



## Excreta Matters: 7<sup>th</sup> Citizens' Report on the state of India's Environment

An agenda for water-prudent and waste-wise India

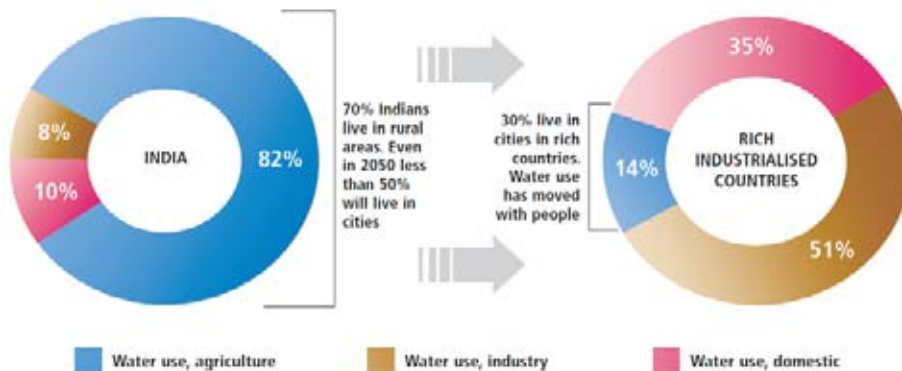


## Water for growth?

Cities-industries need water for growth but India's water use is not changing with its demographics

