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

An agenda for water-prudent and waste-wise India

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**Need to reinvent**

- Rapid urbanization is creating new water stresses
- Violence is growing: Rural – urban, rural - industrial
- Already cases of protest and police firing over water allocation to industry or city
- **Indian cities need to become prosperous without more water**
- How is that possible?
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.

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>

In 1990, Irrigation was 69% of the total, Industry + energy was 6.60%.
In 1999, Irrigation was 70% of the total, Industry + energy was 8.50%.

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>

**71-CITY SURVEY: HOW LEAKAGE LOSSES CREATE THE REAL SHORTFALL IN WATER ACTUALLY SUPPLIED**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Metro</td>
<td>17,987</td>
<td>16,591</td>
<td>1,396</td>
<td>8</td>
<td>6,150</td>
<td>10,441</td>
<td>7,546</td>
<td>42</td>
</tr>
<tr>
<td>Class I</td>
<td>2,879</td>
<td>2,775</td>
<td>104</td>
<td>4</td>
<td>706</td>
<td>2,069</td>
<td>811</td>
<td>28</td>
</tr>
<tr>
<td>Class II &amp; III</td>
<td>129</td>
<td>123</td>
<td>7</td>
<td>6</td>
<td>21</td>
<td>101</td>
<td>28</td>
<td>22</td>
</tr>
<tr>
<td>Total</td>
<td>20,996</td>
<td>19,489</td>
<td>1,507</td>
<td>8</td>
<td>6,877</td>
<td>12,611</td>
<td>8,385</td>
<td>40</td>
</tr>
</tbody>
</table>

MLD: Million litres daily

Source: Anon 2011, 71-City Water-Excella Survey 2005-06, Centre for Science and Environment, New Delhi

**71-CITY SURVEY: WATER THAT ACTUALLY TRICKLES DOWN TO SLUMS**

- **METRO**
  - Population living in slum (%): 24
  - Supply in slum (%): 5

- **CLASS I**
  - Population living in slum (%): 18
  - Supply in slum (%): 5

Source: Anon 2011, 71-City Water-Excella Survey 2005-06, Centre for Science and Environment, New Delhi

Leakages
Water inequity grows
Cost of energy is high and is a growing component of water supply

Groundwater: *abused*

Those that do not get piped water suck out groundwater
But this is not accounted for
Cities only consider ‘official’ groundwater use
Lakhs depend on private wells, tanker mafia & bottled water

**No recognition** of this water source; **no respect** for its management
Water ➔ waste

Cities plan for water, **never for waste**
We take in water, excrete 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

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

Partial treatment = pollution

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
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>36</td>
<td>28</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: K C Tripathi 2007. Pollution in our rivers: the CPOE perspective. Presentation, Nave Delhi, June, mimes.

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**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
- Hindon – River or Drain
- Kali – nadi or drain
- 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**
Cannot pay **full** costs

**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**

<table>
<thead>
<tr>
<th>City</th>
<th>Commercial (Rs/kl)</th>
<th>Industrial (Rs/kl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agra</td>
<td>17.50</td>
<td>35</td>
</tr>
<tr>
<td>Amritsar</td>
<td>6.40</td>
<td>6.40</td>
</tr>
<tr>
<td>Allahabad</td>
<td>7.50</td>
<td>12.50</td>
</tr>
<tr>
<td>Alwar</td>
<td>4.68</td>
<td>11</td>
</tr>
<tr>
<td>Aurangabad</td>
<td>16</td>
<td>39</td>
</tr>
<tr>
<td>Bengaluru</td>
<td>36-60</td>
<td>60</td>
</tr>
<tr>
<td>Bhiwadi</td>
<td>11-16.50</td>
<td>11-16.50</td>
</tr>
<tr>
<td>Bhubaneswar</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Chennai</td>
<td>50-60</td>
<td>50-60</td>
</tr>
<tr>
<td>Cuttack</td>
<td>2.88</td>
<td>2.88</td>
</tr>
<tr>
<td>Dehli</td>
<td>10-100</td>
<td>10-100</td>
</tr>
<tr>
<td>Dhanbad</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Gwalior</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Hyderabad</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Indore</td>
<td>11</td>
<td>22.50</td>
</tr>
<tr>
<td>Jabalpur</td>
<td>10.50</td>
<td>10.50</td>
</tr>
<tr>
<td>Kolkata</td>
<td>10</td>
<td>NA</td>
</tr>
<tr>
<td>Lucknow</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Nagpur</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>Pune</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Rajkot</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Ujjain</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Vadodara</td>
<td>10.80</td>
<td>10.80</td>
</tr>
</tbody>
</table>

**Economics is not a simple answer**

Cities cross-subsidize with high tariff on industries and commercial
But industries move to groundwater
**Unsustainability grows**
Cities unable to recover costs
## Hyderabad’s water-sewage sums

