

# The Impact of Water on Wuhan in Light of Local Conditions

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## ***Abstract***

Wuhan is located on the banks of Changjiang River (also known as Yangtze River). Wuhan boasts 25 percent of water of the whole area, which has an enormous impact on the lives of people. The East Lake is the largest urban one. The rationale of our project is to better understand how lives in Wuhan are influenced by water. In this report, we will answer the following questions: What is the impact of water on Wuhan? How should we preserve the water? The report focuses on recent conditions of the East Lake and the impact on Wuhan and its inhabitants. This is the rationale for our research. In an attempt to discover and resolve the relevant problems, the Yellow Cranes conducted interviews, performed surveys, and researched documents with the assistance of specialists. We expected to achieve the goal that the residents' awareness of cherishing and preserving the precious water resources in Wuhan is highly promoted, and we – Yellow Cranes – expected to experience and foster our comprehensive skills through the project.

## ***Key Words***

Wuhan, The East Lake, Conditions, Preservation, Impact

## **1. Introduction**

Water, as a special ecological resource, supports the whole living system on the globe. The water system not only provides the basic products for human living and production activities, but also maintains the structure of the natural ecological system, ecological process, and regional ecological environment<sup>1</sup>. The East Lake, being the second largest urban lake in China, plays an essential role in Wuhan in terms of its biological, cultural and tourist functions.

The area of lakes inside the scenic area is 33 square kilometers. In terms of its biological function, it makes a great contribution to the biological environment according to the “Fourteenth Five-Year Plan” of protection and development of Wuhan East Lake Scenic Area. For example, it helps to improve the air quality and to control the earth pollution. In the next five years, efforts will continue to be made to strengthen its biodiversity, water environment, wetland protection, among other things.

For its cultural function, there are numerous research institutions and universities situated along the lake side, such as the Institute of Hydrobiology, the Institute of Botany, Wuhan University, and China University of Geosciences, all of which accommodate thousands of talents and researchers. Besides, museums, such as

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<sup>1</sup> 欧阳志云, 赵同谦等. 水生态服务功能分析及其间接价值评价 [J]. 生态学报, 2004(10).

Hubei provincial museum and the museum of art, help citizens and travelers to understand the local culture.

The East Lake also does well in the tourist area. Wuhan Railway Station is situated at the northeast corner of the lake. Scenic spots dot around and within the area, like Wuhan Happy Valley, Moshan Mountain and the botanical garden. What is more, the greenways stretch 101.98 kilometers alongside the lake.

Above all, the East Lake is ubiquitous for citizens in Wuhan, especially those who live nearby. Therefore, this report investigates the effects that the East Lake exert on the life of Wuhan citizens based on the results of a questionnaire survey and an interview that we conducted.

## 2. Interview

Question 1: how long have you been living here?

Answer 1: 42years.

Question 2: Since you have lived here for a long time, do you know what the East Lake looked like before?

Answer 2: 42 years is a long time, and during these years the East Lake has not changed in one direction but has gone through a process from good to bad and then from bad to good again. During my childhood, the water of the East Lake was very clean and clear. Now we are standing in front of the Gate of Wuhan University. There used to be a popular swimming spot nearby. I often came here to swim when I was a child.

Question 3: Has it changed over the years?

Answer 3: Unfortunately, by the time I reached your age, the water quality of East Lake had begun to deteriorate. At the beginning of this century, the water quality of East Lake had reached a poor category 5. I can show you two pictures.



This photo was taken in the summer of 2007 near our Wuhan University. Because of the pollution of the lake and the heat, thousands of fish died overnight. Nearshore water was almost all covered by dead fish.



This photo was taken in the summer of 2009. In the same location, there was an outbreak of "cyanobacteria bloom". During those years, people really did not dare to go swimming in the East Lake anymore. In the most polluted areas, people did not even want to walk around the lake because of the unpleasant smell of the water bodies.

Question 4: Do you know what makes the East Lake so well-managed today?

Answer 4: As I remember, starting in the first decade of this century, the government was

determined to combat pollution in the East Lake. I read in the newspapers that the government had implemented a water ecology restoration project called "underwater forest". But my knowledge of the technical details was limited. What impressed me more was the dismantling of a large number of boat restaurants on the East Lake and the relocation of factories around the lake.

