



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

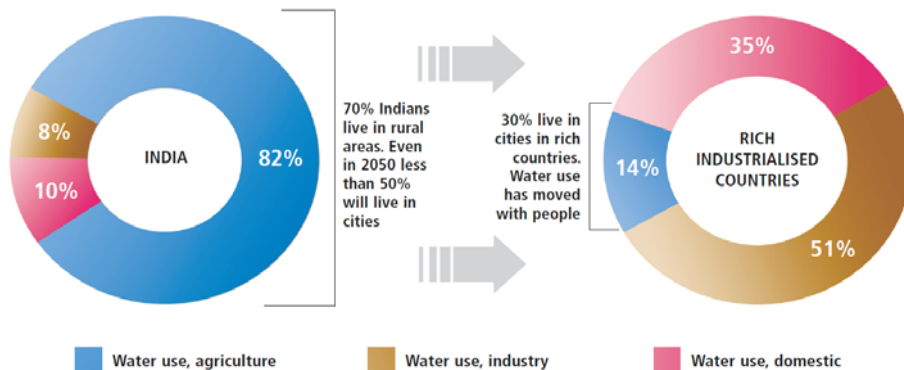
An agenda for water-prudent and
waste-wise India



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



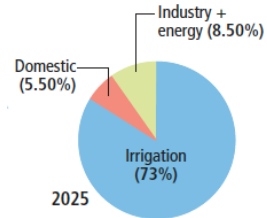
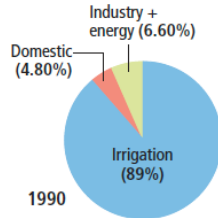
Source: Anon 2009, *Water in a Changing World*, Third UN World Water Development Report, UNESCO, Paris



Vague old water sums

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

Category	1990 (BCM)	2025 (BCM)
Irrigation	460	688
Domestic	25	52
Industry + energy	34	80
Total	519	942



BCM: billion cubic metres

Source: Anon 1999, National Commission on Integrated Water Resources Development, Ministry of Water Resources, Delhi



Recent information shows otherwise

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

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



Need to reinvent

- Violence will grow
- 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?

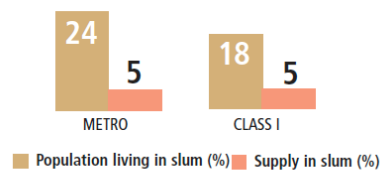
71-CITY SURVEY: HOW LEAKAGE LOSSES CREATE THE REAL SHORTFALL IN WATER ACTUALLY SUPPLIED

	Demand 2005 MLD	Supply 2005 MLD	Gap in 2005 MLD	Shortfall in supply, 2005 (%)	Leakage loss MLD	Supply after loss, 2005 (MLD)	Demand- actual supply gap, 2005 (MLD)	Shortfall in actual supply, 2005 (%)
Metro	17,987	16,591	1,396	8	6,150	10,441	7,546	42
Class I	2,879	2,775	104	4	706	2,069	811	28
Class II & III	129	123	7	6	21	101	28	22
Total	20,996	19,489	1,507	8	6,877	12,611	8,385	40

MLD: Million litres daily

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

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



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

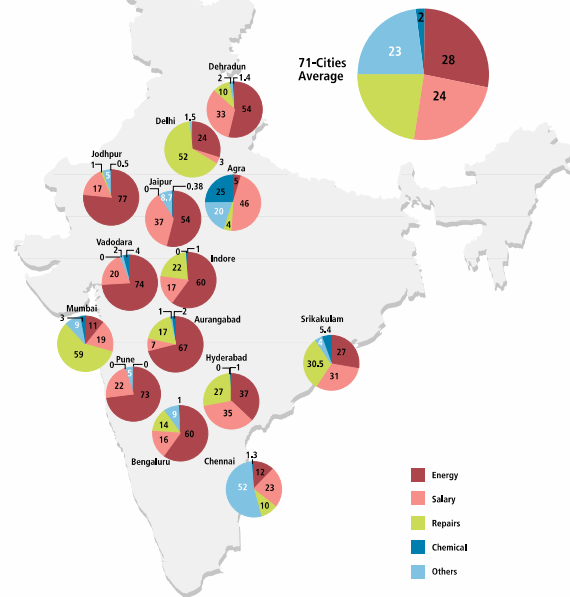
Leakages

Water inequity grows



COMPONENTS OF WATER SUPPLY IN DIFFERENT CITIES (IN PER CENT)

Cost of energy is high and is a growing component of water supply



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



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

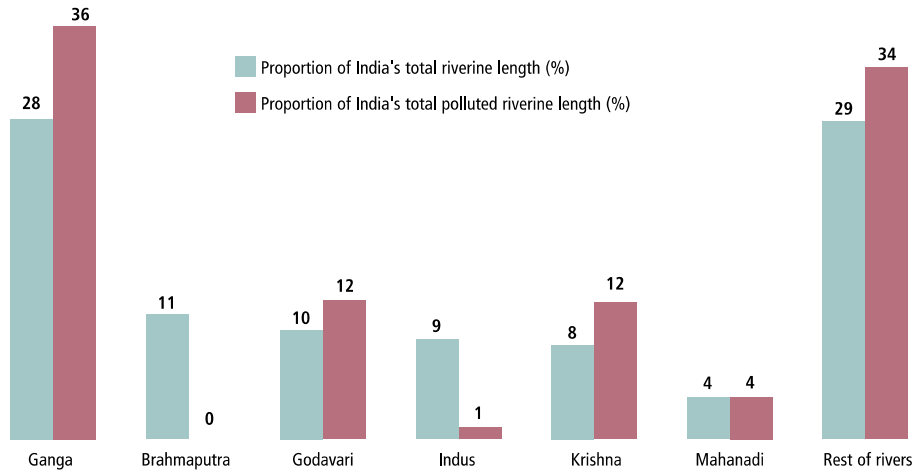
Cost of building system is high

- 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



Source: R C Trivedi 2007, *Pollution in our rivers: the CPCB perspective*, presentation, New Delhi, June, mimeo



