

# TD 608

## Project Management and Analysis

### Part I

#### Project Conception and Execution



Milind Sohoni  
A Water Story

# A Water Story

## An Ongoing Research

- What is the typical urban water supply cycle
- What are rural domestic water provisions
- What are the engineering challenges
- What are the policies involving rural and urban water
- How can engineering and policy make a difference
  
- **Output:** A report, or an argument with factual data, surveys and so on.

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## The Main Players

- Urban water (say, e.g., Mumbai's)
- Projects which hold water
- Rural drinking water
- Rural farming water
- Budgets
- Geology and Civil Engineering practices

# Mumbai-the system

- Greater Mumbai-a population of about 150 lakhs
- Average water consumption-**3500 MLD**
  - ▶ (i.e., mega-liters-per-day )
- Big projects-*Bhatsa*, *Vaitarna*, in Shahpur taluka.
- Several small projects-*Tulsi*, *Vihar*, *Powai*
- Huge Infrastructure of pipelines, filtration plants and pumping stations.
- Largely by gravity
- **Marginal Investment Cost per MLD**: Rs. 4 crores.
  - ▶ (Mr. Srivastava, Dep. Commissioner)
- System recharges every monsoon (rainfall 3000 mm/year)
- Cost comes out to be  $(4 \times 10^7)/(365 \times 10^6)$  or:

Investment

Rs. 100 per cubic meter of year-long availability

# Mumbai-MCGM and the consumer

- MCGM (Municipal Corporation of Greater Mumbai)
  - ▶ Salient features of the budget
  - ▶ Different services
- **Property Tax:** a percentage of asset value
  - ▶ pay-as-you-earn, *progressive*
- **Octroi, Sales Tax**
  - ▶ pay-as-you-consume, *regressive*
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- 10-15 wards, each ward under an office.
- Of 3500 MLD, about 20% **non-revenue-water**
  - ▶ this includes losses, theft
  - ▶ roughly along international norms
- Older wards un-metered, newer metered **but many unfunctional**
- Unmetered water charge bundled with property tax
- Average tariff Rs. 6 per cubic meter for domestic and Rs. 15-20 for commercial.
- **Rough Parity between tariff and O&M costs**
- Average consumption **200 LPD**
  - ▶ (i.e., 70 cubic meters per year)

That is ...

an investment of Rs. 7000 per person

# Jal-Swarajya

A *template-scheme* to create village-level drinking/domestic water supply systems.

## Main points

- Aimed to create *piped household* water supply
- Initial Capital Costs borne by state
- O&M costs borne by beneficiaries
- Once deployed, **no investment in village for 15 years**
- Connected with WB

- Norm: **40 LPD** i.e., only for drinking and rudimentary domestic use.
- **social structures**: Village community, capacity building, service-provider
- **technical**: source identification and strengthening, laying of pipes, storage tanks
- Allocation: **Rs. 1600 pp**: works out to:  $(1600)/(40 \times 365)$  i.e., about

an investment...

of about **Rs. 100 cu. m.** for storage and distribution!

# Jal-Swarajya-Implementation

- Hundreds of villages in Maharashtra, over the last 2-3 years, and an older similar program.
- **Problem:** cross-community vested interests
- **Problem:** Billing by village committee, and insufficient executive power.
- **Problem:** Inadequate follow-up

## Criticism

- **Source stabilization** : an important sub-goal, bundled with distribution
- 40 LPD not adequate for cattle
- Inadequate funding: sources
  - ▶ Open wells, bore wells, i.e., **Ground Water**
  - ▶ Existing reservoirs
- No surface storage structures-**no budget**

## Early Results: Discouraging

- Ground-water based schemes in trouble
- about 30% of the schemes

# The rural norm

**Question** : Why is the rural norm so low? Why is it not in line with the urban “norm” of 200 LPD?

**MWRRA** :

- calls water a *scarce economic and social commodity*
- begin with **water entitlement**, which will be tradable
- lead to a **water market** and more efficient use
- **however**, ties irrigation water entitlement to land holding!
- no clear reference to norms for non-land-holding families

“What ever can the land-less do with water? ”

**Lots** . Assume a family of 5 and thus an entitlement of 1 cu. m. per day.

- **Horticulture**: Look at various *wadi* programs. A 5-*guntha* vegetable plot will yield about 200 kg of vegetables (every 3 months), for consumption or sale.
- **Keep Buffalos**: About 5 buffalos throughout the year!
- **Make Bricks, Repair houses**: 15,000 bricks per month.

# Livelihood Resource

Thus 200 LPD would be an important livelihood resource!