And I know there is now a special hotline for lake protection in our city. If we happen to find any dumping of pollutants into the Lake or illegal construction around the lake, each of us can call to report it, and the government will deal with it promptly.

Question 5: As we know, in addition to the natural scenery of the East Lake, the East lake can also be used for many different sporting activities, such as walking on the East Lake greenway or water marathon and so on. Do you think these activities have an impact on people's life?

Answer 5: My life is a bit far from the marathon, but the East Lake greenway is really relevant to my life. My family and I often take leisurely walks on the East Lake greenway. And you know, the East Lake greenway is actually very long, and you can follow it from one side of East Lake to the other. On holidays, we often spend a whole day taking the kids for a hike or a ride on the green way.

### 3. Survey

This survey aims to show whether Wuhan citizens are affected by the East Lake. Furthermore, the survey shows which effect citizens get and why this effect exists. Finally, we found some ways to improve the water quality and develop the East Lake in a harmonious way.

### 3.1 The participants

311 people participated in the survey, all of whom currently live in Wuhan. Hence, their answers were taken into consideration.

### 3.2 Answers to the survey

In the following section, diagrams and tables are provided to explain and analyze the data from the questionnaires.

Q1: How many years have you been living beside the East Lake?

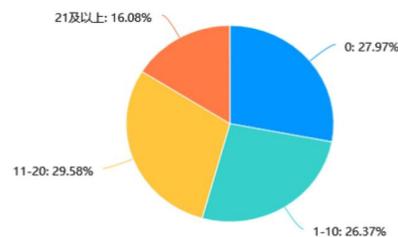


Figure 1: Years of living beside the East Lake

It can be clearly seen that almost half participants (47.66%) have been living beside the East Lake for over ten years. About one third of participants do not live near the Lake.

Q2: How often do you visit the East Lake?

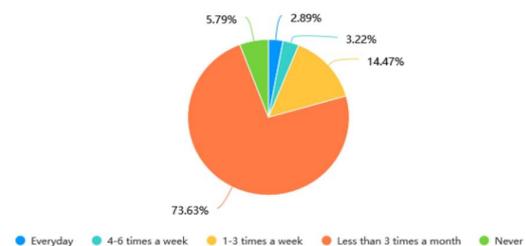


Figure 2: Frequency

A large proportion of residents went to the East Lake less than three times a month, which accounted for 73.63%. A small number of inhabitants visited the East Lake every day or four to six times a week.

Q3: What's the purpose of your visiting the East Lake?

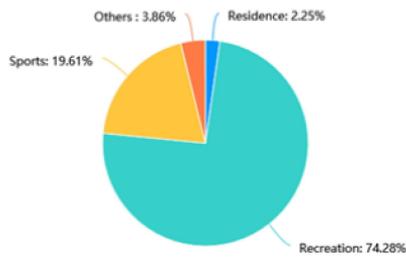


Figure 3: Purpose of visiting the East Lake

It can be concluded that the main purpose of visiting the East Lake was recreation, which was composed of 74.28%. Doing sports ranked second (approximately 20%).

Q4: What kind of effect is exerted on your life by the East Lake?

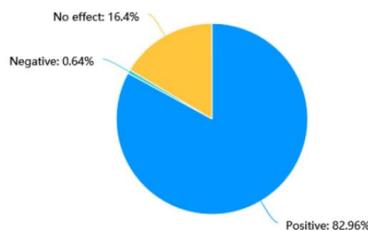


Figure 4: Three kinds of effects

A significantly higher amount of people experienced a positive effect (82.96%) compared with people who were not affected (16.4%). Only 2 people out of 311 claimed that the East Lake exerted a negative effect on their life.

Q5: Why does the East Lake have POSITIVE effect on your life? (Open question)

According to participants' answers, the most frequent words mentioned by them were "beautiful scenery", "releasing pressure", and "good place to exercise". To be specific, a significant amount of people (around 60%) thought that the East Lake was a beautiful place, with good air and water quality, which exerted a positive effect on their life. Then, some people

also regarded it as an outlet to reduce their pressure, which accounted for around 50%.

