



# THE IMPACT OF ARTIFICIAL LAKES ON SURROUNDING CONSTRUCTIONS (CASE STUDY: CHITGAR LAKE, TEHRAN)

Seyed Gholamreza Bani Ahmad

Master of Urban Planning, Urban Planning, Department of Geography and Humanities, PNU South Tehran, Tehran, Iran.

## ABSTRACT

As one of the main results of the industrial revolution and the development of technology, urbanization is considered as the dominant pattern of housing today, which is increasing day by day. Urbanization has had many consequences, one of which is environmental issues. Artificial lakes are built in regions where possible, mostly for environmental purposes. Proper management of these lakes is very important because neglecting them can have many consequences. Increased urban construction can be considered one of these consequences. This study was mainly conducted to investigate the impact of artificial lakes on the increase of urban construction. For field studies, Chitgar Lake in District 22 of Tehran was selected. Data were collected using two methods of library documentation and field studies with questionnaires. Data analysis was performed using mean analysis and correlation methods. The results indicated that building Chitgar Lake in District 22 of Tehran had a significant effect on increasing urban construction.

**KEYWORDS:** City, Artificial lakes, Urban construction, Chitgar Lake.

## INTRODUCTION:

It is clear to everyone that all actions related to development are associated with human intervention and necessarily cause changes in the relationship between humans and the natural environment (Rajaei, 2015: 201). So any regional development, such as the construction of man-made artificial lakes, is a kind of human intervention in nature that must be logical and systematic (Klian and Trikar, 1979: 269).

One of the examples of man-made interventions was the Martyrs of the Persian Gulf Lake called Chitgar Lake in District 22 of Tehran, which was predicted in the development of the first comprehensive plan for the west of Tehran in 1968. Therefore, this plan is based on the ideas of modernism. Later, the construction of the lake was put on the agenda in the detailed plan of Tehran in 1999, but its implementation was postponed. Finally, the implementation of this huge project began in 2007 after 39 years. The first phase of its water intake began in 2012, and it was opened in 2013 in a hurry.

## PROBLEM STATEMENT:

The synchronization of urban development and industrialization on the one hand and the growth of urbanization in recent years on the other hand have led to numerous environmental, economic, and social consequences (Nouri and Rafieian, 2016: 5) and has faced urbanites with many economic, social, and environmental challenges. According to studies, population growth and urban sprawl have turned urban green spaces into rough and impenetrable concrete surfaces, and this trend is especially evident in developing countries and the Third World. Industrialization and population growth in cities have led to speculative construction that has somewhat reduced the quality of life. On the other hand, the need to create new urban land uses to meet the needs of citizens has gradually reduced the share of natural spaces, which leads to limited human access to nature (Nahibi and Hassan Dokht, 2014: 5).

## LITERATURE REVIEW:

Artificial lakes are among the large-scale projects in cities that have a huge impact on the environment. As mentioned before, these spaces are mainly created for environmental purposes and after being exploited, they have consequences, some of which may be urban constructions and the constructing high-rise buildings.

Due to the importance of these spaces, studies have been done on artificial lakes and their effects, some of which are as follows:

In a study titled "Evaluation of Artificial Lakes in the World and their Effects on the Environment", Zarei Bidaki and Nohegar (2017) studied the Martyrs of the Persian Gulf (Chitgar) Lake and the most important goals and objectives of creating artificial lakes in the city and examined their positive and negative effects. They also examined the situation of Chitgar Lake in District 22 of Tehran, evaluated its effects with emphasis on its environmental dimension, and offered solutions to improve its situation and reduce its effects.

## Theoretical foundations:

The concept of the city can be defined from different perspectives. From a historical point of view, the city used to perform some tasks and services, and its perfor-

mance created rights and advantages for it, and it was located exactly opposite the village because of these facilities. It is not easy to provide a relatively comprehensive definition of the city that includes various aspects and components, theoretical topics, and common research areas in this field of research related to the concept of the city. The main reason for this is to be found in the city nature, the diversity of its forms both now and in the past, and the breadth of issues and problems related to the city.

