India - Cost Effectiveness of Rural Water Schemes

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RWS Expenditures Continuously Increasing

- Habitations ('000)
- Cum Exp (since 1992)

% Rural habitations covered with safe drinking water

- Fully
- Partially
- Not covered

Expenditure (Rs bln)

Habitations ('000)

Year:
- 1998-99
- 99-00
- 00-01
- 01-02
- 02-03
- 03-04
- 04-05

1995 96 97 98 99 2000 01 02 03 04

0 50 100 150 200 250 300 350 400

0 200 400 600 800 1000 1200 1400 1600

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Coverage Slipping
(10th plan working group estimates)

Total Rural Habitations = 1.4 million

- Sources going dry or becoming quality affected
- Systems working below capacity due to poor O&M
- Increase in population resulting in lower per capita availability

Is RWS expenditure improving service delivery?
How cost effective is the RWS program?
**Study Design**

### Consumer Survey

**Sample Consumer Survey**
- Current service vs demand
- Coping strategies
- Cost
- Improvement preferences
- WTP/Affordability
- Impact of impurities

**Water quality measurement survey**
**Water consumption measurement survey**

### Scheme Survey

**Secondary Data State**

**Secondary Data District/Village**

**Sample Scheme Survey**
- Capital & O&M costs
- Cost recovery
- Design & Actual performance

**Panchayat Level**
- Fund flow by source
- Fund utilisation

*Representative Schemes*
Expenditure on Supply Driven Schemes Dominate

Flow of Funds under different programs

- ARWSP: 31%
- MNP: 39%
- PMGY: 14%
- EAP: 8%
- Others: 3%
- Swijdhara + SRP (demand driven): 5%

Expenditure on Demand vs Supply driven schemes (1997-98 to 2005-06)

- Supply: 92%
- Demand: 8%
Problems reported by households (% of HH reporting)

- Supply Inadequate
- Frequent Breakdowns
- Shortage in certain months of the year
- Timing not suitable
- Low Pressure

Low levels of Service Delivery

<table>
<thead>
<tr>
<th>Service</th>
<th>Supply Inadequate</th>
<th>Frequent Breakdowns</th>
<th>Shortage in months</th>
<th>Timing not suitable</th>
<th>Low Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP</td>
<td></td>
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<tr>
<td>Mini water</td>
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<tr>
<td>SVS</td>
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<tr>
<td>MVS/Reg</td>
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<tr>
<td>All</td>
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</tbody>
</table>
Low levels of Service Delivery

Distribution of households according to days of supply in a week in summer

- GP
- Comm
- PU
- ZP
- Minwater
- SVS
- MVS
- Regional
- All

(% HHs)
- Once a week
- 2-3 Days/Week
- Alternate Days
- Daily

Managed by Schemewise
Low levels of Service Delivery

Dependence of Rural Households on Public and Private Water Sources

<table>
<thead>
<tr>
<th>Schematic</th>
<th>% HHs</th>
</tr>
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<tbody>
<tr>
<td>Main + Supp</td>
<td>Public + Private</td>
</tr>
<tr>
<td>Main Public</td>
<td>Public</td>
</tr>
<tr>
<td>Main Public</td>
<td>only</td>
</tr>
</tbody>
</table>

Managed by Schemewise
Actual Supply lower than Design

- Design LPCD
- Actual LPCD, other seasons
- Actual LPCD, summer

Design hours of supply in a day
- Actual hours of supply in a day
High Coping Costs

Estimated coping cost borne by households (Rs per month)

- Exp on repair of public sources
- Exp on maintenance of own source
- Storage cost
- Opportunity cost of time spent

Coping cost + water charges as % of income

Managed by Schemewise

Monthly income (Rs)

- <3000
- 3001-5000
- >5000
- All
Affordability much higher than User Charges

Stand Post Users

- Water Charges
- Exp on own sources
- Other Coping Costs

Pvt Connection Users

- Costs
- WTP for improved services
- Affordability for improved services

Rs/month
Actual Cost of Schemes much higher than Noms

- **Actual cost of piped water schemes vs cost norm**
  - 28%: By 100% or more
  - 14%: By 50-100%
  - 13%: By 25-50%
  - 7%: By 25-50%

- **Gap between actual & design performance O&M cost**
  - > 80%: 10%
  - 60-80%: 20%
  - 40-60%: 20%
  - 20-40%: 10%
  - < 20%: 5%

- **Cost of piped water supply infrastructure**
  - Cap bldg/SO/NGO
  - Instnl Cost
  - Capital Cost

- **% of schemes**
  - % of schemes in which per cap capital cost > norm: 7%
  - % of schemes in which pre cap O&M cost > norm: 5%

- **Rs/HH**
  - PU/govt
  - Community
Costs vary across States

Cost Distribution for RWS (1997-98 to 2005-06)

- Capital: 62%
- O&M: 14%
- SO/NGO: 1%
- Instnl: 23%

Avg Exp: Rs 110 per cap pa
How Rs 100 is spent?

