Excreta Matters: 7th Citizens’ Report on the state of India’s Environment

An agenda for water-prudent and waste-wise Agra

Water for growth?

Cities-industries need water for growth

Water Transition that will not happen

Urban-industrial growth needs water but in India, even as this sector will grow, people will continue to live in rural areas and depend on agriculture.

<table>
<thead>
<tr>
<th></th>
<th>Water use, agriculture</th>
<th>Water use, industry</th>
<th>Water use, domestic</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>82%</td>
<td>10%</td>
<td>8%</td>
</tr>
<tr>
<td>Rich industrialised countries</td>
<td>51%</td>
<td>35%</td>
<td>14%</td>
</tr>
</tbody>
</table>

70% Indians live in rural areas. Even in 2050 less than 50% will live in cities.

30% live in cities in rich countries. Water use has moved with people.
Vague old water sums

UPDATE REQUIRED: THE LAST TIME INDIA ESTIMATED ITS FUTURE WATER USE WAS IN 1999

<table>
<thead>
<tr>
<th>Category</th>
<th>1990 (BCM)</th>
<th>2025 (BCM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigation</td>
<td>460</td>
<td>688</td>
</tr>
<tr>
<td>Domestic</td>
<td>25</td>
<td>52</td>
</tr>
<tr>
<td>Industry + energy</td>
<td>34</td>
<td>80</td>
</tr>
<tr>
<td>Total</td>
<td>519</td>
<td>942</td>
</tr>
</tbody>
</table>


Recent information shows otherwise

SOBERING PROJECTIONS: THE FUTURE OF SIX KEY INDUSTRIAL SECTORS (IN MLD)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Freshwater withdrawal 2008-09</th>
<th>Freshwater consumption 2008-09</th>
<th>Projected withdrawal 2020-21</th>
<th>Projected consumption 2020-21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>108,334</td>
<td>13,995</td>
<td>117,940</td>
<td>23,597</td>
</tr>
<tr>
<td>Paper and pulp</td>
<td>2,375</td>
<td>238</td>
<td>3477</td>
<td>483</td>
</tr>
<tr>
<td>Iron and Steel</td>
<td>1,860</td>
<td>674</td>
<td>4482</td>
<td>1,901</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>545</td>
<td>273</td>
<td>652</td>
<td>379</td>
</tr>
<tr>
<td>Cement</td>
<td>249</td>
<td>249</td>
<td>674</td>
<td>674</td>
</tr>
<tr>
<td>Aluminium</td>
<td>441</td>
<td>27</td>
<td>1246</td>
<td>94</td>
</tr>
<tr>
<td>Total</td>
<td>113,803</td>
<td>15,455</td>
<td>128,471</td>
<td>27,132</td>
</tr>
</tbody>
</table>
Urban Expansionism

- Cities have to source water from further and further
- Costs rise, leakages rise
- Conflicts – Urban-rural, industry-rural

- Pipe-dreams sold by water establishment
Cost of energy is high and is a growing component of water supply

Groundwater: abused

2. Those that do not get piped water suck out groundwater
But this is not accounted for
Cities only consider ‘official’ groundwater use
Crores depend on private wells, tanker mafia, bottled water
No recognition of this water source; no respect for its management
No Deposits, account emptying

3. Groundwater is critical for water supply, but recharge is neglected
   • Reasons:
     – Land is valued, water is not
     – There is no legal protection for recharge zones and drainage systems
     – No protection for lakes or ponds
   Sponges of cities being destroyed. Deliberately

Water in, sewage out

4. Cities plan for water, forget waste

About 80% water leaves homes as sewage
More water=more waste
There is no account for sewage
Cities have no clue how they will convey waste of all, treat it, clean rivers
Cities only dream of becoming New York or London
Sewage sums

Sewage generated = 38,255 mld
Capacity to treat = 11,788 mld (30%)
Sewage actually treated = 8,251 mld (22%)
Cost of treating remaining 26,467 MLD ranges from Rs 26,500 to Rs 105,868 crore
Delhi and Mumbai alone have 40 per cent of sewage treatment capacity in the country
78 % sewage is officially untreated and disposed off in rivers, lakes, groundwater
Fill it, flush it, forget it

Planning for hardware

5. Cities plan for treatment not sewage
   • Treatment plants are not simple answers
   • Can build plants to treat, but there is no waste being conveyed for treatment
   • Most cities do not have underground sewage but engineers sell pipe-dreams of catching up with infrastructure
   • Politicians buy pipe-dreams
   • We lose rivers. Generation of lost rivers
6. Cities do not control pollution

