

# SUSTAINABILITY A SERIOUS CHALLENGE FOR THE INDIAN WATER SECTOR

Dr. Manisha Jaiswal

Assistant Professor, Department of Commerce,  
Daulat Ram College, University of Delhi, Delhi India

Dr. Suchitra Prasad

**Abstract:** *Water is a finite and irreplaceable resource that is essential for human survival. Water is at the core of sustainable development socio-economic development, healthy ecosystems, and environment. It is crucial for reducing the global burden of disease and improving the health, welfare and productivity of population. By 2050, global water demand is projected to increase by 55%, this growing demand from water demand is largely influenced by population growth, urbanization, manufacturing, thermal electricity generation and domestic use. India occupies 2 percent of the world's land area, represents 16 percent of the world population and 15 percent of livestock, whereas it has only 4 percent of the water resources of the world. India ranks 133rd out of 180 nations for its water availability and 120th out of 122 nations for its water quality. It has been evaluated that 80 percent of India's surface is polluted which results in India losing US\$ 6 billion every year due to water-related diseases. India is facing serious water shortage and this critical situation is expected to deteriorate as the overall population is expected to increase to 1.6 billion by year 2050. Water can pose a serious challenge to human wellbeing and sustainable development. So, it is very important to conserve this precious resource. Steps like sustainable utilization of water source and reuse of recycled water can go a long way solve the problem of water scarcity. Hence, the paper aims at understanding the importance of water, present condition demand supply consumption and shortage of water. The current study also focuses on waste water generation and its treatment how government, Local bodies, Agriculture users, Industrial users and Household users act upon it to conserve and protect water from wastage.*

**Keywords:** *Sustainable development, population growth, water availability, sustainable water management, conservation of water.*

## I. INTRODUCTION

Water plays a central and critical role in all aspects of life –, in food security, in production, in health and sanitation and in politics. At a primary level, everyone needs access to safe water in suitable quantities for drinking, cooking and personal hygiene, and sanitation facilities that do not compromise health or dignity. Scarcity of water takes a huge toll on health and well-being and comes at a huge financial cost, with a massive loss of economic activity in many countries, not just least developed countries. Water is a key factor in each of the three supports of sustainable development – economic, social and environmental. In this viewpoint, it is understood that water must meet the needs of not only the current population and but also of future generations. Thus, Sustainable development is the centerpiece and key to water resource quantity and quality, as well as national security, economic health, and societal well-being. Sustainability means the capability to support life, to comfort, and to nourish. Development means improving or creating to a more advanced state. Thus, water sustainability implies the capacity of a population to preserve access to adequate quantities of water of suitable quality for sustaining human and ecosystem health. But human use and pollution of freshwater supplies have reached a level where the sustainability of water resources is endangered. The subsequent water scarcity and water quality degradation limits agricultural production, reduce ecosystem functions, and hinder economic growth. A recent study hinted that there will be no drinking water in the country by 2040. Pollution of fresh water sources by untreated water from factories and industries has further deteriorated the situation.

**II. OBJECTIVES OF THE CURRENT STUDY:** The purpose of this paper is to understand

1. The importance of water for all the aspects of life and as a supportive pillar for sustainable development.
2. Per capita availability of water (cubic meters) in India
3. Sectoral Consumption of water
4. Demand, Supply and Shortage of Water in Selected Cities of India
5. Waste Water Generation and its treatment
6. Challenges in Wastewater Recycling in India
7. Key Obligations for various stakeholders in the water sector

## III. RESEARCH METHODOLOGY

The study is descriptive in nature. This paper is based on secondary data and information that has been collected from the concerned sources as per need of the research. The relevant books, articles, papers and web-sites are used in this study.

## IV. ALARMING STATISTICS

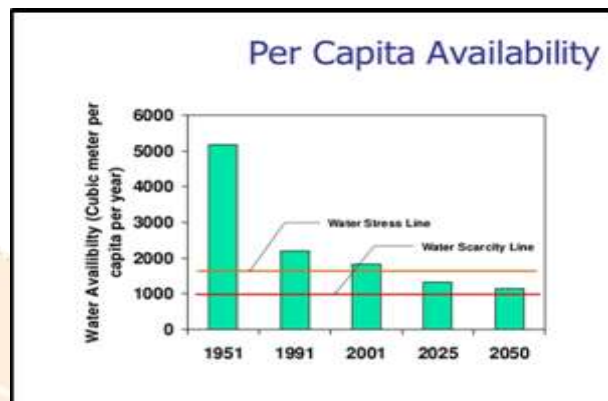
- Per capita availability of water in India has gone down from 6,042 cubic metre in 1947 to about 1,545 cubic metre in 2011.
- 76 million people are deprived of access to safe drinking water.
- In 2015 approximately 329, 000 children under the age five died due to diarrhea.

