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Performance analysis of Water storages in the hot and dry cities in Iran Case Study: Water storage of the Seyyed Ismaeel

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ABSTRACT

Due to dry weather in major part of Iran, lack of rain, seasonality of river and inaccessibility to water, it has been consideration the various arrangements for supplying the fresh water in dry seasons of the year**.** It can be named the water storage, constructed and Aqueduct. In this regard, the water storage was used for saving of water in juicy seasons and using it in during the rest. In the past, the water storages have many applications in cities, and like to other major buildings of urban concentration centers, such as the main center of markets, neighborhood centers and among of Convoys Caravansary way are constructed. In fact, the role of water storages in the margin of desert cities and low water regions was so strike, and water storages are gone in many neighborhoods considered the largest and most remarkable architectural units. According to the water crisis in the world and the importance introduce of indigenous architecture in each region. In this paper, We to the study and analysis of performance and components of water storages and their roles in preserving of life in hot regions and desert, and then it presents the Seyyed Ismaeel water storage as a sample case study. The Seyyed Ismaeel water storage has been located in the center of the Chalamidan Quarter of Tehran.

Key words: water storage, Seyyed Ismaeel, analysis, performance, Iran.

Introduction

Water storages have a deep place in the Iranian culture, because the most parts of Iran are in the hot and dry climate. Rain in this area is very small. Therefore, always the most extensive plains of Iran, Iranians with utilizing all its capabilities for access to water, Delve in aqueduct about tens kilometers, and for storing water in winter and using in summer, have established the water storage. [4]

Water storages have established in the context of desert and center of cities, and most they are the second building (after the mosque) in terms of breadth and magnitude.

Water storages contain a large cubic reservoir or cubic or rectangular cylindrical shape inside the earth, and on this tanks have covered by arch or dome. Often these tanks have one or two Staircases for picking water form tanks. Water storages consist of four basic elements: **A-Treasury** (Cylindrical shape (place of water storage), which was created in the heart of the earth, subterranean water is dominated, However, the land is maintained the water temperature), **B- Dome** (Covering a hemisphere shape on treasury to protect water from environmental pollution and keep it cool), **C-Milk leg** (flight corridor to take water from treasury), **D-Wind catcher** (A tool for guiding air flow into the water storages to prevent water from corruption). [3]

This study is divided into seven sections: Section two deals literature review; Section three describes water storages; Section four presents Research methodology; Section five presents case study; the remaining sections analyses the research findings and present the research results and questions for future research.

Literature Review:

Nguyen et al. (2011) deals the prevalence of disease based rural water storages in the Vietnam. Results showed that water storages are one of the most factors for controlling of disease.

Parfitt et al. (2010) reviews water storages in the North Pole, and its impact on the Sediments of Freezing and Fossils.

Nurge and Perusich (2010) have paid Methods of measuring water absorption by water storages and their impact on regional ecosystems.

Christiansen et al. (2010) are discussed to examine and measure changes in gravity caused by water storages, in this research, water

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storage function have evaluated in controlled conditions. Processing and analysis has been done using non geophysical methods.

Xavier et al. (2010) have paid the diversity of water storages and how they function in the period2003 to 2008 in the Amazon and their impact on the river.

Baldwin et al. (2008) have paid to review structures and water quality parameters in diff erent conditions. In this study, different conditions and different parameters affect on water storages are evaluated and important of them and the quality of water storage has been studied.

Sharda et al. (2006) have been discussed paid to review how to manage their water storages and water in India. In this study, it is estimate their impact on performance and evaluation of groundwater.

Han et al. (2005) have been reviewed water storages performance based on satellite maps. In this article, the water storage is assessed using the possibilities of remote sensing and satellite.

Boutena et al. (1996) are paid monitoring and modeling of water storages; in this research has been studied management of water storages by atmospheric deposition.

Zafarzadeh (2006) is paid to determine the chemical quality of water in water storage of Golestan province. The results suggest that a significant number of water qualities of the water storage of some chemical parameters, especially heavy metals due to being over the limit, are not suitable for drinking.

Javadi (2008) reviews and analyzes the architectural ornamentation "Ganjali Khan complex" masterpieces of Safavid era art in Kerman. This study examines the effects of architectural decoration in the water storages.

Farrokh Yar(2007) is paid to To check the water in the old warehouse districts, Kashan and AranBidgol. In this study is assessed various water storage and their performance.

Pary Noush (2004) has paid to the old water storages and function of water in the city of Qazvin them and they are assessed.

Mortazavi and Bagheri (2003) review Desert Wa ter technology: aqueduct and water storages. The research knows subterranean water transfer system and how to design and architectural style as Yazd and Kerman water storage.

Qobadyan (2006) studies the climate, architecture and applicationof water stor age and ground pools. it is paid Explain the types and their geographical distribution, how he worked and how to run the application and the interest.

