



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

An agenda for water-prudent and
waste-wise India



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?

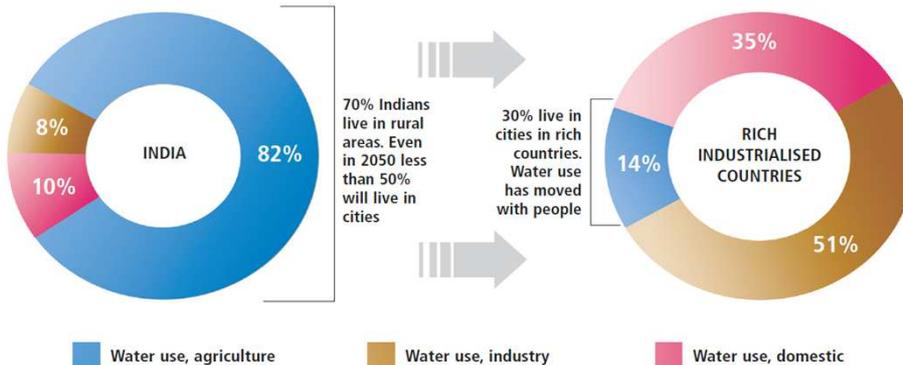


Water for growth?

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



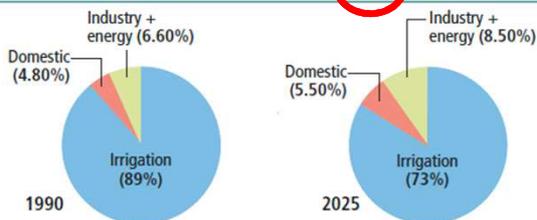
Source: Anon 2009, *Water in a Changing World*, Third UN World Water Development Report, UNESCO, Paris