The physical system of the city consists of a set of special spatial or physical subsystems that interact with each other and are the result of relationships between the relevant activity subsystems. Thus, the physical system of the city is a set of adapted spaces that are formed to meet organized needs or demands (goal) that interact with each other within the channel or the network through adapted channels or transportation networks (Habib, 2008: 5). So the physical system of the city has two main components as follows:

1. **Adapted spaces:** These are places or spaces in which activities take place within spaces.
2. **Adapted channels:** These are the channels (or spaces) in which the relationships within the channels are established.

The elements of the physical system of the city are adapted spaces (land uses) between which there are continuous interactions through communication networks (transportation).

According to the Japanese architect Fumihiko Maki, the main body can be found in any city on which the main structure of the city is based, and other parts of the city form a sub-structure. Maki sees the city as a living organism that must change over time. In this way, a fixed structure can be defined in the city and the filling parts can be variable. What Maki's Metabolism Movement suggests is that we need both parts of the city, the fixed part that may change over the centuries, and the variable part that we can see changing daily (Fainstein, & Campbell, 1997: 110).

## Positive effects of artificial lakes on the environment and ecosystem:

According to many experts, artificial lakes can contribute to the proper cycle of hydrology, clean air in the region, increase the per capita green space, create artificial reservoirs, and cultivate various aquatic species that are environmentally friendly.

## Economic disadvantages of artificial lakes:

All of the above economic benefits will conflict with the interests of the region and will lead to the destruction of the region's ecosystem and the local economy in the case of improper design, improper location, and disregard for the lake's interactions with the local ecosystem and the environment.

## Negative effects of artificial lakes on the environment and ecosystem:

Ignoring the climate of the region and warnings of experts sometimes has adverse consequences, such as the effects of Nigeria's artificial lake, which both harm humans and destroy the ecosystem and the environment. Consequences such as change of insect species in the region, insect infestation in houses, swampy lakes, dumping local sewage into the lake, not creating a treatment plant

and causing severe pollution, reducing water oxygen and increasing algae, and human-induced earthquakes in the surrounding environment are just some of these negative effects.

#### ANALYSIS OF FINDINGS:

Due to the lack of information on the impact of Chitgar Artificial Lake on the increase of urban construction in District 22, an attempt was made to study the factors affecting urban construction in District 22 of Tehran and Chitgar Lake area and the impact of the lake on this construction using questionnaires. The results are as follows:

More than 30% of people have been living in this region for less than 5 years, which indicates its immigrant reception. Also, a large number of people have chosen District 22 because of the weather and environmental conditions. Some people with a long history of living in this area raised the issue of land and housing prices, which were lower than in many regions of the city in previous years before the opening of large-scale projects in District 22, but today it has increased significantly due to the type of land uses in the region and its environmental condition.

**Table 2: The number of construction permits issued by the number of floors**

Year	No floor	1 floor	2 floors	3 floors	4 floors	5 floors and more
2009	0	2	4	10	307	63
2011	-	12	496	4	2	52
2013	-	-	6	8	404	175
2015	0	1	-	1	131	55
2017	0	0	0	0	240	65

Source: Statistical Yearbook of Tehran, 2007-2017

The status of answering the questionnaires is according to the following table:

**Table 3: The impact of Chitgar Lake on urban construction indicators**

	Very low	Low	Moderate	High	Very high
To what extent has the construction of the artificial lake affected the reduction of air pollution in the region?	2	5	7	42	44
To what extent has the construction of the artificial lake affected the increase of population density in the region?	12	19	22	27	20
To what extent has the construction of the artificial lake affected the increase of urban traffic in the region?	10	15	19	31	25
To what extent has the construction of the artificial lake affected the increased building density in the region?	9	12	15	32	32
To what extent has the construction of the artificial lake affected the increasing generation of construction waste in the region?	17	18	22	17	25
To what extent has the construction of the artificial lake affected the location and development of residential settlements in the region?	11	10	12	35	32
To what extent has the construction of the artificial lake affected the development of commercial towers in the region?	8	7	9	34	40
To what extent has the construction of the artificial lake affected the creation of trans-regional land uses in the region?	10	10	11	36	33

The first value of 0.019 was related to the significance level, and the mean value was 5% in different analyzes. The relationship was significant if the value obtained was less than the mean and non-significant if it was higher. Accordingly, it was concluded that there was a significant relationship between the independent variable (construction of the artificial lake) and dependent variable (urban construction).