### 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

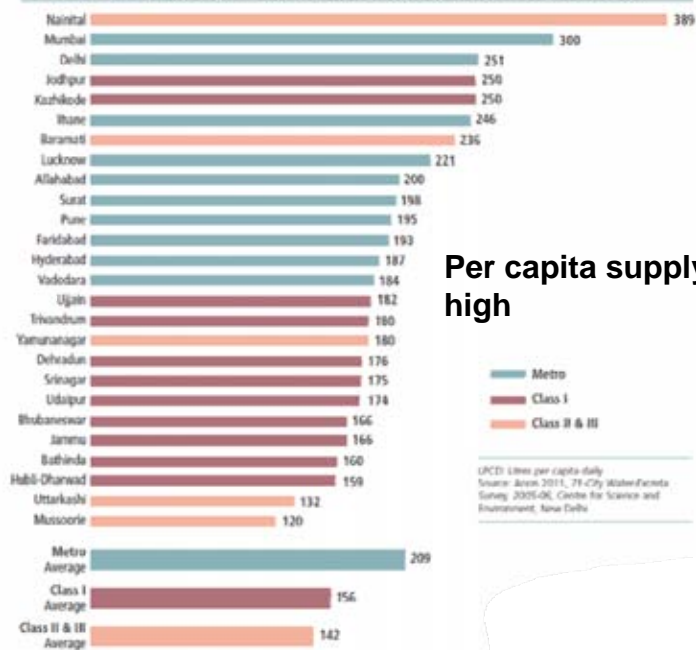


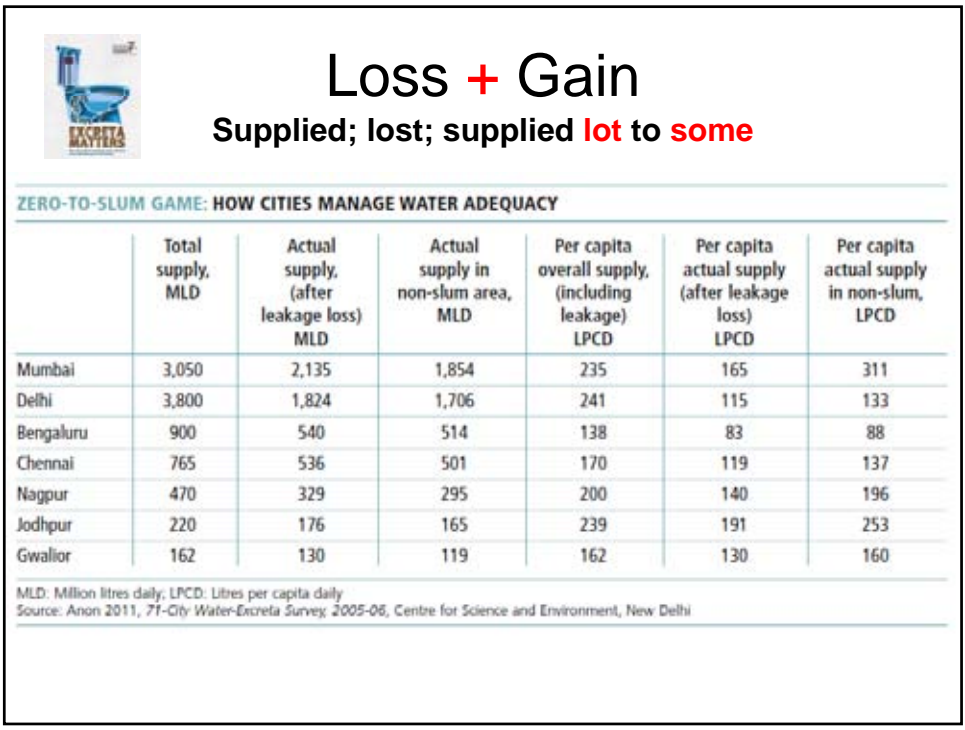
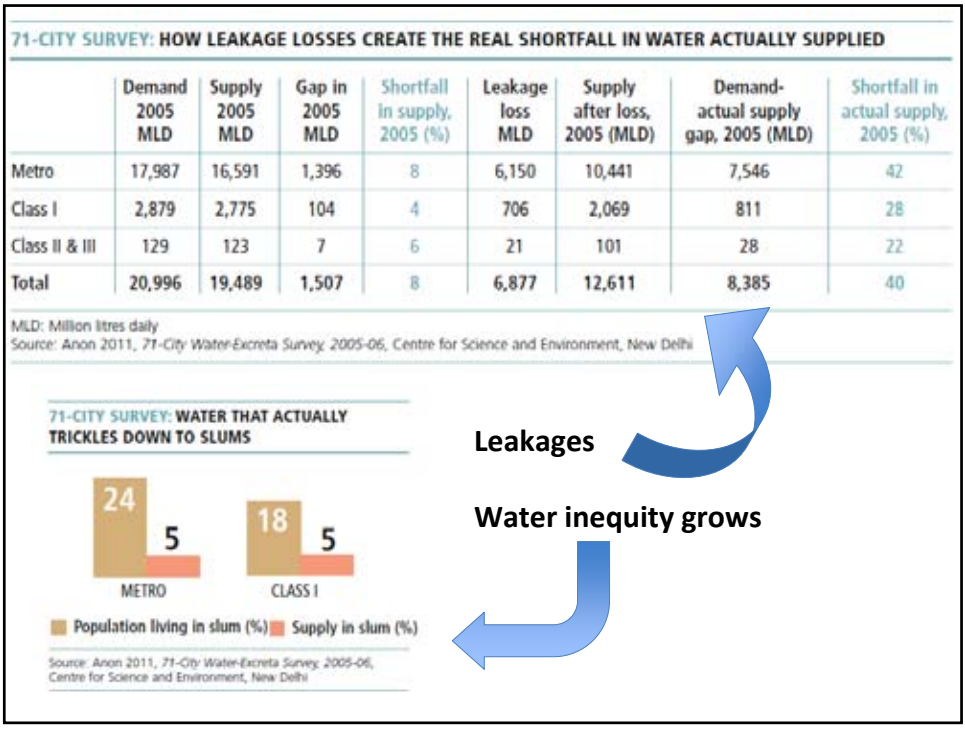
## Need to reinvent

- 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?



