WATER SHORTAGES IN INDIA: PAPER

Water is a critical resource that sustains life, ecosystems, and economies. Yet, India—a country that houses 18% of the world's population—has access to only 4% of global freshwater resources. This imbalance places immense pressure on the nation's water supply, leading to widespread water shortages. With rapid population growth, industrial expansion, and climate change, water scarcity in India is becoming more acute each year. In this article, we will explore the reasons behind India's growing water crisis, the future scope of the problem, potential solutions, government measures, and suggestions for better water management.

The Growing Water Crisis: Facts and Figures

Water shortages in India are not a new phenomenon, but they have escalated to alarming levels in recent years. According to the NITI Aayog's 2018 *Composite Water Management Index Report*, nearly 600 million people in India experience high to extreme water stress. This means that they live in areas where the demand for water exceeds the available supply, leading to frequent shortages. Furthermore, the consumption of contaminated water is linked to approximately 200,000 deaths annually, highlighting the dire public health implications of the water crisis.

India's per capita water availability has drastically declined over the past few decades. In 1950, per capita water availability was around 5,000 cubic meters per year, but by 2021, it had fallen to 1,486 cubic meters. Projections indicate that this figure will drop further to 1,367 cubic meters by 2031, placing India well below the threshold for water scarcity.

India's river basins are also severely affected by water shortages. Research by the Council on Energy, Environment, and Water (CEEW) suggests that 11 out of the country's 15 major river basins will face severe water stress by 2025. Major river basins such as the Ganga, Krishna, Mahi, and Subarnarekha already have annual per capita water availability of less than 1,000 cubic meters. Even

more concerning are the Cauvery, Pennar, and Sabarmati basins, where water availability is below 500 cubic meters per person, indicating extreme water scarcity.

Reasons Behind Water Scarcity in India

Several factors contribute to India's growing water shortages:

1. **Population Growth and Urbanization**: India's population is expected to reach 1.6 billion by 2050, putting additional strain on already limited water resources. Rapid urbanization has led to increased water demand in cities, which often struggle with inadequate infrastructure for water supply and wastewater treatment.
2. **Agricultural Practices**: Agriculture accounts for around 80% of India's total water usage, primarily due to inefficient irrigation methods. The over-extraction of groundwater for farming has led to a significant depletion of aquifers, particularly in northern and western India. Groundwater levels have dropped drastically, exacerbating water shortages in both rural and urban areas.
3. **Climate Change**: Climate change is amplifying India's water woes by altering precipitation patterns and increasing the frequency of extreme weather events. The *State of Global Water Resources* report by the World Meteorological Organization (WMO) noted that 2023 was the hottest year on record, with India experiencing unusually high rates of evapotranspiration (the process by which water evaporates from soil and plants). This increased water loss contributes to the drying up of rivers and reservoirs.
4. **Industrial Demand**: Water-intensive industries, such as coal-based power plants and steel manufacturing, place a heavy burden on India's freshwater resources. These industries rely heavily on water for cooling and processing, making them highly vulnerable to water shortages.
5. **Poor Water Management**: India's water management system suffers from inefficiencies at multiple levels, including outdated infrastructure, inadequate sewage treatment facilities, and poor enforcement of regulations. According to reports, only 28% of sewage wastewater generated in India's urban centers is treated and reused, leading to water contamination and wastage.

Future Scope: What Lies Ahead?

If current trends continue, India's water crisis will only worsen in the coming years. With growing demand and decreasing supply, water shortages will have far-reaching consequences for the country's economy, public health, and environment.

1. **Impact on Agriculture**: Agriculture, the backbone of India's economy, will be severely impacted by water shortages. Crop yields may decline, leading to food insecurity and increased rural poverty.
2. **Industrial Slowdown**: Water-intensive industries, such as power generation and manufacturing, could face production halts or slowdowns, which would negatively affect economic growth and job creation.
3. **Public Health**: Access to clean drinking water is already a major issue in many parts of India. As water shortages worsen, more people will be forced to rely on contaminated sources, leading to an increase in waterborne diseases.
4. **Social Conflicts**: Water shortages could fuel tensions between states and communities over the allocation of water resources. In fact, disputes over river water sharing have already caused friction between states like Karnataka and Tamil Nadu over the Cauvery River.

