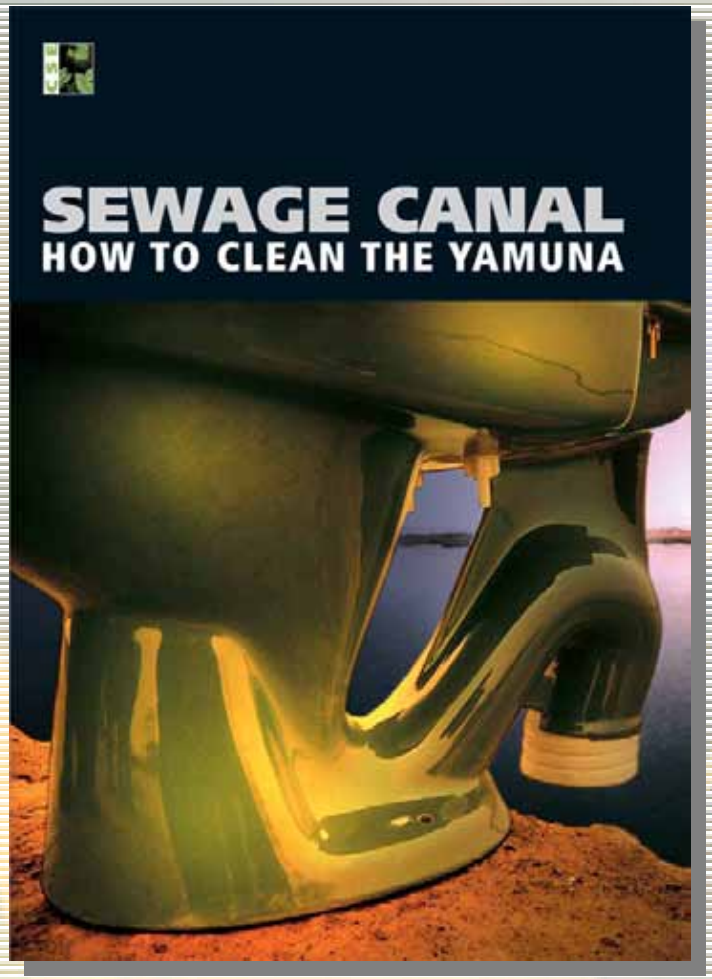
Sewage Canal: How to Clean the Yamuna



Sewage Canal: How to Clean the Yamuna

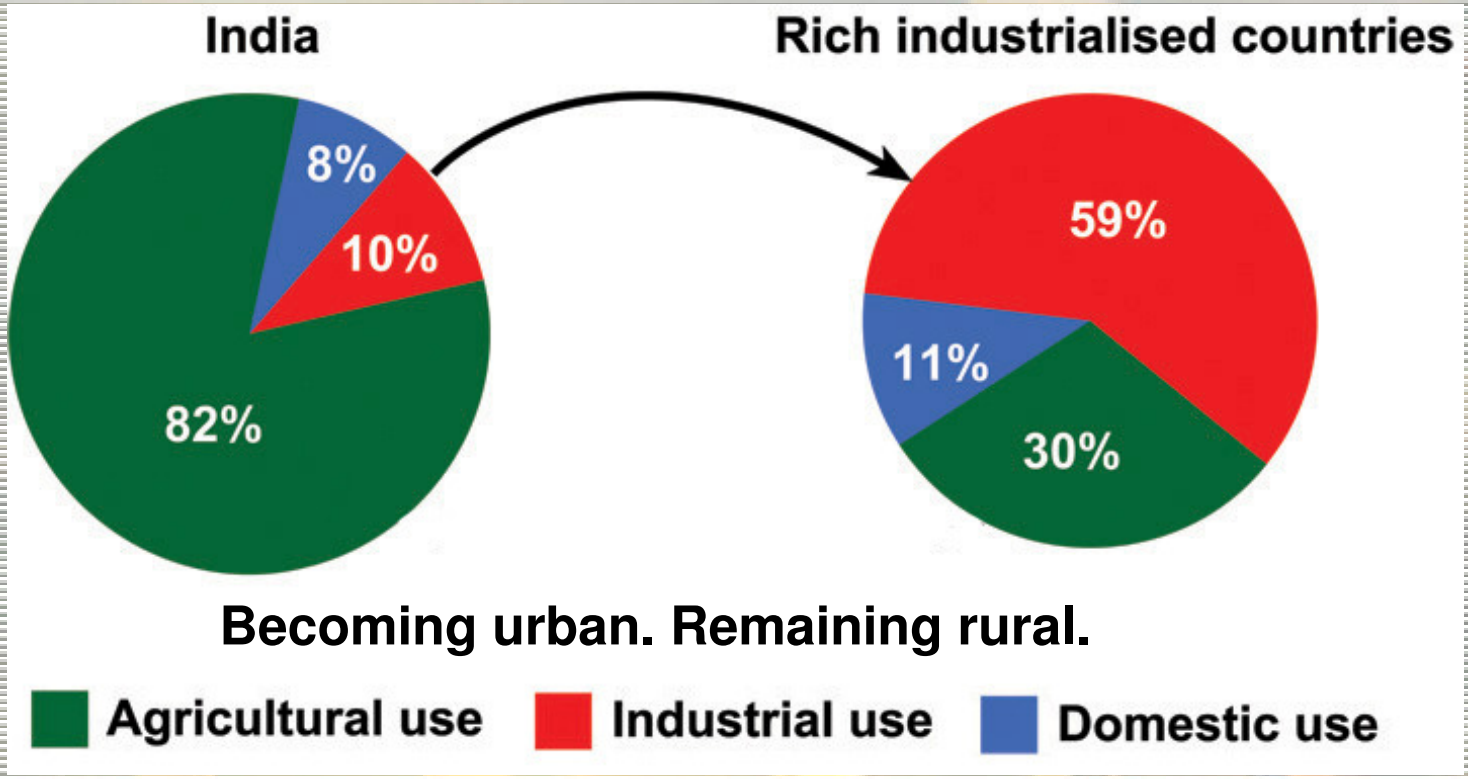
About Yamuna. But not just Yamuna

- Every river, every lake, every water body getting polluted. Full of our sewage.
- We take water, return sewage.
- 80% of water leaves as sewage
- Cities are growing, need more water, discharge more pollution.
- Dirty water means ill health: biggest cause of children's death.

Be angry. Not acceptable.

Sewage Canal: How to Clean the Yamuna

Water wars within



Pollution will add to water stress. Cannot allow it.
Have to build cities without pollution.

Water 'wars' happening between old users and new users…

- Not full blown wars – skirmishes;
- Tonk district: farmers fight against water allocation to Jaipur and Ajmer;
- Veeranam lake: farmers fight against water allocation to Chennai;
- Vishakapatnam: farmers fight Jindal project for its water allocation. Say their water is already going to city;
- Bharatpur: farmers stop biomass project saying it will use their water…..

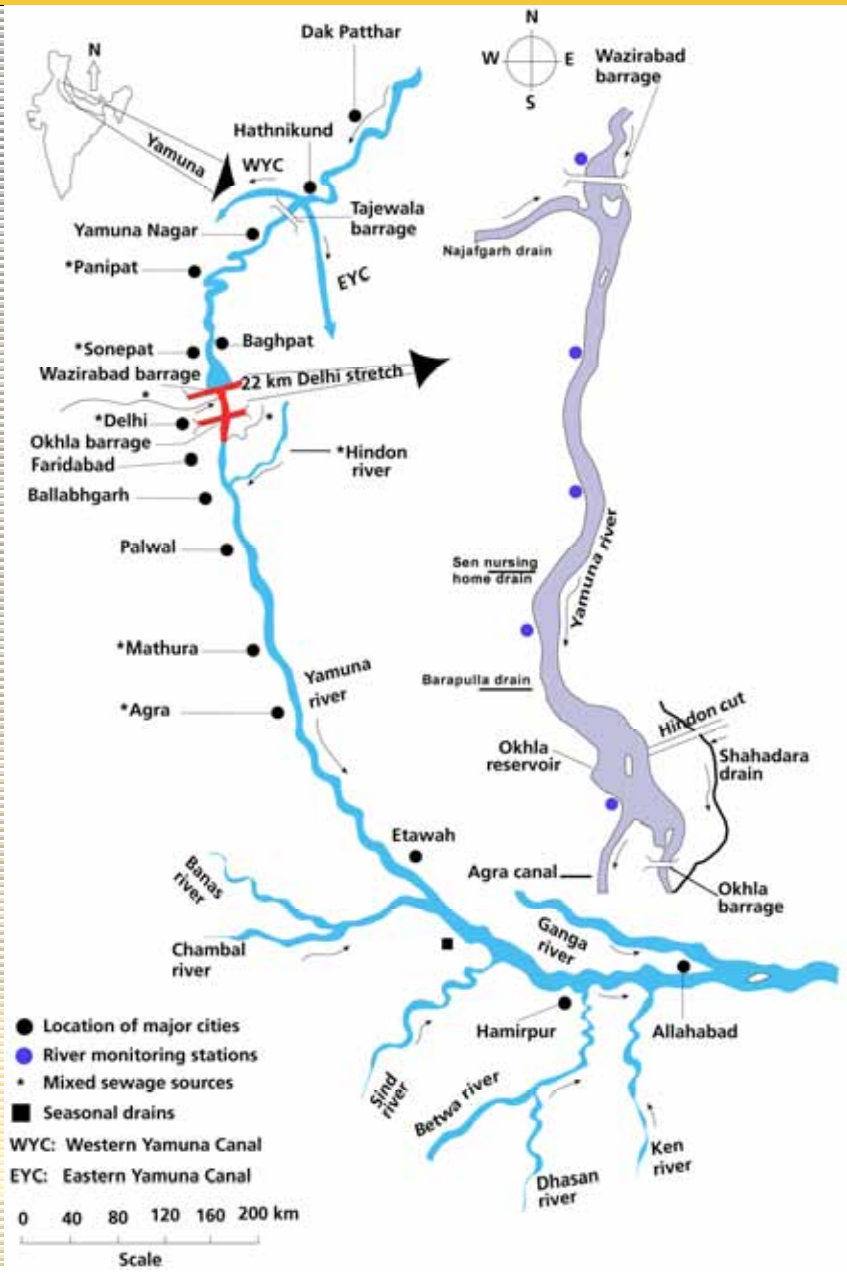
Sewage Canal: How to Clean the Yamuna

Can't afford to pollute

- Are river action plans working?
- Cities water need will grow…
- They will take water upstream; discharge waste downstream; take clean water, release dirty water
- Reduce the water availability; increase stress; increase in incidence of disease
- Understand Yamuna to understand India's water future