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

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

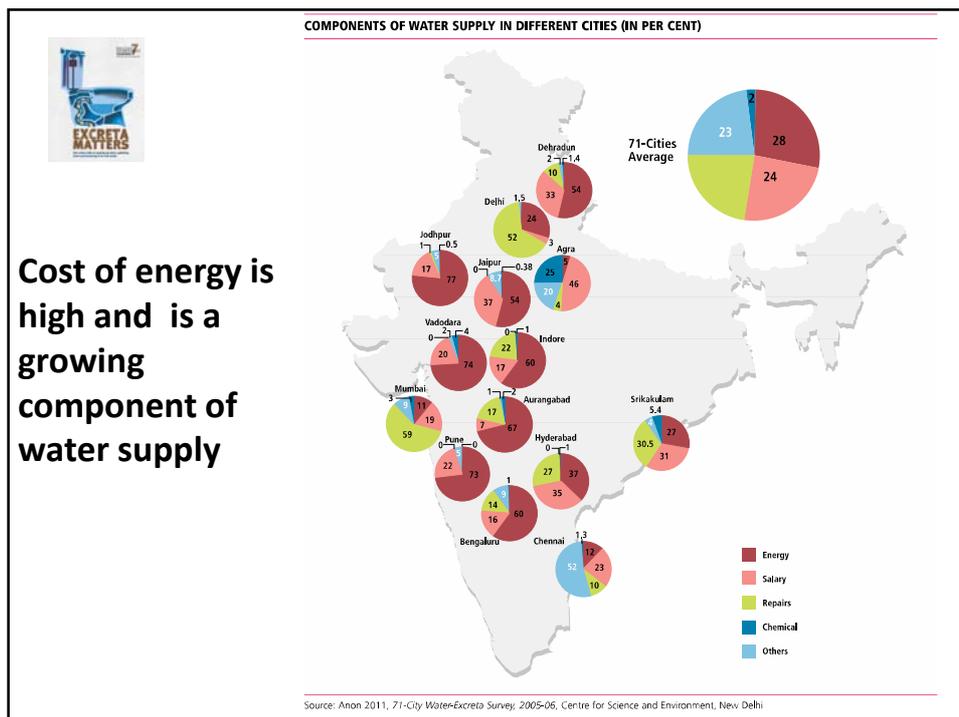
71-CITY SURVEY: WATER THAT ACTUALLY TRICKLES DOWN TO SLUMS



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

Leakages

Water inequity grows



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

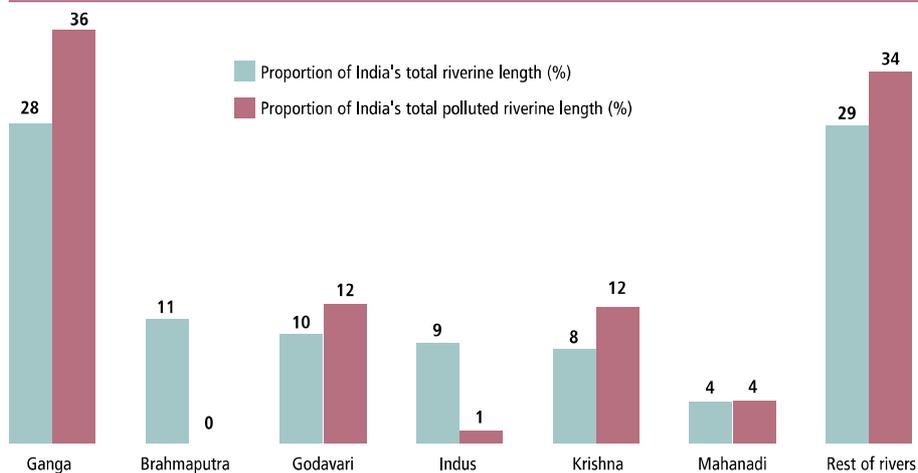
Cost of building system is high

- 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
- 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**



Economics is not a simple answer

Cities cross-subsidize with high tariff on industries and commercial

But industries move to groundwater

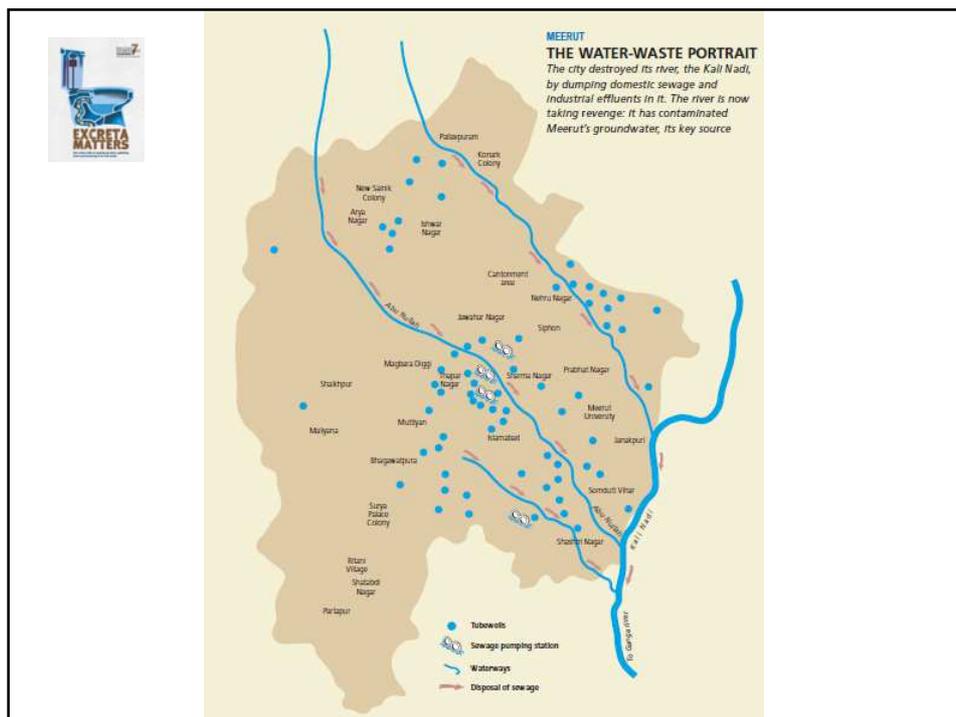
Unsustainability grows

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




Meerut's water-sewage sums

Municipal area	2005		2011	
Population	1.6 m		1.9 m	
Water demand	MNN	CPHEEO	MNN	CPHEEO
	197 MLD (127 lpcd)	271 MLD (175 lpcd)	241 MLD	332 MLD
Sources	Groundwater, surface sources			
Source (official)	Groundwater	Surface	Groundwater	Surface
	97%	3%		
Actual supply after loss 40%	115 MLD, 30% loss			
Population served	71% covered by system			
Water treatment plants	Nil, only chlorination			
Sewage generated	MMN	CPCB	BMC	CPCB
	148 MLD	208 MLD		
Length of sewage network	132 KM covering 21% area; 25% households connected			
Sewage treatment facilities	Nil disposed in Kali nadi			
Actual treatment	Nil			