Q6: Why does the East Lake have Negative effect on your life? (Open question)

Only 2 participants did not like the East Lake. One said: "The boulevard in the south side is not broad enough". And the other said: "There are too many tourists in the East Lake, which causes traffic congestion."

Q7: Why does the East Lake have No effect on your life? (Open question)

The reason why people thought the East Lake had no effect on their life was that they infrequently visited the East Lake, which was attributed to the distance and time.

Q8: What do you think of the RECREATION function provided by the East Lake?

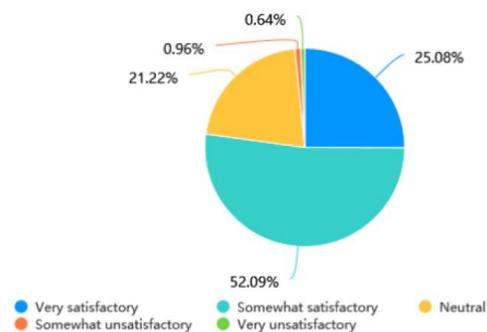


Figure 5: People's satisfactory degree about the RECREATION function of the East Lake

A significant proportion of residents (around 77.17%) were satisfied with the recreation function provided by the East Lake. Only 2 people were not content with it at all.

QUESTION 9: What do you think of the SPORTING function provided by the East Lake? Single Choice

As data about question 9 shows, over half of the surveyed people are just somewhat satisfied with the sporting function of the East Lake while only few people (just accounting for 0.32% of the total people) are very satisfied with its sporting function. People who hold neutral and very

satisfactory attitudes make up 20.9% and 22.51% respectively. The second-lowest rate is 1.93% which explains the percentage of somewhat unsatisfactory people.

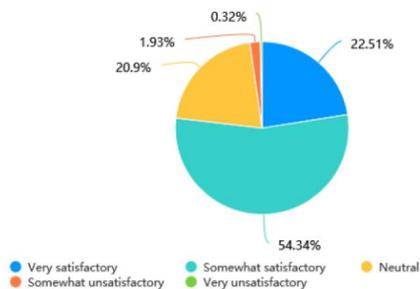


Figure 6: People's satisfactory degree about the SPORTING function of the East Lake

Question 10: What do you think of the SIGHTSEEING function provided by the East Lake? Single Choice

According to the data collected, we can find that more than 50% of the surveyed people have a somewhat satisfactory attitude towards the sightseeing function provided by the East Lake. The proportions of neutral and very satisfactory attitudes are both about 20%. Few people hold a somewhat unsatisfactory and very unsatisfactory opinion about its sightseeing function.

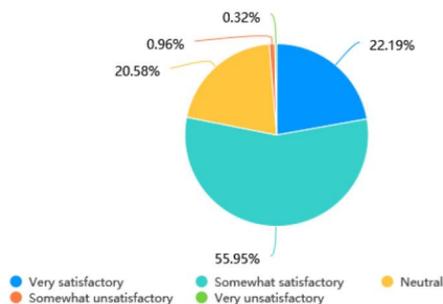


Figure 7: People's satisfactory degree about the SIGHTSEEING function of the East Lake

Question 11: Do you know any policy of controlling water pollution for the East Lake? Single Choice

A significantly higher proportion of people answered with yes, compared with people answering with no.

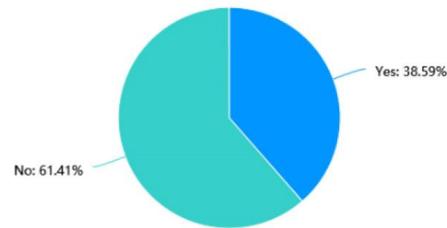


Figure 8: Do you know any policy of controlling water pollution for the East Lake?

Question 12: How well do you think these policies are implemented? Single choice

On the implemented policies, less than half of the surveyed people hold somewhat satisfactory views. About 30% of these people are very satisfied with them. People having neutral attitudes account for 19% or so, while the percentage of somewhat unsatisfactory is 1.67%. Surprisingly, nobody among them is somewhat unsatisfactory.