**Demand driven**
- Institutional Exp
- IEC, HRD, NGO Etc.
- Loss due to overprovision
- Loss due to defunct schemes
- Resources used for O&M (net of recovery)
- Actually trickles to the beneficiary

**Supply driven**
- Institutional Exp
- IEC, HRD, NGO Etc.
- Loss due to overprovision
- Loss due to defunct schemes
- Resources used for O&M (net of recovery)
- Actually trickles to the beneficiary
Cost Recovery relatively better in Demand Driven Schemes

- HP
- Avg 48%
- Community managed 74%
- GP managed 50%
- PU managed 23%

Piped Water Supply Schemes
O&M Cost Recovery much lower against Design Costs

- **Mini water**: 59% Design Cost, 36% Actual Cost, 62% Cost Recovery
- **SVS**: 46% Design Cost, 22% Actual Cost, 48% Cost Recovery
- **MVS/Reg**: 56% Design Cost, 17% Actual Cost, 31% Cost Recovery
- **All**: 53% Design Cost, 25% Actual Cost, 47% Cost Recovery

Rs per HH pm
Low Performance vis-à-vis all Indicators (Management Agency)
Low Performance vis-à-vis all Indicators (Technology)

- Reliability & Adequacy
- Affordability
- Fin Sustainability
- Environ Sustainability

Graph showing performance of different technologies:
- Mini water
- SVS
- MVS
### Indicators of Performance

#### Reliability and adequacy

- LPCD (from the piped water scheme) in summer
- LPCD (from the piped water scheme) in other seasons
- Proportion of household requirement of water met by water from the scheme in summer
- Proportion of household requirement of water met by water from the scheme in other seasons
- Number of days of supply each week in summer
- Number of days of supply each week (in seasons other than summer)
- Hours of supply each week in seasons other than summer
- Time taken to fill a 10 liter bucket
- Time spent for water collection each day in summer
- Time spent for water collection each day in seasons other than summer
- Incidence of supply system getting affected by frequent breakdowns
- Households’ assessment of water quality (based on two criteria listed below)
  - % households that consider the supplied water to be bacteriologically contaminated
  - % households that consider the supplied water to have chemical problems such as salinity, excessive iron, etc.

#### Affordability

- O&M cost per household served as a ratio to the average income of piped connection users
- O&M cost per household served as a ratio to the average income of stand post users

#### Environmental Sustainability

- Incidence of source drying out during summer

#### Financial Sustainability

- Extent of recovery of O&M cost (O&M contributions made by beneficiary households divided by O&M cost)
- Proportion of private connection users regularly paying water charges
Huge Subsidies perpetuating Inefficiencies
(Subsidy per year, 1997-2004)

NOTE: O&M cost subsidy is computed on the basis of O&M cost of schemes and O&M cost recovery

Rural Subsidies on Irrigation, Fertilizer, Power ≈ 0.1%; 0.2%; 2% of GDP
Subsidies skewed towards Piped Water Supply

Subsidy per Household

- PWS users
- HP users
- All

Rs / month

Kar  Ker  UP  UA  Mah  TN
Subsidies evenly distributed across Income Classes

<table>
<thead>
<tr>
<th>Income Class</th>
<th>% of HH</th>
<th>% of subsidy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 2000</td>
<td>20%</td>
<td>100%</td>
</tr>
<tr>
<td>2001-3000</td>
<td>40%</td>
<td>80%</td>
</tr>
<tr>
<td>3001-5000</td>
<td>60%</td>
<td>60%</td>
</tr>
<tr>
<td>5001-7000</td>
<td>80%</td>
<td>40%</td>
</tr>
<tr>
<td>Above 7000</td>
<td>100%</td>
<td>20%</td>
</tr>
</tbody>
</table>
Cost inefficiencies higher in Supply driven Schemes (Piped Water)

- Capital cost
- Supplementary source cost
- Institutional cost
- Indirect power subsidy
- O&M cost
- Coping cost
- SO/NGO cost