Meerut Water Supply

- Three agencies involved – UP Jal Nigam (source to Nigam's jurisdiction), Meerut Nagar Nigam within its area
- Huge demand-supply gap of 81 MLD
- Water supply started in 1886 from surface sources
- Since 1996, city has been dependent on groundwater; extracts 162 MLD from 102 deep tubewells
- Water is supplied with minimal treatment – only chlorination



Meerut Water Supply

- 9 Zones + 3 independent township zones
- 960 KM long pipeline system covering 30% of city
- No supply in 29 urban villages, 25% of mohallas
- 79,000 connections
- Expenditure Rs 4.75 crore, income Rs 2.52 crore per year



Water Quality a serious problem

- Chlorination insufficient
- Groundwater quality-affected
 - Nitrate level 209 mg/l (40 mg/l)
 - Iron exceeding 1000 mg/l limit
 - Industrial effluents
- Depleting aquifers, levels dipping by 1 m a year
- **Untreated sewage and industrial effluents are polluting groundwater**



Heavy metals in the water

Drain/River	pH	TSS (mg/l)	COD (mg/l)	BOD (mg/l)
Abu Nullah 1	7.63	1650	2229	1017
Abu Nullah 2	7.35	375	427	126
Meerut Drain	7.74	1680	2805	1037
Kali Nadi	7.77	1887	2293	360
Permissible limits	5.5 – 9		250	3

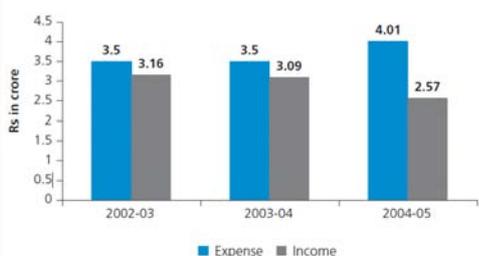
Manganese	0.01 mg/l	18250 mg/l
Nickel	0.02 mg/l	600 mg/l
Cadmium	0.003 mg/l	333.3 mg/l
Iron	0.3 mg/l	33340 mg/l
Chromium	0.05 mg/l	140 mg/l



The economics of water

GRAPH: EXPENSE VS INCOME

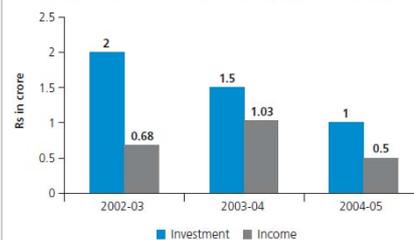
Recovery is only 53 per cent



Source: Anon 2006, City Development Plan – Final Report, BCEOM India Pvt Ltd in association with CRAPHTS Consultants (I) Pvt Ltd, Meerut

GRAPH: THE ECONOMICS OF SEWAGE

The Jal Nigam in Meerut charges 2.5 per cent of the house tax as a sewerage charge. In 2005-06, the Nigam invested Rs 0.15 crore in building and maintaining the city's sewers



Source: Anon 2006, City Development Plan – Final Report, BCEOM India Pvt Ltd in association with CRAPHTS Consultants (I) Pvt Ltd, Meerut

