

IMPACTS OF FLOODING AND RIVER BANK EROSION ON LOCAL PEOPLE OF HINTHADA TOWNSHIP, AYEYARWADY REGION

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Abstract

Flooding and River bank erosion have emerged as one of the environmental problems in Hinthada Township. Hinthada Township is located on Ayeyarwady Deltaic Area known as Myanmar Granary and is located on the western Bank of Ayeyarwady River. As the study area is located on the bank of Ayeyarwady River in the deltaic area, flooding and bank erosion occur every year. At present, flooding and bank erosion are more severe in the area due to climate change and agricultural land was eroded yearly. Because of flooding and bank erosion, status of education, health and economy of the local people are low. Existing fertile kaing land support crop cultivation and local farmers cultivate seasonal crops especially kaing crops in flood free period. To get higher income through crop cultivation, farmers practice adaptable ways in crop cultivation. The objectives of the paper are to understand flooding and bank erosion in the area, to study loss of agriculture land, to assess the socio economic impacts of river bank erosion and to find the perception on adaptability and resilience of the inhabitants. Field observation was thoroughly done to get detail understanding on impacts of flooding and river bank erosion. To illustrate local people perspectives on bank erosion, focus group discussion was done. To present the paper, qualitative quantitative mixed method will be applied.

Key words: flooding, bank erosion, socio-economic conditions of local people

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Introduction

The Republic of the Union of Myanmar is prone to multiple natural hazards including cyclones, floods, drought, landslides and earthquakes (FAO,2015). Natural hazards cannot be prevented from occurring, but their impacts can be reduced. Flood and Riverbank erosion are dynamic and natural processes which have an adverse impact on livelihood of the local people. River bank erosion is the wearing away of bank materials of a river and a dynamic process causing the loss of agricultural land.

In Myanmar, Ayeyarwady Region is known as Myanmar's Granary and it possesses *Le* land, *Ya*, *Kaing Kyun*, *Garden* and *Dhani* Land. Most population of the Hinthada Township lives in rural areas and they absolutely depend on agriculture. In the dry season, farmers lived near the bank of Ayeyarwady River cultivate crops such as chili, vegetables, flowers, maize and etc on Kaingland. Ayeyarwady is the most affected region in terms of destroyed crops with more than 100,000 hectares (247100 acre) of cultivated land washed away due to floods and a total loss of crops (FAO,2015).

Drainage condition of Ayeyarwady River at Hinthada Township is poor because of flood plain and deltaic area (Lwin Lwin Cho, 2017).

River erosion means current of the river hit the banks of rivers and broken the banks, which create most sensitive and dangerous situation in river areas (Khan,2012).At the lower course, the river overflows its banks and its velocity decreases outside the river channel. River deposits and there is shallower water on the inside of a river. It is one of the factors forcing flooding and bank erosion.

Flood and River bank erosion are dynamic and natural processes which have an adverse impact on livelihood as homesteads are destroyed, cultivatable lands are wiped out and employment opportunities are reduced (Acharjee, 2013). Flooding is more severe in the study area and recorded flood occurred in 2015. Water level reached more than 2.1 meter(7 ft)in August, 2015. At present, flooding and bank erosion became worse and local people lost their farm land. In Hinthada Township, the impacts of flooding and erosion on the socio economic lives of the poor villagers are distinct.

Severe flooding caused bank erosion and area of cultivated land owned by the local people decreased distinctly.

In the study area, Pegyikyun, Letpanhla, Kywetkyun, Theyoe, Kyaukye, Tarngote, Phaunghteik, Tharyaraye and Shwegukyun villages are severely affected by flooding and river bank erosion. Kyaukye Village possessing more than 200 households and cultivated area of more than 800 hectares (2000 acres) on Kaing land is nearly being disappeared during 2 year period.

When Hinthada is at danger level, water level at these village tracts is 0.9 meter 993ft high. But water level usually reaches more than 1.5 meter (5 ft) and water level reached to 2.1 meter (7 ft) in August, 2015. In the rainy season, crops cannot be cultivated in Tarngote, Pegyikyun, Letpanhla and Kywetkyun village tracts in the rainy season to flooding and young adults in the area move to other place as migrant workers to get income. The river bank erosion causes huge destruction of agriculture land and loss of house, schools, etc. Flooding and river bank erosion is important because river erosion leads to huge socio-economic losses and has been great impact on eroded villages.

