SABMiller India – CII
Neemrana Ground Water Management Initiative:
A Model for collective governance
by
Meenakshi Sharma - SABMiller India
Vinayak Damle - Confederation of Indian Industry
Sustainability of Water Resource

- Compliance &
- Enhancing Use efficiency
- CSR & Partnerships & Collaborations
Basic Model of Corporate Initiative

- Water Balance Model
  - Sustainability assessment for different water and land use choices
  - Assessment of net incomes to farmers for preferred land and water use choices
  - Participatory crop demonstration trials
  - Crops Services for innovative farmers
  - Irrigation systems design for enhanced water use efficiency
  - Training programme
  - Inputs and market linkage

- Knowledge Generation & Development of Planning Tools
  - Agriculture Extension Program for Farmers

- Water Harvesting and Recharge
  - Development of shelf of projects
  - Assisting PRI and other stakeholders

- Technology development and demonstration

- Mobilizing Stakeholders
  - Dialogue with all stakeholders (Govt. agencies, industries, PRI, CBO, NGOs)
  - Technical and training support to stakeholders
  - Initiating and facilitation stakeholder dialogue
Framework – Water Balance

- Water Balance
  - Abstraction
    - Water Available
      - Water Utilization
      - Losses
  - Precipitation
    - Infiltration
      - Shallow Soil Moisture
      - Deep Infiltration?
      - Evaporation
    - Surface Storage
    - Aquifer Recharge
    - Immediate Evaporation
    - Runoff
  - Irrigation
    - Water Consumption
      - Evapotranspiration
      - Deep Infiltration?
    - Consumed water
  - Industries
    - Deep Infiltration?
  - Human's / Live Stock
    - Water Consumption
    - Deep Infiltration?
1st Step in Project Planning: mapping

Area Demarcation of > Watershed basin on the basis of ridgeline
Contours Derivation 5m from DEM
Process of Water Balance: cascading starting from 1st order

1st order WS/Streams

2nd order WS/Streams

3rd order WS/Streams

4th order WS/Streams
Industrial Area Marked

Existing Water Bodies Marked
LISSIII 07 Feb 2006

- Hills
- Crop Classification
- Village Boundary
Overlay of LISS Classification on Cartosat-I
Water level contours for the entire target area
Field data collection to carry out water balance of the area
Strategies for Recharge

Run-off estimates

- By Rational method (Rainfall intensity basis)
- By Curve number method (Antecedent moisture content basis)

Technology for ridge areas

Runoff water directly penetrates to deep aquifer through opening in rocks.
Conceptual Model of Recharge Shaft

- **Inlet**
- **Open space for water inflow from storage chamber**
- **Dimensions of the chamber**: 2.0 m x 2.0 m x 3.0 m
- **Pebble**
- **Sand**
- **Gravel**
- **Clean water**
- **Perforations**
- **Casing**
- **GL**
- **12 inches**
- **40 inches**
- **70 m**
Technology for plain areas where drainage exists

- Construction of stone masonry or improved gabion structure across the drainage channel.
- Introduction of artificial recharge shaft in the ponding area.

Masonry check dam with artificial recharge system
Technology for plain areas with totally obliterated drainage system

- Dug out pits in low lying areas, a few being constructed presently.
Improved water use efficiency through improved irrigation techniques

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Sprinkler Technology</th>
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<tbody>
<tr>
<td><strong>Crop</strong></td>
<td>Bajara, Bhindi</td>
</tr>
<tr>
<td><strong>Variety</strong></td>
<td>MP-7792, Paineer - 86M52, Shona-16</td>
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<tr>
<td><strong>No. of Villages Covered</strong></td>
<td>30</td>
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<table>
<thead>
<tr>
<th>Irrigation Number</th>
<th>Time duration, min</th>
<th>Water Applied, m³</th>
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<tbody>
<tr>
<td>1</td>
<td>300</td>
<td>77.94</td>
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<tr>
<td>2</td>
<td>300</td>
<td>77.94</td>
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</tr>
<tr>
<td>3</td>
<td>270</td>
<td>70.15</td>
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</tr>
<tr>
<td>4</td>
<td>300</td>
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<td>5</td>
<td>240</td>
<td>62.35</td>
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<tr>
<td>6</td>
<td>210</td>
<td>54.56</td>
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<td>7</td>
<td>360</td>
<td>93.53</td>
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<tr>
<td>10</td>
<td>120</td>
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</tr>
<tr>
<td>total</td>
<td>2760</td>
<td>717.05</td>
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</table>