PER CAPITA PRESTIGE: WATER SUPPLY LEVELS CITIES DECIDE ARE COMPLETELY ARBITRARY (IN LPCD)







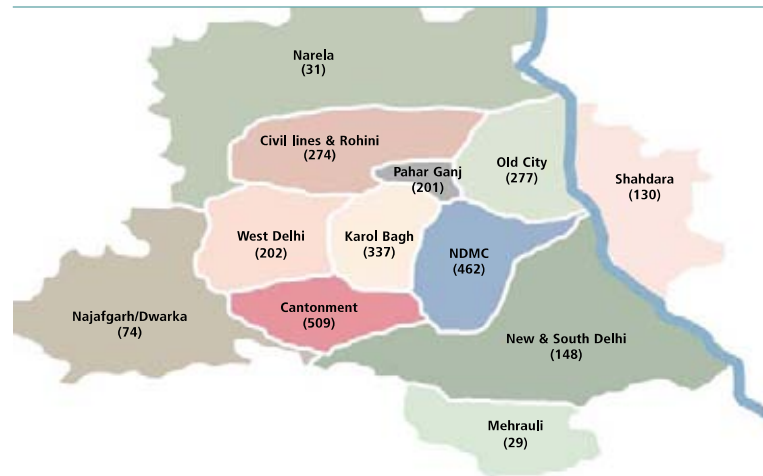
**MP cities:** Enough; but lost in distribution;  
gained because pipeline does not reach all

	Demand	Supply	Supply after loss	Supply to served areas
Bhopal	176 lpcd	166 lpcd	108 lpcd	250 lpcd
Dewas	70 lpcd	60 lpcd	46 lpcd	
Gwalior	150 lpcd	162 lpcd	130 lpcd	190 lpcd
Indore	135 lpcd	113 lpcd	74 lpcd	150 lpcd
Jabalpur	135 lpcd	154 lpcd	120 lpcd	200 lpcd



= **'Official inequity'**

DELHI: CAPITAL INEQUITY (IN LPCD)



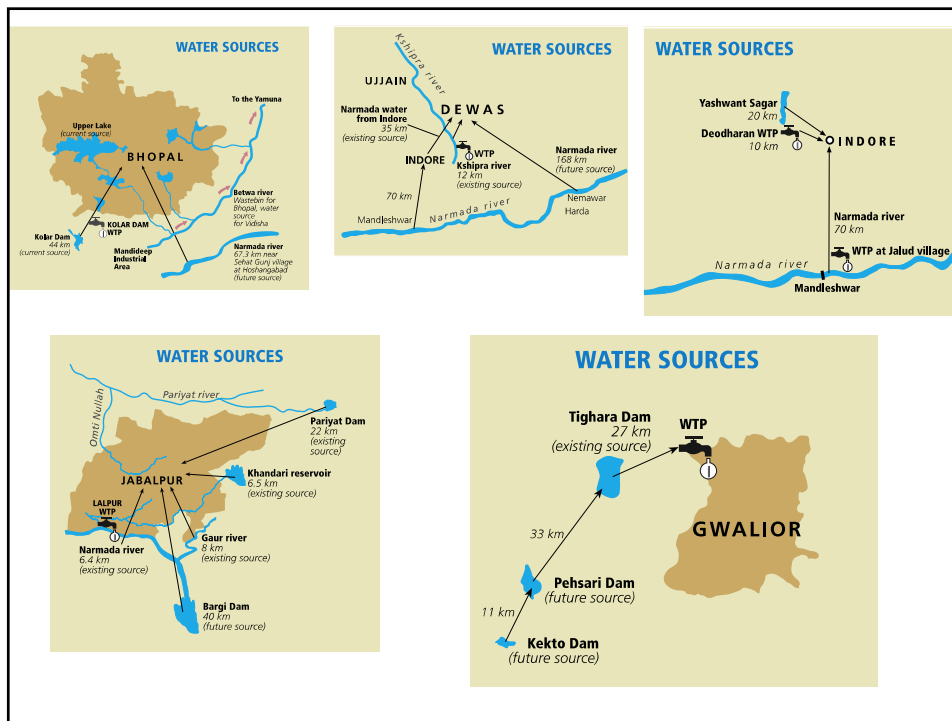
LPCD: Litres per capita daily; NDMC: New Delhi Municipal Corporation  
Source: Sunita Narain et al 2007, *Sewage Canal: How to Clean the Yamuna*, Centre for Science and Environment, New Delhi



