A Geographical Study on the Potentials of Wetland: A Case Study of Nampha *In*, Banmaw Township

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Abstract

The research paper emphasizes on the potentials of wetland in Banmaw Township from various geographical points of view. Nampha *In*, a wetland in northeastern part of Banmaw Town, is important for fishing, agriculture, hunting and the collection of natural resources for the livelihoods of local communities. Wetland is saturated with water, either permanently or seasonally. Nampha *In*, a wetland area of Banmaw Township is formed by Taping River and Hkai Pa *Chaung* especially during the rainy season. It provides fish to local people all the year round. About 46 species of fish are found in the lake. Its adjacent unflooded highland areas or the water-retreated lowland areas of the *In* are most useful for crop cultivation at least once a year. Depending on the wetland of *Nampha In*, major occupations such as fishing, agriculture and floating fuel wood are done. Although there are many natural resources in Nampha *In*, very less number of occupancy still utilized the natural resources of Nampha *In* area.

Key words: Banmaw Township, Nampha *In*, wetland, fishing, agriculture, floating fuel wood.

Introduction

Wetlands are one of the world's most important environmental assets, containing a disproportionately high number of plants and animal species compared to other areas of the world. Wetland is a low area of land that is covered with shallow water and plants. Many plants, fish and birds live in wetland area. Wetland area maintains a lot of water. This storage area prevents natural flooding. This water also goes into the ground and recharges the ground water. Wetland plants can clean sewage and dirty or polluted water. Wetland is saturated with water, either permanently or seasonally. It takes on the characteristics of a distinct ecosystem (Wikipedia).

Study area

Nampha *In* is in the eastern part of Banmaw Town. It lies between the Latitudes of 24˚ 17′ 40″ N and 24˚ 18′ 13″ N and between the Longitudes of 97˚ 17′ 22″ E and 97˚ 25′ 14″ E. It is about 9 kilometers (5 miles 4 furlongs) away from the downtown area of Banmaw. It has an area of about 474.6951 acres and an elongated shape. It is bordered by Banmaw University in the north, Nampha Ward in the south, Momauk Township in the east, and Taping River in the west (Map 1.1). As the lake is situated on the left bank of Taping River, it is inundated by the

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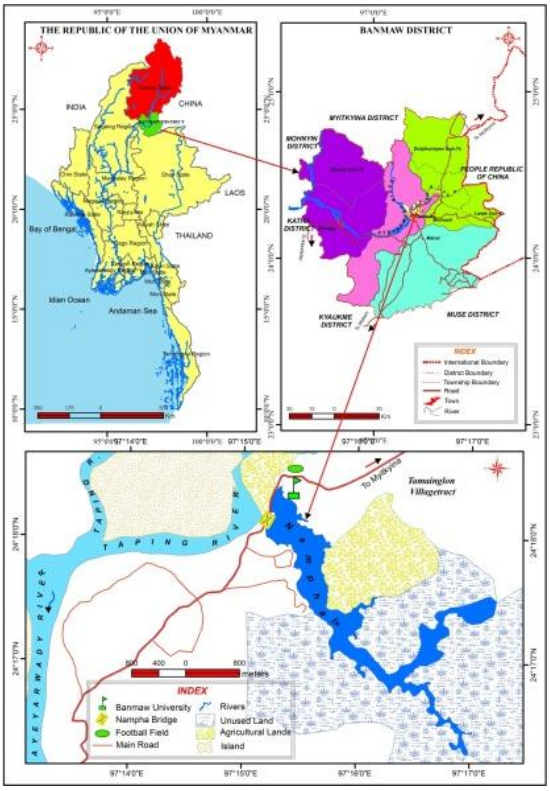
river during the monsoon season. In the high water season, it is about 3.29 km long and 24.14 km wide with a depth about 3.66 m. In dry season, its length generally reduces to 1.61 km and the width to 17.70 km with the depth over 3.13 m (San San, 2013). The lake area falls within the subtropical climatic zone. Its dominant soil type is alluvium left by Taping River during its retreat of flood. Whenever the Taping River flood, the water flows into the *In* and becomes full of water, resulting in widening of *In's* water surface two and a half times that of the low water level. When the flood water retreats, water gradually flows out from the *In*, leaving fertile alluvium on the *In's* bed. Depending upon the *In's* water, fishery is practiced. Moreover, on the non-waterlogged bed cultivation of paddy and vegetables are done. Therefore, it can be said that Nampha *In* plays an important role in the economic activities of its surrounding area.