This is for participatory crop demonstration trials on 0.2 ha plots. The conventional practice is minimum 960 m³ water through 8 irrigations. That is a minimum saving of 25% for practices that can be promoted in a short duration – not high end practices that require longer duration for adoption.
INM Demonstration

Farmer’s practice

Wheat Crop trails

Cluster bean Crop trails
## Results of Participatory Crop Demonstration Trials

<table>
<thead>
<tr>
<th>Cost Details</th>
<th>Bajara</th>
<th>Okra</th>
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<tbody>
<tr>
<td><strong>Under conventional crop &amp; irrigation management practice on 0.2 ha area</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of Seed, Rs</td>
<td>250</td>
<td>900</td>
</tr>
<tr>
<td>Cost of Major Nutrients, Rs</td>
<td>445</td>
<td>610</td>
</tr>
<tr>
<td>Cost of Micro Nutrients (Zn, Br, S, etc)</td>
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<td>0</td>
</tr>
<tr>
<td><strong>Total Inputs Cost, Rs</strong></td>
<td>695</td>
<td>1510</td>
</tr>
<tr>
<td><strong>Total Production, qt</strong></td>
<td>6</td>
<td>12</td>
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<tr>
<td><strong>Gross Income, Rs</strong></td>
<td>4,800</td>
<td>18,000</td>
</tr>
<tr>
<td><strong>Net Income, Rs</strong></td>
<td>4,105</td>
<td>16,490</td>
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</tbody>
</table>

| Under INM (Integrated Nutrient Management) Participatory Crop Demonstration Trial |        |       |
| Cost of Seeds, Rs                              | 290    | 3600  |
| Cost of Major Nutrients, Rs                    | 300    | 388   |
| Cost of Micro Nutrients (Zn, Br, S, etc)       | 200    | 235   |
| **Total Inputs Cost, Rs**                      | 790    | 4223  |
| **Total Production, qt**                       | 12     | 30    |
| **Gross Income, Rs**                            | 9600   | 45000 |
| **Net Income, Rs**                              | 8810   | 40777 |

**Increase in Net Income**

- **Bajara**: 4,705 (+114%)
- **Okra**: 24,287 (+147%)

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Water Resource Sustainability Scenario

Gap in Ground water Abstraction and Recharge
- Total estimated abstraction = 65.35 Mm3 (238 mm)
- Total estimated deep recharge = 6.27 Mm3 (22.86 mm)
- Estimated gap between recharge and abstraction = 59.08 Mm3 (215.14 mm)
- Therefore estimated annual decline of groundwater level = 0.71 m
- The actual observed average annual decline of groundwater level = 0.9 m

Enhancement of natural recharge
- Estimated deep ground water recharge from ppt through natural process: 6.27 Mm3 (22.86 mm, 3.5% of ppt)
- Deep infiltration from ppt:119.31 Mm3 (434.7 mm, 66.51% of ppt)

Potential for artificial recharge
- Estimated run-off = 53.81 Mm3 (196 mm)
- Total required artificial recharge = 42 Mm3 (153 mm) i.e. 78.05% of the total runoff.

Potential for water saving in agriculture
- Potential for water saving in groundwater irrigation in agriculture = 30% or 17.08 Mm3 (62.14 mm)
Institutionalising sharing of knowledge

- Development of a resource center for putting all knowledge and information in public domain
- Providing online assistance to farmers and other stakeholders
Challenges

- Corporate capacities
- Limitations of Government schemes and programmes
- Managing convergence
<table>
<thead>
<tr>
<th></th>
<th>Corporate/ SABMiller</th>
<th>Apex body/ CII</th>
<th>R&amp;D/ Resource Organisations/ ACWADAM</th>
<th>Grassroot NGOs/ HUMNANA</th>
<th>Govt./ CGWB/ RIICO</th>
<th>Donors – Innovative Programs</th>
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<tbody>
<tr>
<td>Knowledge generation</td>
<td>✓</td>
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<tr>
<td>Augmentation (Ground water recharge)</td>
<td>✓ ✓</td>
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<td>Water use efficiency in Agriculture</td>
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<td>Stakeholder dialogue</td>
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<td>Convergence of govt. programmes</td>
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<td>Resource Centers – activities, information, web sites</td>
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<td></td>
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<td>✓</td>
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</tbody>
</table>

 ✓: Activities being conducted by primary partners – **SABMiller, CII, ACWADAM, Humana**
 ✓: Activities being conducted by other collaborating stakeholders in a small way – other industries, **Rajasthan Industrial and Investment Corporation (RIICO)**
 ✓: Upscaling – Government, **Donor Agencies** – needs to happen in a big way
Thanks