<table>
<thead>
<tr>
<th>Municipal</th>
<th>2005</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>7 m</td>
<td>8.2 m</td>
</tr>
<tr>
<td>Water demand</td>
<td>HMWSSB</td>
<td>CPHEEO</td>
</tr>
<tr>
<td></td>
<td>1300 MLD (187 lpcd)</td>
<td>1216 MLD (175 lpcd)</td>
</tr>
<tr>
<td>Sources</td>
<td>Surface and groundwater</td>
<td></td>
</tr>
<tr>
<td>Source (official)</td>
<td>Groundwater</td>
<td>Surface</td>
</tr>
<tr>
<td></td>
<td>12%</td>
<td>88%</td>
</tr>
<tr>
<td>Actual supply after loss</td>
<td>558 MLD (after 40% loss)</td>
<td>918 MLD, 40% loss (UAW)</td>
</tr>
<tr>
<td>Population served</td>
<td>70% covered by system</td>
<td></td>
</tr>
<tr>
<td>Water treatment plants</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Sewage generated</td>
<td>HMWSSB</td>
<td>CPCB</td>
</tr>
<tr>
<td></td>
<td>600 MLD</td>
<td>605 MLD</td>
</tr>
<tr>
<td>Length of sewage network</td>
<td>2400 km, 100% in 165 sq km central area</td>
<td>Pipelines being laid in 450 sq km peripheral areas</td>
</tr>
<tr>
<td>Sewage treatment facilities</td>
<td>2</td>
<td>3, capacity 533 MLD</td>
</tr>
<tr>
<td>Actual treatment</td>
<td>426 MLD</td>
<td></td>
</tr>
</tbody>
</table>

### Sources

- **Surface**
- **Groundwater**

### Water Demand

- HMWSSB
- CPHEEO

### Sewage Generation

- HMWSSB
- CPCB

### Sewage Treatment

- CPHEEO
- CPCB
Hyderabad Water Supply

- HMWSSB in charge of water supply and sewage of Hyderabad and adjoining municipalities
- City draws water from Nagarjuna Sagar 100 KM and Godavari 186 KM away (also lifted 500 M)
- Total distribution network is 2300 KM, 0.6 million connections (77% domestic, 20% slums)
- 115 MLD groundwater drawn officially. Unofficial figures are double this
Hyderabad Water Supply

- Early water sources – Hussain sagar, Osman sagar and Himayat sagar
- Network of 50 lakes built to store water
- Surface water has tanked
  - 934 tanks recorded in 1973
  - 834 in 1996
  - 18 ponds <10 Ha lost
  - From 1964 – 1990, area under water bodies fell from 2.5% to 1.5%

Water crisis as tanks disappear

- Encroachments and pollution are destroying Hyderabad’s tanks
- Extensive flooding and backflows of sewage e.g., Nadeem Colony
- Interconnecting channels have been blocked worsening floods e.g., by Hyderabad Golf Association
- Projects with an impact on tanks
  - Taj Banjara
  - Lanco Hills
  - Aliens Project
  - Aparna Sarovar
Musi River

- Emerges from Ananthgiri hills 90 KM west of city and runs 28 KM within city limits
- Drainage includes Hyderabad municipal corporation area + surrounding municipalities
- Untreated sewage discharge 700 - 800 MLD from city
- BOD 80-100 X bathing water standard (3 mg/litre)

Sewage Situation

- HMWSSB 1180 MLD
- 100% coverage of lateral sewers in core area
- 18 nallahs carry treated and untreated sewage to Musi River
- Peripheral areas remain poorly serviced, largely with septic tanks cleaned by informal service providers
- Sewage from upmarket areas flows into low-lying talabs
Sewage Merry-go-Round

Drains and Rivers

Groundwater

Water is pumped for domestic use

Sewage flows

The Way Ahead – Water

- **Investment of Rs. 4622 crore**
  - 100% coverage by 2016
  - Increase supply to 8 hours a day by 2016
  - 24X7 by 2021
  - Reduce losses to 15% by 2021
The Way Ahead – Sewage

• Rs. 1076 crore for sewerage network + treatment plants
• 10 new plants to treat 600 MLD under National River Conservation Directorate along Musi River
• Use different technologies to treat sewage to < 5 BOD (nearly bathing quality)
• 51 MLD plant to be commissioned shortly

Reform agenda: affordability

**Action: Cut costs of water supply**

• Augment local sources. Give them legal protection. These include lakes, ponds, feeder channels and catchments
• Recharge/store groundwater based on geo-hydrological studies
Water Conservation

• **Reuse/Recycle** water. Grey water for gardening
• Treat sewage for industry/farming :: Use a mix of technology
• Treat used water for domestic use
• Replace catchments that have disappeared with RWH from all built-up areas (roofs, roads, etc) to recharge tanks and ponds – augment local water quantity

Plan for sewage

**Action:** Plan for sewage before water

Sewage = resource

• **No water scheme must be passed without sewage component**
• Plan **differently** for sewage treatment **now**
• Mantra is decentralisation
  – Use open drains/rivers as treatment zones
  – Use lakes and ponds as treatment zones
  – Treat locally so that treated water can be used locally

**Sewage must be our obsession**
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**

**We all live downstream**