## 'Loss' not just inefficiency

- Distribution loss is **not just** about inefficiency
- Distribution loss **intrinsic to supply system**
  - distance leads to high transmission losses
  - distance leads to high costs of energy
  - distance leads to high O&M costs of repair

But **'augmentation'** is name of water supply  
Build, pipe, pump and do not worry about supply

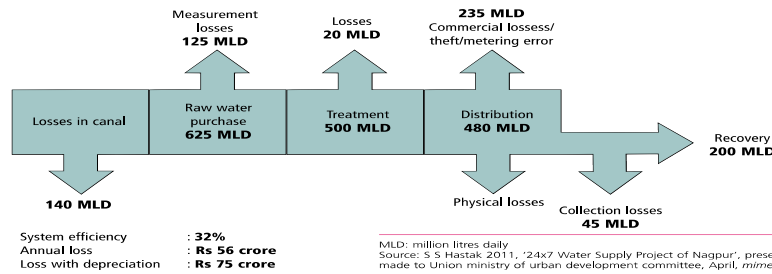




# Nagpur: **lost** accounts

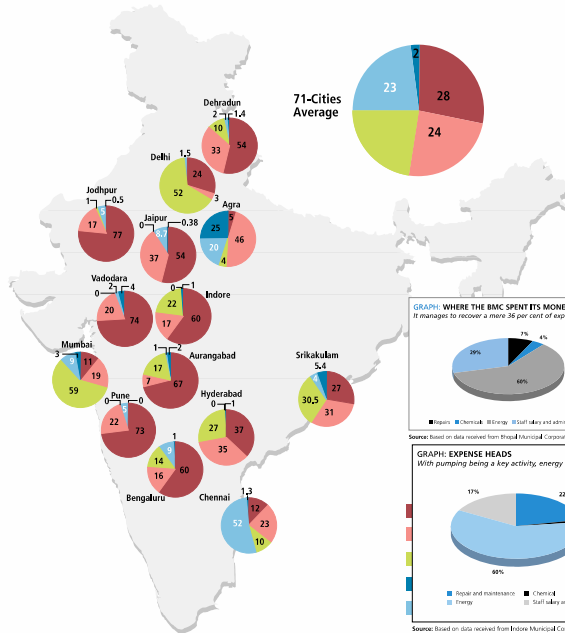
- Only city with accounts of **where** water is lost
- **765 mld** – sourced from tiger reserve of Pench – 45 km away. Ends with **200 mld**

**DRIP DROP OFF: NAGPUR'S WATER HIGHWAY ILLUSTRATES HOW WATER GETS LOST**



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

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

But people depend on private wells, tanker mafia and bottled water

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



### AQUIFER ABUSE: FALLING GROUNDWATER LEVELS IN DELHI

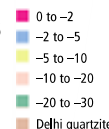
#### MAY 2002

Where water was found  
(in metres, below ground level)

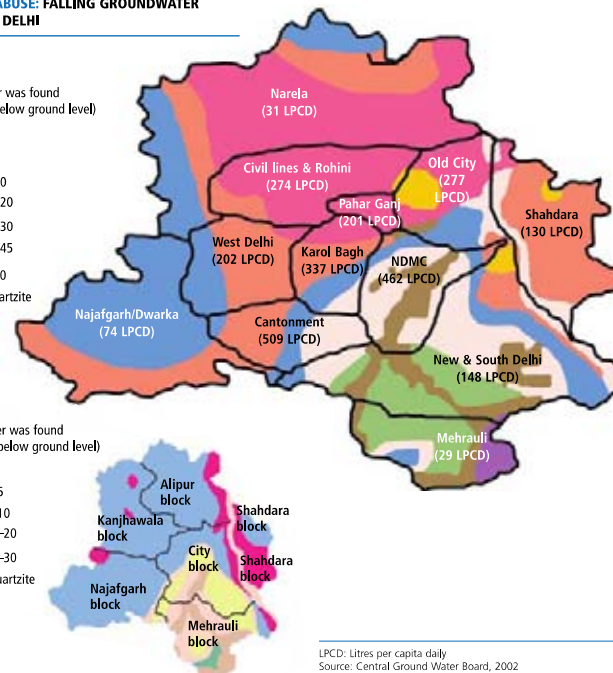


#### 1960

Where water was found  
(in metres, below ground level)



