Discussion on Soil Appearance, Lake Surface Water Level and Surrounding Engineering in Shuangli Lake

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Team Photo

Background Research

In ancient times, Shuangli Lake was connected to the sea, and ships could go to Guningtou Port. After the Battle of Guningtou, the Hubin Road was built in 1951, and the embankment was built from Wushatou in Nanshan to the bottom of the lake in 1969, forming a lake separated from the sea called Cihu. Since then, the ecological environment of Guningtou has changed.

Shuangli Lake is located in Kinmen, Taiwan (Republic of China), where has a Subtropical Marine Climate, with an average temperature about 21°C. The hottest temperature is 33°C from July to August, and the coldest temperature from January to March is only 10°C. The annual rainfall in Kinmen is sparse, with an average annual rainfall of less than 1100mm, and the distribution is uneven. The rainy season is mainly from February to April each year, and the dry season is mainly from October to February of the next year.

Abstract

After taking photos for a long time and observing Shuangli Lake manually, we observed the photos and the Kinmen Daily and found that the land near Shuangli Lake was still dry after the rain, and the water of the lake did not rise, presumably due to long-term drying.

Research Motivation

I will pass Shuangli Lake on my way home by bus. We thought that 2021 will be a dry year, so we decided to observe and take pictures for a long time to try to identify some problems caused by weather factors and possible environmental impact.

Research Purposes

1. Explore the relationship between soil and rainfall
2. Discuss the dredging project of Shuangli Lake

Observe Location

The island we observed is Kinmen Island. Kinmen Island covers an area of about 132 square kilometers. It is a mainland island formed by submersion. It is long from east to west and narrow from north to south. The eastern half obviously exposes a lot of granite gneiss, while the western half is dominated by laterite layers, and the highest point is Taiwu Mountain (253 meters) in the east of the island. Kinmen Island has many hills and bays, and Lieyu is in the southwest of the island across the strait. The minerals in Kinmen Island include granite, porcelain clay, etc. The specialty Kinmen sorghum is famous far and wide.

Please refer to the following Google Earth, the site we studied is in Guning Village, Jinning Township, Kinmen County, Shuangli Lake, Taiwan.

Research Methods

Our research method is to take pictures and observe Shuangli Lake for a long time, and compare all the pictures to find out the changes after four months.

Research Process and Results

1. Photo Analysis

Photo direction: facing southwest

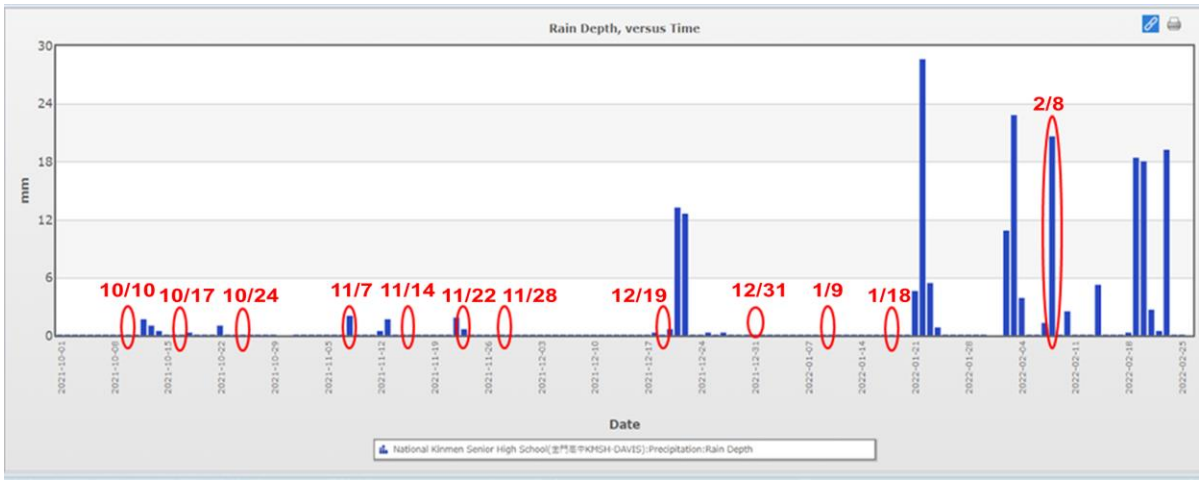
10/10/2021	**10/17/2021**	**10/24/2021**
		
11/7/2021	**11/14/2021**	**11/28/2021**
		
12/19/2021	**12/31/2021**	**1/9/2022**

		
1/18/2022(dredging work begins)	**2/8/2022**	**2/28/2022**
		

1. The relationship between rainfall and land appearance in the eastern section of Shuangli Lake

(1) We found that the surface of the land was still very dry after the rain, and the water level of the lake did not rise. It means that the cracking of the land was very serious, and the soil could not be restored to its original state even after the rain. The reason may be that the amount of rainfall is still less than the amount of water absorbed by the soil plus the amount of evaporation.

