“Where have all the water gone?”
Institutions, incentives and behavior overtime

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Where have all the water gone?

What explains the problem of poor performance of large scale public irrigation in the Philippines?
Background: Philippine irrigation

• Internationally renowned / well documented
• role model in transforming bureaucracies: 1980s
• Benchmark for learning process / participatory approaches in developing countries in 1980s
Institutions, incentives, behavior and outcomes

Unabated deterioration of facilities

Chronic underinvestment in maintenance

Persistently low collection of fees

Perverse bureaucratic and aid incentives

Poor Water Service

Poor productivity / incomes

Persistently low collection of fees

Chronic underinvestment in maintenance

Unabated deterioration of facilities
Data and Methodology

• Panel data on level of irrigation service, payment of irrigation fees, income and expenditure, aid allocation

• Cross section data / archival work on
  – Investment allocation
  – Condition of infrastructure
  – Profile / size of irrigation bureaucracy
  – Profile of irrigation associations / public irrigation

• Field work in (2003-2005)
  – key informant interviews / focus group discussions
  – participant-observation / attend farmer meetings

• N = 2056 observations; 20,000 data points
Field work: Summers of 2003-2005
Chronic underinvestment in maintenance

Persistently low collection of fees

Poor Water Service

Unabated deterioration of facilities

Poor productivity / incomes

Perverse bureaucratic and aid incentives

EVIDENCE
(2) Unabated deterioration of facilities (2002)

<table>
<thead>
<tr>
<th>Facility</th>
<th>Total</th>
<th>% in need of rehabilitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head works</td>
<td>145 units</td>
<td>34%</td>
</tr>
<tr>
<td>Main Canal (MC)</td>
<td>3,917 km</td>
<td>61%</td>
</tr>
<tr>
<td>Control Structures (MC)</td>
<td>11,423 units</td>
<td>53%</td>
</tr>
<tr>
<td>Lateral Canal (LC)</td>
<td>10,299 km</td>
<td>63%</td>
</tr>
<tr>
<td>Control Structures (LC)</td>
<td>39,949 units</td>
<td>56%</td>
</tr>
<tr>
<td>Service Roads</td>
<td>13,967 km</td>
<td>74%</td>
</tr>
</tbody>
</table>
(1) Chronic underinvestment in maintenance

![Bar chart showing recommended and actual spending for various O&M expenditure items.](chart.png)
(3) Poor water service

Only 65% of service area irrigated on 10 year average
Persistently Poor Collection of Fees

Collection of irrigation fees 45% for a 10 year average

80% of accounts payable were unpaid over a 10 year period
(5) Outcomes of poor irrigation service

Low yields

Low farm incomes
What explains underinvestment?

Unabated deterioration of facilities

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Poor Water Service

Poor productivity / incomes
Evidence: Bureaucratic incentives

- **Oversized irrigation bureaucracy**
  - 50% of staff are redundant / duplication of functions
  - 60% of staff doing work that can be done by farmers

- **Entrenched vested interests**
  - Agency dominated by engineers → construction oriented
  - 74% of staff have been with agency for at least 20 years
  - Ageing staff: motivated by job security / awaiting retirement

- “Service for Survival: Do Our Best for NIA’s Best”
Consequences of bureaucratic incentives (1)

NIA spends more than what it earns (ratio of 1.36:1)

<table>
<thead>
<tr>
<th>Year</th>
<th>Operating Income</th>
<th>Operating Expenses</th>
<th>% OI to OE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td>560</td>
<td>661</td>
<td>85%</td>
</tr>
<tr>
<td>1992</td>
<td>482</td>
<td>722</td>
<td>67%</td>
</tr>
<tr>
<td>1993</td>
<td>571</td>
<td>684</td>
<td>83%</td>
</tr>
<tr>
<td>1994</td>
<td>606</td>
<td>779</td>
<td>78%</td>
</tr>
<tr>
<td>1995</td>
<td>666</td>
<td>872</td>
<td>76%</td>
</tr>
<tr>
<td>1996</td>
<td>800</td>
<td>1027</td>
<td>78%</td>
</tr>
<tr>
<td>1997</td>
<td>1041</td>
<td>1222</td>
<td>85%</td>
</tr>
<tr>
<td>1998</td>
<td>772</td>
<td>1343</td>
<td>57%</td>
</tr>
<tr>
<td>1999</td>
<td>876</td>
<td>1220</td>
<td>72%</td>
</tr>
<tr>
<td>2000</td>
<td>786</td>
<td>1218</td>
<td>65%</td>
</tr>
<tr>
<td>Ave</td>
<td>716</td>
<td>975</td>
<td>73%</td>
</tr>
</tbody>
</table>
Consequence of bureaucratic incentives (2)