Pourjafar (2002) reviews systems and store fresh water supply, it has been discussed most notably the traditional ponds and water storage in the Persian Gulf region.

Water Storages and theirs performance:

Water storage is one of the ancient architectural phenomenons in the low water and dry areas. The oldest water storage is the city of URE (near Basra) that it is built on this city in 2150 BC by order of the URE King on the Ziggurat platform. The Dourantash-Ilami water storage related to about the second millennium of BC. Construction of water storage can be an important water storage facility in Iran. There are various types of water storages based on their performance: [1]

- **Private water storages:** they are made in the urban and rural homes, often under buildings or in the yard below the surface. The tanks of these water storages are typically cubic or rectangular flat ceiling or are rocking. In this type of water storages, if the tank built under disrespecting yard, water harvesting was done with a bucket of through the roof or near the ceiling by hand pump.
- **Public water storages:** there are various types of these water storages (**A-the urban water storages:** We were made usually centers near neighborhoods and the possibility of religious, educational, welfare and trade. **B – The Rural water storages**: generally was built in the central village fields. These water storages were very simple architecture. **C – The way water storages**: This route is usually along roads and convoys. **D – The desert water storages:** We usually were made in dry deserts to drink and to water down pets). [7]

Structure elements of water storage: structures include water storage tank, milk leg, Portico, Stairs and Wind. [3]

- **Tank**: it is Places for water storing and the main element for the formation of water storage. Most important factor in variation from the water storage tank, it uses urban and rural. Tanks are preventing water pressure, which will enter the body, and it is placed inside the earth, and its depth has 16-15 meters to the level crossing. When the water storage tank is below the ground level or subterranean water streams can be easily and naturally be mounted on it, and it is not needing additional resources to transfer water to the tank. The greater the depth of the earth, we lower the temperature fluctuations and the depth of 6.5 meters. The annual average temperature is on the ground. Underground water storages, so water does not freeze in winter, and summer is cool and refresh.
- **Milk leg**: the location of the tank is connected to the big brass. Its Figure is as a half or eight ears quad square.
- **Portico**: it is help entering to water storages. A frame with two vertical pillar and a closing

inscription, Stone bench Work Category, and Tailings showing that small stone cistern manufacturer and aware.

- **Wind**: With proper guidance to the space underneath and the wind and air circulation inside the yard and other spaces will cause the air chill (rack wind is considered direction in water storages in each area according to wind direction conditioning, Total wind of water storages varies from one to seven winds). [6]
- **Staircase (staircase)**: number of steps has changed according to the depth of the water storage tank, of course floor of the tank is lower the Portico. Numbers of steps are sometimes also 80-70 stairs.

How to build water storage: store water for construction, ground water storage chose in the firm local and tolerate heavy weight, water tank and vault walls have it.

After determining the location and digging, usually with a concrete floor, it is completely coated the limestone and were executed generals' integrated foundation. In some cases, if a tank is large, the brick floor had covered by carpet. [4]

For water storage walls were used the brick red (it is resistant to water). Tank wall and floor are coated with mortar, and then the wall was roofed with a dome or vault.

Type of materials and how to run is not always the same. Construction of water storage for large Portico in Qazvin tank with a capacity of 6000 cubic meters, that is one of the largest reservoirs in Iran, and it has been used the lime in the concrete floor of the entire body. For coverage of small water storages has been used vault for columns and sometimes kept in the vault of the fire tank by stairs or generally perpendicular to adjacent surfaces of the tank and started on the ground level and portico.

Most cities in the desert, usually wealthy individuals in their homes are used private water storages and one of the underground rooms to store water. These water storages were filled also like the public water reservoir of subterranean water or creek in early spring mix staircase and brass water valve.

Water storages generally are divided into two categories: The first type is a cylindrical shape that has been dug in the earth. These types of water have been made as small warehouses (with a capacity of 20 to 30 cubic meters of water) or large (with a capacity of 84 to 88 cubic meters of water). The second type of water storage is made columns as forums to listen and eight figures. This type of sample has about 1.370 cubic meters of water storage capacity.

Construction of water storages has had to depend on the following factors: Financial position of the person, shape and water storages, Regional status, type of water storages by low population or high population area, along the road in the village or town and tribal differences in the migration path, Regional natural position.