Cost of building system is high

- City can build sewage for few not all
- Spends on building pipes, repair and energy costs of pumping to treatment plant of this waste
- Spends to treat waste of few
- Treated waste of few gets mixed with untreated waste of majority
- The result is pollution

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**Rivers: Hydrocide**

**The state of India's rivers: the extent river stretches are polluted**

<table>
<thead>
<tr>
<th>River</th>
<th>Proportion of India's total riverine length (%)</th>
<th>Proportion of India's total polluted riverine length (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ganga</td>
<td>28</td>
<td>36</td>
</tr>
<tr>
<td>Brahmaputra</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>Godavari</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Indus</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Krishna</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Mahanadi</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Rest of rivers</td>
<td>29</td>
<td>34</td>
</tr>
</tbody>
</table>

Source: R C Tripathi 2007, Pollution in our rivers: the CPCB perspective, presentation, New Delhi, June, mimes
Generation of **lost** rivers

- Delhi knows only Najafgarh – a dirty drain of Yamuna. It was Sahibi – which once flowed from the Aravalli into a jheel
- Mumbai knows only Mithi – a dirty drain. It even calls it a drain. But this was its river
- Ludhiana knows Budha Nullah as a drain. But this was a darya – a river

Generation of lost rivers. How many more will we have to lose before we remember

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Cannot pay **full** costs

7. **Infrastructure is not a simple answer**

Assumption that infrastructure is about costs is **flawed**

1. Water tariffs are high in many cases
2. Tariffs are high but recovery is poor because meters do not work
3. Poor pay high costs; money or with their health
4. Where tariffs are high, people move to groundwater
5. Water-sewage-pollution costs are high and **unaffordable by all**
Agra’s master plan

Agra’s water-sewage sums

<table>
<thead>
<tr>
<th></th>
<th>2005-06</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipal area</td>
<td>122 sq km</td>
<td></td>
</tr>
<tr>
<td>Population</td>
<td>1.43 m (2005)</td>
<td>1.7 m (2011)</td>
</tr>
<tr>
<td>Water demand as per city agency (AJS)</td>
<td>245 MLD @ 171 LPCD</td>
<td>290 MLD, 18% increase</td>
</tr>
<tr>
<td>Per capita demand</td>
<td>171 LPCD</td>
<td>171 LPCD</td>
</tr>
<tr>
<td>Sources</td>
<td>Yamuna</td>
<td>Yamuna, new pipeline</td>
</tr>
<tr>
<td>Surface sources</td>
<td>100% (official)</td>
<td></td>
</tr>
<tr>
<td>Groundwater</td>
<td>Groundwater = 75 MLD (CPCB)</td>
<td></td>
</tr>
<tr>
<td>Actual supply after loss 45%</td>
<td>135 MLD</td>
<td></td>
</tr>
<tr>
<td>Population served</td>
<td>75%</td>
<td></td>
</tr>
<tr>
<td>Water treatment plants, capacity</td>
<td>2,410 MLD</td>
<td></td>
</tr>
<tr>
<td>Actual treatment</td>
<td>246 MLD</td>
<td></td>
</tr>
<tr>
<td>Sewage generated</td>
<td>240 MLD (CPCB)</td>
<td>153 MLD (AJS)</td>
</tr>
<tr>
<td>Population covered by sewage network</td>
<td>30%</td>
<td>232 MLD</td>
</tr>
<tr>
<td>Sewage treatment plants</td>
<td>4, capacity 90 MLD</td>
<td>4, 250 MLD</td>
</tr>
<tr>
<td>Actual treatment</td>
<td>66 MLD</td>
<td></td>
</tr>
</tbody>
</table>
Agra’s water-sewage map

Water, not supplied

1. Water supply in cities: Planners obsessed with water, not supply
2. In Agra, there is 45% shortfall between water supply and demand
3. Main pipeline capacity is low, pumping and filtration plants in poor condition
4. How much water is supplied to industry?
5. Where does water come from
   1. Yamuna river
   2. Groundwater
   3. Palra Bulandshahr pipeline (Future source)
   4. New high-tech water treatment plant
How Agra pollutes its own water

Severe quality issues

• All parameters are exceeded by a vast margin
  – Biological oxygen demand 10X stipulated level
  – Chemical oxygen demand 5.6X stipulated level
  – Ammonia 25X stipulated level
  – Coliform count 14X stipulated level

• Need alternative sources
  – 342 MLD from Upper Ganga Canal
  – 140 cusecs from Tehri
  – 134 MLD plant to process Yamuna’s sewage laden water for drinking @ cost of Rs 156 crore
Agra falls prey to expansionism