• Farmer participation with patronage
  – to reduce O&M cost, NIA involves 71% of IAs as labor contractors (NIA’s version of decentralization)
  – 50% of IAs rated functionally poor
  – 99% of all IAs with membership of less than 60% of potential members
  – 93% of IAs with ave. net worth of $1,030
How does incentives in foreign aid affect bureaucratic incentives?

- Foreign aid – main source of irrigation funding
Foreign Aid Incentives:
Career incentives

- Lending decisions tied to career objectives
- Size of loan portfolio
- Most projects are construction oriented
- Straightforward construction & design projects
- Quick disbursing / easy to monitor
- Aid officers also engineers
Foreign aid + Bureaucratic incentives

• Double moral hazard problem:
  – donors need irrigation agency as borrower
  – Irrigation agency needs donors for funds

• Incentives
  – Non-credible threat of enforcement by donors
  – negligible cost of non-compliance by NIA
  – creates incentive to under invest in maintenance
Foreign aid + Bureaucratic incentives

- Aid fungibility - 40% of NIA’s income is subsidized by fungible foreign funding
Summary

• Consistent and strong evidence that foreign aid reinforces perverse incentives faced by public irrigation bureaucracies

• Result: underinvestment in irrigation maintenance leading to the vicious cycle problem in irrigation

• Counterfactuals: agriculture, trade, aid, fiscal policies
Foreign aid + Bureaucratic incentives

• Aid fungibility sustains incentive to build, neglect and then rebuild

• → helps keep agency survive financially
Chronic underinvestment in maintenance
Persistently low collection of fees
Poor productivity / incomes
Poor Water Service
Unabated deterioration of facilities
Bureaucratic and aid incentives
Farmer Incentives

Counterfactuals
## OLS Model: Dependent Variable free riding

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Coef</th>
<th>SE Coef</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>32.250</td>
<td>3.426</td>
<td>9.41</td>
<td>0.000</td>
</tr>
<tr>
<td>SCARCT</td>
<td>-4.292</td>
<td>1.210</td>
<td>-3.55</td>
<td>0.000</td>
</tr>
<tr>
<td>AREA</td>
<td>-0.014</td>
<td>0.008</td>
<td>-1.65</td>
<td>0.099</td>
</tr>
<tr>
<td>DISTANCE</td>
<td>-0.006</td>
<td>1.484</td>
<td>-0.00</td>
<td>0.997</td>
</tr>
<tr>
<td>AGE of IA</td>
<td>-2.915</td>
<td>1.528</td>
<td>-1.91</td>
<td>0.057</td>
</tr>
<tr>
<td>USERSIZE</td>
<td>0.037</td>
<td>0.012</td>
<td>3.10</td>
<td>0.002</td>
</tr>
<tr>
<td>GENDER</td>
<td>-0.015</td>
<td>0.067</td>
<td>-0.22</td>
<td>0.824</td>
</tr>
<tr>
<td>SALIENCE</td>
<td>-0.050</td>
<td>0.029</td>
<td>-1.74</td>
<td>0.082</td>
</tr>
<tr>
<td>WEALTH</td>
<td>7.865</td>
<td>1.694</td>
<td>4.64</td>
<td>0.000</td>
</tr>
<tr>
<td>ORIGIN</td>
<td>-6.627</td>
<td>5.228</td>
<td>-1.27</td>
<td>0.205</td>
</tr>
<tr>
<td>GOV</td>
<td>-6.178</td>
<td>1.383</td>
<td>-4.86</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Pearson Coefficient = 25%
Conclusions

• Political economy of robust institutions

• Attention to systemic incentives and strategic behavior of actors overtime
Thank you