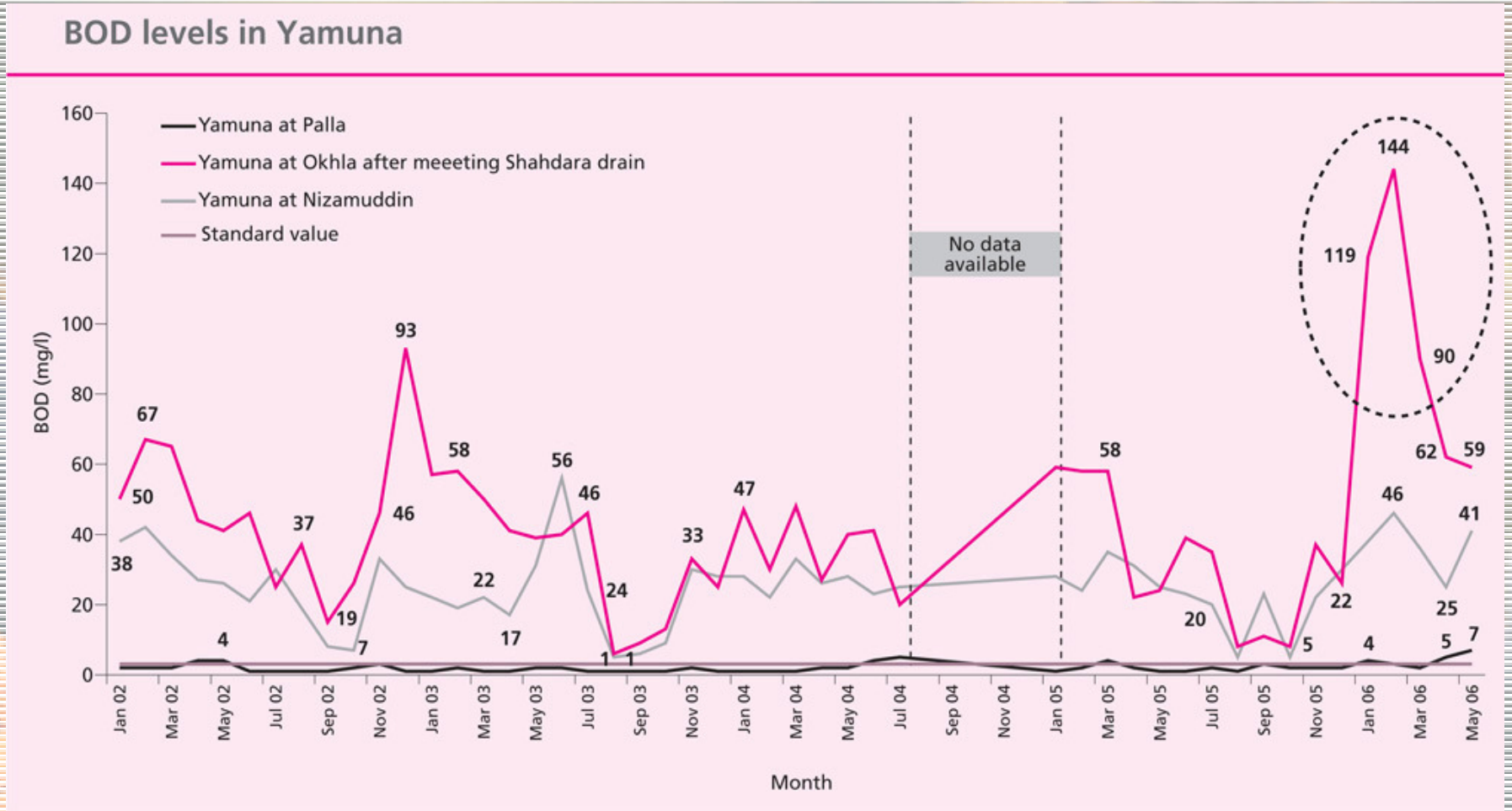
Sewage Canal: How to Clean the Yamuna

22 Km stretch in Delhi contributes 70 per cent of the total pollution load of the river



Sewage Canal: How to Clean the Yamuna

Yamuna a dirty drain of Delhi (BOD levels)



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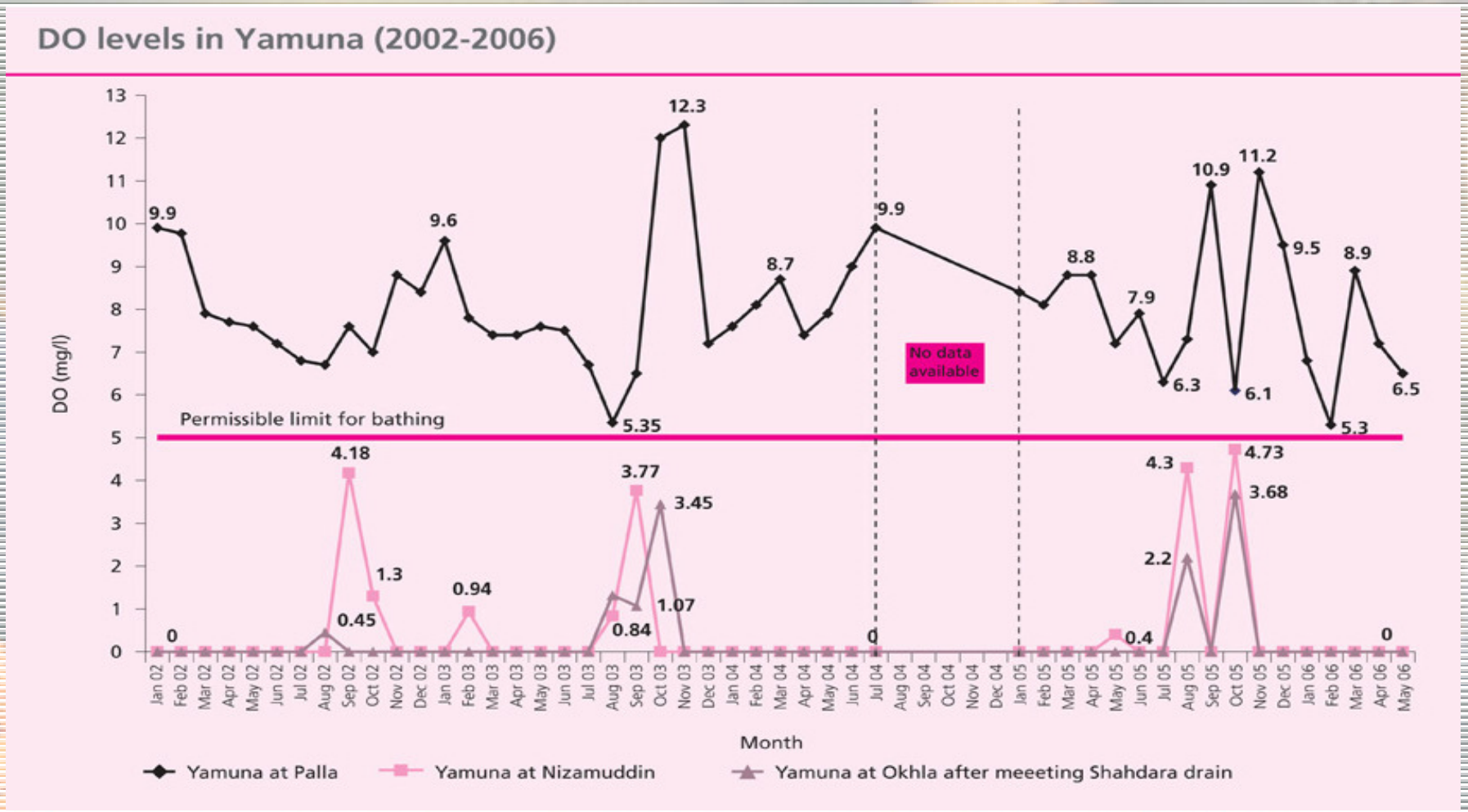
DO levels: Yamuna is dead.