- 70% of the freshwater available in the form of ground water and surface water is polluted.
- 65% rainwater concludes in the sea due to absence of storage facilities.
- 90 percent of the waste water released into rivers, lakes, and ponds is untreated and leads to additional contamination of fresh water sources.
- By 2050, India's expanding population and contracting water supply will touch alarming ratios.

#### V. PER CAPITA AVAILABILITY OF WATER (CUBIC METRES) IN INDIA

India has 2.45 per cent of the world's land, holding 16 per cent of the world's population however the freshwater reserves are only 4 per cent of that of the world. The average annual precipitation, received in the country is 4000 billion cubic metre. This precipitation is not evenly distributed it varies from less 100 mm in Rajasthan to more than 2500 mm in Assam. The per capita water availability in the country is reducing gradually due to increase in the population.

**Table 1**

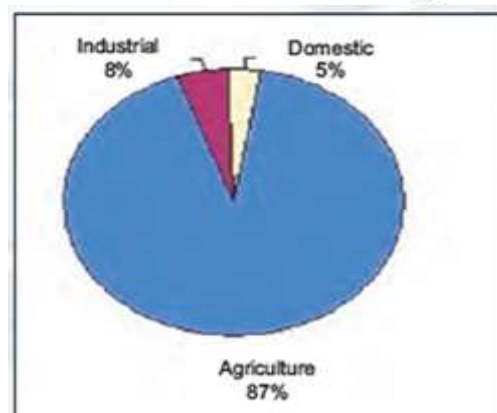


According to the Central Water Commission (CWC) yearly, report, the average annual per capita availability of water in the country, has dropped from 5,177 cubic metres in 1951 to 1,545 cubic metres in 2011, below the 'stress level' of 1,700 cubic metres. The average annual per capita availability of water for the country as a whole will reach the level of 1,000 cubic metres by 2050 as against 5177 cubic meters in 1951. By 2050, the average annual per capita availability of water for the country as a whole will reach the level of 1,000 cu m. as against 5177 cubic meters in 1951, Declining PCWA has put India on the verge of water scarce category nine out of our 20 river basins with 200 million populations are already facing "water-scarce" condition. According to the Ministry of Water Resources per capita water availability in 2025 and 2050 is projected to come down by roughly 36 percent and 60 percent respectively of the 2001 levels.

#### VI. SECTORAL CONSUMPTION OF WATER

Over the years, the consumption of water is rapidly increasing and the supply of fresh water remains more or less constant. Nearly 87 per cent of the water is expended for agriculture, followed by the industrial sector, which uses about eight per cent. The domestic sector accounts for around five per cent of the total water consumption. This share is likely to increase to 11 per cent by 2050. With this, the per capita consumption will be double by 2050. At present more than 85% of domestic water and 60% of agriculture water use is depends on groundwater. India is using more groundwater than China and the United States combined.

**Pie Chart 1**



The industrial sector utilizes only eight per cent of water, are worst affected due to water crisis as they are given the last preference by the National Water Policy. Industrial water requirement doubled during last decade and expected to increase about 3 folds by 2050 (from 42 BCM in 2000 to 151 BCM in 2050) water plays a significant role in generation of electricity as well. According to Central Public Health and Environmental Engineering Organization, (CPHEEO) the domestic consumption of water is about 135 liters/per

day/per capita), under normal conditions. The per capita demand for big cities are usually larger as compared to the small towns because of the climatic conditions, presence of industries, variants in demand, habits of people and their economic status.

#### VII. DEMAND, SUPPLY AND SHORTAGE OF WATER IN SELECTED CITIES OF INDIA IN (MILLION LITRES PER DAY) (MLD):

The rapid growth in population, urbanization and industrialization has led to a significant increase in water requirement. Demand in the country is expected to overtake the availability of water very soon. With 90 per cent of India's territory served by inter-state rivers, water scarcity has already led to a rising number of conflicts across the country. India's supply of water is quickly declining mainly due to mismanagement of water resources, though over-pumping and pollution are also the major contributors. Not a single city in India can provide clean water that can be consumed from the tap on a 24×7 basis.

