Research on the changes of water capacity for Sha Hu lake in 30 years

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Abstract. This article studies the changes of Wuhan Sha Hu lake water volume during the past 30 years. By analysing environment in the development of our city construction, we provide relevant references and advice for governing natural resources and protecting environment.

1 Introduction

Sha Hu lake located in the northeast of Wu Chang. In the dynasty of Qing, the construction of a railway passed the lake. The road near the small Sha Hu lake, which is also known as the Sha Hu road, now becoming nearly annihilation. Lu dong is the great lake in the land, also known as the Sha Hu lake, which has namely the same size with the present Sha Hu lake. According to the latest data provided by the Wu Han government, Sha Hu lake has a reality area of 0.134 square kilometers. The Sha Hu lake reality covers an area of 3.197 square kilometers, which is ranked the second lake comparing with Shang Xun lake. Shang Xun lake is the largest lake in the city of Wuhan , which is the inner ring only. In the recent years, due to the rapid expansion of this city, the lake is also affected by the artificial lake and other factors, and its area has been reduced continuously. The ecological environment of Sha Hu lake is also seriously challenged. Therefore, it is necessary to study it. The area selected in this study is the main traffic roads around Sha Hu lake. The following pictures cover the area of Wuhan avenue and friendship avenue, such as Democratic road and Zhong Bei road[1-4].

2 Method

The raw data of our study mainly came from the geographic cloud, and the used software are ENVI and Arcgis. Our study mainly analysing the results in the 1990 landsat4-5 and 2016 landsat8 data, due to landsat4-5 was lost in 2011.

Research purpose: this study mainly uses remote sensing images to understand the changes of the water volume for Sha Hu lake, and analysis the causes of its changes. By doing this, we will provide corresponding countermeasures in our conclusion section.

First of all, the influence of the download is made in the band. After doing this, the image is tailored to the research area, in which the influence of the download will make the atmospheric and geometric corrections. The results are respectively shown in figures 1 and 2[5, 6].

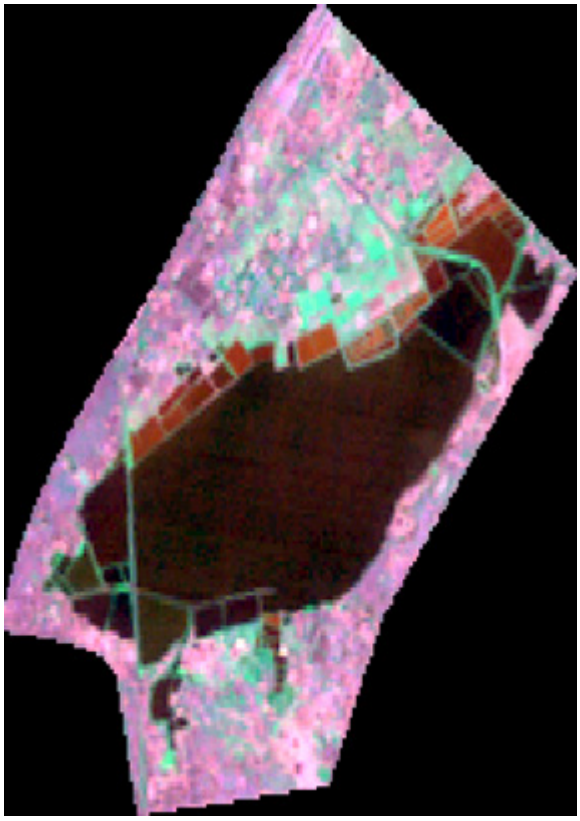

Figure 1. Sha Hu figure resulted with atmospheric correction.