Wateromics

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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial</td>
<td>Metered</td>
<td>17.25</td>
<td>19.8</td>
<td>22.8</td>
<td>24.5</td>
<td>26.3</td>
<td>28.28</td>
<td>30.4</td>
<td>32.7</td>
<td>35.15</td>
</tr>
<tr>
<td>Commercial</td>
<td>Metered</td>
<td>8.6</td>
<td>9.9</td>
<td>11.4</td>
<td>12.2</td>
<td>13</td>
<td>13.94</td>
<td>15</td>
<td>16.1</td>
<td>17.3</td>
</tr>
<tr>
<td>Government</td>
<td>Metered</td>
<td>6.9</td>
<td>7.9</td>
<td>9.1</td>
<td>9.8</td>
<td>10.5</td>
<td>11.29</td>
<td>12.15</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>Cantonment</td>
<td>Metered</td>
<td>5.1</td>
<td>6</td>
<td>6.9</td>
<td>7.4</td>
<td>8</td>
<td>8.6</td>
<td>9.25</td>
<td>10</td>
<td>16.75</td>
</tr>
<tr>
<td>Domestic</td>
<td>Non-metered</td>
<td>3.45</td>
<td>3.9</td>
<td>4.55</td>
<td>4.9</td>
<td>5.3</td>
<td>5.65</td>
<td>6.1</td>
<td>6.55</td>
<td>7.4</td>
</tr>
</tbody>
</table>

Source: http://www.agaraj.com/staff.html, as viewed in May 2011
Note: Price figures in Rs. per kilolitre

- Agra Jal Sansthan largely in the black
- Despite rising costs, Agra’s citizens get poor quality water
Groundwater in Agra

- CGWB, 2005-06: 75 MLD
- Unknown number of private wells
- Groundwater level falling @ rate of 55 cm per year (2005); now reported to be 2 m in some parts of the city
- Serious quality issues
  - Hardness in 30%
  - Faecal coliforms
  - Fluorides and nitrates in 26%

Sewage sums

- Varying figures
- Only 50% of drains intercepted
- 10 open into Yamuna upstream of water works
- Capacity to treat: 27% of generation (90 MLD)
  - Plants run improperly
  - Sewage network covers 30% of city area
- Treated waste mixes with untreated sewage = Pollution

<table>
<thead>
<tr>
<th>CPCB</th>
<th>UPJN</th>
<th>AJS</th>
</tr>
</thead>
</table>
We all live downstream

Looking ahead

- Under YAP 1, Rs 78 crore spent, but no change in Yamuna water quality
- YAP 2 – Rs 124 crore sanctioned for sewers, enhancing STP to 144 MLD
  - Nothing for southern and eastern parts of Agra
- JNNURM – Rs 763 crore for sewer lines, treatment capacity and pumping stations
- Taj Trapezium – Rs 44 crore for sewerage and pumping stations
- New STP capacity of 160 MLD sanctioned
Reform agenda

1. Prioritize public investment differently
2. Plan to cut costs of water supply
3. Invest in local water systems
4. Reduce water demand
5. Spend on sewage not on water
6. Cut costs of sewage treatment – think laterally
7. Plan to recycle and reuse every drop

Affordable water

Action: Cut costs of water supply

• Augment local sources. Afford them legal protection. These include lakes, ponds, feeder channels and catchments
• Recharge groundwater based on geo-hydrological studies
• Maximise rainwater harvesting, mandated through building by-laws
**WateRR**

**Action:** Reduce demand and supply through better management and planning

**Action:** Reuse/Recycle water. Grey water for gardening

Treat sewage for industry/farming :: Use a mix of technology
- Decentralised treatment: small plants, soil biotechnology
- Bio-remediation

Treat for used water domestic use

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**Plan for sewage**

**Action:** Plan for sewage before water

**Sewage = resource**
- No water scheme must be passed without sewage component
- Sewage must be our obsession
- Plan differently for sewage treatment now
- Mantra is decentralisation
  - Use open drains as treatment zones
  - Use lakes and ponds as treatment zones: constructed wetlands
  - Treat locally so that treated water can be used locally
Plan **with** knowledge

- Last assessment of industrial-urban water demand was in 1999
- Water supply is a **simple** calculation:
  - water demand \( \times \) population
- Waste is simple calculation:
  - water supply \( \times \) 1.25
- As actual water supply not known, waste estimation off the mark

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Excreta does **Matter**

- Is about **affordable** urban growth
- Is about **inclusive** urban growth – planning for all and not some
- Is about **sustainable** urban growth – planning for true-green cities

- Is about our need to re-invent **growth without pollution**