**Table 2**

City	Demand	Supply	Deficiency (%)
Mumbai	4,300	3,600	43.3
Delhi	3,830	2,950 >	29.8
Kolkata	2,258	1,568	44
Chennai	3,000	1,950	53.8
Hyderabad	956	770	24.2 (least deficient)
Indore	318	184	72.8
Bangalore	1,200	860	39.5
Lucknow	560	440	27.3
Jabalpur	239	144.5	65.4
Vaizag	305	159	91.8 (most deficient)

Source; Tata Institute of Social Science

Table 1.2 shows that many cities especially the southern cities are most water deficient. Chennai and Bangalore suffer from 53.8 and 39.5 per

cent shortage respectively. Andhra Pradesh has too limits: water scarcity is a moderate 24.2 per cent in Hyderabad, an upsetting 91.8 per cent in Vaizag. In north India, Delhi accounts for 29.8 per cent water shortage and Lucknow, 27.3 per cent. Central India is more water poor than the north India. For example, Bhopal is 26.4 per cent water-deficient while Jabalpur and Indore record rates are 65.4 and 72.8 per cent respectively. In west, Mumbai accounts for 43.3 per cent and Kolkata in the east clocks at 44 per cent. According to a World Bank report, 21 Indian cities are stepping towards zero ground water level by 2020. Climate change, early summer, insufficient rain-fall, over exploitation of groundwater, dropping water level, rapid growth in population, wastage of water, and lack of water management policy is making it problematic for the urban local bodies to meet the growing demand of water. By 2050, the total water demand will increase by 32 per cent. Domestic and Industrial sectors will claim for 85 per cent of the additional demand. India is likely to face fresh water scarcity between 2030 and 2040.

#### VIII. WASTE WATER GENERATION AND ITS TREATMENT

With declining freshwater sources, and increasing industrial, agricultural, and domestic demand, wastewater treatment and its usage is absolutely essential. To bridge the gap between demand and supply for water in India, use of treated wastewater in the urban, municipal and industrial environment should be done on priority basis. At present, there are 920 sewage treatment plants in India. However, India has the facility to treat only 37 percent or 22,963 million litres per day (MLD) of the present sewage generation, but only around 30% of the sewage is treated. Around 13,468 MLD of wastewater is produced by industries out of which only 60 percent is treated. Nearly about 80% of water distributed for domestic use should come back as wastewater for further treatment and reuse, but only 20 % of wastewater is treated and available for reuse. There is a huge mismatch between the wastewater generation and its treatment. Due to functional defects in the sewage lines and in the treatment plants big cities are treating only 30-40% and small cities/towns treat only 8% of the wastewater. Delhi, uses 4,346 million litres of water per day of which 87% returns as waste. However, Delhi has the facility to treat only 61% of the total wastewater it produces. Big cities of Maharashtra guzzle three times as much as Delhi, turn 80% of that into sewage and treat less than half of their total wastewater. The untreated wastewater is cleared into water bodies every day. Due to flow of untreated sewage and effluents the level of pollution is accelerating in water bodies. There is an urgent need for treating 100 percent wastewater and regaining as much usable water as possible.

#### IX. CHALLENGES IN WASTEWATER RECYCLING IN INDIA

The biggest challenge India faces is the cost of putting up of wastewater treatment plants and reorganising of sewerage systems. As per Centre for Science and Environment estimates the cost incurred to build a wastewater plant is Rs 1 crore per million litres. Urban and rural India will not be able to afford the construction of such plants without generous support from the government and private sector. The local bodies are generally not interested in taking up wastewater treatment because none of the available technologies has a direct economic return. The unavailability of land also acts as a common barrier in the building of wastewater plants in India, especially in urban areas where land is a highly expensive commodity. At present most of the wastewater treatment plants are outdated and need of latest technology and capacity expansion. Other challenges like uninterrupted power supply, skilled labour force, adapting environmental guidelines are consistent features in setting up of wastewater treatment plants.

