

# Is Water of Delhi Sustainable?

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**Abstract:** *Global Risks Report (2015)* water supply crisis was recognized as the “top 1 high-impact risk for our current times” by *World Economic Forum*. The United Nation General Assembly (2015) adopted Sustainable Development Goals (SDG’s) with the primary agenda of laying the foundation for the achievement of sustainable future. The major issue of crisis in modern India is the rapid growth of issue related to water scarcity. The rapidly rising industries and urban centers are leading to the overconsumption as well as overexploitation of the available resources leading to the severe condition of water scarcity. Delhi, the capital of India emerged as one of the worst hit city of the nation suffering from the rapid increase of water scarcity. The aim of this research work is to highlight the ensuing water crisis due to the rise in demand as the consequence of rising population and pollution in Delhi. This research work primarily aims to interrogate one of the most significant questions that whether the National Capital is sustainable in terms of water supply. Through analyzing the data available this research paper will study the relation between exponential population growth and water shortfall as well this paper will attempt an analysis on the plant capacity and demand.

**Keywords:** Water scarcity, sustainability, water shortfall, population growth

## Introduction:

The United Nation General Assembly (2015) adopted Sustainable Development Goals (SDG’s) with the primary agenda of laying the foundation for the achievement of sustainable future. The ongoing concern across the Globe regarding the depletion of resources have made it imperative to bring our attention towards this rising concern and to figure out the necessary measures to safeguard as well as judiciously use the resource available so that it can be saved for the future generations. The most dominant cause of concern mostly in the developing countries is the lack of water resources. United Nations General Assembly has listed it as the sixth agenda in the sustainable development goals. The sixth agenda of the SDG primarily talks about the access to the clean water and sanitation. Water is the most basic necessity of life, but the changing dynamics of India suggests that the major issue of crisis in modern India is the rapid growth of issue related to water scarcity. The rapid industrialization and urbanization is leading to the overconsumption as well as overexploitation of both the available fresh surface water and groundwater thus leading to the severe condition of water scarcity. Delhi, the capital of India emerged as one of the worst hit city of the nation suffering from the rapid increase of water scarcity. Delhi being the capital of India attracts large number of population from across the country, who hails here in search of employment and better livelihood. The large scale immigration from the different region of the country to Delhi has led to the haphazard growth in population leading to the increased demand in water supply. In the recent article published by NDTV India titled “*As Yamuna Almost Dries Up, Drinking Water Problem May Worsen in Delhi*”( May 16, 2022) officials of Delhi Jal Board stated that the capacity of production of water at all the major treatment plants of Delhi i.e. Wazirabad, Chandrawal and Okhla has dipped further as the major source of water that is river Yamuna is almost at the verge of drying up. The officials from DJB also argued that the water supply from these plants have dropped by almost 40 percent and further stated that the water level of Wazirabad pond has gone down to 669.40 feet which is lowest so far, as the consequence the production at major treatment plants i.e. Wazirabad, Chandrawal and Okhla dropped by 60-70 percent. The major cause of this crisis one might think of is the exponential growth in population and pollution as well as the water conflict between states. Amidst this entire rising crisis it’s become imperative to interrogate regarding the sustainability of water resources.

The aim of this research work is to highlight the ensuing water crisis due to the rise in demand as the consequence of rising population and pollution in Delhi. This research work primarily aims to interrogate one of the most significant questions that whether the National Capital is sustainable in terms of water supply. Through analyzing the data available this research paper will study the relation between exponential population growth and water shortfall as well this paper will attempt an analysis on the plant capacity and demand.

## Objective:

The objective of this research work is to bring into fore the question of ensuing water crisis due to the rise in demand as the consequence of rising population and pollution in Delhi. This research work primarily aims to interrogate one of the most significant questions that whether the National Capital is sustainable in terms of water supply. Through analyzing the data available this research paper will study the relation between exponential population growth and water shortfall as well this paper will attempt an analysis on the plant capacity and demand.

## Hypothesis:

This research work will argue that the major cause of rising water shortage across city is rise in population, increased level of water pollution due to rise in levels of ammonia and inter-state water dispute between Delhi and Haryana as well as this research will interrogate on the issue of sustainability.

## Problems:

### ➤ Source of Water:

The major source of water in Delhi is river Yamuna and river Ganga, according to the current reports the water level of Yamuna River is declining as well as the lower level of supply of water from other states is leading to water deficit in Delhi.

➤ **Rise in population:**

The exponential rise in population is leading to increased water demand as well as disparity in water supply.

➤ **Rise in Pollution:**

The rapid industrial growth near the treatment plants as well as near River Yamuna is the major cause behind the rise in pollution. The inter-state dispute has often led to the rapid increase in level of Ammonia in water thus making it unfit for consumption.