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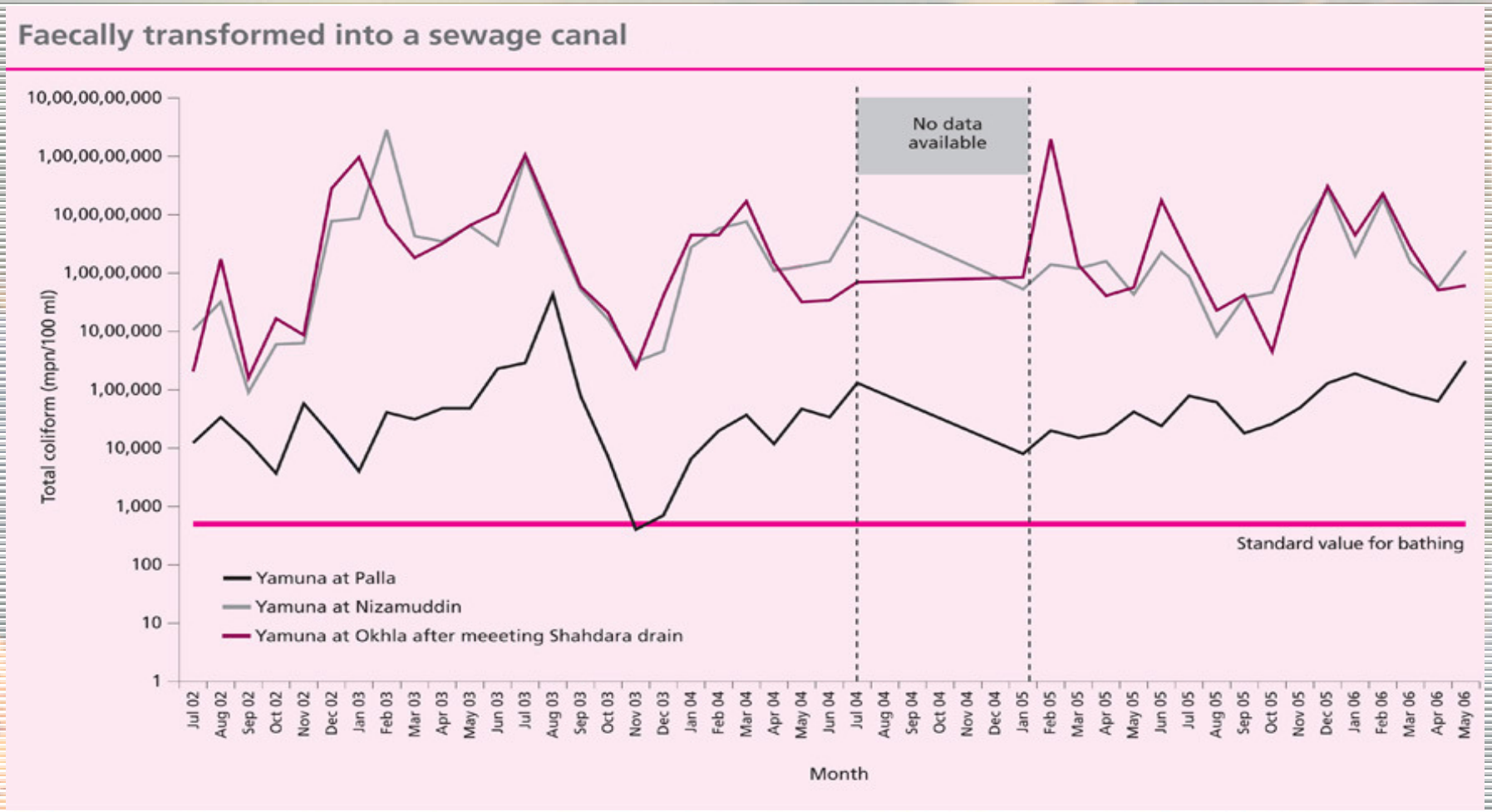
Faecal Coliform: our sewage



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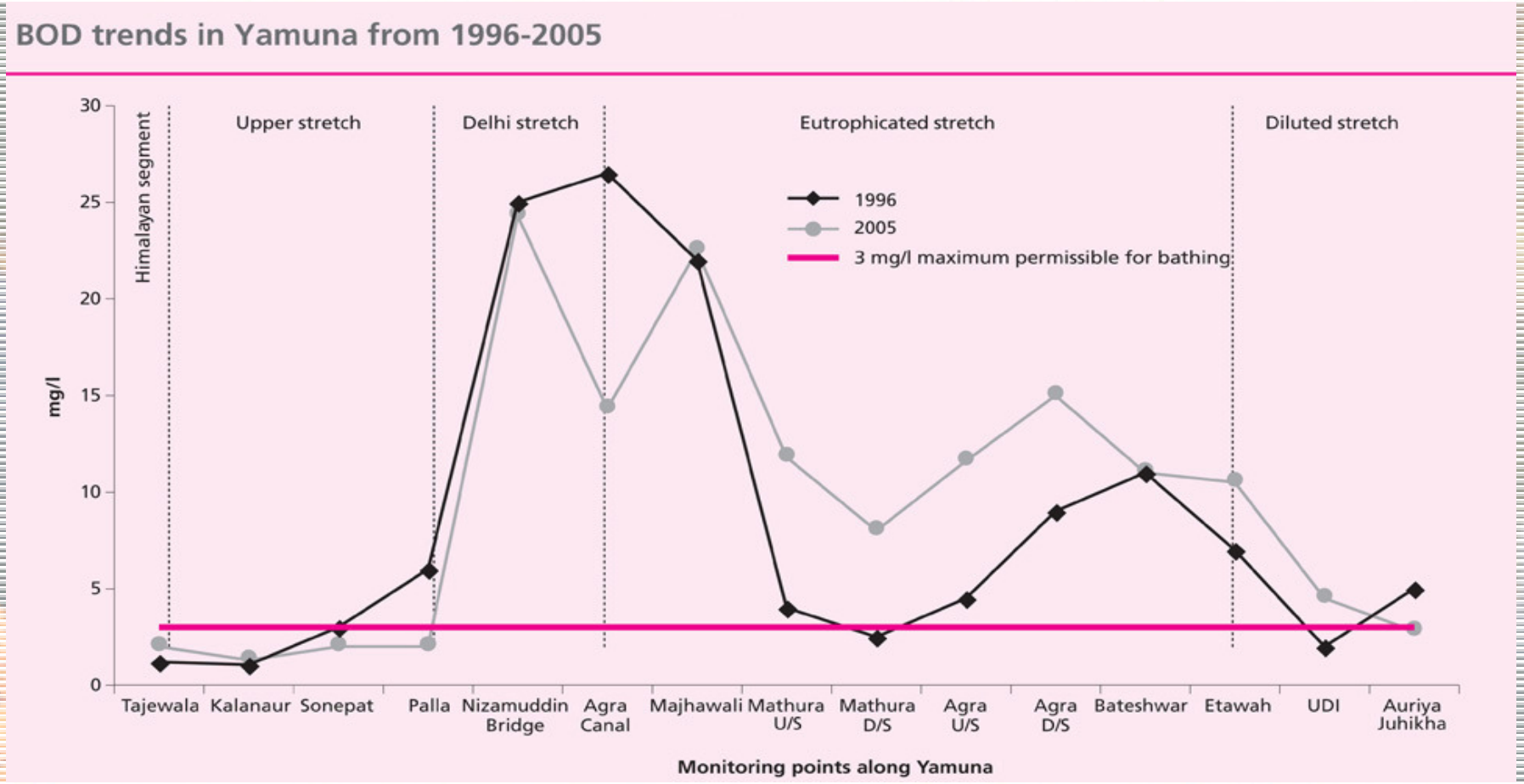
We all live downstream: what we do to the river; others will do the same



Sewage Canal: How to Clean the Yamuna

Funds spent, programmes implemented

- By 2006

17 sewage treatment plants built;
10 common effluent plants built;
30 km of trunk sewers repairs (out of 130 km)
Slums removed from riverfront
Low-cost toilets built

Sewage Canal: How to Clean the Yamuna

Money spent

Money down the drain

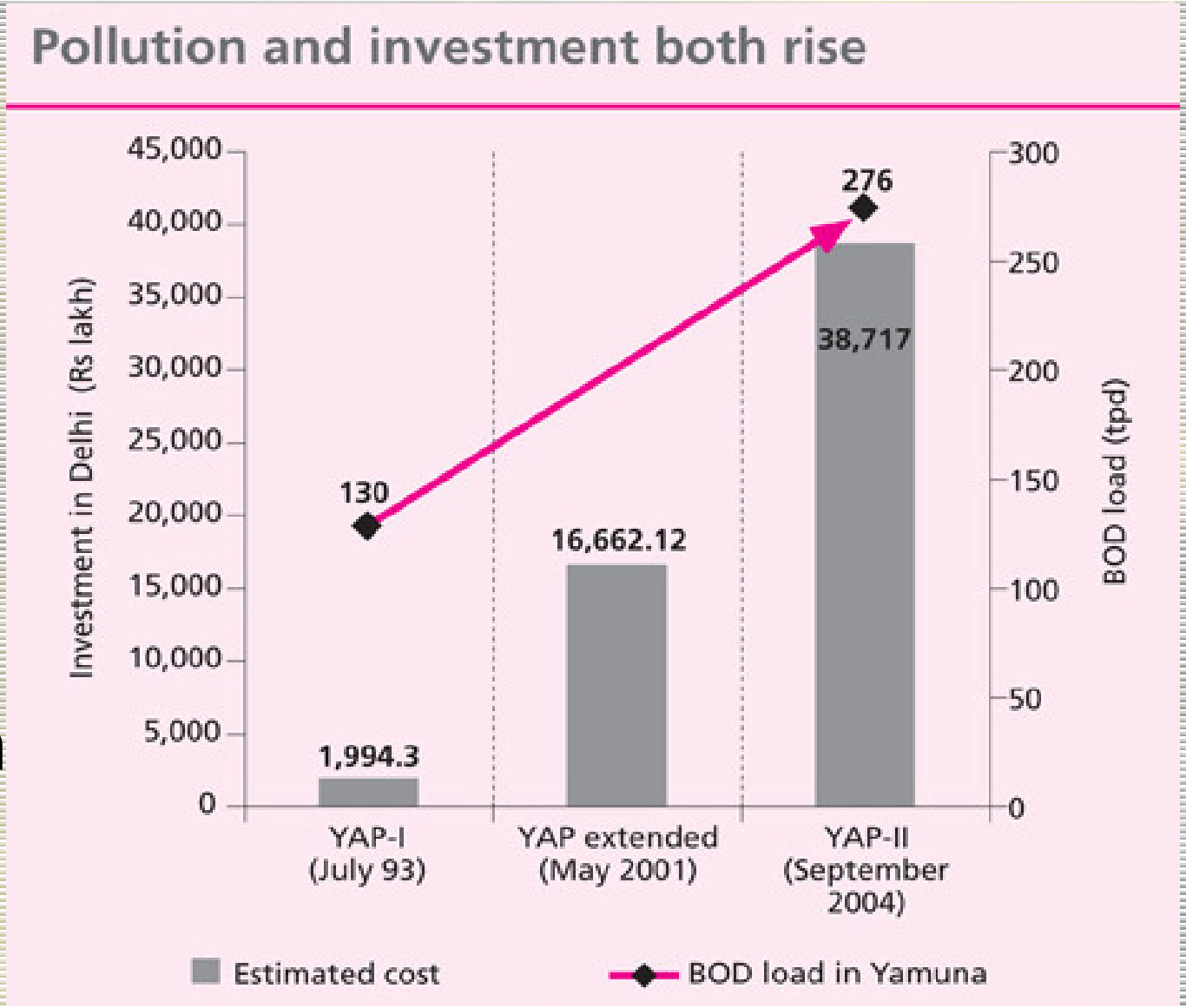
Capital investment to clean Yamuna	Rs crore
YAP-I (spent in Delhi)	19.94
YAP extended (in Delhi)	166.62
17 STPs with a capacity 2,330 mld[1]	745.6-1,048.5
15 common effluent treatment plants	256
Total	1,188.16-1,491.06