Where pipeline does not reach  
People depend on groundwater  
Falling groundwater levels tell us about inequity



LPCD: Litres per capita daily  
Source: Central Ground Water Board, 2002



## Lakes: **Present lost**

As groundwater is not considered as critical for water supply, recharge is neglected

Land is valued, **water is not**

No legal protection for city lakes, catchment and drainage systems

Sponges of cities being destroyed. **Deliberately**



## 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





## Excreta: **sums**

- 2009:

Sewage generated = 38,255 mld

Capacity to treat = 11,788 mld (**30%**)

Sewage actually treated = 8,251 mld (**22%**)

**78 % sewage** is officially untreated and disposed off in rivers, lakes, groundwater

**We flush, we forget**



## 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



**Cities do not have drains**  
**New growth cities are growing without drains**  
**Backlog and front-log impossible to fix**  
**As cities fix one drain, another goes under**

**71-CITY SURVEY: AREA COVERED BY CLOSED DRAINS  
SHOWS REAL STATE OF SEWAGE COLLECTION**

% of area covered	
0-10	Cuttack, Guwahati, Jabalpur, Jammu, Ranchi, Thane, Aizawl, Bathinda, Bhilwara, Siliguri, Srikakulam
10-30	Agra, Alwar, Aurangabad, Indore, Mathura, Meerut, Puducherry, Thiruvananthapuram, Dehradun, Dewas, Hubli-Dharwad, Jhansi, Kozhikode, Lucknow, Solapur, Tumkur, Udaipur, Ujjain, Dhanbad
30-50	Allahabad, Bengaluru, Bhopal, Delhi, Lucknow, Patna, Srinagar, Amritsar, Bhubaneswar, Jodhpur, Mumbai
50-70	Faridabad <sup>2</sup> , Hyderabad, Jaipur <sup>1</sup> , Kanpur, Kolkata, Nagpur, Gwalior, Mussoorie, Nainital, Rajkot, Vadodara, Yamunanagar
> 70	Chennai, Pune, Surat, Gurgaon <sup>2</sup>

<10

Guwahati, Jabalpur, Jammu,  
Ranchi, Thane, Aizawl,  
Bathinda, Bhilwara, Jammu,  
Jabalpur, Siliguri,  
Srikakulam

<sup>1</sup>Claims 80% coverage in CSE survey, 65% in City Development Plan for JNNURM; <sup>2</sup>Faridabad and Gurgaon: only old-city within municipal limit included  
Source: Anon 2011, 71-City Water-Excreta Survey, 2005-06, Centre for Science and Environment, New Delhi



## Bengaluru: sewage sums

- 3610 km of sewage pipes
- 14 sewage treatment plants = **781 mld**
- Generates 800-1000 mld of sewage
- **But treats only 300-400 mld**
- Rest does not reach
- Now plans to build 4000 km more pipes
- **Builds, grows and more lines need repair**
- **Catch-up that does not catch-up**



## Partial treatment = pollution

### Cities do not control pollution

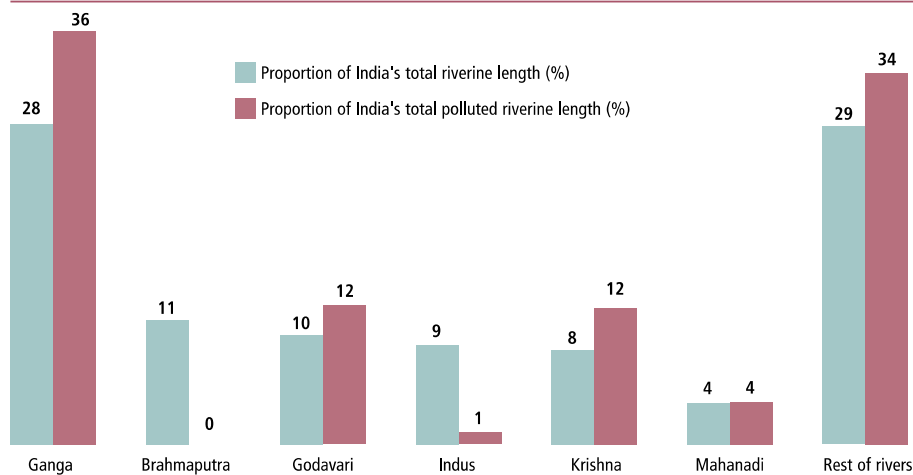
Cost of building system is high

- City can build sewage system for **few**
- 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**