Process cooling water in water storages: water storage tank through the channels several kilometers in length in one of the coldest winter nights filled with cold water sectors. Channels were often open to cooling water through evaporation and radiation heat transfer with the sky so that its temperature cooled to near the freezing point decreases. [6] In summer the water inside the tank to heat the layers accordingly so that the water temperature according to the radiation heat exchange with the ambient temperature inside the dome roof water storage and water temperature is close to the floor almost the same temperature water tank in the winter. Because of thermal layering within the water tank is that when air flow from the outside environment through the input channels to funnel water reservoir into the internal space to be dealing with the reservoir water level caused by the evaporation process of the water surface, its heat loses his place with several layers of warmer and because of its lower density will change more. Milk harvesting water from the reservoir at the lowest point is placed so that any disturbances in the heat category are not created and is maintaining the thermal layering. Diagram below the water temperature at the lowest and highest water storage layer for all months of the year according to the daily mean temperature and soil type on water storage shows:

The test on one of the water storage in Yazd, Iran which has four windward tetragonal, a ceiling dome and reservoir cylindrical height and diameter of the base of the same length of 10m are measured, the water tank and the water storage of the distance about 30 kms, Channel along the way by which both are open and covered supply is disrespecting. For two months, July and August the warmest months of the year are in Yazd, the average water temperature in the water storage bottom, respectively, 13.2 and 14 2degrees. Celsius and average temperature environment and water surface temperatures, respectively, are approximately 41 and 39degrees Celsius.[8] According to the results of the numerical solution and experimental measurements can be made to point out that the water storage temperature is depended on the storage size. Water temperature entered into the primary reservoir and the soil type and moisture.

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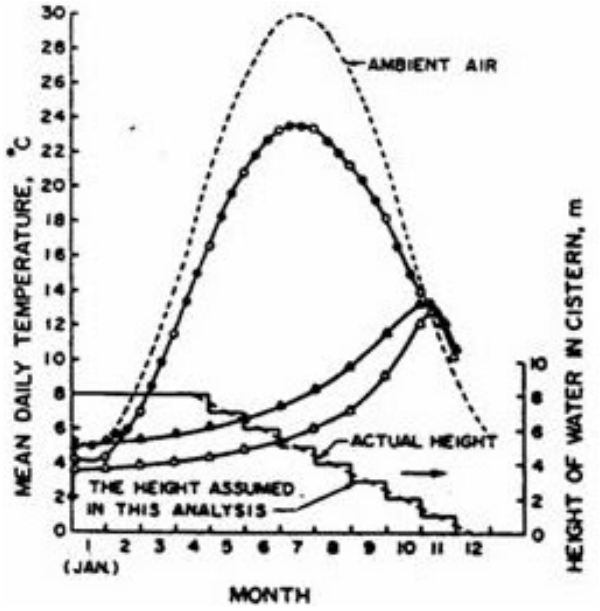

Research Methodology:

Study method is the type of case study; it is used survey on description methods used. This approach to analog for distribution features is used in statistical community. This research based on descriptive analytical, and research design based on the target type is applied. Validity and reliability in the present study have been studied by using exploratory factor analysis and Cronbach's alpha.

Statistical sample population: Population studies are all the water storages, and the sample included is the Seyyed Ismaeel water storage.

Required information for performance reviews the Seyyed Ismaeel water storage and study of scrolling is through documents and interviews.

Validity test is simply the ability to measure tool to measure the trait that the test is made. Validity of the unique features of data collection methods that can be said that information collected and the actual logic that can be achieved the correct results. In compiling the research to overcome the weakness of making aspect of validity, it must be achieved in small volume to test and to interpret its results. Purpose test for accuracy before its validity has been done and further exploration of the factor analysis for greater accuracy was used (Momeni, 2004, p. 220).

Reliability is a primarily device for accurately measure the result refers to the accuracy of reliable, trusted quality, stability, or repeatability refers to test results. In the present study to assess the reliability has been used the comparative method.

Case Study (Seyyed Ismaeel Water Storage):

Based research methods, it tries to the Seyyed Ismaeel water storage investigated and the performance is evaluated.

Architecture: materials used in the Seyyed Ismaeel water storage are cream color bricks and mortar with special flowers and lime mortar, with dimensions $20\times10\times5$. Furthermore,k poured molten are made of lead and lead-lined the back walls. This building has a rec angular plan with dimensions 30×42 m, and it have been constructed thhadrection North - South, including input, storage, stairs and wind. Water storage is flat the outer covering. Flat roof, the last of ts major source for coverage pilars have gone to work, the more water usework. The s that form complex with the mosque, school, caravanserai and they haconvoy,tructed on the roof, you can be seen roof. You ctural spaces such as mosques, schools and rooms.

Discussions and Conclusions:

Basis of research proves that because of drought weather major part of Iran and non seasonal rainfall and lack of river access to water, measures to provide fresh water in dry seasons has been consideration; of including the establishment clause, the aqueduct and water reservoir named. In this regard to water storage tank, it was used for water in high water seasons and during the rest.

This study introduces and analyzes the performance of components and water storages and their role in preserving life in the hot desert regions and then presents a sample case study for field testing of objective content expressed occurs. The case study is the Seyyed Ismaeel water storage as a sample case study. The Seyyed Ismaeel water storage has been located in the center of the Chalamidan Quarter of Tehran.

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