Aim and objectives

The main aim of the research paper is to find out the potentialities of resources in Nampha *In*. The objectives which may provide the main aim are:

- to measure the wetland area in both high and low water seasons,
- to categorize the human activities around the wetland area,
- to study the threatening factors to wetland (Nampha *In*), and
- to find out how many people depend on wetland resources.



Map 1.1 Location of Nampha *In* Area in Banmaw Township

Source: UTM Map No. 2497_03, 2497_0.4, 2497_07, 2497_08

Materials and methods

Physical bases, occupational structure around the wetland area, number of population who rely on the resources of the wetland are considered as research materials for this paper. To acquire necessary data, field survey and observation methods were conducted. Moreover, to know the human utilization on resources of the Nampha *In,* interviewing with the local people was also made. Qualitative approaches are applied to examine the potentialities of the resources of the study area.

Physical features of the study area

The physical factors include location, topography, drainage, geological setting, climate, soil and life within the wetland. These factors affect the wetland restoring and living. The study area is a drainage basin area (Figure 1). Topographically, the elevation is about 362 ft above sea level at the mouth of inlet (Hkai Pa *Chaung*), about 348 ft above sea level at the mouth of outlet (Taping River) and about 345 ft above sea level at the centre of the Nampha *In*. Hkai Pa *Chaung* and Awng Lawng *Chaung* flow from Momauk Township and enter the Nampha *In*. The water is standing the whole year at the center of Nampha *In*. Its depth is about 6 to 9 feet.

Climate is one of the natural elements which influence natural ecosystem. The climate has much influence over wetland utilization particularly wetland area restoring, ecosystem and agricultural activities. During the 30-year period from 1985 to 2014, the average mean temperature was 77.28˚F, the maximum temperature was 89.97 ˚F and the minimum temperature was 64.60 ˚F. The average total rainfall was 74.16 inches. The study area receives subtropical monsoon climate (Cwa) according to Koppen's climatic classification.

Soil is also an important factor for the agriculture sources, wetland sedimentation and life species. In the study area, silty clay loam and silt loam are found at the western part of Nampha *In* and clay loam, sand clay, and sandy loam with gravel trace at the head of Nampha *In* according to the results of grain size analysis of soil samples and previous research data. Moisture content is 20% to 50 % in some of soil samples. According to the soil data, variety of crops can be grown in the study area and variety of animals and trees are found in the study area.

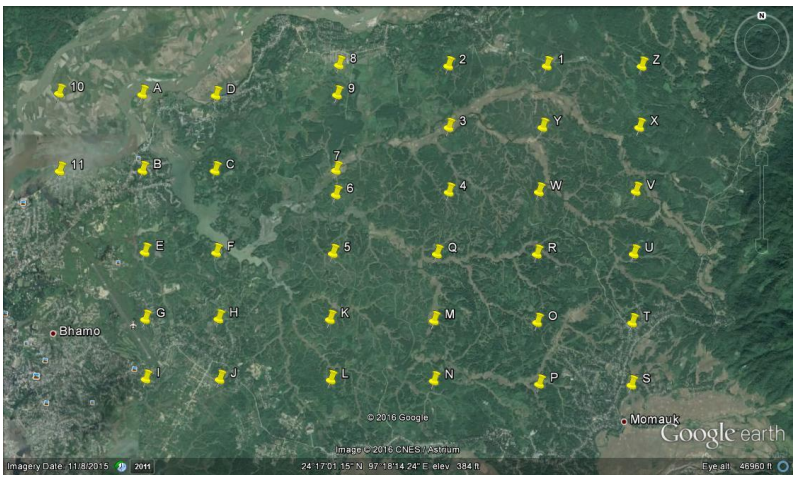


Figure (1) Drainage Basin Area of Nampha *In*, Banmaw Township

Source: Google Earth (2016)