Sewage Canal: How to Clean the Yamuna

Balance sheet

input: funds

output: pollution



Sewage Canal: How to Clean the Yamuna

Not about pollution. It is about sewage

- We discuss pollution because it is modern and somehow touchable.
- We do not discuss human excreta and its disposal. That is an untouchable subject.
- **Flush and forget mindset**
- Drains will carry it. Somebody will treat it. Somebody will build sewage treatment plant. Clean it. Dispose it.
- Don't care. Yamuna is polluted **not** because of us

But it is about us: our water; our sewage

Understand the political economy of defecation

Sewage Canal: How to Clean the Yamuna

Urban drinking water and sanitation challenge

- **Cities are sourcing their water from further and further away – costs them money to pump; high losses in water transportation (roughly 20-50%)**

- **Cities are worried about water not about their waste**
- **Waste not treated goes into water of others – cities have to invest in cleaning water (Agra – chlorine). Can't clean then they look for new source**

- **Costs of water supply means cities can subsidise some and not all. Subsidise the rich**

Sewage Canal: How to Clean the Yamuna

Current system: bring water (from distance); treat, pump, pipe to home, take sewage, pump, pipe, treat and dispose…river will be clean

- **Should work. But:**

a. **It is capital intensive – creates divide between the rich and poor in a city. The state can subsidise some but not all. Subsidises rich**

b. **It is resource intensive – uses water, creates waste. Adds to stress.**

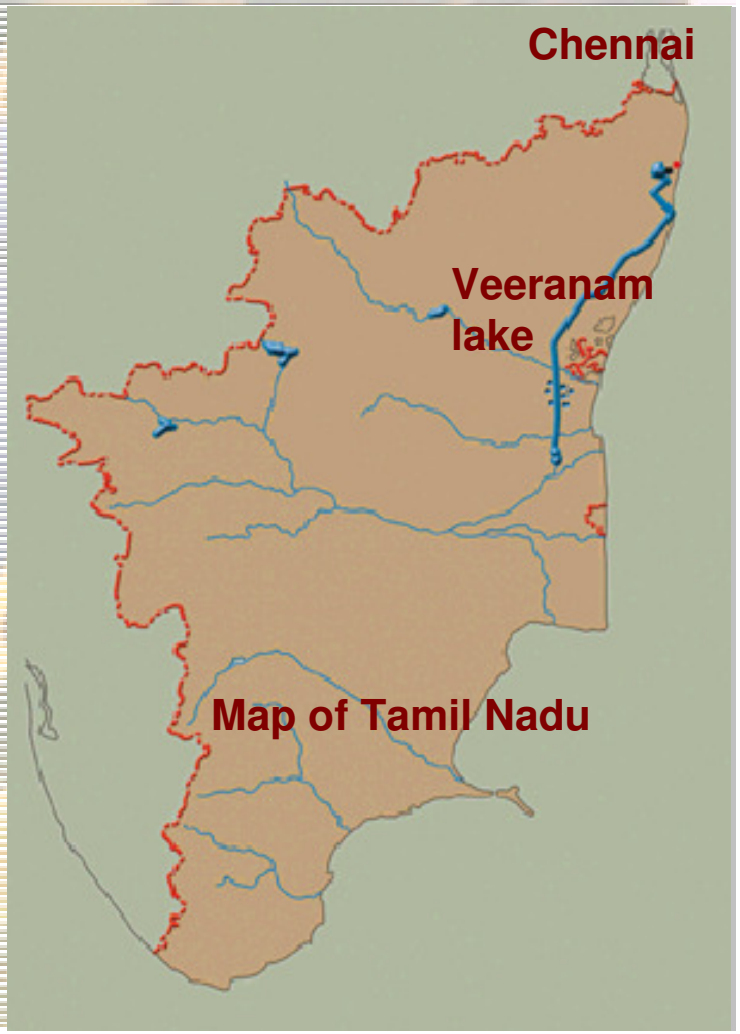
Sewage Canal: How to Clean the Yamuna

Cities in search for water

Chennai: **235 km**
(Veeranam lake) and now planning to go farther 300 Km (Veeranam extension project).

Bangalore: **95 km**
(Cauvery) pumping 1000 m elevation.

Delhi**: 450 to 500 km**
(from Tehri dam)



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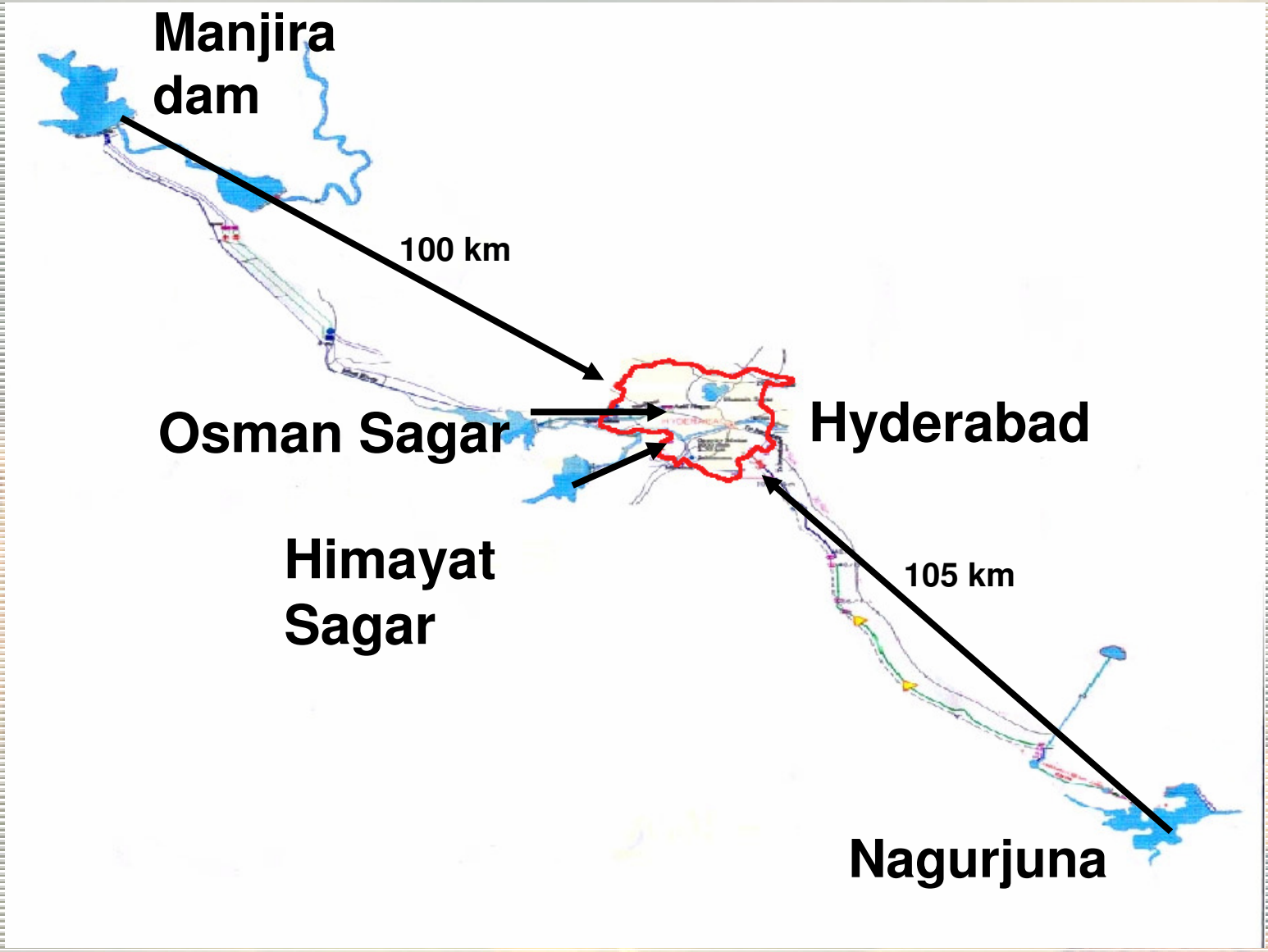