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Lets look at an hamlet of 400

- $200 \times 365 \times 400 = 28,000$  cu. m.
- With a norm of Rs. 100 /cu m., **Rs. 28 lakhs**
- Thus, there is an allocation of Rs. 28 lakhs for the village water system.

A small surface storage structure is possible!

Small Check-dams,

- if succesful, are in the cost bracket!
- Effective solutions to the water provisioning problem
- Help in Ground-water recharge
- Important for the food and livelihood security of the community

**Conclusion:**

- If you apply equal norms to urban and rural people
- Technical solutions for rural communities do exist

# The Question

So, do we have the know-how to build small check-dams at the price-point **Rs. 100 per cu.m.**

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# NO

## Irrigation Department

- Know-how and practice in 300,000 cu. m. plus.
- About 4000 such dams in Maharashtra and claims 99% success-rate.
- Price-point about the same as above.

## ZP and others

- Soil conservation, *gram vikas* and so on.
- Most designed *not to hold water!*
- Largely **hand-book method**. No site-specific analysis and design.
- Most fail, i.e., do not hold water beyond January.
- **About 1500 littered all over W. Maharashtra alone!**

# The Challenge

Protocols for the **design, test, analysis and construction** of small structures at the price-point Rs. 100 per cu. m.

- There may be many options:
  - ▶ Check-dams, village ponds, KT-bandharas, stone tanks
  - ▶ **But all seem to be surface storage**
- There are very few attempts by the state machinery, e.g., *Karjat Tribal Block*
- Clear disregard of the domestic water needs of villages

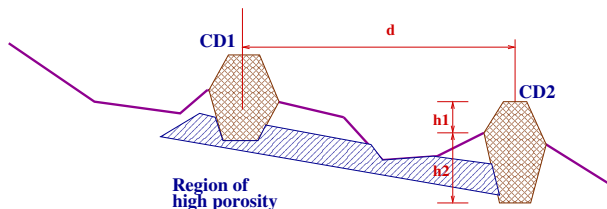
## What is needed

- Effective site-specific protocols for geological testing
- Methodologies for specific corrective procedures
- Analysis of existing structures
- Simulation studies of typical approaches such as **sequential structures**
- Study of ground-water and surface-water interaction.

# Typical Vexing Problem in Konkan Region ...

## Loss of storage water by January

- What are the causes?
- Is there a channel? Or is the dam faulty?
- How much does is the recharge? Will it help the wells below?
- Where should I take the well?
- How is the channel to be profiled?
- Sounding, resistivity or tracers?
- Can grouting be done?
- Will a subsequent structure help?



# Payback

## Can the village pay back the investment?

- For a family of 5, the investment is Rs. 35,000.
- Assuming a 10% return, we get Rs. 3500, while for 5%, it is Rs. 1750.

So, is the 200 LPD norm financially or economically viable?

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### Developmental Answers

- Small projects are generally cheaper and also yield other societal benefits, such as capacity, skills and entrepreneurship building.
- There are many construction options (e.g., labour participation) which results in project costs actually reaching community, through *wages, rents and royalties*.

But, should we not ask this for the Irrigation Projects? Do these projects pay for themselves, in terms of capital costs?

# How to pay back

This depend on what the family does with 1 cu. m. per day.

- **Rear buffaloes** - should be easy
- **Make bricks** - easy again, bricks sell at Rs 1/brick.
- **Horticulture on 5 *gunthas***- This is the toughest.

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  - **Horticulture on 5 gunthas**- This is the toughest.
- Each *guntha* will give the family about 40 kgs of vegetables.
  - Assuming 3 seasons per year, we have about 120 kilos per *guntha*
- **What is the market price for vegetables?**-Rs. 10
  - i.e., depending on the rate, 2-3 guntha produce will go in servicing debt.
  - Thus, its financially unviable to base pay-back on horticulture.

## Hard Questions

- Why is the price not Rs. 20?
- Who are the farmers producing vegetables at Rs. 10?
- **Is water free for these farmers?**

# Irrigation and the City

**Ray, Isha** (2005). *Get the prices right: water prices and irrigation efficiency*. Economic and Political Weekly, August 13 2005: 3659 3668.

- Irrigation usually through open canals with a rotation of about 14 days
- Substantial difference between tail and head of canal
- Irrigation water charges are largely *non-volumetric*, but on
  - ▶ area of farm, crop, location of farm on the canal and rotation
- The price, though supposedly around 5-10 % of profits earned, are usually too little to be counted
- Volumetric charging is *too expensive to implement*
- Produce thus substantially cheaper and usually for urban consumption
- Thus the subsidy is enjoyed equally by the irrigated-land farmer and the urban consumer *alike* .

Thus, this market distortion is again in favour of the urban consumer, and is here to stay!