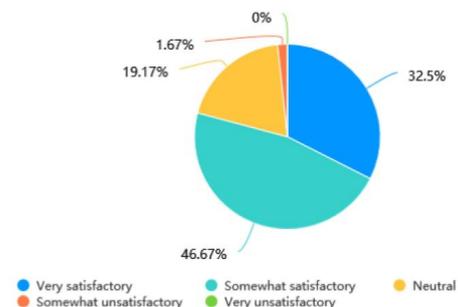


Figure 9: People's satisfactory degree about the implemented policies

Question 13: Do you agree that measures applied to control the East Lake in recent years improve your life quality? Single choice

The figure clearly reveals that the number of people answering yes overwhelmingly surpasses that of people answering no.

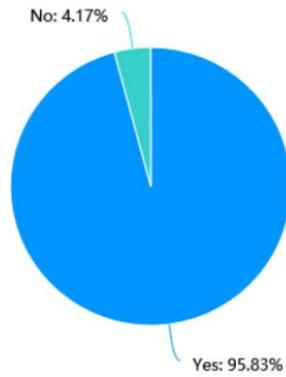


Figure 10: Do you agree that measures applied to control the East Lake in recent years improve your life quality?

Question 14: What do you think is the most effective way to improve the East Lake’s water quality? Multiple choices

Most people we interviewed think the most effective way to improve the East Lake’s water quality is to implement the water pollution controlling policies by the government and reduce the discharge of sewage from factories. About 35% of them claimed the most effective way to improve the East Lake’s water quality is to raise public awareness of protecting the environment through the media. Around 18% of these people said the most effective way to improve the East Lake’s water quality is to report and prohibit citizens’ behavior that would pollute the water.

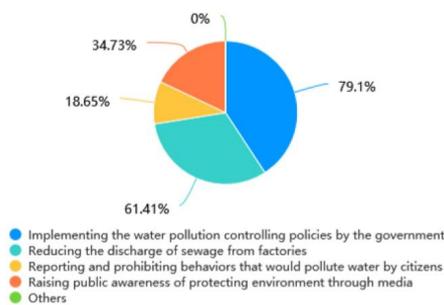


Figure 11: The most effective ways to improve the East Lake’s water quality

Question 15: What do you think can protect the biological environment in terms of personal behaviors? Multiple choice

Over 90% of the people believe that the biological environment is best protected by developing the habit of taking away the rubbish. And in order to accomplish environmental protection, more than 50% of them choose to use cloth bags or paper bags in replacement of plastic bags and not to feed fish or birds without permission. Over 30% of them believe it would be good to oblige people not to take pets into the park (e.g.: dogs). Moreover, 3.22% of the surveyed people believe there are other ways to protect the biological environment, such as prohibiting arbitrary construction works along the lake, maintaining as far as possible the natural original appearance, sludge treatment, finding a way to clean up the water and eliminate pollution, shutting down restaurants and B&Bs completely, strengthening monitoring and facilitating human intervention to build a more healthy and rational ecosystem, planting more flowers and trees, building a greenway around the lake for walking and cycling, less human intervention, more natural scenery, and actively cleaning up water dirt.

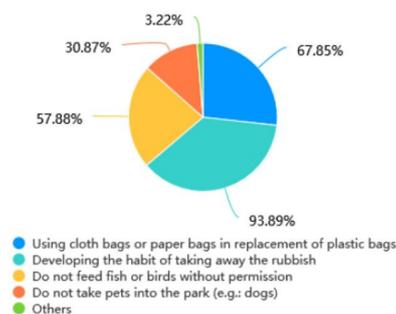


Figure 12: The personal behaviors to protect the biological environment

Question 16: What else do you think can further develop the East Lake to benefit citizens or the environment? Multiple choices

Over 60% of the interviewed people think more sports facilities should be provided (e.g.: fitness

facilities), more green ways should be added, and more plants of various species should be introduced, to develop the East Lake to the benefit of citizens and the environment. About 46% suggest providing more public service facilities (e.g.: convenience stores) to further develop the East Lake. 2.89% of them choose other ways to develop the East Lake, which includes the plum garden and Cherry garden incorporated in the Dadong Lake greenway, quality management of security in East Lake, building an additional waterfront corridor, planting climbing Chinese rose on both sides of the road, creating more scenic spots with stories and cultural connotations, constructing additional greenways around the lake for walking and cycling, ensuring more convenient transportation to and from the lake scenic area through additional subway stations, increasing the number of business streets such as East Lake Coffee town, and providing more convenient means of transportation within the lake scenic area, such as electric frequency cars and bicycles due to its large area of the East Lake.