- Lack of meters
- Flat tariffs



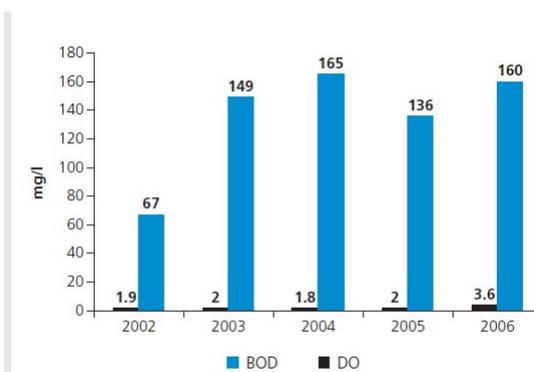
Immediate water challenges

- High leakage losses of 30%
- Large percentage of unserved population
- Rapidly falling groundwater levels
- Deteriorating groundwater quality
- Ganga and Yamuna are already over-exploited



Kali Nadi is black indeed

- River receives heavy load of sewage and industrial effluents from Saharanpur, Muzzafarpur, Meerut and Ghaziabad
- CPCB recommended closing all tubewells along the river

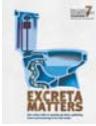


Source: www.cpcb.nic.in, as viewed in March 2007



RUHANI KALUR / CSE

Wading through the dying Kali Nadi: the same waters are used by the people of 1,700 villages and 12 towns

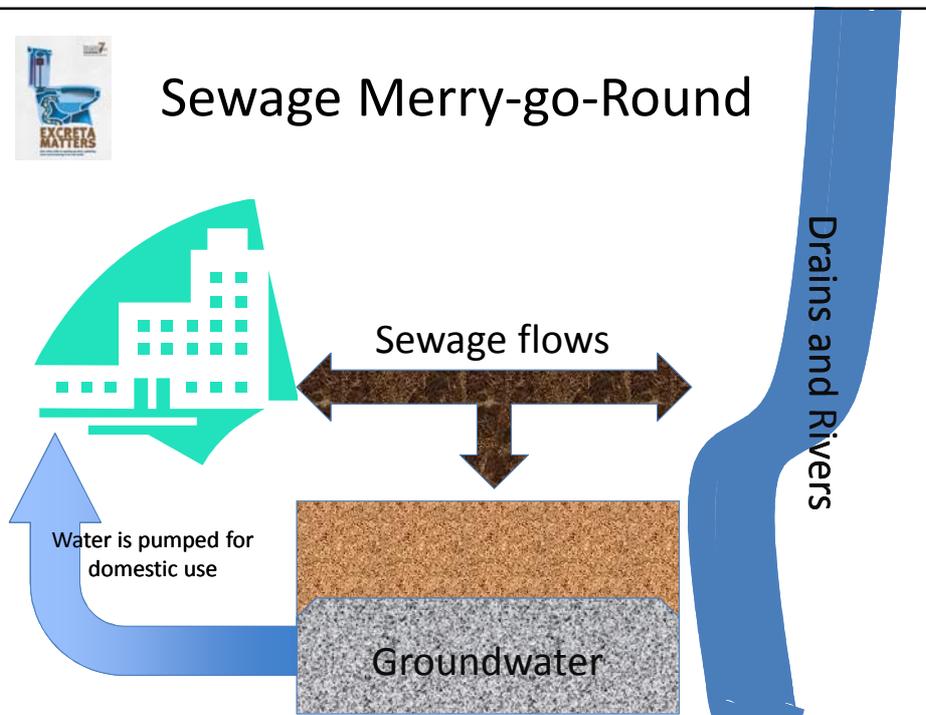


Sewage Situation

- How much?
 - **MNN = 148 MLD; CPCB = 208 MLD**
- Length of network 132 KM, 7 pumping stations
- Sewage pumped to sludge farm and then to Kali Nadi
- Only 45 MLD is disposed in this manner
- Rest flows through 3 nallahs to the river



Sewage Merry-go-Round





The Way Ahead – Water

- **Investment of Rs 627 crore**
 - Plan to reduce use of groundwater, but not clear how
 - Remove inequities in water supply by 2024
 - 24X7 supply by 2030
- Game of catch up



The Way Ahead – Sewage

- Investment of Rs 952 crore
- Develop a centralised system given density of core city area
- First STP in 2012
- Full coverage by 2024

Imperative to capture and treat ALL sewage NOW



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. Concretization?
- Recharge/store 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/rivers 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 \times population
- Waste is not a simple calculation:
official water supply \times 0.90
- As actual water supply not known, waste estimation off the mark. Water demand is not known



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