Rs / KL
Economies of Scale yet to be realised

- Ground water based
- Surface water based

Optimum size
Optimum in areas of serious ground water quality problem
Trend in Consumer Preference towards Domestic Connections

- Domestic
- Shared

- LPCD

<table>
<thead>
<tr>
<th>Year</th>
<th>Domestic</th>
<th>Shared</th>
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<tbody>
<tr>
<td>1980s-90s</td>
<td></td>
<td></td>
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<tr>
<td>2000+</td>
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Observations & Way Forward
Key Observations

- Huge inefficiencies in service delivery and cost of all types of schemes – PU / community managed; Supply / Demand driven
- Reforms currently focusing on small low cost 40 LPCD schemes – without efficiency considerations
- **Community managed schemes generally better than PU managed schemes** in terms of performance and cost recovery
- Decentralizing responsibility to GPs reduces expenses and mobilizes resources for infrastructure
- Consumer demand moving towards higher consumption levels and greater convenience of private connections
- Huge coping cost indicates affordability not an issue
## Performance

<table>
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<tr>
<th>ISSUES</th>
<th>WAY FORWARD</th>
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</table>
| Noms: Existing ‘Fully Covered’/’Partially Covered’/’Not Covered’ norms create perverse incentives | • Decentralize + Regional Perspective Planning + District (Watershed) level planning  
• **Reconcile bottom-up demand with top-down planning** |
| Low level of Service Delivery | • Flexibility according to consumer preferences from a basket of choices derived from Perspective Plans  
• **Scheme Design Norms to be clarified and monitored**  
• **Contractual arrangements to improve accountability**  
• Performance Improvement Plans and Incentives |
| States monitor fund flow and infrastructure coverage | • Scheme performance, functionality  
• **Independent M&E assessments** with public disclosure  
• Credible M&E institutions |
## Cost Recovery

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<tr>
<td>Poor for both SVS and MVS</td>
<td>State specific user charge ‘ceilings’ for O&amp;M. Balance subsidized if exceed affordability</td>
</tr>
<tr>
<td>Inequity in charges across Programs &amp; Schemes</td>
<td><strong>Statewise policy</strong> and imposition of equitable charges</td>
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## Economies of Scale

<table>
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<th>ISSUES</th>
<th>WAY FORWARD</th>
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<tbody>
<tr>
<td>Not being realized – existing low cost 40 LPCD Ground Water (GW) Schemes inefficient</td>
<td>Scheme size of 500+ households would be cost efficient (small MVS)</td>
</tr>
<tr>
<td>Large Surface Water (SW) Schemes affected by diseconomies of scale beyond 3000 to 3500 HH - most beyond optimum</td>
<td><strong>Local water source not a constraint:</strong> Replace large SW schemes with smaller GW schemes implemented/managed by user communities/operator. Local water availability/quality problem: Centralized water production (public/private agency) with decentralized management (intra-village distribution by user communities/private operator)</td>
</tr>
<tr>
<td>ISSUES</td>
<td>WAY FORWARD</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Currently favors supply driven schemes (92%)</td>
<td>• <strong>Major push towards demand driven schemes</strong>, but:</td>
</tr>
<tr>
<td></td>
<td>- Consider scale economies in demand driven small schemes (including HP)</td>
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<td>- Augment habitations fully covered as per GoI norms with demand driven schemes</td>
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<td></td>
<td>- Decentralise MVS construction &amp; maintenance, with possible PPP to improve accountability</td>
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<td></td>
<td>- Bifurcate existing MVS &amp; Regional schemes into smaller schemes at village level if required, devolve O&amp;M to GP/user groups/operator</td>
</tr>
<tr>
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<td>• <strong>Sector-wide Approach</strong> to fully scale up demand driven schemes</td>
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### Subsidy

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<td>Huge subsidies – could reduce with better O&amp;M recovery but remain large as long as capital cost is mostly unrecovered</td>
<td>• <strong>Reduce institutional cost</strong> with efficient decentralization</td>
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<tr>
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<td>• Avoid supplementary schemes by improving performance of main scheme and instilling accountability thru contracts</td>
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Improving effectiveness of Schemes

Scale-efficient Size

Top-down/Bottom-up Planning

Flexible Institutional arrangements (decentralised service delivery/PPP)

Appropriate scheme design norms
O&M & capital cost norms

Top-down/Bottom-up Planning

Improve account-ability

Flexible service delivery

Improve design, preparation

40 → 70+ LPCD

PC/NC Norms

Redefine Swajaldrhara

Emergence of a New Model?
Thank You!