## Public vs Private?

- Not the question
- Investment is the issue
- Management is the issue

**BUT**

- Private sector experience in this sector **limited**
- Current contracts about public investment, private profit: **PIPP**



**Public investment:  
Private  
Profit**

**Khandwa:** Rs 96 crore  
public financing;  
90% public  
Tariff: Rs 12/kl  
How will it be paid?  
How will it be  
collected?  
**Shivpuri:**  
Tariff: Rs 15.40/kl

**What about sewage?**  
What about investment  
in local water sources?

### PRIVATE WATER EFFORTS IN INDIA

City/Value	Operator	Scope	Type	Status (as of June 2011)
Tirunelveli (1993) Rs 1,000 crore	IL&FS	To build, operate and charge for water supply	BOT	Operational
Salt Lake, Kolkata (2010) Rs 60 crore	JUSCO-Volhas	30-year contract for management of water supply and sewerage distribution	BOT	Under implementation
Chennai (2006) Rs 473 crore	WRCL	100 MLD desalination plant – bulk supply on fixed rates	BOT	Operational
Nagpur (2007)	Veolia	7-year contract for 24x7 system – distribution, rehabilitation, augmentation and bulk supply	Management contract	Under implementation
Hyderabad		Non-revenue water reduction and performance improvement	Management contract	Being tendered
Hullu-Dharwad- Belgaum-Gulbarga (2005)	Veolia	4-year contract to increase connections; supply 24x7 water (distribution contract) in piped areas	Management contract	Operational
Latur, Maharashtra (2005)	Subhash Projects	10-year contract for distribution	Management contract	Work suspended as disputes arose on terms of contract and delays
Mysore <sup>2</sup> Rs 160 crore	JUSCO	24x7 supply; over a million people and 150,000 connections	Management contract	Under implementation but may require renegotiation as final contract underestimated work and money
Haldia <sup>3</sup> Rs 100 crore	JUSCO	25-year contract for design, development, operation and maintenance of water supply in Haldia on lease (of existing assets) and BOT of new assets	Lease-cum-BOT	Under implementation but is rumoured to be stuck as financials of project are weak
Devas (2006) Rs 60 crore	MSK projects	Bulk water supply to industries	BOT	Ongoing but is facing problems as industries are reluctant to take water at agreed rates; domestic supply is irregular and theft from pipeline is common
Khandwa <sup>4</sup> (2009) Rs 115.32 crore	Vishwa Infrastructure, Hyderabad	Conveyance of Narmada river water over 52 km and ensure 24x7 water supply in city	BOT (90% public financing of Rs 103 crore); concessionaire to invest rest and pay for O&M; base price Rs 12/kl	Under implementation but long-term viability of project is questionable; Even with public financing, cost of water supply is high
Shivpuri <sup>5</sup> (2010) Rs 60 crore	Doshian-Veolia, Ahmedabad	Bringing water from Modikheda dam and supply 24x7 to city	BOT (60% public financing of Rs 54 crore); concessionaire to invest rest and pay for O&M; base price of water set at Rs 15.40/kl	Under implementation, but viability is a question, given the high tariff of water
Naya Raipur (2009) Rs 156 crore	Jindal Water Infrastructure	Wells on river Mahanadi, pipeline to city, treatment distribution and billing for 52 MLD	BOT	Under implementation
Kolhapur (2010) Rs 75 crore	Vishwa Infrastructure, Hyderabad	76 MLD sewage treatment plant	BOT (70% or Rs 52 crore public financing and to pay for fixed and variable cost of treated sewage)	Under implementation