Available Solutions

Despite the severity of the problem, there are several solutions that can help mitigate India's water crisis:

1. **Wastewater Reuse**: One of the most promising solutions is the reuse of treated wastewater. The Indian government recently proposed regulations that mandate up to 50% wastewater reuse by 2031 for bulk consumers (those using more than 5,000 liters of water daily). Reusing treated wastewater can help reduce freshwater demand, especially in industries and urban areas.
2. **Efficient Irrigation**: Implementing more efficient irrigation techniques, such as drip irrigation and sprinkler systems, can significantly reduce water consumption in agriculture. This would also help reduce the over-extraction of groundwater.
3. **Rainwater Harvesting**: Encouraging rainwater harvesting at the household, community, and industrial levels can help replenish groundwater levels and provide a sustainable source of water for non-drinking purposes.

4. **Improved Water Infrastructure**: Upgrading water infrastructure, including pipelines, treatment plants, and reservoirs, will help reduce water loss due to leakage and contamination.
5. **Desalination**: In coastal areas, desalination plants could provide a viable solution for meeting water needs. However, desalination is an energy-intensive process, so it should be used in combination with other water management strategies.

Government Measures and Initiatives

The Indian government has recognized the gravity of the water crisis and has introduced several measures to address the issue:

1. **Jal Jeevan Mission**: Launched in 2019, this initiative aims to provide safe and adequate drinking water to every rural household by 2024 through tap connections. The mission also focuses on promoting water conservation and rainwater harvesting.
2. **Atal Bhujal Yojana**: This scheme, launched in 2020, aims to improve groundwater management in water-stressed areas. It promotes community participation in water management and the adoption of sustainable practices for groundwater replenishment.
3. **Namami Gange Program**: This flagship program focuses on cleaning and rejuvenating the Ganga River by improving sewage treatment facilities and promoting sustainable water use practices.
4. **Pradhan Mantri Krishi Sinchai Yojana (PMKSY)**. Launched in 2015, the scheme aims to improve water-use efficiency in agriculture, which consumes the largest share of the country's freshwater resources.

   By promoting technologies like **drip irrigation** and **sprinkler systems**, PMKSY reduces water wastage and ensures that farmers can irrigate their fields with minimal water usage. The scheme also focuses on expanding irrigation coverage to under-served areas through infrastructure development, while encouraging water conservation practices like **rainwater harvesting** and **groundwater recharge**.

Suggestions for Better Water Management

To effectively address India's water shortages, a multi-pronged approach is needed. Here are a few suggestions:

1. **Public Awareness**: Raising awareness about the importance of water conservation and encouraging individuals and communities to adopt water-saving practices can go a long way in reducing water wastage.
2. **Policy Enforcement**: Stronger enforcement of water management policies and regulations is crucial. Industries, in particular, should be held accountable for their water consumption and wastewater treatment practices.
3. **Research and Innovation**: Investing in research and innovation in the field of water conservation and treatment technologies can lead to more efficient and cost-effective solutions for water management.

Conclusion

India's water crisis is a complex and multifaceted problem, driven by a combination of population growth, industrial demand, climate change, and poor water management. However, with the right policies, technologies, and public participation, it is possible to address the issue and ensure a sustainable water supply for future generations. Wastewater reuse, improved irrigation practices, and better infrastructure are just a few of the solutions that can help India navigate its way out of this crisis. Ultimately, collective action from the government, industries, and citizens will be key to overcoming the water shortages that threaten India's future.

Main Practice Question

Discuss the key factors contributing to the water crisis in India, focusing on the role of population growth, agricultural practices, and climate change. In your answer, explain how each of these factors exacerbates the scarcity of water, and suggest potential solutions that can help mitigate the impact of these issues.

Answer Guidelines:

- **Introduction**: Start by briefly introducing the water crisis in India, mentioning the severity of the problem and its consequences for the economy, environment, and public health.
- **Population Growth**: Discuss how India's growing population (expected to reach 1.6 billion by 2050) increases water demand, particularly in urban areas. Explain how rapid urbanization puts pressure on inadequate water infrastructure, leading to over-extraction and scarcity.
- **Agricultural Practices**: Highlight that agriculture accounts for around 80% of India's total water usage. Explain how inefficient irrigation methods and the over-extraction of groundwater for farming are causing severe depletion of aquifers, especially in northern and western regions of India. Mention the importance of shifting to more efficient irrigation techniques like drip and sprinkler systems.
- **Climate Change**: Explain how climate change contributes to altering rainfall patterns, increasing the frequency of droughts and extreme weather events. Emphasize the impact of higher temperatures and evapotranspiration rates, which exacerbate the drying of rivers, reservoirs, and groundwater sources.

- **Potential Solutions**: Suggest solutions such as the reuse of treated wastewater, improved irrigation techniques, rainwater harvesting, and upgrading water infrastructure. Conclude by emphasizing the need for collective efforts from the government, industries, and the public.