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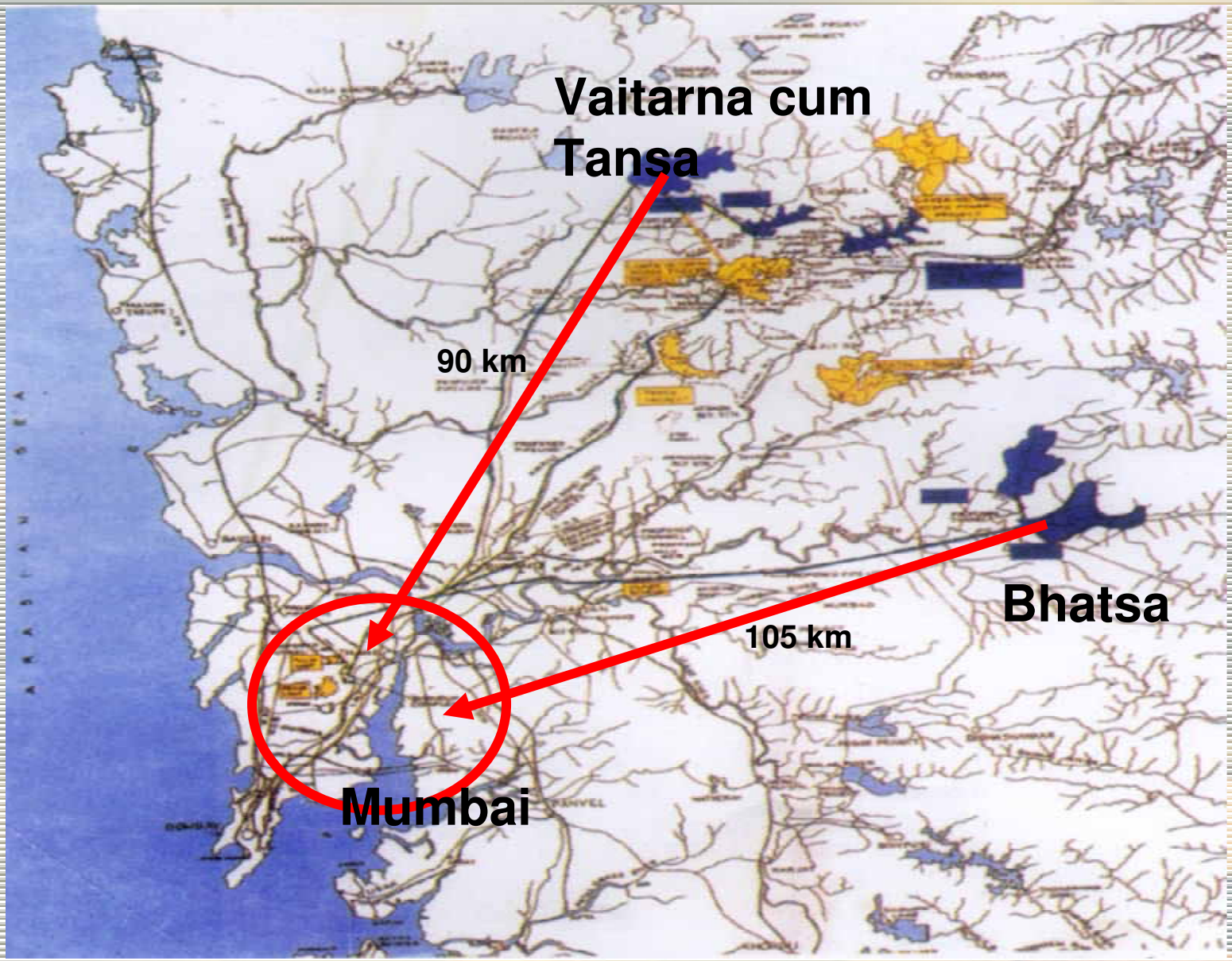

Sewage Canal: How to Clean the Yamuna

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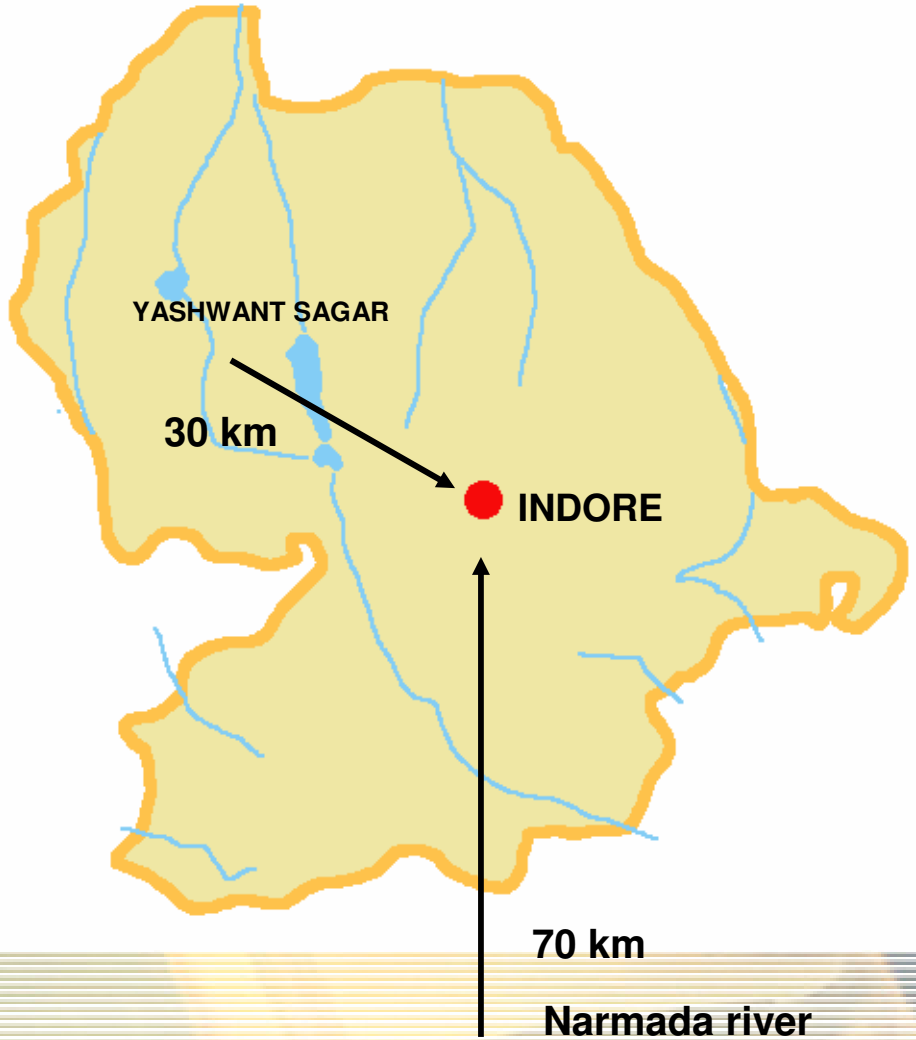

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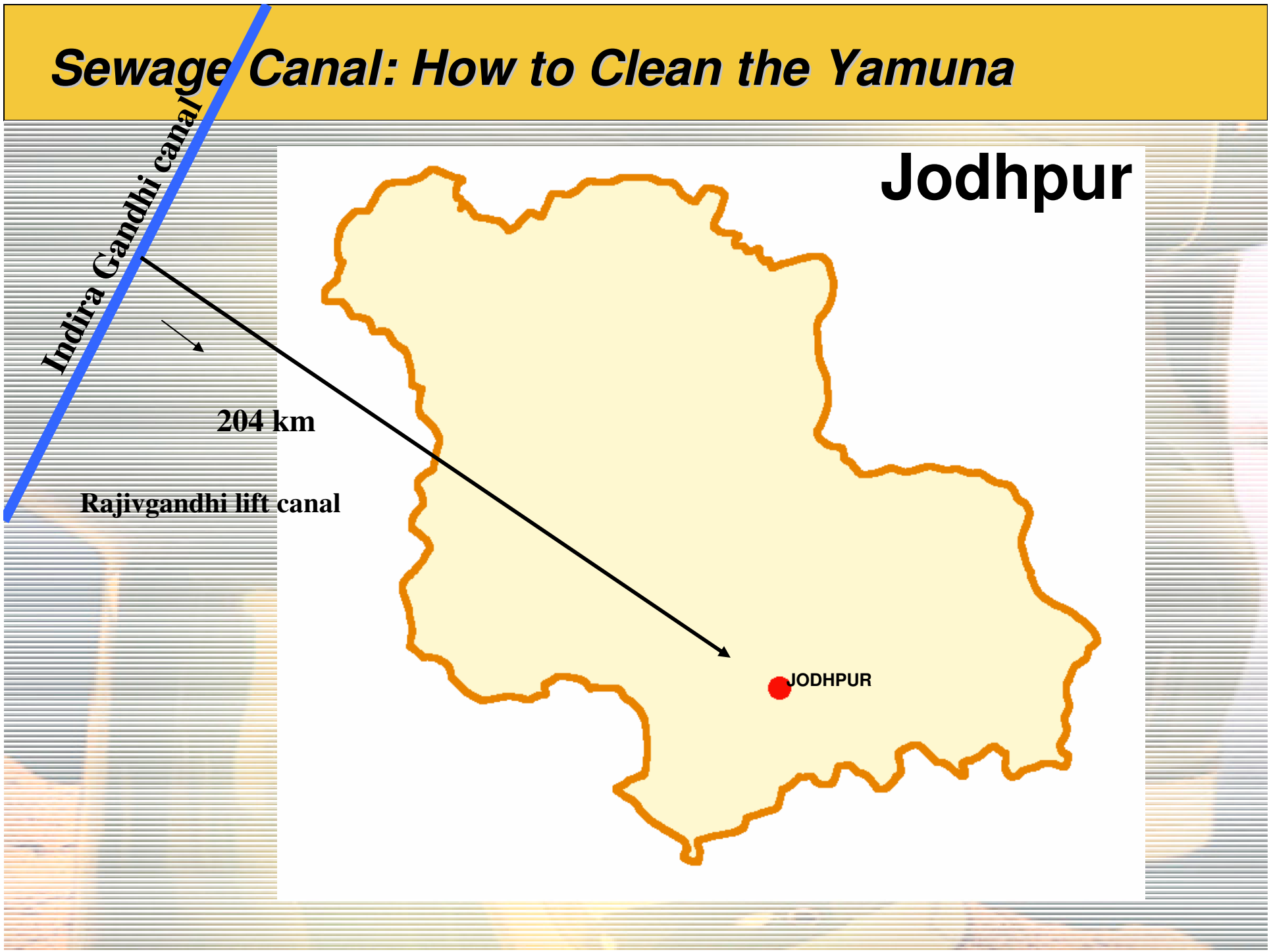


