Service Committee at "National workshop on Communicating Risks", Yangon, Myanmar, 30-31 May 2006

6.4 Major Floods in the Past (1997-2007)

The Table 20 indicates the past major flood events from 1997 to 2007.

Table 20 Major Floods in Past (1997-2007)

S/N	Location	Date	No. of Affected Village Tracts and Villages	No. of Affected Households	No. of Affected Families	Affected Population	Deaths	Loss (x100,000 kyat)
1.	Homalin, Sagaing Division	8/7/97	5 villages in 2 wards	9,916	9,950	59,594	-	99 *(9,000 USD)*
2.	Homalin, Sagaing Division	25/9/97	63 villages	3,867	3,867	28,399	-	238 *(21,636 USD)*
3.	Paungpyin, Sagaing Division	11/7/97	5 villages	6,652	6,652	44,143	2	-
4.	No. 2 Myoma Ward, Mawlaik, Sagaing Division	13/7/97	16 villages	3,622	3,622	21,897	-	-
5.	No. 10 Myopaw Ward, Myikyina Township, Kachin State	9/7/97	10 villages	4,254	4,471	30,615	4	33 *(3,000 USD)*
6.	Kayan Township, Yangon Division	7/6/97	-	1,189	1,189	5,878	-	-
7.	Bago Division	7/7/97	All villages in 6 townships	6,629	6,629	33,768	50	-
8.	Kayin State	1/8/97	All villages in 5 townships	18,804	18,855	109,840	-	-
9.	Hpa-an, Kayin State	13/8/91	6 villages	2,669	2,669	14,488	-	-
10.	Kyauktaw, Rakhine State	10/7/97	-	1,030	1,030	5,983	-	50 *(4,545 USD)*
11.	Wundwin , Mandalay Division	2/6/01	Thètaw village	463	1,164	2,172	42	-
12.	Monywa, Sagaing Division	18/8/02	-	9,178	9,460	48,746	-	2,535 *(213,909 USD)*

S/N	Location	Date	No. of Affected Village Tracts and Villages	No. of Affected Households	No. of Affected Families	Affected Population	Deaths	Loss (x100,000 kyat)
13.	Salingyi Township, Sagaing Division	18/8/02	-	1,647	1,702	10,216	-	-
14.	Kani Township, Sagaing Division	19/8/02	-	2,042	2,207	12,048	-	2,447 *(222,454 USD)*
15.	Kyaikmaraw Towship, Mon Division	19/8/02	-	829	829	4,686	-	414 *(37,636 USD)*
16.	Hta/16 Ward, Shwepyithar Township, Yangon Division	8/9/02	-	886	886	4,541	-	-
17.	Hkamti Township, Sagaing Division	3/7/03	-	1,230	1,536	8,131	-	-
18.	Kyaukse District, Mandalay Division	9/10/06	All villages in 4 wards	1,443	1,763	7,045	-	351 *(31,909 USD)*
19.	Sagaing Division	11/9/06	6 villages near Yaymyetgyi Lake	770	791	5,372	-	-
20.	Kyaukpadaung Township, Mandalay Division	9/10/06	2 villages	14	18	97	16	-
21.	Bhamo, Shwegu, Myitkyina Townships, Kachin State	24/7/07	-	600	600	3,167	-	-

Note: Exchange rate – 1,100 kyat = 1 USD

6.5 Flood Risk Reduction Initiatives in Myanmar

6.5.1 Forecasting and Warning

At the national level, the main responsibility of flood monitoring, weather forecasting and issuance of early warning falls on the Department of Meteorology and Hydrology (DMH). Under the guidance of the Director General of DMH, a committee headed by the Deputy Director General has been formed to take responsibilities for issuing flood warnings. If the water level of any station along the rivers is expected to reach or exceed its danger level, it is necessary to inform the Flood Committee immediately.

Upon receiving the flood information together with the computed flood forecasts, the Flood Committee discusses the possibility of the flood inundation. The Flood Committee, then, has to decide whether to issue the flood warnings. Once the decision is made, the warnings are disseminated through different channels of communication such as radio, television, newspaper, telegraph and telephone to the administrative authorities of the flood prone areas. If the expected flood is a severe one, the warnings are broadcast frequently (every 3 hours) through Myanmar Broadcasting Services (TV and Radio).

6.5.2 Flood Risk Mitigation

The key agency for flood risk mitigation in the country is the Irrigation Department under the Ministry of Agriculture and Irrigation. Irrigation Department and Forest Department are cooperating to undertake the conservation and reforestation activities in the important watershed areas. Ministry of Health, in addition, has identified, in close association with Department of Meteorology and Hydrology, 48 flood prone townships in the country for their planning purpose. Every year, from the beginning of the rainy season, public awareness raising programs are in place such as radio talks, radio plays, newspaper articles and TV short programs.

In terms of community level initiatives, Myanmar Red Cross Society is the leading force in implementing Community Based Flood Management capacity building programs in selected flood vulnerable areas in the country.

6.6 Trends in Flooding

In the past two decades, the duration of Monsoon is found to be getting shorter but rainfall becomes much more intense and heavier. For instance, in 2008, the annual rainfall surpassed normal amount significantly in Kachin, Upper Sagaing, Mon, Yangon, Ayeyarwady, Kayah, Kayin, Tanintharyi, Bago and Rakhine. Floods occurred along all major rivers during peak monsoon and in Monywa and Bago, the second maximum water levels in more than 43 years were recorded and the third maximum water level in 44 years was recorded at Shwegyin in 2008.It has been indicated in the studies from the Department of Meteorology and

Hydrology that at the stations located in the higher latitudes (central and northern parts), a change from warming to cooling has been observed since 1977 and for stations located at somewhat lower latitudes (Deltaic and Southern parts), an alternate pattern has been recorded.

6.7 Looking Forward

In Myanmar, the need for irrigation is highest in the central dry zone while the delta is more concerned with drainage and flood protection problems. Heightening the flood problems is the considerable siltation of the major waterways. It is recorded that 299 tons of silt get deposited into Ayeyarwady River annually. As a result, the frequency and severity of the flooding at many locations along the rivers are increasing.

Furthermore, the impacts of climate change and global warming can make the water level reduce in the central Dry Zone, resulting in water shortages, while the water level in the Delta Region will rise due to the change of sea level. With the intensified concerns over the global climate change, there is an urgent need to address the relatively low level of technological capability and the lack of appropriate trainings on these issues.

Construction of dams and flood retaining structures can, to some extent, reduce the flood damage but there requires a balance between the development of such infrastructure and the maintenance of natural wetlands and river basins. Disaster impact assessments should be carried out before a development project can be approved, specifically if they are to take place in fragile river catchment areas where floods are natural phenomenon.

Equally vital are the adoption of land use management practices and the enforcement of land use regulations, to be the integral parts of the development process. Nowadays, the urban population is growing significantly and most cities being situated within the reach of the any major rivers, it is imperative to employ measures to mitigate and reduce flood risks.

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