The second value of 0.21 was related to the coefficient of determination. This meant that 21% of the dependent variable changes were predictable by the independent variable.

**Table 6: Regression analysis and coefficient of determination**

Regression model	Non-standardized coefficient		Standard coefficient	T	Sig
	B	Standard error	Beta		
Constant	2.223	0.402		5.676	0.00
Urban construction	0.37	0.167	0.354	2.123	0.015

Source: Questionnaires

According to the obtained significance level, there was a significant relationship between the two variables (construction of Chitgar Artificial Lake and urban construction in District 22 of Tehran). There is an important variable in the table above, which is the Beta coefficient.

According to the obtained coefficient, it was concluded that for each unit of change in the independent variable, about 37% change was made in the dependent variable, namely urban construction in District 22 of Tehran and the surrounding area of Chitgar Lake.

#### CONCLUSION:

The process of urban development, the formation of the physical structure of cities, and the subsequent development of the urban construction industry have made this issue one of the most important challenges in the field of urban management.

As one of the man-made spaces, Chitgar Lake was constructed in District 22 of Tehran with environmental goals such as conditioning the air of the region and the city. A review of developments in the region shows that the desire for investment and types of construction in this region has increased over the past decade, the construction trend has expanded sharply, and many towns can be seen around it today.

In this study, an attempt was made to briefly review the current situation of Chitgar Lake and the process of developments in the region. According to the results, many land uses with extra-regional functions have been located in the region, among which are Chitgar Forest Park and Chitgar Lake.

The impact of Chitgar Artificial Lake on the construction process of the region was analyzed using questionnaires (the main tools) and expert opinions. Questionnaires were distributed among 100 people who tried to be selected from municipal experts, university teachers, etc.

The results showed that the construction of Chitgar Lake had an impact on the constructions in the region so that 21% of the construction changes could be predicted by the construction of Chitgar Lake. Besides, for each unit of change in the independent variable, about 37% of the changes in urban construction in the region were predictable.

#### REFERENCES:

- I. Jamshidian, Mohammad; Seyed Alipour, Seyed Sadegh; Elahigholiloo, Elnaz (2015). In Search for a Lake Analysis of Landscape Architecture in Chitgar Lake of the Persian Gulf Martyrs, Manzar (The Iranian Scientific Open Access Journal of Landscape), No. 31, pp. 42-56.
- II. Habib, Farah (2008). Notes for Urban Morphology, Tehran, Islamic Azad University, Science and Research Branch, Faculty of Art and Architecture.
- III. Zare Bidaki, Zahra; Nohegar, Ahmad (2015). Evaluation of Artificial Lakes in the World and their Effects on the Environment, with a View to the Martyrs of the Persian Gulf (Chitgar) Lake, Tehran, Osve Institute of Higher Education, The International Conference on Civil, Architectural and Urban Planning in Contemporary Iran; Tehran, Shahid Beheshti University.
- IV. Nazari, but God; Vali Beigloo, Zeinab (2015). Evaluating the Effects of Increasing Building Density on the Welfare of Citizens (Case Study: Chitgar Lake), Tehran, The First National Conference on Sustainable Development, Kimia Research Group.
- V. Nouri, Shiva; Rafeian, Mojtaba (2015). Assessing the Economic Impact of the Implementation of Urban Mega Projects on Urban Areas (Case study: Persian Gulf Martyrs Lake located in District 22 of the city of Tehran), Soffeh Journal, No. 73, pp. 42-56.
- VI. Bramely, Glen & Kirk, Karryn (2005). "Does planning make a difference in urban form? Recent evidence from Central Scotland, in The Journal of Environment and Planning. Vol.37. pp 355-378.
- VII. Zeng, C. Song, Y. He, Q. She, F. (2018). Spatially explicit assessment on urban vitality: Case studies in Chicago and Wuhan, Sustainable Cities and Society 40 (2018) PP. 296-306.