# Smaller Cities?

## JNNURM: Jawaharlal Nehru National Urban Renewal Mission

[www.jnnurm.nic.in](http://www.jnnurm.nic.in)

### Objectives: Urban Development

- Reforms to enable investment, sustainable development
- Develop asset development and asset management
- Meet common minimum program and Millenium Development Goals
- Mentions Public-Private partnership
- typically follows WB nomenclature and spirit
- Mandatory and Optional city and state level reforms!

### Mandatory Reforms include:

- City development plan (CDP)
- TAP, accounting, e-governance
- internal provisions for the urban poor
- repeal land-ceiling and rent-control acts
- reduction of stamp-duty to 5%
- Reform of property tax
- O&M ring-fence around utilities, e.g., WATER

# More JNNURM and in Maharashtra

- Education and Health expressly forbidden in JNNURM
- Mass-Transit (metro etc.) infrastructure allowed.
- No mention of public transport.
- No mention of public spaces, playgrounds or gardens
- seems to curtail funding for public services!
- seems to try and make property market more efficient

## 5 cities in Maharashtra

### Water and Sewerage projects

City	crores
Mumbai	1800
Thane	220
Nagpur	691
Nanded	306
Nashik	198
Pune	300*

Question: Who is paying for all of this?

- 70%-50% as a grant from state/center.
- 30%-50% to be raised by municipal corporation through soft-loans or bonds.

# City and Budgets

**Question:** Who is paying for the 30%-50%?

- This, in turn, *supposedly* must be paid by the taxes collected by the city.
- Three obvious sources:
  - ▶ *progressive*: Property taxes
  - ▶ *regressive*: Water Charges
  - ▶ *regressive*: Octroi

Here is a table of municipal budget data from the CDPs

City	Water	Property	Octroi
Nagpur	?	18%	42%
Nanded	10%	9%	65%
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## JNNURM mandatory provisions

- “Reform of Property Tax so that it becomes a major source of revenue for the ULB”
- “Cities should graduate to full cost O&M recovery in utilities”

So, should this expenditure be regarded as **O&M** and the **Water Dept.** is to pay, or is it **Capital Expenditure** and the **City** pays?

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Hopefully, its labelled as **Capital Costs!**

# However ...

## Observations

- In Pune, planned Property Tax revenue increase is capped *lower* than that from water! Same trend elsewhere.
- In fact, no mention of a target property rate!
- Huge business community pressure to reduce Octroi.

This is in stark contrast to most healthy international cities of similar size.

International Property Tax rates hover between 0.5%-1%!

Property Tax Rate Reform is mandated by JNNURM and will require:

- GIS and records of all properties
- Setting a target rate-missed by JNNURM
- Regular appraisal of asset value
- Coverage

Thus, there are many *fat* reasons why this will go at a slow pace

# Water-Right or Commodity

## A standard dictionary

definition		funding source
right	⇔	progressive taxes
commodity	⇔	regressive taxes
Mixed	⇔	Capital costs: progressive O&M costs: regressive

Thus, in this terminology, we may say that JNNURM treats water as mixed goods

Even the *Mixed* option is difficult to implement because:

Cause	Effect
Wide inequality in income and property values	Even telescopic rates will squeeze the poor
Rapid Growth	Large O& M budgets
<i>non-regularised</i> homes	<b>No legal rights</b>

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### The Question

So, what are the urban poor to do?

# Water for Livelihood: Summary

- There is a great mismatch, *both institutional and per-capita* between provisions for urban vs. rural water
- JNNURM enables cities to embark on source development projects in the rural hinterland.
- Without clear budget and policy directives, this is unlikely to help the urban poor.
- There is no agency which effectively addresses the rural water needs
- Jal Swarajya as a scheme is insufficient in its very design to address this need
- The technology for the rural water problem needs research
- Irrigation appears as a subsidy to the landed rural and the urban consumer.
- Besides this, it distorts the market to make rural water projects unviable.
- Both these together will lead to further irregular movements from the un-serviced rural hinterlands to the poorly serviced urban slums
- Livelihood water is likely to remain a central problem to the urban as well as rural poor

# Research Agenda

- **Jal Swarajya**: analysis of the scheme, and survey of existing projects.
- **Karjat TB**: documentation of drinking water schemes, successes and failures.
- **Governance**: Execution of rural schemes, identification of problem areas, tanker schemes and so on.
- **Technical**: Large body of work needed.
- **Irrigation**-detailed data of a typical valley system
- **MWRRA**-and irrigation and the rural landless
- **JNNURM**-monitoring and study of CDPs vis a vis water and sewerage
- **JNNURM**-study of provisioning for the poor
- **Comparative Study**-across cities in the world