Field survey and measurements

The channel cross section form is described by using a number of variables. Fundamental measurements of width, mean depth and velocity were made to define the size, shape and discharge. The width is directly measured by stretching a plastic rope in meter scale. Water depth was measured by mechanical electronic Depth Sounder and sounding rod (hand instrument). Velocity was measured by electronic current meter or flow meter. According to the field survey and measurement (3-11-2015), the width of the outlet cross section site has 14 m, the average depth water has 6.2 m and the total area is about 219.42 m^2. The cross-section of Nampha Stream is shown in figure (2). To calculate the total discharge, the following formula is used.

$$Q = A \times Vm \quad = m^3 sec$$

Where, Q = the total discharge,

A = the total area of the cross section area and

Vm = mean velocity of the inlet or outlet of the cross section sites

The total discharge of inlet cross section site (at the mouth of Hkai Pa *Chaung*) was 0.0326 cubic meter (7 gallons) per second and outlet cross section site (near 1/50 Nampha Bridge) was 4.607 cubic meter (1,013 gallons) per second. According to the measurement, it can be found that the second cross section site (outlet) discharge is 4.5744 cubic meters per second notably more than the inlet site. At that time, the total capacity of water storage was 1,467,449.99 cubic meter or 322,800,263.7 gallons.

Inlet (at the mouth of Hkai Pa *Chaung*)

Outlet (at the mouth of Nampha *Chaung*)

Measurement of Flow Rate and Depth of Water

Source: Field Measurement (3-11-2015)

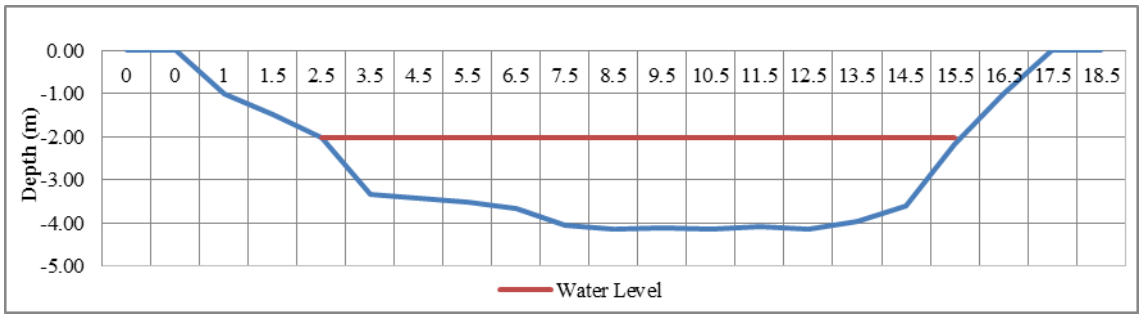


Figure (2) Cross-section of the Nampha Stream at No. 1/50 Bridge

Source: Field Observation (3-11-2015)

Life within the Nampha *In*

A wide variety of plants and animals are found in Nampha *In* area.

Flora

Many aquatic types of vegetation are distributed within the Nampha *In*. Plants found in the study area can also be divided into four main groups: submerged water plants, floating water plants, emerged water plants, and surrounding trees and shrubs.

Submerged water plants (tall grasses) and floating water plants such as *Beda* (Water Hyacinth) distributed everywhere in the Nampha *In*. Emerged water plants such as *Kya* (water lily) are found in the middle of Nampha *In*. The surrounding trees of *In* area are *Thezin*, *Ok-hne*, *Phet-aung*, *Gon-min*, *Ye-tha-Phan* (Country Fig), *Taw-kok-ko* (Rain Tree), *Taw Theyat*, *Kyaung-sha* (Indian Trumpet), *Ban-bway*, *Kin-mon-chin*, *Thin*, *Ma-u*, *Pilaw-Pinnan* (Cassava), Cane, variety of Bamboo, *Kyu* (Reed) and *Zee*. The south-western portion of the lake was found as an area covering natural swamp forest and thatch forest.