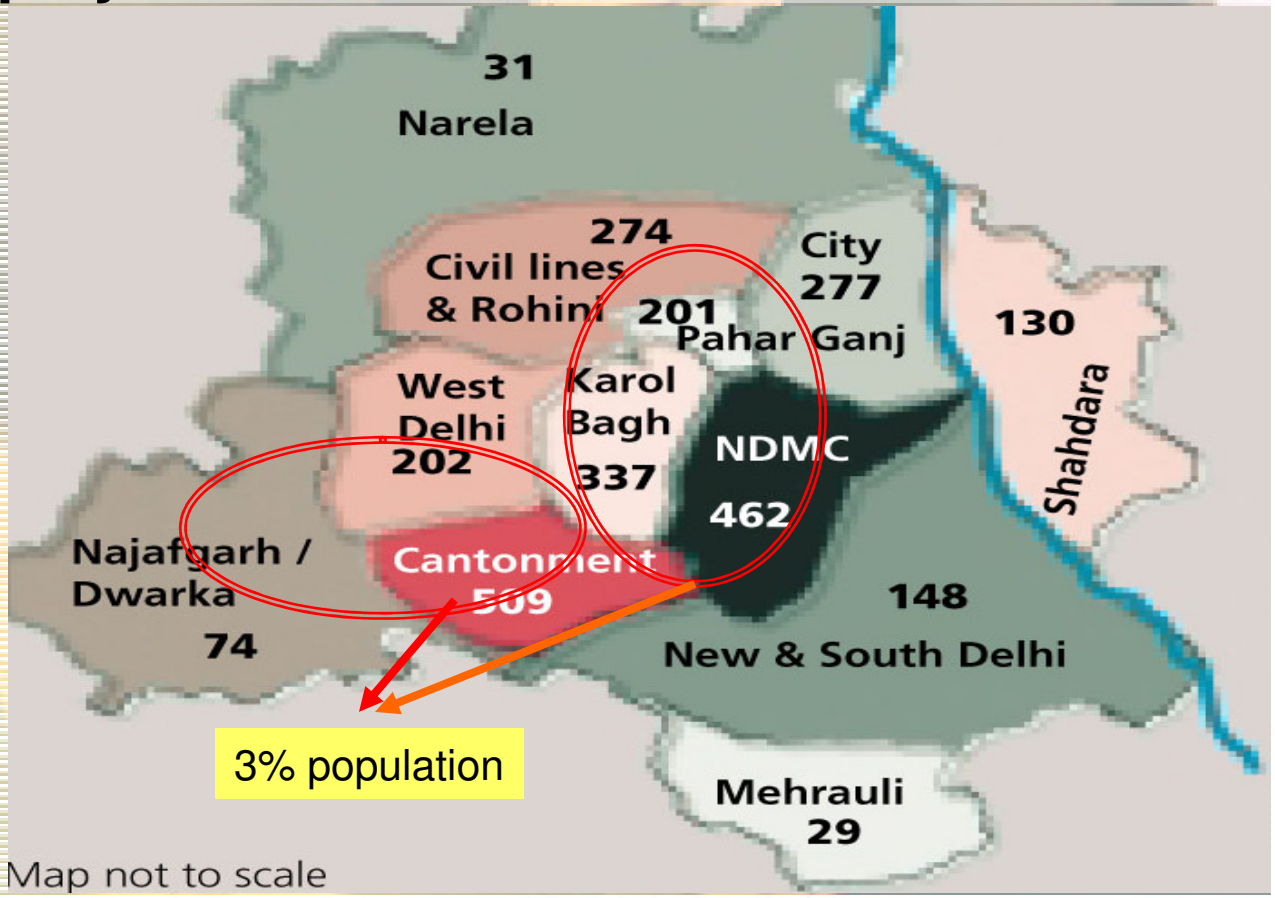
Sewage Canal: How to Clean the Yamuna

Inefficiencies are high

- **Huge distribution losses in water supply – between 20-50 per cent.**
- **Losses add to costs, which recovery is difficult;**
- **Because cost is high cannot recover from consumer;**
- **Cannot invest in efficiencies and clean water for all.**

Sewage Canal: How to Clean the Yamuna

Transportation costs are high. Distribution costs high. Cannot be recovered. Subsidy to some. Water inequity in Delhi.



Sewage Canal: How to Clean the Yamuna

Add: waste to these sums

- The more water we use = the more waste we generate.
- The more waste we generate = more money to collect, to convey, to treat and to dispose
- The more waste we do not treat = polluted water and increased burden of health costs.

- **Simple sums: but we can't add up**

Sewage Canal: How to Clean the Yamuna

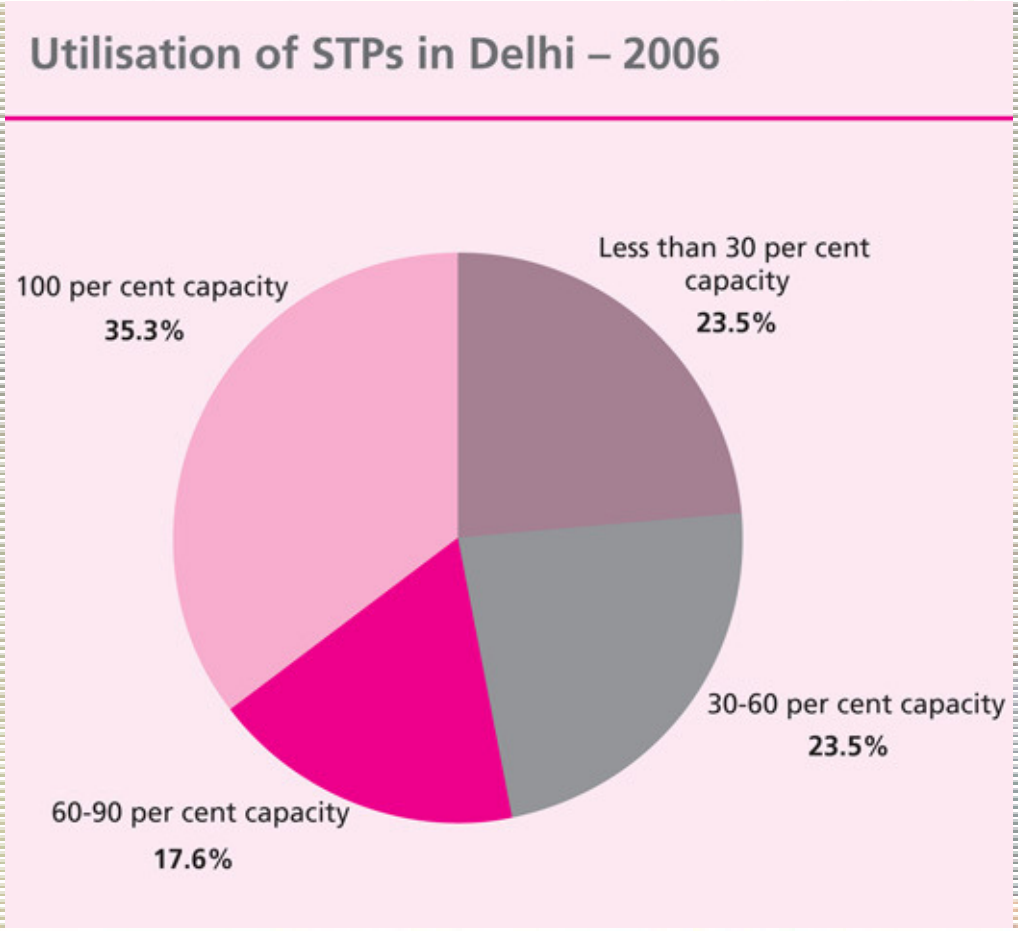
If STP was the answer, pollution in Yamuna not a problem

- India has installed capacity to treat roughly 20% of excreta it generates

- Delhi has 40% of India's installed capacity
- 17 STPs: can treat 2330 mld of waste
- Delhi generates 2,500 mld (DJB) or 3,700 mld (CPCB)
- Can treat: 93% or 62%
- But..