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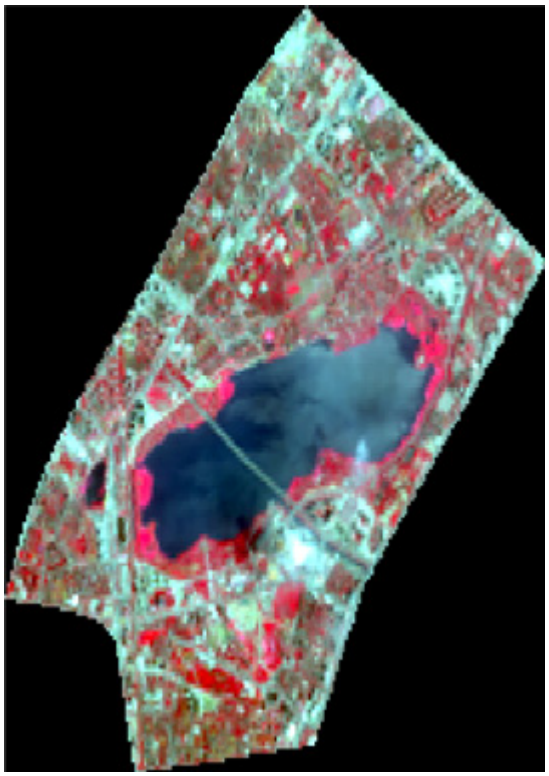

Figure 2. Sha Hu figure resulted with geometric correction.

Secondly, the figure will be placed in the unsupervised classification. There are not many methods in Arcgis, which mainly only provides the five functions such as : "interactive supervised classification", "maximum likelihood method classification", "ISO class unsupervised classification", "category probability" and "principal component analysis". In general, multispectral images can satisfy the need of image classification through these tools[7, 8]. The number of classification iterations is no more than 50 times, and the rest can be made by using the default value. Considering the surrounding has mainly three types of land use types, we can divide it into urban construction land, forest land and waters. In this paper, the classification images is created by Arcgis maximum likelihood classification tool, thus it may misclassify some units (random noise) and create small invalid regions. In order to improve the classification, it is best to reclassify the units of these misclassification and classify them as classes or clustering which can directly surround them. The most common techniques for cleaning up classified images include filtering, smoothing, and removing small isolated areas. The shape of the divided figure is more beautiful than by using the data cleaning tool.

Thirdly, the results will be obtained by dealing with the area classification statistics. The data of land use change is needed to be obtained. Then, the data is rasterized and vectored. We also discard the grid selection tool, according to the attribute selection to delete. In the final, we use "Nibble" to fill a vacancy, and replace it with the adjacent point value mask[8]. The mask is deleted within the scope of the value of grid unit.

3 Results

Drawn in Arcgis, the results are shown in figures 3 and 4. Figures 3 and 4 have shown, the Sha Hu lakes water area rapidly discreased in recent years. The main reason is the fast urban development, which means that the urban scale expands rapidly[9]. The increasing of city's high housing prices, which is known as the swelling, has becoming a booster. Cause artificial lake waters hitherto, and it affected the Sha Hu lakes water area. The above reasons resulted that the Sha Hu lake ecological environment is deteriorated.

Sha Hu lake is reduced for two reasons: one is the climate anomaly in Hubei province in recent years. It has many years precipitation, which had done in the Yangtze river headwaters area of cloud seeding operation. However, it can not change the overall trend of precipitation reduction; Second, then increase of rivers into the lake basin water in agriculture, which reduces the flow into the lake. The damage is caused by reducing the discharge of rivers into the lake, which making Sha Hu lakes area already narrowed considerably. The origin is bird island and land together. Form the peninsula, the birds began to damage from natural predators, and ecological environment deteriorated. At the same time, the water evaporated, and salinity in Sha Hu lake water is also on the rise, which threating the fish and birds in the water.

Figure 3. Sha Hu figure resulted rasterized in 1990.