Study Area

Hinthada Town is located in the Northern portion of the Ayeyarwady Region. It lies between North latitudes 17 °15' and 17° 39' and also between East longitudes 95°13' - 95° 30'. It is situated on the deltaic area of Ayeyarwady Region and Southeastern part of Hinthada Township. As it is situated between Ayeyarwady and Ngawun rivers, the area suffers flooding and bank erosion badly.

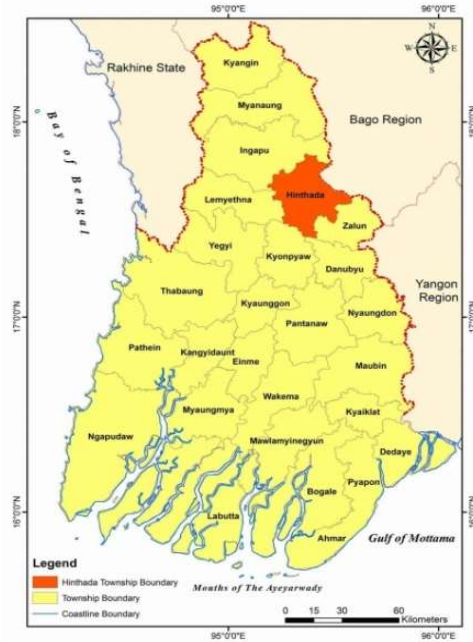


Figure 1: Hinthada Township in Ayeyarwady Region
 Source: Agriculture Atlas (2002)

Objectives

Objectives of the paper are:

- to understand flooding and bank erosion in the area,
- to study loss of agriculture land,
- to assess the socio economic impacts of river bank erosion and
- to find the perception on adaptability and resilience of the inhabitants

Methodology

Both primary and secondary data were collected in order to understand socio-economic conditions of local people and reach clear results and conclusion. For examining the effect of flooding and river bank erosion on the local people of Hinthada Township, 10 village tracts were mainly chosen as samples from affected village tracts. These areas located on the southern

bank of Ayeyarwady River are now actively witnessing flooding and bank erosion and effects on the local people are more severe. Questionnaires were distributed to 10 households in each village tracts and questions were mainly concerned with education, health, the loss of their property and their coping mechanism. The patterns of rehabilitation and their perception about the causes of erosion and the way they continuously try to adapt were observed.

Discussion and focused interviews were conducted with authorities, heads of village tracts, old aged person lived in the area to gain insight into the problems related to bank erosion and its impacts on the socio economic conditions of the local people.

Results and Findings

Flooding and River Bank Erosion

River bank erosion is a natural process influenced largely by rainfall, soil structure, river morphology, topography of the river and adjacent areas, and floods; it can also be influenced by human activities such as intensive agriculture, settlement expansion, deforestation, etc (Yousifet al, 2015). But, in the study area, erosion processes are mainly caused main by the continuous run-off over a slope.

Hinthada Township has been affected by massive floods almost every year. Flooding became severe due to change in amount and distribution of rainfall caused by climate change and shallow river channel of Ayeyarwady caused by deposition. Local people lost their agricultural land and flooding and river bank erosion have negative impacts on local people.



Plate 1: Bank erosion at Theyoe Village
(27.6.17)



Plate 2: Bank erosion at KywetKyun
Village (27.6.17)



Plate 3: allocation the Monastery by Bank
erosion at Kyaukye Village
(27.6.17)



Plate 4: Bank erosion at Kyaukye
Village (27.6.17)

In Hinthada Township, Pegyikyun, Letpanhla, Kywetkyun, Theyoe, Kyaukye, Tarnote, Phaunghteik, Tharyaraye, and Shwegukyun villages located western part of Ngawun and Ayeyarwady rivers suffer severe floods and bank erosion. In these villages, the erosion rates varies from 1.8 meter (6 ft) to 77 meter (264 ft) per year (Wint Wint Htun, 2016). Among them, Kyaukye Village suffered most severe bank erosion and nearly the whole village was eroded.

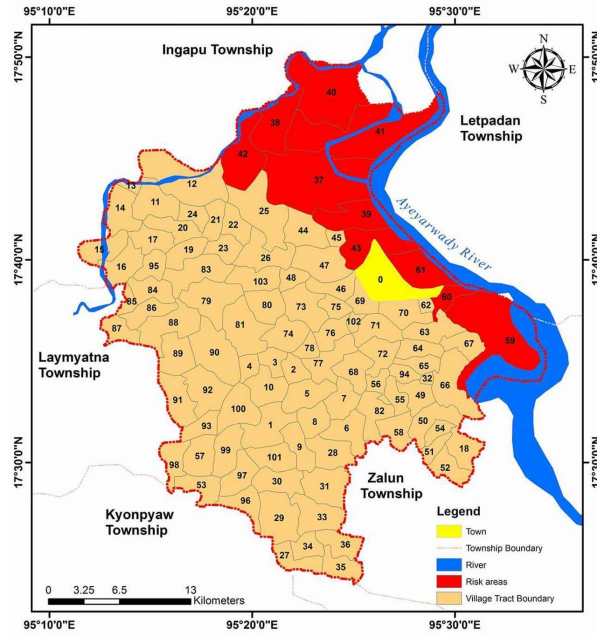


Figure 2: Village Tracts affected by flood and river bank erosion
Source: Field survey (June, 2017)