Sewage Canal: How to Clean the Yamuna

Underutilised: where there is waste; no STP; where there is STP; no waste



Sewage Canal: How to Clean the Yamuna

Drainage exists; but does not work. Drainage does not exist; does not work

- **Cannot transport waste to the sewage plant. Sewage plant cannot treat.**
- **5,600 km of drains in city; 130 km of trunk sewers; in poor state.**

Then:

- **Large parts of the city does not have official-underground drainage system**
- **Large parts of the city lives in unauthorised-illegal colonies**

Sewage Canal: How to Clean the Yamuna

Unequal cities are polluted cities

- Half (or more) of the city is unconnected to the official underground drainage system;
- But "Illegal or unauthorised or unconnected" these will have excreta
- This excreta flows into open (storm water) drains
- These same drains also carry treated effluents from sewage treatment plants to the river
- This 'legal' treated effluent is mixed with 'illegal' untreated effluent

- Result: pollution

Sewage Canal: How to Clean the Yamuna

Take
East Delhi
Shahadra drain

Discharges 16% flow or 20% of BOD load into Yamuna

2 STPs
Yamuna Vihar: 45+45 mld treated.
Kondli: 45+45+113 mld treated

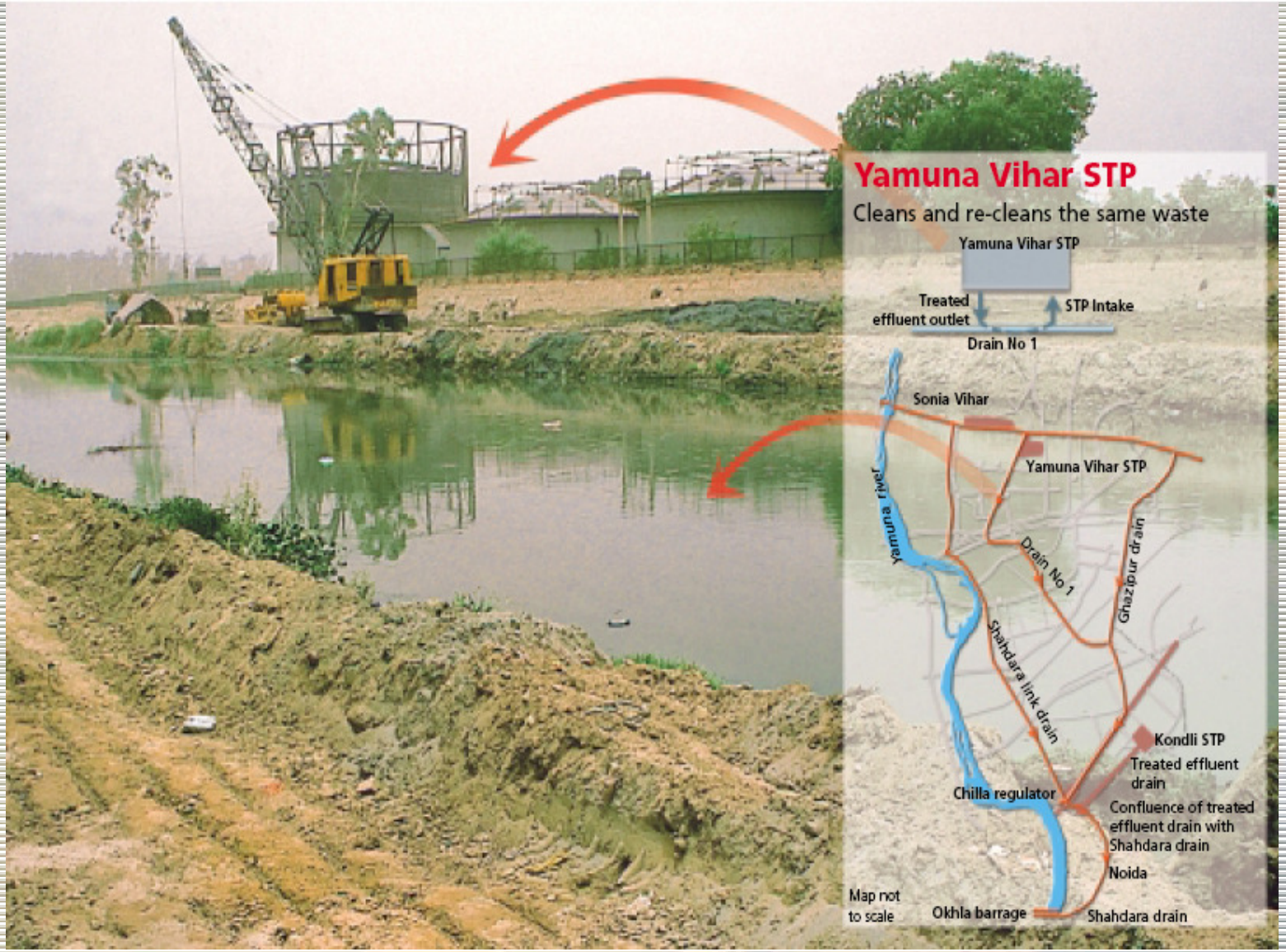
Sewage Canal: How to Clean the Yamuna

But

- **Treated effluents from Yamuna Vihar discharged into drain**
- **Drain carries effluents of un-sewered colonies**
- **Treated and untreated effluent then picked up at Kondli**
- **Treated again**
- **Discharged into drain which carries effluents of unsewered colonies – in Delhi and Noida.**
- **Are we surprised: River stays polluted**

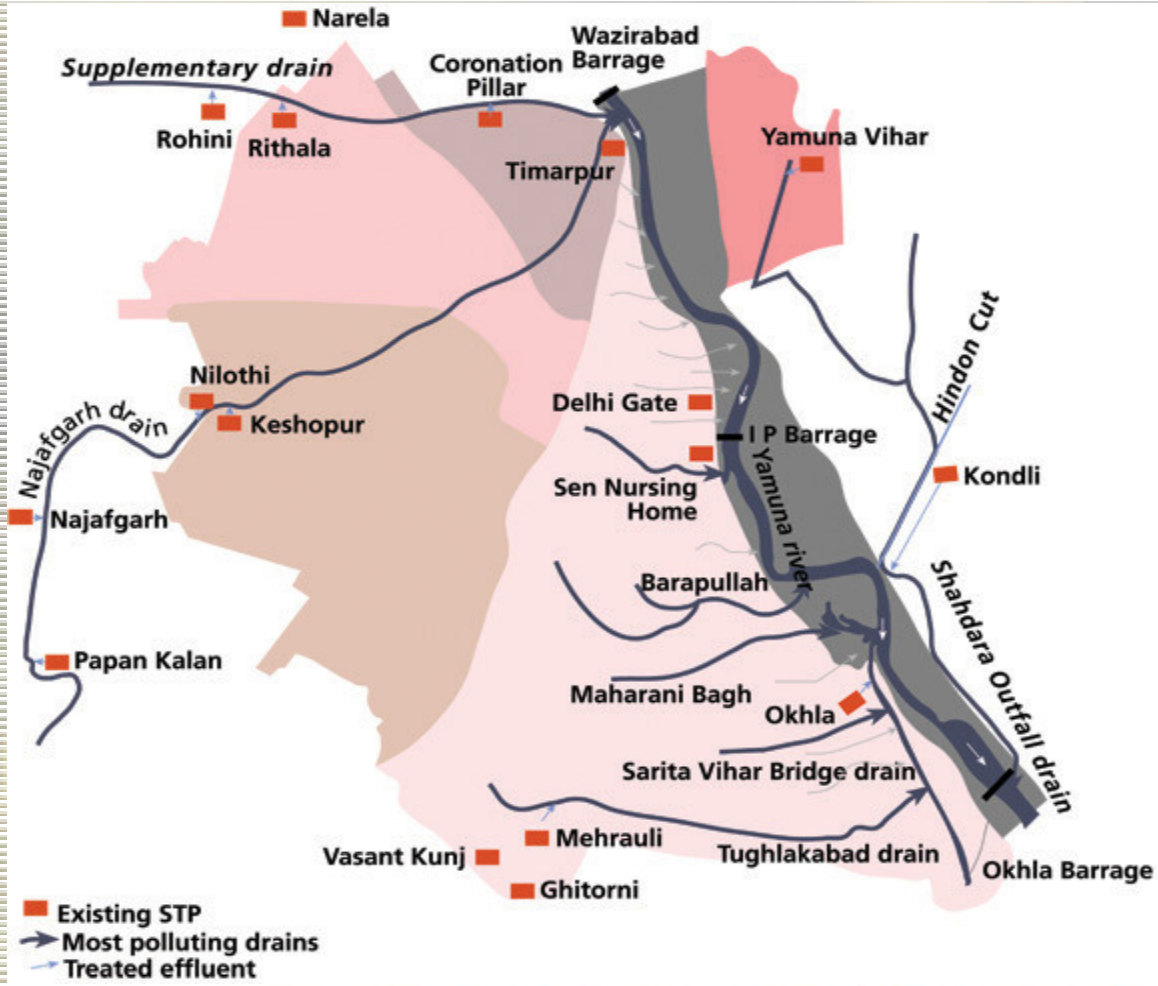
Sewage Canal: How to Clean the Yamuna

But



Sewage Canal: How to Clean the Yamuna

Sewage treatment plants located far away from sources. Treated water mixed in same drain. Not reused.



Sewage Canal: How to Clean the Yamuna

Can we pay full cost? Can we design system for all?

- It costs Rs 5-6 per 1000 litres to supply treated water to us
- We pay Rs 2.20 per 1000 litres
- Cost will increase if pollution increases. Upstream cities will do the same as Delhi
- Will cost Rs 30-40 per 1000 litres to take back our sewage; treat it; dispose it. (Hardly pay)
- Cost will increase as river gets more polluted. No assimilative capacity.