BOT: Build-Operate-Transfer; M: Minkire; MLD: million litres daily; O&M: Operation and Maintenance  
Source: Aron 2008, Presentation on Financing Experience in Water Sector; ICRA (an associate of Moody's investors services USA), Bangalore.  
<sup>2</sup> Aron 2011, '24x7 Urban Water Supply at Jamshedpur: Experience on PPP in urban water supply and sanitation sector', Jamshedpur Utilities and Services Company Ltd, presentation to Working Group on Urban and Industrial Water Supply for 12th Five Year Plan, Mumbai.  
<sup>3</sup> Aron 2011, Information from PPP database website, provided by Planning Commission, Government of India, May 2011



## BUZZWORD: 24x7

Experience **limited**

Karnataka cities: **26,000** household reached

Nagpur: **15,000** households reached

Cost is high; recovery is low;

### 71-CITY SURVEY: IS IT POSSIBLE OR FEASIBLE TO UP-SCALE 24X7 PILOT ROJECTS?

	Connected population	Number of connections (legal and illegal)	Number of connections reached/to be reached with 24x7	% to reach	Distri-bution system (km)	Distri-bution system repaired (km)	% of distri-bution system to reach	Cost/per connection (Rs)
Karnataka cities*	923,107	179,247	26,045	86	1,590	238	85	15,000-20,000
Nagpur		200,000	15,000					10,000

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



## AGENDA FOR FUTURE



## Affordable water

- **Agenda: Cut costs of water supply**
- Supply to all and not some

To reduce losses in distribution; reduce costs of supply, cities must depend more on local water systems. **Catch water where it falls**

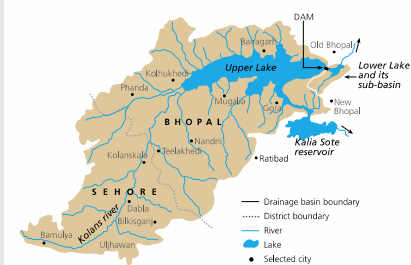
Cities **must legislate** to protect local water bodies, **do rainwater harvesting**



**Protect local water sources for water security**  
**Legislate area of each lake**  
**Legislate area of catchment of each lake**  
**Account for water from local systems first, then get Narmada**

### MAP: BHOJ WETLAND BASIN

The wetland, which spans two districts, is a Ramsar site. The Rs 250-crore project to clean and conserve the site has not had much results. There have been allegations of the money getting siphoned away



Source: Aniruddhe Mukerjee and Mohan S Kodarkar 2006, 'Bhoj Wetland: Experience and lessons learned brief', [http://www.rainwaterharvesting.org/bhoj\\_lake/bhoj\\_lake.htm](http://www.rainwaterharvesting.org/bhoj_lake/bhoj_lake.htm) as viewed in June 2011



## Reduce water use

**Agenda: Demand and not supply management**

**Must reduce wastage, reduce **intra-city inequity**, reduce demand of water**

Promote water-efficient appliances

Promote **water-prudent** cities

Promote **water-wise** societies



## Plan for **sewage**

**Agenda: Plan for sewage before water**

- **No water supply without sewage component**
- **Sewage must be our obsession**





## Plan **differently** for sewage

### **Design to treat all waste**

- Treat waste in open drains and not wait to build all drains

### **Treat waste to recycle and reuse water**

- Treat waste to generate wealth – not use water as carrier or for waste disposal



## Treat local; **recharge**

### **Treat waste locally so that reuse is possible locally**

- Cut costs of piping and pumping
- Treat using microbes/separation/biotic oxidation systems etc
- Treat to reuse, not to waste
- Every lake can be a water-treatment zone



**Amarnath yatra:**  
in cold climate; high altitude; difficult conditions; sewage is treated using microbes  
Sewage is cleaned to less than 15 BOD  
**Waste is turned to water** and returned to hydrological cycle



*Cleaning the waste of millions: toilets are dosed with microbes and so don't smell, waste goes to a reed bed and oxidation tank.*



## 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 need to re-invent **growth but without pollution**

