

Preliminary Investigation of Water Level Fluctuation in Yemyet In

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Abstract

Wetlands are among the world's most productive environments. Meanwhile, they are also the most threatened ecosystems in the world. Yemyet In is located in Sagaing Township, also an important wetland and natural resource for its surrounding area in the Dry Zone area of Myanmar. There has an area of 28.5 square miles (18240 acres) in the period of flood and 23.15 square miles (14813 acres) in that of normal. Small changes in precipitation and stream inflows strongly affect the extent of the lake surface area. For times when there are no satellite images, it is difficult to determine the extent of the lake from observations. Water balance computations were performed to create a water-level series for Yemyet In extending back in time. The water-balance computations confirm the crude local people knowledge about historical lake status. It is found that if the average monthly precipitation is less than 2.45 feet during the wet season around Yemyet In, there is a risk that this shallow lake dries out in the dry season. This paper also conducts the fluctuation patterns of water level and processes of fluctuation from the perspective of physical condition and human activities.

Key words: Sagaing Township, Yemyet In, water balance computing, lake level

Introduction

Background

Generally, lake is a large body of inland water, to which streams and rivers are coming in or from which streams and rivers are going out (Hla Tun Aung, 2003). Lakes are highly valued for their recreational, aesthetic and

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scenic qualities, and the water they contain is one of the most treasured of our natural resources. Lakes constitute important habitats and food resources for a diverse array of fish, aquatic life, and wildlife, but lake ecosystems are fragile. Lake ecosystems can undergo rapid environmental changes, often leading to significant declines in their aesthetic, recreational, and aquatic ecosystem functions. Exposed to external effects from the atmosphere, their watersheds, and ground water, lakes are subject to change through time. Human activities can further accelerate the rates of change. If the causes of the changes are known, however, human intervention (lake-management practices) sometimes can control, or even reverse, detrimental changes. Wide fluctuations in stage (lake level) can create major hardships for lakeside residences, marinas, and businesses, and they also may impair the habitat suitability for nearshore biota. These changes most commonly are linked to weather anomalies (extended periods of abnormally high or low precipitation), but also may be associated with human activities such as withdrawals for water use.

There are several lakes in Myanmar and some of them take an important role in the processes of local and regional development. Yemyet In is situated in the Sagaing Township, within the Sagaing Division of the Union of Myanmar (Figure 1). It lies (9) miles north of Sagaing city. Yemyet In is a pan shaped depression between the Sagaing range and Shwetaunggon range. The longest length from north to south is about (9) miles and east to west is about (5) miles. During the highest flood period of the rainy season, the length of the lake from north to south is about (14) miles. It is one of the natural lakes which is moderately wide in Sagaing Division.

Fluctuations in water levels have occurred in the Yemyet In since that was formed. They are the result of several natural factors and in recent time have also been influenced by human activities. The primary natural factors affecting lake levels include precipitation on the lakes, run-off from the drainage basin, evaporation from the lake surface, inflow from upstream lakes, and outflow to downstream lakes. Human factors that also affect the water levels include diversions into or out of the drainage basin, consumption of water, dredging of outlet channels and the regulation of outflows.

There are three types of water level fluctuations on the Yemyet In: long-term (multi-year), seasonal (one-year) and short-period (less than an hour to several days). The long-term fluctuation in Yemyet In water levels result from persistent low or high water supplies. The seasonal fluctuation in In levels reflect the annual hydrologic cycle which is characterized by high water

supplies to the lakes during the rainy season and lower supplies during the remainder of the year. Short-period fluctuations, lasting from less than an hour to several days, are caused by meteorological conditions. The effect of wind and differences in barometric pressure over the lake surface create temporary imbalances in the water level at various locations.