Sewage Canal: How to Clean the Yamuna

Indian rivers: same tales

TABLE 1.1: Spending on river clean up

River action plan	Outlay (Rs crore)	Expenditure (Rs crore)
1 Ganga Action Plan-I	**462**	**433**
2 Ganga Action Plan -II	**2,386**	**919**
2.1 Yamuna+extended+phase II	1,356	677
2.2 Gomti	324	40
2.3 Damodar	23	1
2.4 GAP-II (West Bengal)	396	156
2.5 Towns directed by Supreme Court	221	43
2.6 CETP-Kolkata tannery project	65	0
3 National River Conservation Plan	**2,318**	**958**
Total (1+2+3)	**5,166**	**2,310**

Source: Anon 2005, MIS report of programmes under National River Conservation Plan-Vol-II, MoEF, New Delhi, November, *mimeo*

Sewage Canal: How to Clean the Yamuna

Planned; not built: less than 40 per cent of sewage treatment capacity built

TABLE 1.2A: **Sewage treatment capacities created under river action plans – 2005**

Action plan	Sanctioned cost (Rs crore)	STP capacity planned (mld)	STP capacity created (mld)
National River Conservation Plan	625.99	3,153	645
Ganga Action Plan phase-II	457.64	2,211	808
Yamuna Action Plan	218.32	927	741
Gomti Action Plan	123.81	436	42
Damodar Action Plan	1.66	67	0
Ganga Action Plan-II (main +Supreme Court towns)	113.85	780	25
Ganga Action Plan phase-I	340.54	882	865
Total	1,424.17	6,247	2,318

Sources: Anon 2005, 'MIS report of programmes under National River Conservation Plan-Vol II', MoEF, New Delhi, November, *mimeo*

Sewage Canal: How to Clean the Yamuna

40% capacity created exists in Delhi alone

TABLE 1.3: The big STP states

State		No of STPs	Percentage of total in country
1	West Bengal	39	14.5
2	Uttar Pradesh	35	13
3	Delhi	30	11
4	Maharashtra	24	8.9
5	Karnataka	19	7.1
6	Andhra Pradesh	18	6.7
7	Haryana	17	6.3
8	Madhya Pradesh	15	5.6
9	Tamil Nadu	14	5.2
10	Gujarat	10	3.7
11	Bihar	8	3
	Total for 11 states	**229**	**85**
	Total STPs in country	**269**	**100**

Note: In Delhi the 17 STPs have 30 treatment units hence number of STPs is taken as 30.
Source: Anon 2006, *Status of Sewage Treatment in India*, CPCB, MoEF, February, New Delhi

Sewage Canal: How to Clean the Yamuna

Maths of national excreta

- **2006 CPCB estimated sewage from class I and II cities =**
- **Total sewage = 33,200 mld**
- **Capacity to treat: 6,109 mld (18% of sewage)**
- **Sewage actually treated: 4,400 mld (72% of capacity created)**
- **Gap: 28,800 mld of sewage**
- **= 13.5% of sewage generated actually treated**

Sewage Canal: How to Clean the Yamuna

Not simple 'infrastructure' issue: learn from Yamuna: will cost; cannot pay; cannot provide for all; will pollute

TABLE 1.4: Costs of capital and operations in different Delhi STPs

Heads	Conventional	Advanced technology		Decentralised micro STPs	
	Rithala Phase-I (ASP)	Rithala Phase-II	Sen Nursing Home		
		High-load aeration and biofiltration	Densadeg	SAFF	FAB
Total capital cost (Rs lakh per mld)	27.75	49.19	61.18	63.50	45.00
Capital cost in Rs per person	299.70	531.25	660.74	685.80	486.00
O & M costs in Rs per kilolitre at the treatment plant	0.60	0.40	3.00	2.50	1.82
Observed BOD values (in mg/l)	12.00	6.00	4.00	less than 10	less than 10
Observed TSS values (in mg/l)	25.00	7.30	10.00	less than 20	less than 20

Source: Data compiled from Delhi Jal Board and Municipal Corporation of Delhi

Sewage Canal: How to Clean the Yamuna

Water-waste connections: more water; more cost of treatment

TABLE 1.5: Water-waste economics

Water use (litres per capita)	Waste generated (litres per capita)[1]	No of persons whose waste could be treated at 1 mld plant	Cost of sewage treatment per capita @ Rs 28 lakh per mld (Rs)
40	36	27,777	100
200	160	6,250	448

Sewage Canal: How to Clean the Yamuna

Cost of system is high. Cannot pay. Cannot subsidise all. Only rich.

- **This is the political economy of defecation.**

- The rich use water. Are connected to sewage system. Waste is collected. Even treated.
- But they cannot pay for full costs..
- The poor use little water. Not connected to sewage system. Waste flows in open drains. Not treated.
- But if system not designed for all. Not affordable by all. **Will not work.**

Sewage Canal: How to Clean the Yamuna

The ultimate irony

- If we don't clean river; pollution increases;
- If we don't treat waste; groundwater gets contaminated;
- Rich (you and me) move to bottled water
- Pay Rs 12 per litre
- Poor have no option. Pay with health costs.

- Unacceptable. Wrong. Will not work

Sewage Canal: How to Clean the Yamuna

What do we do?

Think: of Yamuna in Delhi, not of Hudson in New York, not of Thames in London

Think: of software not hardware

All the STPs, all the interceptor drains…will not work.

If we do not understand and rework the way we manage the business of water-sewage

Sewage Canal: How to Clean the Yamuna

1. Treat **all** sewage

A. Intercept sewage from open drains (not just 'legal' sewage)

B. Use open drains as treatment areas – plan for drains, not just wish them away

C. Maximise the current sewage treatment plants – do not only build new

Sewage Canal: How to Clean the Yamuna

2. Treat but **do not discharge** into drain

- **Once sewage is treated; reuse-recycle so that not added to the untreated sewage in drain**

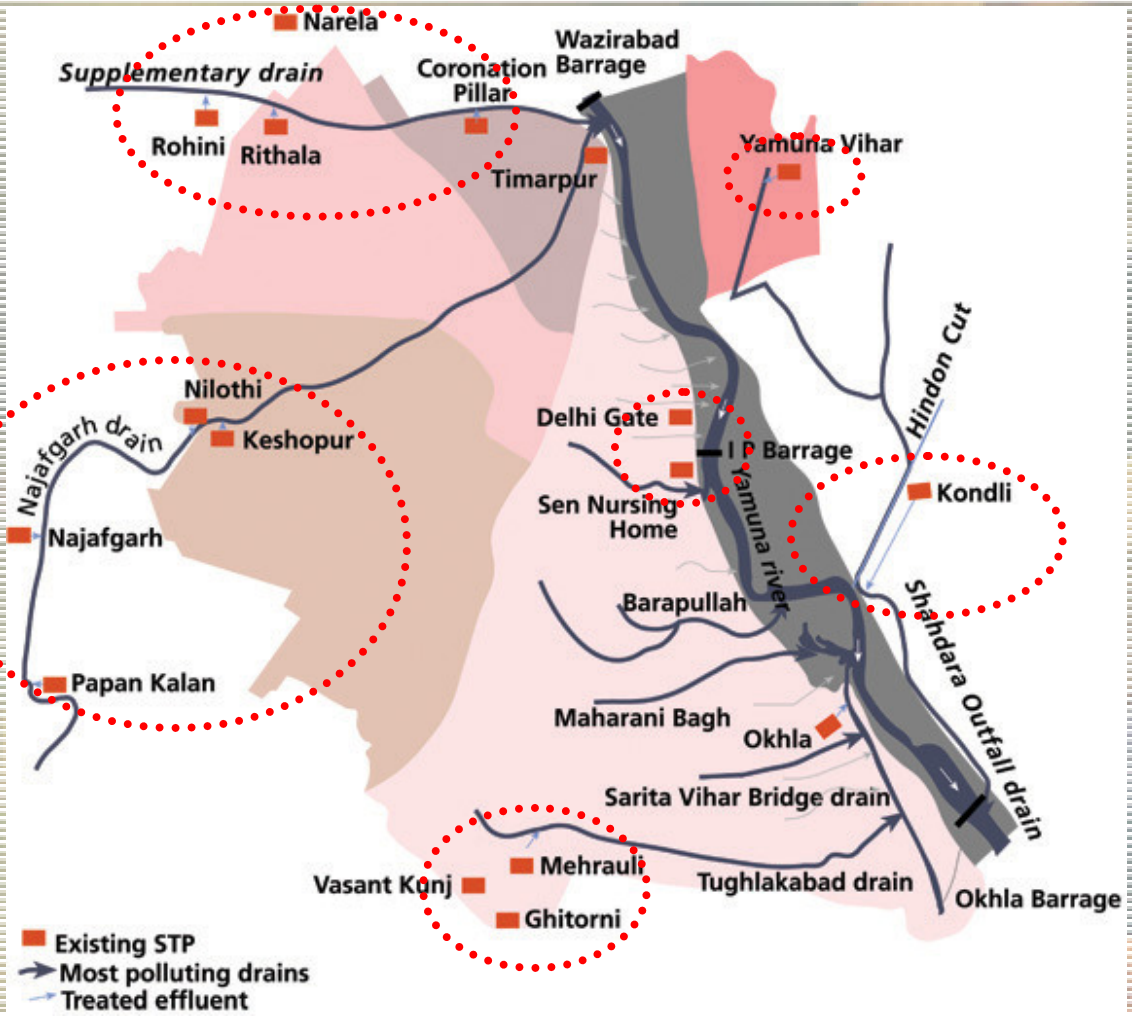
Or

- **Once sewage is treated; put into river for dilution – treat close to the river as possible**

- **Promote reuse so treat close to the source as possible. Build where there is waste. Where you build plan for disposal or reuse**

Sewage Canal: How to Clean the Yamuna

Intercept in drain; take to treatment plant; treat; reuse and not mix in same drain. If no option for reuse; treat and dispose directly in the river. Meet standards needed for assimilative capacity of river



Sewage Canal: How to Clean the Yamuna

3. Plan sewage-sanitation for all

- **It is unacceptable that half of Delhi does not have access to sanitation or sewage**

Invest

- **But think differently. Find leapfrog solutions to new sewage answers**
- **Re-invent the flush toilet – so that it is affordable for all**
- **And does not cost us the Earth**

4. Rework water; rework economics

- River needs water to assimilate our waste
- Reduce water use to reduce waste discharge
- Recycle and reuse waste as water

Learn **economics** of water-sewage-excreta

Learn the economics that **matter**

Sewage Canal: How to Clean the Yamuna

Think great. Not big

- Have to rework paradigm of water and waste
- Have to rethink waste – so that we generate less; can treat cheaply; can reuse

- No options
- **Remember: We all live downstream**