Total distance of erosion at Hinthada Town in western river bank between 2009 and 2015 was 720.4 m (1714.55ft). Erosion rates in the front flood land area of Hinthada Town are still increasing (WintWint Htun, 2016).

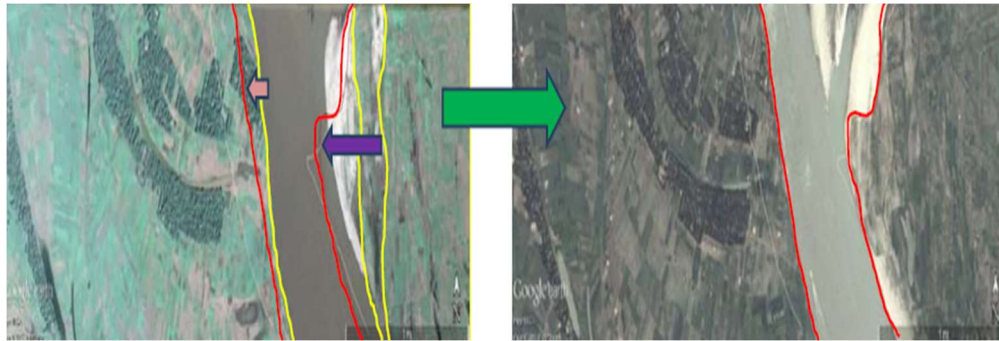


Figure 2:Bank erosion at Kyaukye Village
Source: Ye Khaung Htun (2016)

The study area is topographically flood plain areas and affected by river bank erosion. In the study area, bank erosion occurs frequently and affects local people and their property in the region.

Impacts on Socio-economic Conditions of Local people

In order to understand socio economic conditions of local people affected by bank erosion, a questionnaire survey and semi-structured interview were conducted.

According to questionnaire results, 62 percent of the respondents suffer the flooding period of between 45 and 50 days and 38 percent less than 20 days. The high flood period is the end of July, August and September locally called as mid and the end of the rainy season. Local people know that flooding and bank erosion became more severe and it is due to shallow river channel of Ayeyarwady River.

Local people get supports during the flood periods from the monks such as Sayadaw Ashin Nyanaissara, etc and philanthropic social organizations like Gayunar Alindan.

According to structured-interview, 83 percent of the local people do not move to the places instructed by local authorities and only 17 percent to monastery that is designed as temporal shelter for flood victims.

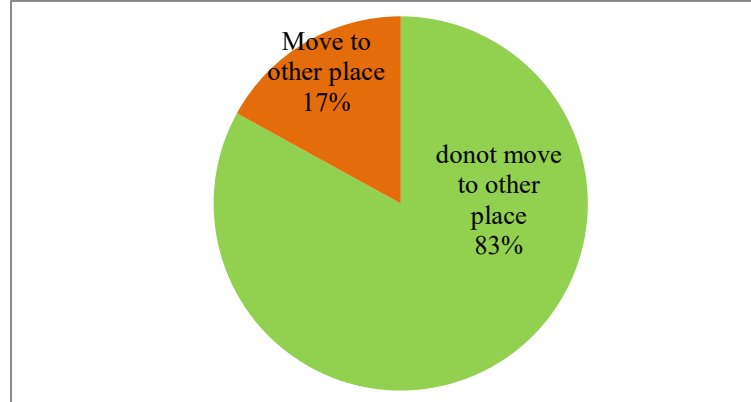


Figure 3: Respondents' answer on movement to other places

Source: Questionnaires' results(June, 2017)

Allocation of Houses

According to questionnaire's results, 33 percent of the population allocate their home once during 10 years period, 19 percent twice and 48 percent three times.

Aung Chan Tha village no longer exists and people live in the village move to Kyaukye and The Yoe villages. In Let Pan Hla Village, people allocate their home on pasture as their former places were eroded.