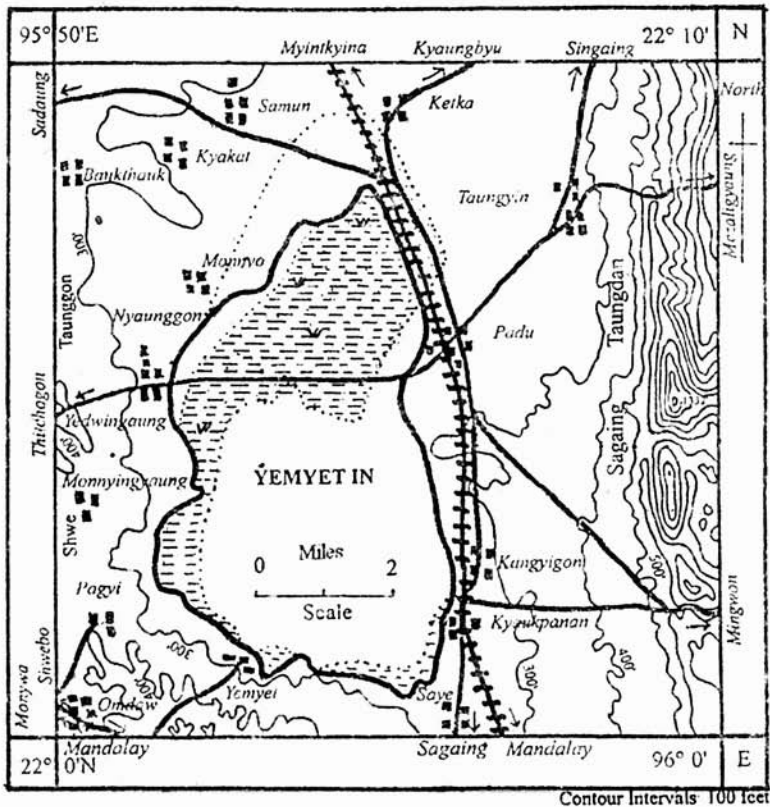


Figure 1. The location map of Yemyet In in Sagaing Township.

Source: U San Myint (2004)

The main objective of this study is to describe water level fluctuations of Yemyet In area in accordance with the amount of rainfall. There are seven streams of salty water from north, west and south direction and eleven streams of fresh water from west, north and east flow into Yemyet In. Most of the streams are narrow and shallow. In some years it is filled with water the whole year round. However some years experience low water level. But in least

rainfall or drought years, this lake is completely dried up. If the area receives heavy rainfall, it will be filled with water.

Previous Investigation

The preliminary investigations were based on local needs reference of Yemyet In in 2004 and other literature reviews. In that investigation there was no evidence about water level fluctuation. In this study work, investigation to water level fluctuation in Yemyet In was made on collected rainfall data of surrounding areas and on the questionnaires of villagers in Padu, Yemyet and Yedwinkaung Villages of Sagaing Township during field period.

Problem

Yemyet In is formed by the rift-valley fault and a pan shaped depression. So, it has water-level fluctuation in associated with yearly rainfall in this study area. Consequently there have water level changes and economic problems for fishermen, farmers and others who rely on it. In this research observed to determine:

- (1) How did the water level fluctuates over past years?
- (2) Are there any relationship between landform, climate and water level fluctuation?
- (3) Is there a relation between human activities and water level fluctuation?

Data and Methods

Primary data were entirely collected from structured interview record. Secondary data especially rainfall data were collected from Sagaing Township Peace and Development Council and another Departments as Myanmar Agriculture Enterprise. Especially, situation about water level changes, how to affect human activities and physical conditions on water level fluctuation areas were collected from the interview record. In this research work, data analysis were made on field observations collected from three villages, Padu, Yemyet and Yedwinkaung and on rainfall data from rainfall stations at study area. For Within the period of field observations, the data were collected from

fishermen, business men, some native people and the peasants, respectively. To become reliable facts and figures, rainfall data were compared with land reforms management years in Yemyet In area.

Origin of Lake

According to the local believes the origin of the lake derived from over-respective nature of local people upon national hero and spirits. With regard to origin of Yemyet In, the most possible reason is that was formed by the Earth's crust movement with subsidence and uplifting that occurred along an active Sagaing Fault. Subsidence is lowering of land surface and uplift is rising of land surface as Shwetaung Hill on the west and Phokaung Hill on the east. It also may be new land lake as the uplifting of marine sediments because its form is large and shallow. Change in land surface elevation can create lakes. Shwetaung Hill (West) and Phokaung Hill (South) are composed with young sand stone layer. However, it is important to emphasize that, geologically, lakes are temporary and form rapidly and decay quickly. Because most of the Earth's land surface is dominated by fluvial erosion, lakes that do occur are threatened with either capture and draining by expanding tributaries or infilling of sediment until the lake becomes extinct. The origin and some distinct characteristics of tectonic lake formation are comparable to that of the Yemyet In. In addition, the displacement of Sagaing Fault reveals the major tectonic movement in Myanmar and it can be traced from the research works of Myint Thein, 2004. He said "it is now know that the right-lateral displacement along Sagaing Fault is due to a spreading centre developed under the Andaman Sea from Middle Miocene (11 million years) onwards. Myint Thein et al 1991, based on their field work made during 1976 through 1981, estimated that the total displacement of the Sagaing Fault had been 126.14 miles (203 km) at an average of 0.79 inches (2 cm)/year."

Changes of Water Level

Water level fluctuation pattern of the study area, Yemyet In, is analysed from two types of data: primary and secondary. Primary data collected by structured interview method can give a clue to the cycle of fluctuation. According to the interview with local people, there are three types of water level fluctuations on the Yemyet In: long-term (multi-year), seasonal