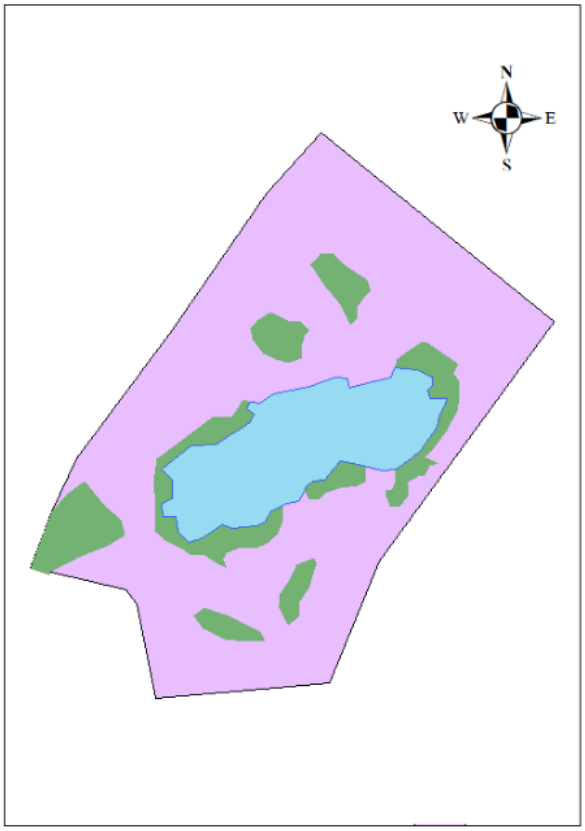

Figure 4. Sha Hu figure resulted rasterized in 2016.

4 Resolutions

After analysing the recent situation of Sha Hu lake, we give some advice and references.

1. The management of Sha Hu lake should consider the basic construction project for the ecological city. It is the most important position in the management of water environment protection. Lake in the city brings together a variety of problems and contradictions, we should comprehensively consider the rain flood regulation, real estate development, acceptance, fisheries aquaculture, park and landscape construction and so on. Many works should be firstly done to resolve lake filling and problems such as the severe water pollution and ecological environment deterioration[10].

2. The model of Sha Hu lake environment should be transformed from a single to comprehensive. The situation in this lake varies from one model to another. By referring the model of lake governance in the similarly cities, we should comprehensively find the governance mode suitable for the current situation of lakes. We can also integrate and adopt various effective means to improve the efficiency and sustainability of governance management.

3. Regularly conduction in the lake inspection, which is recorded in the illegal lake related projects. We can coordinate the relevant departments to supervise the rectification, which can increase the punishment of the causes of the lake, and resolutely crack on the illegal lake project. Heavy diseases need to be used with strong medicine, and the chaos of the elephant needs to be used. Only intensified punishment can effectively stop illegal lake behaviour[10-13].

4. Determination to solve the problem of rain and sewage diversion. We must quit the process of cutting pollution in the downtown area. With the population and industry gathering, the contradiction between urban development and lake water environment protection is becoming more and more prominent. Sewage pollution is the foundation of the protection and management of lakes. Improve the network year by year, the reasonable utilization of water resources increases urban drainage the quality of the ecological environment. It is the construction of ecological civilization, and can realize the urban sustainable development inevitably choice. Accelerate the construction for the urban rain pollution diversion project around the lake, and basically ensure that the lake body in the city is no longer polluted.

5. The protection and management mechanism of lake in this city. As soon as possible, we will implement the lake management mechanism in the inner city of the jurisdiction, and change the overlapping and lax enforcement of multi-department management functions. Not regularly check the lakes in the area and make the results in public. The protection funds of the lake should be included in the government budget, which can ensure to establish a stable investment mechanism. We should make full use of the market mechanism to form a diversified investment pattern, which is established in a market-oriented and diversified investment for lake protection. It can guide nongovernmental capital to invest the lake protection project.

5 Conclusion

In order to protect the environment, we should actively protect the Sha Hu lake. First, we should strength publicity and improve the popularization of relevant knowledge. Second, the government should take active measures to formulate a series of relevant protection measures. Third, we should actively carry out research on Sha Hu lake and ensure that the measures taken are correct and efficient.

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