Loss of Property and the Economic Stress

People lived in Kyaukye, Tarngote, Phaunghteik, Tharyaraye, and Shwegukyun villages lose their agricultural land because of bank erosion. Bank erosion caused decrease in agricultural land and the income became low.

River bank erosion and flooding also have very serious psychological effect on local people due to loss of home, property, land and etc. Because of bank erosion, people buy land plots on Kaing Land of other villages that are away from bank erosion. It is found that about 5 or 6 households collectively buy 0.25 hectare (an acre) of Kaing land and it is again divided into small plots on which new houses were built. The price of 0.25 hectare (an acre) of Kaing land is about 2,000,000 ks. After allocation their homes to new places and some people are in debt.

Loss of Agricultural Land

Most people cultivate Kaing crops in their Kaing land and it has been eroded at the rate of 0.4 km (0.25 miles) per year. Therefore, they lost their agriculture land and area of cultivated land decreased. Loss of agricultural land is a very common effect of flood and erosion in the area. Due to bank erosion, local people have been losing a vast area of land every year. Therefore, cultivated area is more limited and income is getting low. In the area, kaing crops are mainly grown after receding river water. Cultivation period was shorter than other areas that are free from flooding. Local people highly depend on the land to get income and the loss of land is a major problem affecting socioeconomic condition of the area.

Poor Transport System

As the area is annually affected by floods, the earth-roads in the villages are poor in condition. While the villages are flooded, local people use boats to go one place to another. When the flood water retreats, these roads are muddy and it affects socioeconomic condition of the local people. Every household possesses a boat for the purpose of using in the flood period.



Plate 5: Poor Road at Gaungsaykyun Village (24.6.17) **Plate 6:** House and boat at Gaungsaykyun Village (24.6.17)

Problems on Education

Most villages have a primary school and most of schools are attached with monasteries. But inundation is annual phenomena and it is difficult for children to go to school in the flooding. Problems on the class irregularity, low accessibility, insecurity, etc hamper the education of the children.



Plate 7: School at Gaungsaykyun Village (24.6.17) **Plate 8:** Monastery at Gaungsaykyun Village (24.6.17)

According to questionnaire survey, 20 percent of the local people said that they do not allow the children to go to school because of insecurity caused by flooding, 32 percent said because of low accessibility and 48 percent said because of lack of teachers and school closing due to severe flooding.

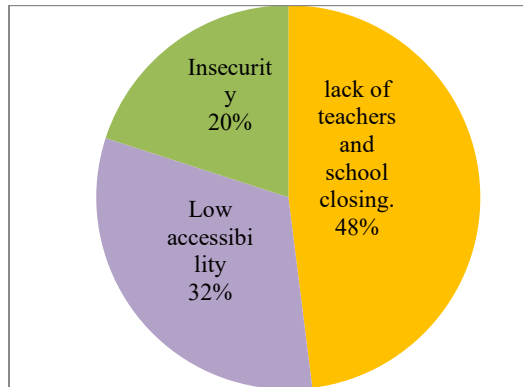


Figure 4: Respondents’ answer on Education

Source: Questionnaires’ results (June, 2017)

Medical Problems

During the flooding period, authorities announced that to shift to other for the purpose of protecting the local people because these areas do not have adequate medical facilities and staff. But, local people do not move to other areas.

According to field survey, there is no problem on snakes in villages such as Gaungsaykyunin flooding period and the problem is found in Pegyikyun, Letpanhla, Kywetkyun, Theyoe, Kyaukye and Tarngote villages. For that case, there is no sufficient medicine and staff in the flooding period.

Survival Strategies

As flood and bank erosion are natural processes, therefore it is not possible to provide complete protection from these hazards. Local people can minimize the adverse effect of flood and erosion by adopting various household techniques. Household’s ability to adapt with flood and river erosion depends on people’s socioeconomic and environmental conditions,

such as education, income and occupation. Though, flood and river erosion cause the loss of land and properties, people's indigenous coping techniques could significantly reduce their vulnerability without outside assistance. Most of the houses raised the floor above the possible flood level (Plate 9). Moreover, most people possess boats to be used in flood period (Plate10).



Plate 9: house at Gaungsaykyun Village (24.6.17) **Plate 10:** house at Gaungsaykyun Village (24.6.17)

According to questionnaires' results, they get information on flooding and bank erosion from radio. According to interviews, some adults get information on face books.

Adaptation Strategies for Crop Cultivation

As the local people depend on agriculture for their income, pulses, black gram, tomato, Accra, cucumber, chilli, pulses and tomatoes are grown Kaing land in flood free period.