**Methodology:** Secondary data have been collected and analyzed based on primary observation.

**Literature Review:**

The rapid depletion of the natural resources has already managed to garner the attention of many researchers and scientists. Further the most basic and important resource i.e. the water resource is depleting at an alarming rate thus making it imperative to discuss the issue of sustainability related to water resources. M Kummu et.al (2019) in their acclaimed work “*The world’s road to water scarcity, shortage and stress in the 20<sup>th</sup> century and pathways towards sustainability*” have analyzed the major fundamental stressor of water scarcity that is causing hindrance in attaining sustainability goal. In this he emphasized the difficulties in satisfying the needs of a population as well as the overuse of resources via analyzing the most fundamental conceptions of shortage, its impacts due to low availability per capita, its impact on water as a consequence of high consumption relative to availability.

The noted article on “*Evaluating the economic impact of water scarcity in a changing world*” written by Flannery Dolan et.al (2021) discussed and claimed that the scarcity of water is dynamic and complex that emerges from the influence of climate change, basin-level water resources, and managed systems’ adaptive capacities. David Seckler in the research work titled “*Water Scarcity in the Twenty-First Century*” did a study to calculate the water supply and demand on the global scale by taking 118 countries as the reference point and tried to project the demand for the period for 1990-2025. Seckler identified the geographic and nature focal point to study the growing water scarcity. Falkenmark et al. (1989), Alcamo et al. (2000), Vörösmarty et al. (2000) It is a well evident fact that major part of the world are facing water scarcity, which majorly refers to the situation “wherein demand for water by all sectors, including the environment, cannot be satisfied fully due to the impact of water use on supply or quality of water”. Singh N. P (2010) acclaimed research article “*Space and Ground Water problem in Delhi*” raised the crucial issue of water affordability and argued that many households do not have the financial capacity to have their own private taps, because 40 percent people live in slum, urban village and unauthorized colony. After reviewing the available literature, one thing that can be observed is the concern for rising water crisis and the question of sustainability. This paper discusses one of the prominent and significant questions “*Is Delhi Sustainability?*” Through analyzing the data available this research paper will study the relation between exponential population growth and water shortfall as well this paper will attempt an analysis on the plant capacity and demand.

**Relation between population and water shortfall in Delhi:**

The haphazard population in growth in metropolitan region of Delhi has created a very ambivalent situation with uneven distribution of water. The temporal study as shown in table- 01 depicts the population growth and water shortfall in Delhi. In the 2000 the population of Delhi was 132 lakhs with the water production of about 630 MGD, the demand in that year was 792 MGD thus leading to the water shortfall of 162 MGD which shows that the per capita per day requirement is 217 litres. Whereas the growth in population increased from 132 lakhs in 2000 to 153 lakhs in the year 2005, there was slight increase in water production that is 650 MGD but the demand for water increased remarkably from 792 MGD to 918 MGD thus leading to 268 MGD shortfall with slight decrease in per capita water requirement to 192 litres. In the year 2009 population was about 170 lakh with the water production increased to 810 MGD, increased population led to the increase in demand i.e. 1020 MGD, the shortfall observed in that year is 210. In the 2010 the population of Delhi was 180 lakhs with the water production of about 845 MGD, the demand in that year was 1080 MGD thus leading to the water shortfall of 235 MGD which shows that the per capita per day requirement is 213 litres. Whereas the growth in population increased from 180 lakhs in 2010 to 230 lakhs in the year 2021, there was slight increase in water production that is 1290 MGD but the demand for water increased remarkably from 1080 MGD to 1380 MGD thus leading to 90 MGD shortfall with slight decrease in per capita water requirement to 255 litres.

**Table-01: Demand and water shortfall in Delhi**

Years	Water Production (MGD)	Demand (MGD)	Shortfalls (MGD)
1951-56	60	152	92
1961-66	130	230	100
1971-76	175	323	148
1981-86	337	515	178
1991-96	575	786	211
2000	630	792	162
2005	650	918	268
2009	810	1020	210
2010	845	1080	235
2021	1290	1380	90
2022			

Source: Delhi Statistical Abstract, Department of Economics and Statistics, Govt. of NCT of Delhi, Delhi Jal Board

The above dataset clearly depicted that the through the year population of metropolitan region of Delhi is rising thus making it primary cause of water scarcity in Delhi. The increase in population is leading to the increase in water demand whereas the water production is increasing only slightly therefore causing shortfall. The above analysis establish that the rapid growth of population is having direct impact on water demand thus on water shortfall.

### Water Treatment Plant and Water Treatments in Delhi:

The rise in water demand had made it inevitable to ignore the rising concern, hence Delhi Jal Board is making required efforts to increase the plant capacity to meet the target of sustainability. The major water treatment plants that are responsible for water supply across city are Bhagirathi, Chandrawal, Haiderpur, Nangloi, Sonia Vihar, Wazirabad, Okhla, Dwarka, Bawana and considerable amount of water is supplied from rainy and tubewells. The plant capacity of Bhagirathi was 105 MGD in 2013 which was increased to 112 MGD in the year 2022 and DJB has targeted it to increase it by 114 MGD. Chandrawal had the plant capacity of 103 MGD in the year 2013 whereas in the year 2022 it was increased to 95 MGD and the targeted increase is 100 MGD. In the year 2013 Haiderpur has the plant capacity of 225 which was considerably increased to 231 MGD in the year 2022 and DJB targets it to increase to 236 MGD. The plant capacity of Nangloi was 40 MGD in 2013 which was increased to 42 MGD in the year 2022 and DJB has targeted it to increase it by 42 MGD. Sonia Vihar had the plant capacity of 140 MGD in the year 2013 whereas in the year 2022 it was increased to 141 MGD and the targeted increase is 140 MGD. Currently in the year 2022 water treatment plants Okhla, Dwarka and Bawana have the plant capacity of 21 MGD, 51MGD and 20MGD respectively. The targeted plant capacity of these plants are 21 MGD, 52MGD and 21MGD respectively. Rainy wells and tube wells in the year 2022 has the plant capacity of 90MGD and the target set by DJB for the year 2022 is 137 MGD.