Submerged Water Plants (Tall Grasses)

Floating Water Plants (Hyacinths)

Emerged Water Plants (Water Lily)

Surrounding Trees and Shrubs

Surrounding Trees and Shrubs

Source: Field Observation

Fauna

The wetland provides valuable habitat for various species of birds. Wetlands are especially important for waterfowl and migratory birds. 18 aquatic birds' species are found in Nampha *In*. The common types of aquatic birds found in the Nampha *In* are Sit-sa-li, Wan-be, Byaing, Ye-kyet, Tit-ta-du, Lin-wet, Byaing-auk, Kywe-kyaung-byaing, Wai-tharli-byaing, and Ye-ngon (Ei Ei Win, 2018).

Fish live in wetland than in nearby rivers and streams. A wetland must have permanent deep water for fish survival. Therefore, most of fish species are found at the center of Nampha *In*. About 46 species of fish are found in the lake. The most common types of fishes caught in the Nampha *In* are Nga-gyee (Stinging cat fish), Nga-khu (Common cat fish), Nga-nu-than (Butter cat fish), Nga-but (Shark wallago), Nga-khone-ma (Ptain-fish) Nga-phe (Grey feather back), Salapia (Tilapia), Nga-shint (Shore eek), Nga-thaing (Moulmein labeo), Shrimp and small fishes (San San, 2013). Other aquatic species such as toad, bats, squirrels and snake are found in the Nampha *In*.

Water Bird Wan-be

Economic activities of Nampha *In*

Nampha Ward is located in the vicinity of Nampha *In* and the livelihood of people living in Nampha Ward relies wholly or partly on the wetland (Nampha *In*). The people earned their living by cultivating summer paddy, vegetable, fishing, and raising animals. The total population of Nampha Ward was about 3,216 persons, 690 households and 690 houses in 2015. Of these 3.2 percent were fishermen, 1.02 percent were farmers and less than 1 percent was odd-job workers in this lake area.

According to the field observation, it is found that there are three principle types of economy being practiced: crop cultivation, fishing, floating fuel woods.

Crop cultivation: Many diversification crops were cultivated on the flooded area. Out of the total 690 households, 39 households (5.65%) are engaged in agriculture on the floodplain of Nampha *In*. Summer paddy, maize, groundnut and vegetables are grown on the alluvial soils depending on the location in winter and summer. Nearly all farmers grow summer paddy. The farmers mostly grow maize or others in accordance with market demand. Less number of farmers grows vegetable or flower not only for their family need but also for local market with the limited area. Around the lake area, some people grow pineapple, banana, maize and vegetable.

Paddy Cultivation

Cabbage Cultivation

Groundnut Cultivation

Maize Cultivation

Flower Cultivation

Tomato Cultivation


Cauliflower Cultivation Chili Cultivation

Source: Field Observation

Fishing: Nampha *In* experienced flooding every year during the rainy season. For about 4-5 months (June to October), the flood plain areas are not able to be used for crop cultivation and during that period some farmers are engaged in fishing in small scale. According to the high or low water season, fishermen population changes from 35 persons to 105 persons in a year. It can be noted that more population of fishermen are observed during summer and winter than those of rainy season. All fishermen use the traditional methods and fishing net. Fish farming and duck raising are found in the wetland area in small scale.

Fisheries

Duck Raising Fish Farming

Source: Field Observation (4-11-2015)

Floating Fuel Woods: Although electricity supply is available, almost all households in Nampha Ward use firewood for cooking and other purposes. Logs are cut from the upper part of Taping River and are floated along the river. At the mouth of the lake, the logs are carried by small engine boat and, they are chopped into firewood. Moreover, local people have extracted firewood from the Nampha *In* wetland area.