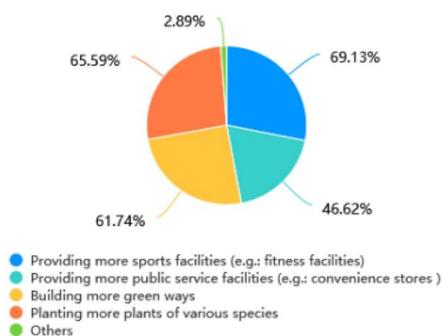


Figure 13: The ways to further develop the East Lake

## 4. Conclusion

As one of the earliest national scenic areas, East Lake is a major aquaculture farm and source of water. It has attracted countless tourists since ancient times, including famous poets Qu Yuan and Li Bai.

Located in the urban area of Wuhan, East Lake is surrounded by 26 colleges and universities including Wuhan University, Huazhong University of Science and Technology, and 56 national and provincial affiliated research institutes such as the Wuhan Botanical Garden, Chinese Optical Valley of East Lake High-tech Development Zone, Hubei Provincial Museum and Museum of Art. Such configuration makes East Lake a cultural hub.

The fact that 47.66% of the interviewees have resided beside the lake for more than 10 years is due to the area's comprehensive supporting infrastructure and vibrant cultural environment. 26.37% of the interviewees go to East Lake every day, and 74.28% of them go for recreation, and 20% do sports at East Lake, ranking the second.

It is found from the investigation that the public has a high level of satisfaction with the sporting and recreational functions of East Lake. The high scores of such functions suggest people's ambitions of living harmoniously with the nature. With its enormous size and stunning natural landscape, the East Lake draws a sizable number of visitors who enjoy the thrill of water sports. The East Lake is undoubtedly the brightest star in the city with hundreds of lakes. Sightseeing also constitutes a vital function of East Lake, which is abundant with sites such as the sunrising at Lingbo Gate.

According to our statistical survey, 61.41% of citizens do not have a detailed understanding of the water control policies introduced in China, which indicates the weak enforcement and promotion of the policies. More efforts are needed to implement them. 30% of the citizens are very satisfied with the effect of policies. It is concluded that policies achieve good results with disadvantages.

The 13th question tells the origin and quality of citizens' happiness. 95.83% of the attendants demonstrate that the improvement of their life

quality is largely influenced by policies made by the government. As questions 6-8 show, the enhancement of facilities and water quality not only make citizens feel more involved and happier, but it has also improved air quality, and it has facilitated the development of the ecological chain and the ability to regulate natural ecology. Overall, controlling policies are progressing on the right way.

The answer to the fourth query demonstrates how significant East Lake is to Wuhan citizens. The East Lake, according to some, is Wuhan's soul. More than 80% of the people felt East Lake had a favorable impact on them in terms of their quality of life, recreation, culture, and other areas. The results of our questionnaire survey alone cannot be used to assess the significance of the East Lake to the citizens of Wuhan because we were unable to locate pertinent and reliable data for comparison. However, because our sample includes persons of all ages, as well as those who have resided in East Lake for various lengths of time and who work in a variety of occupations, we believe that our data is sufficiently representative even though it is not sufficiently large. Second, based on the various responses, we have two connected queries. We will continue to question the respondents about the reasons they believe the East Lake has a favorable effect on them. After compiling the questionnaires, we discovered that 82.6% of respondents believed that East Lake had given them something because it allowed them to rest and take in the picturesque surroundings. They believe the East Lake has served them well in more ways than one. We cannot, of course, overlook the fact that 0.64% of them believed that the East Lake affected them negatively. By their justification, we see that this is mostly related to East Lake's irrational development. Some of the neighborhoods near East Lake lack proper supporting infrastructure, which causes traffic jams and loud roads. This is unpleasant for some

locals, particularly those who reside in the East Lake Scenic Area. Similar to that, a sizable percentage, 16.4%, claimed East Lake had no effect on their life. They are too far away from East Lake and visit it too infrequently, which can be the cause of this. In conclusion, the statistics indicate that very few individuals think that East Lake has a negative impact on them, indicating that a comprehensive development of the lake would mostly improve people's quality of life, with very few drawbacks.

