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2. Water Contamination in Urban Area – Health

In South Delhi's Gulmohar Park, drinking water pipelines have been delivering sewage-contaminated water for over two weeks highlighting failures in urban water governance.

1. Urban water contamination represents systemic failure affecting public health, economic productivity, and environmental sustainability.
2. Multiple constitutional provisions guarantee access to safe drinking water yet enforcement gaps create persistent urban water crises.

1. Understanding Water Contamination

Types of Contamination

1. Biological contamination occurs due to pathogens including bacteria, viruses, protozoa, and parasites such as E. coli and cholera bacteria causing waterborne diseases.
2. Chemical contamination results from industrial effluents, pesticides, heavy metals, and excess nutrients creating long-term health hazards.
3. Physical contamination includes sediments, plastics, and suspended solids degrading water quality and taste.
4. Radiological contamination involves radioactive substances entering water sources creating serious long-term health risks.

2. Why Sewage Mixes with Drinking Water

Infrastructure Failures

1. Sewage enters through cracks and damaged joints in water pipes with risk increasing when pipelines are old, corroded, or damaged during construction activities.
2. Many pipelines were laid decades ago and have exceeded design life with lack of regular maintenance increasing contamination risks.

Intermittent Water Supply Problem

1. Most Indian cities supply water only for few hours daily creating empty or low-pressure pipes.
2. Empty or low-pressure pipes create suction allowing contaminated water to enter through leaks reversing intended flow direction.
3. Intermittent supply is fundamental design flaw creating contamination risk even in relatively new infrastructure.

Poor Sewage Management

1. Large share of urban households lack access to organized sewer networks with septic tanks and untreated effluents often discharging into drains and water channels.
2. Unorganized sewage management creates contamination sources adjacent to drinking water infrastructure.

Structural Challenges in Urban Water Governance

1. Lack of comprehensive digitized maps of water and sewer networks prevents systematic leak detection and maintenance planning.
2. Fragmented responsibilities among multiple agencies creates accountability gaps where no single authority ensures water quality.

3. Weak coordination between water supply and sewage departments allows infrastructure proximity problems to develop unaddressed.
4. Large informal settlements lack adequate water and sanitation infrastructure creating persistent contamination hotspots.
5. Existing standards focus on water quality but not on service delivery mechanisms leaving operational gaps.

Health, Economic, and Social Consequences

Public Health Hazards

1. Spread of waterborne diseases including cholera, typhoid, dysentery, and hepatitis leads to increased burden on public healthcare systems.
2. Vulnerable populations including children, elderly, and immunocompromised individuals face highest health risks from contaminated water.

Economic Costs

1. Higher household expenditure on bottled water, water purifiers, and medical treatment imposes financial burden on families.
2. Industrial productivity loss and healthcare system strain create macroeconomic costs of contamination.

Environmental Degradation

1. Poor wastewater management pollutes urban water bodies creating long-term environmental damage.

Social Inequity

1. Low-income households are less able to access alternative safe water sources creating health disparity along economic lines.

3. Constitutional and Legal Framework

Fundamental Right Provisions

1. Article 21 guarantees Right to Life which includes access to safe drinking water through judicial interpretation.
2. Subhas Kumar v. State of Bihar (1991) – Supreme Court held that right to live under Article 21 includes right to enjoy pollution-free water and air.
3. A.P. Pollution Control Board II v. Prof. M.V. Nayudu (1999) – Court stated access to safe drinking water is fundamental to life.

Constitutional Empowerment

1. Article 243W empowers Urban Local Bodies to manage water supply, sanitation, and public health.
2. Article 47 (DPSP) directs State to raise level of nutrition, standard of living, and improve public health.

Government Initiatives

1. Smart Cities Mission promotes technology-driven monitoring of civic services including water systems.
2. Atal Mission for Rejuvenation and Urban Transformation (AMRUT) aims to develop robust sewage networks and treatment plants.
3. Swachh Bharat Mission addresses sanitation through door-to-door waste collection and source segregation.

4. Way Forward

1. **Infrastructure Modernization** – Urban local bodies should prioritize replacement and modernization of ageing water and sewer pipelines.

2. **Real-Time Monitoring** – Sensor-based water quality monitoring should be institutionalized across urban networks.
3. **Decentralized Wastewater Treatment** – Implementing small-scale localized treatment units (DEWATS) in housing societies reducing burden on main sewer lines.
4. **Independent Audits** – Third-party audits of water infrastructure must be made mandatory ensuring accountability.

Source – <https://indianexpress.com/article/explained/gulmohar-park-sewage-taps-urban-water-systems-fail-10728181/>