Firewood carried by small boat

Firewood

Source: Field Observation (4-11-2015)

There are no waterways connected village to village within the Nampha *In*. The wetland water is used to carry the farming equipments by small engine boats within the *In*.

Transportation

Source: Field Observation (4-11-2015)

Results and Discussion

Wetland benefit or potentialities of resources in Nampha *In*

Wetland is very important source of natural resources, upon which the rural economy depends. Wetlands provide many substantial benefits not only to local society, but also to the people, who live far away from wetlands. The benefits of Nampha *In* are:

1. It provides positive effects for agriculture in flooded area and its surrounding areas.
2. It supports grazing for cattle.
3. Water availability is one of the major strengths for the economic development of local people and the richness of biodiversity.
4. Water can utilize by people for fishing, transport, irrigation and for domestic use. Moreover, it can be used drinking water for livestock.
5. Water may be able to filter down into the local or regional groundwater system.
6. The lake water is possible to irrigate for nearby farm lands. Moreover, the water can support for living aquatic organisms and hydrophyte plants. Those plants provide as a home land for migratory birds. Natural vegetation or wetland plants can clean sewage and dirty or polluted water.
7. Many hyacinths (*beda*) are found in Nampha *In*. It can purify the lake water.

8. The lake can serve as a flood water control for its surrounding area.
9. It provides habitat for plant and animal species.
10. It provides timber, stock fodder, and firewood for local people.

Environmental challenges for wetland (Nampha *In*)

The environmental challenges of Nampha *In* are the followings.

1. Increasing waste dumping has caused many challenges for the wetland. Particularly, polythene, waste material from agriculture, dead plants and polluted wastages are causing enormous impact on the wetland. Many people dump waste material from households into the wetland (Nampha *In*).
2. Dumping of solid and liquid wastes into the wetland degrades the quality of the wetland water and natural beauty of the wetland.
3. In dry season, outflow water from the lake accounts for about 4.5744 cubic meters (above 1,000 gallons) per second more than inflow water into the lake. Permanent water body with at least 2 meter depth in the Nampha *In* does not favor not only for productive crop cultivation but also for the commercialized fishing. Many fish and water birds species are reduced in the low water level.
4. Nampha *In* is flooded every year in the rainy season. Therefore, the cultivated land could not be used for double cropping. Flooding cause damage more or less to the planted crop and the property belonging to the inhabitants around the wetland.
5. The natural deposition of sand and silt become shallow to the lake.
6. Water pollution particularly the release of households' wastes and chemical residues from fertilizer inputs are a serious threat to fishing and reproduction of fish.
7. The expansion of settlement area and growth of population produce various types of pollution around the lake area.
8. Increase deposition of silt in the wetland area from upland areas due to in appropriate land use method also lead to lessen the boggy area.
9. Cutting the trees and cultivation of crops around the lake can reduce the quality of the lake.
10. The use of chemical fertilizers and pesticides in the cultivated lands contaminates the wetland water and threatens the existing plant and animal species.
11. Latrine at the settlement area along the Nampha *In* is a serious threat for wetland water.
12. Raising of livestock particularly ducks, cattle, pigs and buffaloes near the lake increases the level of water pollution by the faeces of these animals.

Threatening factors to wetland area (Nampha *In*)

Cutting the Trees

Disposing Waste

Pigsty

Cowshed

Buffaloes

Latrines

Source: Field Observation (3-11-2015)

Conclusion

Wetlands are one of important natural resources in Myanmar. It is very important for water supply, transport and habitats for fresh water fish. Although natural resource is available, full utilization on the lake is not found yet. Very less number of occupancy still utilized the natural resources of Nampha *In* area. It can be noted that very a few human impact on the area could be found.

The conservation values of Nampha *In* have not been fully recognized yet from different points of view. Although the fish species of the lake are already studied by the Zoologist, the chemical composition of lake water, types of fauna and flora, soil detection are still left out to be observed or to be detected by various fields.

There occurs weak awareness on the important of the lake and on its conservation among local communities. The authorities or departments concerned should maintain the lake area. Only then, Nampha *In* will become a significant wetland area in the near future.

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