(2) Although there is no detailed observation of the lake surface in the western section, the water level has indeed dropped visually.



▲The red circle is the date of the photo, many of which had rained a few days before the photo was taken, but it can be found that the land is relatively dry

▲This is a photo of the land in Shuangli Lake published by Kinmen Daily on 2021/07/02. The long-term comparison shows that even if it rains in December, the water level will not rise significantly, but the soil will be drier.

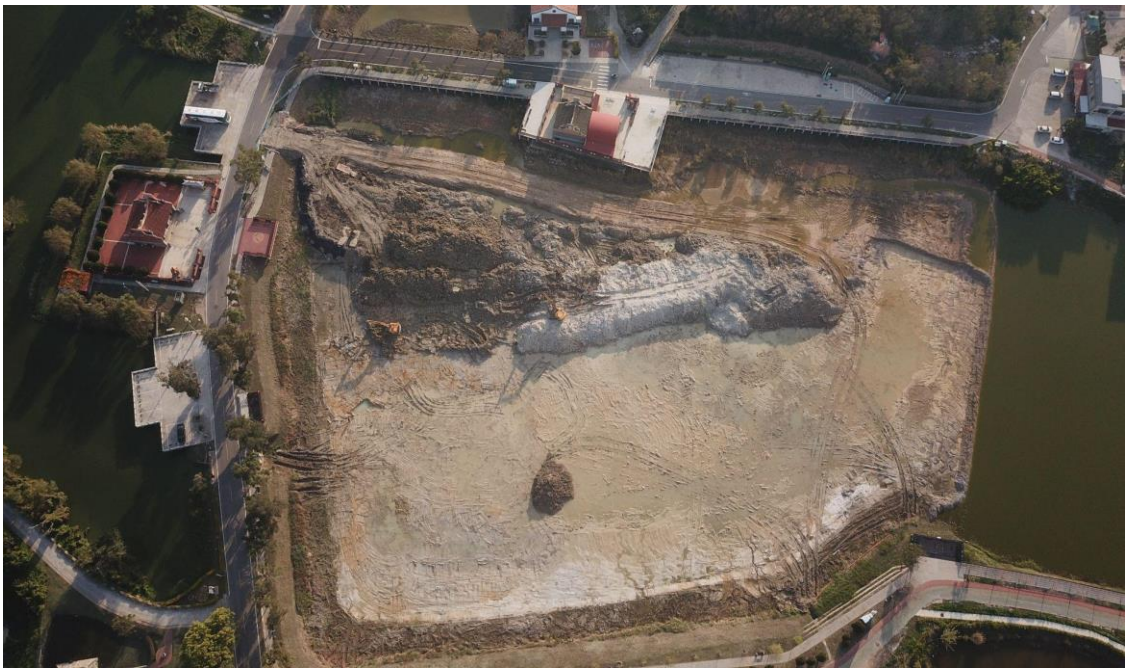
2. Shuangli Lake dredging project

(1) Since January, Shuangli Lake has been carrying out dredging works. We interviewed the local village chief. The village head said: In order to increase the water storage capacity of the entire Shuangli Lake and solve the problem of insufficient water storage in the Shuangli Lake, it is more convenient to carry out the dredging project while the Shuangli Lake is dry.

(2) The soil in the eastern half of Shuangli Lake is dry, but there is water level in the western half. The reason may be that there are sewage discharge outlets and less soil deposition in the western half than in the eastern half.

▲The siltation in the eastern half is more serious than that in the western half.

(3) We compared the lake water level with rainfall before the dredging project (December 31, 2021) and after the project (February 8, 2022), and found that there was an increase, which also showed that the water storage capacity increased.



▲This is an aerial photo taken on February 28, 2022. The dry soil of Shuangli Lake has been accumulated by construction vehicles and is ready to be removed.

Discussion

We explored two types of questions from the recorded images and meteorological observations:

1. Why there is no obvious change in soil appearance after rainfall
2. Does the dredging project of Shuangli Lake help the water storage capacity?

Conclusion

1. The land near Shuangli Lake is still dry after the rainfall, and the lake level has not risen significantly. It is speculated that the rainfall is still less than the amount of water absorbed by the soil plus the amount of evaporation.
2. Before and after the dredging project, the water storage capacity has increased.

References

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