Two open questions are set to collect citizens' suggestions. The first one is about the comments on policies. The majority of citizens are satisfied with the policies in effect, but they also suggest the government should strengthen the extent of ecology controlling to achieve human-ecological harmony. The second one is concerned with the visitors' self-governance. 90% of them concur that it is acceptable and practical to conserve the environment by taking trash away and keeping trash bags at hand.

Additionally, 30% of residents agreed that animals should not be brought to the East Lake. The responses show that people are personally aware of the significance of environmental protection. The government plays a crucial role in developing the East Lake with the help of mass support from the public. According to the results of the survey, the comprehensively developed East Lake exerts great influence on citizens, with positive effect making up the vast majority and negative impacts rarely seen. Additionally, we solicited opinions and suggestions from the public regarding upcoming East Lake development as well as current policies and rules. The East Lake has a significant impact on Wuhan residents generally. The discussion and summary of our investigation of Proposition in this period are presented above. In order to conserve the environment and strengthen our shared home, we hope that all residents would increase their awareness of protecting environment.

## References

[1] 欧阳志云, 赵同谦等. 水生态服务功能分析及其间接价值评价 [J]. 生态学报, 2004(10).

## Appendix: Questionnaire

### The East Lake's Effect on Citizens' Life in Wuhan

1. How long have you been living beside the East Lake?  
A. Never B. 1-10 years C. 11-20 years  
D. Over 20 years
2. How often do you visit the East Lake?  
A. Everyday  
B. 4-6 times a week  
C. 1-3 times a week  
D. Less than 3 times a month  
E. Never
3. What is the purpose of your visit(s) to the East Lake?  
A. Residence  
B. Recreation  
C. Sports  
D. Other
4. What kind of effect is exerted on your life by the East Lake?  
A. Positive (Turn to Q5)  
B. Negative (Turn to Q6)  
C. No effect (Turn to Q7)
5. Why does the East Lake have a POSITIVE effect on your life?
6. Why does the East Lake have a NEGATIVE effect on your life?
7. Why does the East Lake have NO effect on your life?
8. What do you think of the RECREATION function provided by the East Lake?  
A. Very satisfactory  
B. Somewhat satisfactory  
C. Neutral  
D. Somewhat unsatisfactory  
E. Very unsatisfactory
9. What do you think of the SPORTING function provided by the East Lake?  
A. Very satisfactory  
B. Somewhat satisfactory  
C. Neutral  
D. Somewhat unsatisfactory  
E. Very unsatisfactory
10. What do you think of the SIGHTSEEING function provided by the East Lake?  
A. Very satisfactory  
B. Somewhat satisfactory  
C. Neutral  
D. Somewhat unsatisfactory  
E. Very unsatisfactory
11. Do you know any policy of controlling water pollution for the East Lake?  
A. Yes  
B. No (Turn to Q14 directly)
12. How well do you think these policies are implemented?  
A. Very satisfactory  
B. Somewhat satisfactory  
C. Neutral  
D. Somewhat unsatisfactory  
E. Very unsatisfactory
13. Do you agree that measures applied to control the East Lake in recent years improve your life quality?

A. Yes

B. No

14. What do you think is the most effective way to improve the East Lake's water quality?

A. Implementing the water pollution controlling policies of the government

B. Reducing the discharge of sewage from factories

C. Reporting and prohibiting citizens' behaviors that would pollute water

D. Raising public awareness of protecting environment through media

E. Other

15. What do you think can protect the biological environment in terms of personal behaviors?

A. Using cloth bags or paper bags in replacement of plastic bags

B. Developing the habit of taking away the rubbish

C. Do not feed fish or birds without permission

D. Do not take pets into the park (e.g.: dogs)

E. Other

16. What else do you think can further develop the East Lake to benefit citizens or the environment?

A. Providing more sports facilities (e.g.: fitness facilities)

B. Providing more public service facilities (e.g.: convenience stores)

C. Building more greenways

D. Planting more plants of various species

E. Other