

Urbanization and its impacts on water accessibility in East Karachi

ISSN (e) 2520-7393
ISSN (p) 2521-5027
Received on 12th Mar, 2021
Revised on 24th Mar, 2021
www.estirj.com

Aneel Ahmed¹, Mir Aftab Hussain Talpur², Noman Sahito³, Gopal Das⁴, Shaharyar Brohi⁵,

^{1,2,3,4,5}Department of City and Regional Planning Mehran University of Engineering Sciences and Technology, Jamshoro

Abstract: This study puts lights on the impacts of urbanization on water crisis in Karachi district east. The issue of water crisis is worsening due to increase in urbanization in the study area. Regarding study, a number of studies have reviewed to know how other authors have used different research methodologies. After analyzing the certain studies digitizing Arc GIS technique, close ended questions from residents and descriptive analysis methods were used to conduct the study. The results which obtained through questionnaire show that mainly water supply was available alongside the main roads and as long as one enters into the Tehsils availability of water decreases due to unchecked construction and due to increase in population water demand is increasing day by day which results in water scarcity. Union councils wise overhead proposed tanks should be provided to meet the existing and future demand of water in the city. Rain water storage facilities and liquid waste water treatment plant model which was adopted in California USA to meet the water demand of the city should be provided UC wise though which huge amount of water could be preserved. Therefore, the main purpose of this study is not only to highlight the dreadful impact of urbanization on water in east Karachi but also suggest some practical measures to improve the water accessibility in other areas of Karachi.

Keywords: Urbanization, Water Supply, Accessibility, Water Demand and Supply.

Introduction

The world is gradually getting urbanized because of financial turn of events and dispersion of occupations. In advanced nations, populace is settled and the metropolitan population is now a huge one, in developing nation population is also expanding and by 2050 the total populace ought to be of around nine billion with most of being settled in urban areas [1]. Within a limited space, urbanization increases competition for the same natural resources (air, water, and land) for all human needs for life, development, and recreation. The world, which is created by natural space and population, is a living and dynamic being that produces interconnected effects that, if not controlled, can lead to chaos in the city [2].

The land use system and related resources, particularly water resources, are highly dynamic; they undergo significant changes according to the changing socio-economic and natural environment. In fact, land use changes are probably the most important factor in determining water quality in most landscapes [3]. Water framework typically incorporates water and sanitation. Generally, disinfection alludes just to the assortment and treatment of homegrown and modern effluents, and do exclude seepage and solid waste. The administrations of Urban Waters, provided by the city ought to incorporate water supply, sewage framework and treatment, depleting and solid waste. Environmental protection, wellbeing and socio-economic aspects are the components of sustainable urban environment [4]. Throughout the long term, land uses in India have been evolving quickly; causing a sharp

decrease of rural zone and timberland and has caused a huge increase in metropolitan land [3]. Urbanization changes not only the local environment but also alters local conditions in no time. Since the era of industrialization and rapid population growth, land use changes have strongly accelerated in many regions in India [5]. With regards to the planning and management of urban resources, the acknowledgment of the effects of urbanization on the water is among the most essential aspects. The importance comes from the way that water conditions are incredibly valued in metropolitan regions as natural, esthetic and recreational aspect and thus are significant local area resources [6]. Water is the most adversely affected by urbanization.

Urbanization is the phenomenon which starts right after the industrial revolution. People migrated to urban areas for the pursuit of better life style. As urban population grew with rapid industrialization it started to affect the environment of the urban areas. Same is the case with Karachi, as it is an industrial hub of Pakistan it attracts huge population from all over the country which ultimately results in urbanization and unplanned growth. According to the population bureau of statistics of Pakistan the current population has reached to 16.5 million. Owing to rampant urbanization the environment of Karachi has been severely affected because increase in urban growth results in increase in industries, automobiles and construction activities.

Owing to these factors the water pollution has increased manifold in the city. Karachi is the biggest and thickly populated city of Pakistan where water is provided through pipelines. However, burgeoning population and shortage of municipality provided water have adversely affected the

supply and demand balance in the city. Thus, individuals living in the city are presently relying more on the ground water to meet their day by day needs. The over extraction of ground water depletes water table and speeds up the toxins transport from the land surface to aquifers which ultimately affects the aquifers [7].

2. Related Work

A different set of literature reviews have been observed while conducting the study. These are some related work as follows. Exploratory study on drinking water equity and accessibility in Navi Mumbai city a satellite town [8]. is the first related work. The study identifies affectivity of water supply system in term of accessibility and equity to the people of Pawane Village in order to understand its performance in view of targets of SDG's. Closed questionnaire surveys as well as discussions were conducted as a methodology for the concerned study. The results of Study observed that storage condition were filthy, lack of awareness regarding water treatment, water quality and water harvesting technique.