## X. KEY OBLIGATIONS FOR VARIOUS STAKEHOLDERS IN THE WATER SECTOR

The regularity, economic sustainability and affordability of water supply and wastewater treatment services need urgent improvement. It is important for the various stakeholders to take necessary steps to improve the current water scarcity situation in India

### For Central Government:

- To amend the National Water Policy and to emphasize on use of Recycled wastewater and to cut down the usage of groundwater.
- Increase the funding for water source development, sewerage networks and treatment plants under schemes like JNNURM.
- Encourage technical assistance grants for capacity building of Urban Local Bodies to realise Public Private Partnership Projects.
- Increase technical assistance for recycling and groundwater recharge projects.

### For State Governments:

- Specify roles and responsibilities of each entity in the sector
- Create administrating bodies to supervise the management of water resources and pricing of bulk water.
- Support ULBs in developing forceful water supply and wastewater treatment project to attract private investment
- Expand information sharing of state-wise water resources among officials responsible for planning regional development
- Initiate reforms of Urban Local Bodies to facilitate operational autonomy, improve technical capabilities
- Construct dams without creating environmental problems.

### For Municipalities:

- Initiate regular increase in water tariffs to ensure optimal utilization of water resources
- Develop plans for enlarging sewage collection networks and building more sewage treatment plants
- Cut non-revenue water by fixing leaks, supervise water supply quantity and quality.
- Develop planning capacity within local bodies by increasing number of planners, environmental engineers

### For Agricultural users:

- Investment in water-use efficiency enhancing technologies such as drip irrigation
- Application of rainwater harvesting and watershed management techniques;
- Organized farmers' federations could initiate industrial wastewater re-use projects in areas with industrial activity and declining water availability. Similar initiatives could be taken up by farmers' groups in city outskirts.

### For Industrial users:

- Replace existing equipment with more water efficient equipment.
- Use automatic shut-off valves for machine that is not in operation
- Potable water can be substituted with non-potable or reused water for many industrial uses.
- Installation and maintenance of effluent treatment plant and sewage treatment plant in industry area to treat waste water
- To reduce the use of chemicals fertilizers to control water pollution.

### For Households

- clean vegetables in a large bowl of water instead of under running water.
- installing sink aerators
- Turn of taps: when brushing teeth,
- Install water-saving shower heads and take shower for a shorter period of time.
- Always use full loads in your washing machine and dishwasher
- Water your garden only when it needs it
- Wash your car less frequently and use a bucket of water to wash the car
- Fix a dripping tap.
- Install Low-Flow Toilets

## XI. CONCLUSION

Water is the most essential element that sustains life in any planet. One can survive without food for weeks without electricity but can't survive more than 60 hours without water. Sustainable water resources are limited and rare in our country. Carelessness in this sector will head to water scarcity in the next 1-2 decades. Therefore, it is necessary to avoid this crisis by making best use of the existing technologies to conserve the present water resources, and to convert them into usable form and make economical use of them for agriculture, industrial production and human consumption. Enforcing regulatory measures to prevent the misuse of water to encourage sensible use of water will be helpful to conserve water. Finally, knowledge and understanding of all the water consumers to change their lifestyle to conserve water, can help the country to win over the water crisis in the future.

**CITATIONS****Journal Papers:**

1. Sustainable Development of Water Resources in India Article in Environmental Management 21(3):367-393 · January 1997.
2. Managing Water for Sustainable Development: An Indian Perspective IIM Kozhikode Society & Management Review 5(1) vii–xiii © 2016 Indian Institute of Management Kozhikode SAGE Publications sagepub.in/home.nav DOI: 10.1177/2277975215625500
3. Searching for Comparative International Water Research: Urban and Rural Water Conservation Research in India and the United States James L. Wescoat Jr. Aga Khan Program for Islamic Architecture, Massachusetts Institute of Technology, MA, USA; wescoat@mit.edu
4. WATER SCARCITY AND SECURITY IN INDIA Dr. N.G. Hegde, Trustee BAIF Development Research Foundation, Pune,
5. Putting water at the centre of the global agenda Angel Gurría, OECD Secretary-General, 24 April 2017

**Web References:**

6. [http://economictimes.indiatimes.com/articleshow/55050324.cms?utm\\_source=contentofinterest&utm\\_medium=text&utm\\_campaign=cppst](http://economictimes.indiatimes.com/articleshow/55050324.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst)
7. <http://www.downtoearth.org.in/> challenges that India faces in managing its water resources.
8. <https://www.livpure.in/blog/10-shocking-facts-about-water-wastage-in-india-you-should-know>
9. <http://www.who.int/mediacentre/factsheets/fs391/en/>.WHO (2016),” Drinking-water”,