**Table-03: Water Treatment Plant and Water Treatments in Delhi**

Water Treatment Plants	2001 Plant Capacity (MGD)	25/03/2013 Plant Capacity (MGD)	25/03/2022 Plant Capacity (MGD)	Targets (MGD) Year 2022
Bhagirathi	100	105	112	114
Chnadrawal		103	95	100
Haiderpur		225	231	236
Nangloi		40	42	43
Sonia Vihar		140	141	140
Wazirabad	210	132	132	134
Okhla		-----	21	21
Dwarka		-----	51	52
Bawana		-----	20	21
Rainy Well and Tubewells	81	-----	90	137
Total			935	998

Source: Delhi Jal Board-2022.

The data shows that the increased plant capacity is also insufficient to meet the demands hence DJB has set a target to achieve in the year 2022 in order to meet the demands of present as well as future generations. The targeted plant capacity in 2022 is 998 MGD an increase of about 63 MGD.

### Discussion:

Water scarcity is the rapidly increasing crisis globally. The national capital Delhi is the worst hit part of India when it comes to the water sustainability. Sustainability has become distant dream for Delhi, when the current scenario clearly suggests that the water supply is not sufficient to even meet the ends present generation. The major cause of rising water problem in Delhi could be unplanned urbanization; the haphazard growth in population in urban centres is creating a situation of disparity making it inaccessible to many. The above dataset clearly portrayed that across the year population of metropolitan region of Delhi is rising therefore making it primary cause of water scarcity in Delhi. The increase in population is leading to the increase in water demand whereas the water production is increasing only slightly therefore causing shortfall. The above analysis establish that the rapid growth of population is having direct impact on water demand thus on water shortfall. The large scale immigration is leading to the increase in demand of water as well as the rapid industrialization in and around Delhi is the major contributor of pollution thus making water unfit for consumption. The large amount of Ammonia coming from Sonipat (Haryana) in River Yamuna is the primary stressor causing pollution. The widespread concretization stops the seepage of rainwater in ground thus decreasing the levels of groundwater.

The extreme climatic condition of Delhi also plays an important role in water availability. Summer in Delhi last for about 4 months and rain primarily happens for around two months. The demand for water rises in summer and in this season the water level of river decreases considerably thus creating water supply and demand disparity. The concretization of the road inhibits water seepage thus decreasing the level groundwater and the sparse rain in Delhi is not sufficient to increase the level of surface level. The seasonal variation, climate change affects both surface and groundwater level thus creating the imbalance between demand and availability of water which is also the prime reason for water shortfall. The mentioned issues are the major reason behind the rising issue of water scarcity.

### Conclusion:

In the conclusion the above study clearly suggests that the that the major cause of rising water shortage across city is rise in population, increased level of water pollution due to rise in levels of ammonia and inter-state water dispute between Delhi and Haryana thus raise the significant issue that is whether Delhi is sustainable or not. The above analyzed data clearly portrays that the population of metropolitan region of Delhi is rising thus making it primary cause of water scarcity in Delhi. The increase in population is leading to the increase in water demand whereas the water production is only witnessing slight increase therefore causing shortfall. The study established that the rapid growth of population is having direct impact on water demand thus on water shortfall. To meet the demands DJB has set a target to achieve in the year 2022 in order to meet the demands of present as well as future generations. The targeted plant capacity in 2022 is 998 MGD an increase of about 63 MGD. This research highlighted the

ensuing water crisis due to the rise in demand of water supply as the consequence of rising population and pollution in Delhi. It interrogated one of the most significant questions that whether the National Capital is sustainable in terms of water supply. Through analyzing the data available this research paper studied the relation between exponential population growth and water shortfall as well it also attempted an analysis on the plant capacity and demand. After analyzing the data available it can be concluded that if not used judiciously the future generation might suffer to end meets or in the coming future there is going to be lack of safe water for consumption.

#### Suggestions:

- To create sustainable water supply chain revival of Yamuna River is important.
- By creating separate drainage for polluted water on both the banks of river so that polluted water can be separated.
- Permanent solution for the management of excess pollutant like Ammonia generated from neighboring states like Haryana.
- Revival of ponds ( Johar).
- Development of biodiversity parks, afforestation and the creation of recharge pits.
- Rainwater harvesting.
- Restriction on the intra state generated pollutant getting drained into drainage.
- Creation of polluted zones and continuous monitoring.
- Proper city planning and controlled population distribution.
- Proper environmental policies.

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