The second relate work was Urbanization and its effects on water resources: An explanatory analysis [9]. The Imperative focus of the study is to highlight the rapidly growing urban life and its impacts on water resources of Muzaferabad. As far as methodology is concerned in-depth interviews with members of the local government, political workers and local residents of the city were conducted to finds the results of the study. The findings of the study indicate that waters of both rivers Jhelum and Neelum are being viciously contaminated by the local residents, which results in a scarcity of drinking water and a number of viral diseases.

The third related work was Impacts of urbanization on environment [10]. The principal focus of the study was on Urbanization and its impacts on deteriorating water quality and quantity and worsening air pollution in urban centers of India. As a methodology open and close ended questions with residents, detailed interview with concerned authorities were chosen to obtain reliable data. The obtained data highlighted the critical situation of water and Air quality indexes in urban areas of India

3. Methodology

3.1 Random Sampling

Random sampling was selected as a most suitable methodology technique after reviewing the different related works to know the impacts of urbanization on water accessibility in east Karachi. As the population of east Karachi is above one million therefore sample size og 384 questionnaires were set to obtain the required data. Besides the obtained data has been analyzed in SPSS frequency analysis and finally correlation technique has also been used to check the reliability of the data

3.2 Secondary Sources

Secondary sources such as internet, article, mater plan have also been followed to extract the information about water supply, demand and its gap in the study area.

4. Results and Discussion

This research provides credible data about the increasing urbanization and its impacts on water accessibility in the study area.

It not only highlights the extent to which population is booming currently, but also brings forth the projected increase in population by 2030 and its impacts on the water accessibility in East Karachi.

The study also shows the current as well as future gap between water demand and supply in the study area.

Finally, some remedial measures have also been suggested to do away with water foes in east Karachi.

The water treatment model adopted by the California (USA) which provide water with different colored pipeline for domestic and drinkable usage has also been suggested to mitigate water accessibility problems in east Karachi

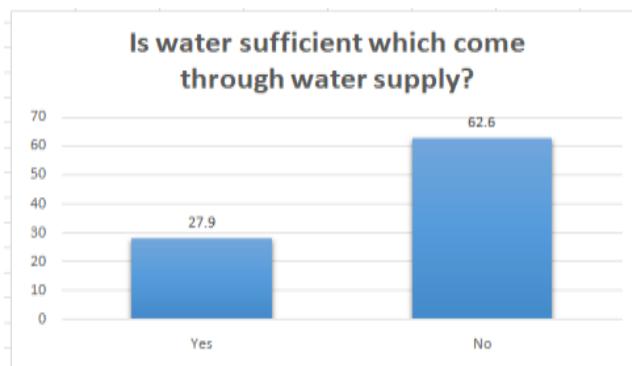


Fig. 1 shows that when respondent were asked about the availability of water supply in there respected area 90.53% replied in positive while 9.47% replied in negative.

Demand and supply of MGDs in the study area:					
Karachi East tahsils	Current Population	Number of HH	Number of MGD received	Number MGD required	MGD gap
FEROZABAD	762,850	141,846	12	20	8
GULSHAN-E-IQBAL	644,362	115,686	35	20	15
GULZAR-E-HIRI	734,410	109,752	13	25	12
JAMSHED QUARTERS	471,830	85,619	14	30	16

EWAES (2019, Januar 1st), Current Water Supply Position.

Table. 1 shows current population of tahsils of Karachi east which are Ferozabad, Gulshan-e-iqbal, Gulzar-e-hijri and Jamshed quarters along with their household size. Besides, it shows the number of MGDs received and MGDs required in the respective tahsils. Finally, the table highlights the current gap between water demand and water supply in the following tahsils.

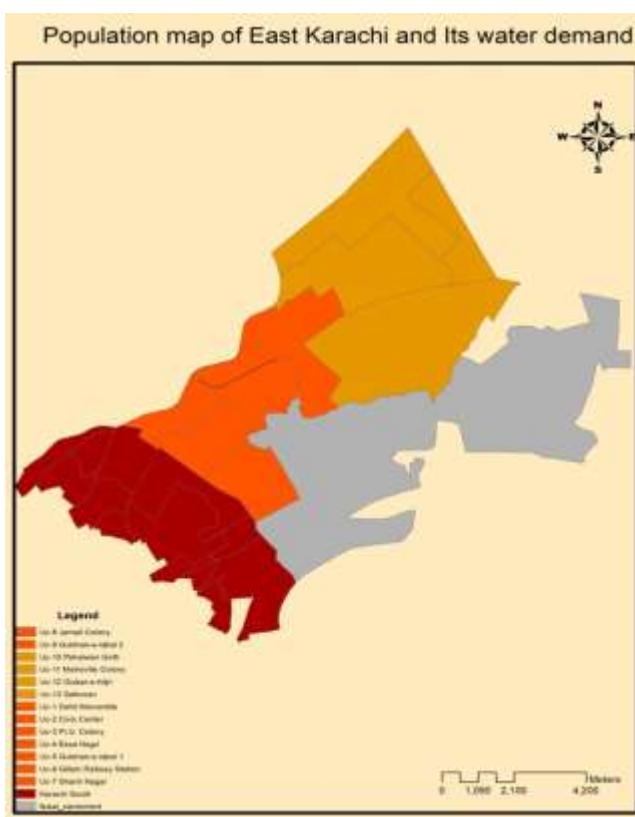


Fig. 2 shows current population of tahsils of Karachi east which are Ferozabad, Gulshan-e-iqbal, Gulzar-e-hijri and Jamshed quarters along with their household size. Besides, it shows the number of MGDs received and MGDs required in the respective tahsils. Finally, the table highlights the current gap between water demand and water supply in the following tahsils.

