Gaming the System: Stimulating Rules and Behavior Change for Governance of Groundwater and Conjunctive Use in India

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The Groundwater Commons

Water as commons:
• High subtractability (one person’s use reduces GW for others)
• Low excludability (boundaries difficult to establish)
• Fugitive resource

Further challenges of groundwater:
• Low visibility
• Lack of understanding of resource dynamics
• Difficult to identify aquifer boundaries, esp. in hard rock
• “Traditional knowledge” insufficient with rapidly developing pumping technology
• State regulation largely ineffective in India
Experimental Games for Experiential Learning

• Usually used to measure propensity to collective action
• Can games be used to strengthen collective action?

  • Shape “mental models” and understanding of relationships
  • Simulate several seasons in short time
  • Try different institutional arrangements (Rules)
Groundwater game

Games
• Groups of 5 men or women
• Choose crop A or B with different water use & returns
• See effect on water table
• Multiple years, with and without communication
• Individual or community payments randomized

Community debriefing
• How this relates to own experiences and challenges farming
• Lessons and insights the participants gained from the experience
• Possible solutions
Surface Water Game

- Players individually decide on contributions to dam maintenance;
- Benefits from dam depend on total investment of all group members;
- Dam benefit equally distributed amongst all players; OR in sequential order
- Community debriefing.

<table>
<thead>
<tr>
<th>Crop</th>
<th>Net return per ha in INR</th>
<th>Water requirement per ha in cum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>15000</td>
<td>5500</td>
</tr>
<tr>
<td>Gram</td>
<td>13000</td>
<td>3000</td>
</tr>
</tbody>
</table>
Intervention logic

- Learning by experiencing rather than formal teaching or learning by doing
- Rethinking habits
- Influencing internalized norms
- Experimenting with own rules
- Shift from “teaching” solutions to offering social learning space to find own solutions
- Demonstrating costs of poor action
- Highlighting interactions between actors
### Outcomes of Games

<table>
<thead>
<tr>
<th>Game</th>
<th>States</th>
<th>Year</th>
<th># habitations</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundwater pilot</td>
<td>Andhra Pradesh</td>
<td>2013, 2014</td>
<td>17</td>
<td>Some effect on attitudes&lt;br&gt;Communities more likely to adopt water registers &amp; rules for groundwater *</td>
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<tr>
<td>Surface water</td>
<td>Rajasthan, Madhya Pradesh</td>
<td>2016, 2017</td>
<td>30, 60</td>
<td>Communities more likely brought swelling water conflicts to the table and engaged in dam maintenance activities *</td>
</tr>
<tr>
<td>Groundwater expansion</td>
<td>Rajasthan, Madhya Pradesh, Andhra Pradesh</td>
<td>2014-2019</td>
<td>214</td>
<td>Total 3747 farmers adopted less water consumptive crops or varieties and irrigation scheduling to save water **</td>
</tr>
</tbody>
</table>

*Compared to randomly selected control communities where game has no been played  
**Compared to farmers’ reported behavior, prior to the games
Water Used Before and After Crop Water Budgeting
Rabi - 2019-20

Locations & Crops

- Tomato, Chittoor
  - Water used Before CWB: 191
  - Water used After CWB: 405

- Jowar - CWB, Yavatmal
  - Water used Before CWB: 214
  - Water used After CWB: 350

- Gram - CWB, Yavatmal
  - Water used Before CWB: 152
  - Water used After CWB: 307

- Wheat - CWB, Yavatmal
  - Water used Before CWB: 258
  - Water used After CWB: 395

- Cotton+Redgram - CWB, Yavatmal
  - Water used Before CWB: 159
  - Water used After CWB: 404

- Cotton - CWB, Yavatmal
  - Water used Before CWB: 244
  - Water used After CWB: 464

- Wheat, Mandal, Bhilwara
  - Water used Before CWB: 288
  - Water used After CWB: 774

- Intercrops (Wheat, Jowar etc.), Mandal, Bhilwara
  - Water used Before CWB: 89
  - Water used After CWB: 627

Legend:
- Water Saved
- Water used Before CWB
- Water used After CWB
Resources


- HTTP://GAMESFORSUSTAINABILITY.ORG/PRACTITIONERS/
  - http://gamesforsustainability.org/2015/12/05/groundwater-game-for-practitioners/
  - https://gamesforsustainability.org/practitioners/#game-on-managing-check-dams