Cropping Calendar

M	A	M	J	J	A	S	O	N	D	J	F
		Accra/Cucumber		flooding period		Tomatoes / Pulses			Chili		

Source: Interview (15.7.17)

According to interviews, accra and cucumber are widely grown in May and June before monsoon sets in and early monsoon period (Plate 12). Because of severe flooding in July and August, farmers do not grow in these

period and young adults move to other towns and Yangon Region to get income in the rainy season.

In August, the people germinate the tomatoes seeds on the temporary buildings in the rivers and in front of their houses. In September, they grow these nurseries on the Kaing land. Therefore, their tomatoes flower and fruit early and the price of tomatoes is high when they sell them to the market due to low supply (Plate 12).

At the end of the rainy periods, growers cultivate tomatoes and pulses. In summer, chili is widely grown on Kaingland due to high market demand.



Plate 11: Accra cultivation on Kaing Land (8.7.17)

Plate 12: temporarily building to germinate tomatoes seeds in August (21.8.17)

Machinery Use in Cultivation

The Kaing lands in the area are fertile and crops can be grown successfully. It is necessary to get long cropping period for the intention of getting income from agriculture by practicing double or triple cropping. To get long cropping period, the farmers use agriculture machinery in ploughing for the purpose of reducing time for tillage. Growers do not have sufficient amount of investment to buy agriculture machinery and these are rent from private owners and it is difficult to get in time. The farmers want to apply agriculture machinery to get long time span for crop cultivation.

Local People's Perception on Rivers

The extent of loss to the bank erosion becomes worse in the area. According to interviews, Aung Chan Thar Village having more than 250 households was located near Kyaukye Village. Last 20 years ago, it was disappeared due to bank erosion and people moved from Aung Chan Thar Village established Kyaukye and Ngareindan villages west of Aung Chan Thar Village. At present, Kyaukye Village is being severely eroded and disappeared quickly.

According to questionnaires' results, 19 percent of the respondents said that river gives disadvantages to them, 68 percent advantages and 13 both advantages and disadvantages.

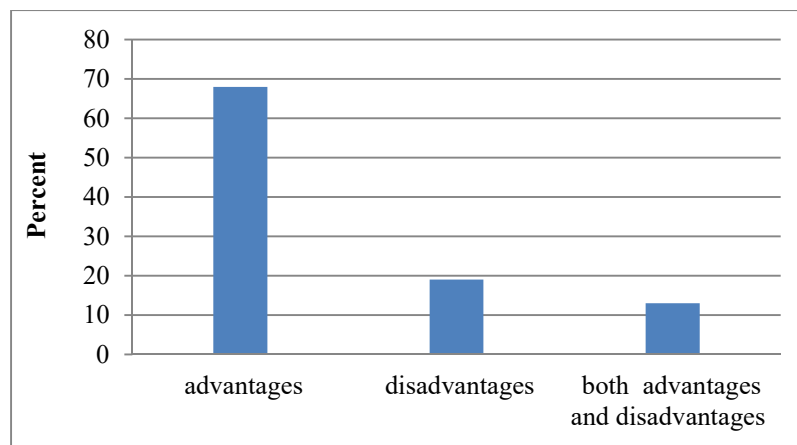


Figure 5: Perception of Local people on migration
Source: Questionnaires' results (June, 2017)

Conclusion

Floods and river bank erosion are common problems for the people living in coastal and deltaic areas. Like other people lived in coastal and deltaic areas, people in Hinthada Township encounter the problems on floods and river bank erosion. As effects of flooding and erosion increased in the area due to rainfall irregularity caused by climate change and shallow river channel caused by deposition, local people encountered socio-economic problems and their socio-economic conditions are low. They lost their

agriculture land that is major pillar to their economy and bank erosion reduces their income through the reducing agriculture land for crop cultivation. Because of flooding, education and health care level of the study area is somehow low.

It is needed to raise local peoples' awareness for the purpose of protecting their areas from bank erosion. It is necessary to do environmental researches in the risk areas. Regional hazard and risk assessments should be done and local people will have to be persuaded in protecting their land. Moreover, permanent settlement should be avoided in risk areas and it is needed to do mitigation practices and contributing to the community base level. It is needed to lend long term loan to farmers for the intention of buying agriculture machineries to get more income from crop cultivation, major economy of the area.

On the other hand, local authorities should plan to pay flood insurance for local people. It is needed to do flood and bank erosion mitigation, installation of floods warning system and Mass education to protect bank erosion and to upgrade socio-economic conditions of the local people.

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