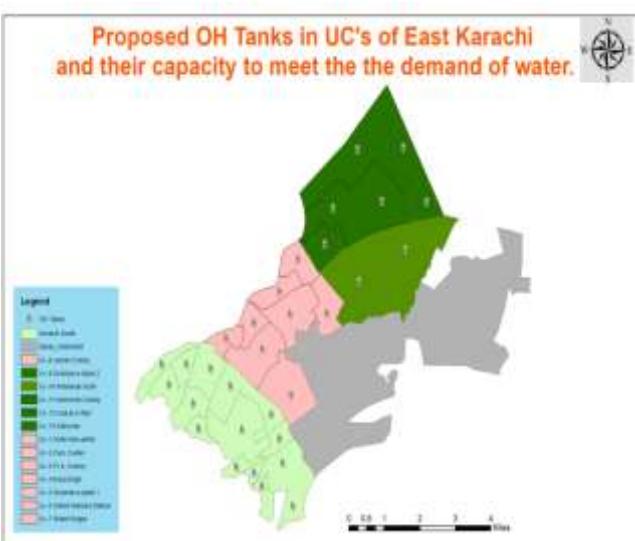


Fig. 3 Proposed overhead tanks in all Union councils of Karachi East, except the union councils of Faisal cantonments, to meet the existing and future demand of water in the district.



Fig. 4 current and future demand of water in MGDs which are 95 and 154 respectively. It also displays the projected liquid waste in MGDs by 2021 and by 2030 which are 66.5 and 108 respectively. Through this liquid waste huge portion of water demand can be meted out.

Conclusion

The issue of water crisis is worsening due to increase in urbanization in the study area. The effects of urbanization on water accessibility in Karachi east was achieved through detailed close ended questionnaire from the residents of the study area. Besides, multiple secondary data sources have been used to evaluate the gap between supply and demand of water in the study area. Finally, some doable strategies through which water accessibility could be improved both quality and quantity wise have also been suggested by implementing the proposed suggestion, the menace of water crisis can be done away with permanently.

References

- [1]. Haque, I. and P.P. Patel, *Growth of metro cities in India: trends, patterns and determinants*. Urban Research & Practice, 2018. **11**(4): p. 338-377.
- [2]. Torrey, B.B., *Urbanization: An environmental force to be reckoned with*. Population Reference Bureau, 2004. **1**.
- [3]. Shivaraj, Y., A.N. FB, and R. Rajesh, *Impact of sewage water on the changes in behaviour and bodyweight of a freshwater fish, Cyprinus carpio (Linnaeus)*. 2018.
- [4]. Tundisi, J.G., *Water resources in the future: problems and solutions*. estudos avançados, 2008. **22**(63): p. 7-16.
- [5]. Chelladurai, P. and S. Kerwin, *Human resource management in sport and recreation*. 2018: Human Kinetics.
- [6]. Huang, G., et al., *Impact of anthropogenic and natural processes on the evolution of groundwater chemistry in a rapidly urbanized coastal area, South China*. Science of the Total Environment, 2013. **463**: p. 209-221.

- [7]. Roy, A.D. and T. Shah, *Socio-ecology of groundwater irrigation in India*. Intensive use of groundwater challenges and opportunities, 2002: p. 307-335.
- [8]. Rahayu, P. and F. Mardiansjah. *Characteristics of peri-urbanization of a secondary city: a challenge in recent urban development*. in *IOP Conference Series: Earth and Environmental Science*. 2018. IOP Publishing.
- [9]. Rashid, H., M.M. Manzoor, and S. Mukhtar, *Urbanization and its effects on water resources: An exploratory analysis*. Asian Journal of Water, Environment and Pollution, 2018. **15**(1): p. 67-74.
- [10]. Uttara, S., N. Bhuvandas, and V. Aggarwal, *Impacts of urbanization on environment*. International Journal of Research in Engineering and Applied Sciences, 2012. **2**(2): p. 1637-1645.

About Authors

Aneel Ahmed Hingoro, MS Scholar, Department of City and Regional Planning, Mehran UET Jamshoro.

Dr. Aftab Hussain Talpur, Associate Professor, Mehran University Jamshoro Rural-Urban Linkages and Civil Engineering

Dr. Noman Sahito, Assistant Professor Mehran University Jamshoro.

Gopal Das Menghwar, Masters in the Department of City and Regional Planning MUET Jamshoro, Research Associate in City and Regional planning MUET Jamshoro.

Shahryar Brohi, Masters in the Department of City and Regional Planning MUET Jamshoro.