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**



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**



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

IT IS A CROSS-SUBSIDY: WHAT CITIES CHARGE FOR INDUSTRIAL WATER USE

City	Commercial (Rs/kl)	Industrial (Rs/kl)
Agra	17.50	35
Amritsar	6.40	6.40
Allahabad	7.50	12.50
Alwar	4.68	11
Aurangabad	16	39
Bengaluru	36-60	60
Bhilwara	11-16.50	11-16.50
Bhubaneswar	8	8
Chennai	50-60	50-60
Cuttack	2.88	2.88
Delhi	10-100	10-100
Dhanbad	7	7
Gwalior	20	30
Hyderabad	35	35
Indore	11	22.50
Jabalpur	10.50	10.50
Kolkata	10	NA
Lucknow	6	6
Nagpur	12	20
Pune	16	16
Rajkot	12	12
Ujjain	25	25
Vadodara	10,80	10,80

kl: kilolitre;
Source: Compiled



- Area of 235 sq km covering rural and urban areas
- Population of about 2.25 million
- Highlights drainage as the most crucial problem of Patna and its surrounding areas and the root cause of many other physical and environmental problems
- Water bodies comprise 1.44% city area
- Slums cover 42 hectares



Main features of Plan

- Preservation of prime irrigated agricultural land as far as possible
- Preservation of existing water bodies to facilitate rainwater harvesting and improvement of ground water regime
- Improvement of existing rivulets and natural drainage channels
- Protection of flood-prone areas by adopting appropriate methods



Patna's water-sewage sums

Municipal area	105 sq km			
	2005		2011	
Population	1.6 m		2.2 m	
Water demand	BRJP	CPHEEO	City agency	CPHEEO
	215 MLD	280 MLD	297 MLD	385 MLD
Sources	Ganga, groundwater			
Source (official)	Groundwater	Surface	Groundwater	Surface
	100%	0%	75%	25%
Actual	88% (190 MLD)	12%		
Actual supply after loss 38%	202 MLD			
Population served	40% covered by system			
Water treatment plants				
Sewage generated	CPCB	BRJP	CDP 2009	
	290 MLD	170 MLD	224.6 MLD	
Population covered by sewage network	9%, 30% of area		Septic tanks ~ 20%	
Sewage treatment plants	4, capacity 121 MLD			
Actual treatment	52 MLD			



Water, not supplied

1. Water supply in cities: Planners obsessed with water, **not supply**
2. **Official estimation of Patna's water needs = less than CPHEEO norms (135 LPCD Vs 175 LPCD)**
 1. 38% shortfall
 2. 60% have piped water supply
 3. 700 km of pipelines, 300 km need replacement
3. Where does water come from
 - i. Groundwater – estimates 190 MLD



Groundwater

- Average depth 5.6 m before rains
- 3.3 m after rains
- Quality issues



Serious water quality issues

Water quality of Ganga in Patna

Parameters	Minimum	Maximum	Mean
DO (mg/l)	7.4	9.2	8.1
BOD (mg/l)	1.8	2.4	2.1
Faecal coliform (MPN/100 ml)	1,100	17,000	5056
Total coliform (MPN/100 ml)	2,200	50,000	15533

There is minimal treatment before distribution. The city is sitting on a health bomb



Sewage, the polluter

- 290 MLD, one third more than estimated by city agency
- 50% drainage through open drains
 - 280 open
 - Silted, clogged with solid waste
- 30% of city had no drainage
- 140 MLD flows directly into Ganga, rest seeps into the ground and mixes with groundwater, which is pumped up for domestic use



Sewage treatment

Name	Capacity in MLD	Sewage reaching plant (MLD)
Saidpur	45	22-25
Beur	35	15
Pahari	25	12
Karmali Chak	16	N/A
Total	121	49-52

- Sewage treatment faces serious financial bottlenecks
- Serious technical bottlenecks – erratic power, poor maintenance
- Cost of operations was Rs 5.4 crore, allotted half
- **Poor sewerage and poor STP siting**



Securing Patna's water future?

- Augment, modernise and improve
 - Water treatment plant
 - Central water and overhead reservoirs
 - 700 km of pipelines in old areas, 500 km in new areas
- Source water from Ganga upstream of city to reduce groundwater dependence by 25%
- But will this solve the quality problem?



Augmenting sewage treatment

Build, neglect, rebuild

- Total of Rs 790 crore by **2030**
 - Sewage treatment plant, Rs 15 crore
 - Disposal network, Rs 720 crore
 - Individual sanitation, Rs 30 crore
 - O&M, not available
- Rs 462 crore for stormwater drains by **2030**



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 on sewage systems
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



WateRR

Action: Reduce demand and supply through better management and planning

Action: Reuse/ **R**ecycle water. Grey water for gardening

Treat sewage for industry/farming :: Use a mix of technology

Treat for used water domestic use



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
 - 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 **x** population
- Waste is not a simple calculation:
official water supply **x** 0.90
- As actual water supply not known, waste estimation off the mark. Water demand is not known



- 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**

