Soil Moisture Management & Critical Irrigation for Rainfed Agriculture

As a Relevant Framework for PMKSY in Rainfed Areas

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The Problematique

- Small farmer with 1.50 acres of dry land
- No access to irrigation
- Mono-crop of groundnut
- The village is already over exploited

Smt. Tulasamma, Kummarivandlapalli, Gandlapenta Mandal, Anantapur Dist, AP
Gandlapenta: Anantapur, rainfall profile
Risks of Rainfall Failures in Rainfed Agriculture

Initial Drought

Medium drought spell

Prolonged Drought spells

Uncertainty at the onset of monsoon
RAINFED AREAS - CHARACTERIZATION

Wealth index - a composite index of percentage of households in the district possessing landlines, banking services, potable tap water, electricity as main source of lighting, concrete roof, LPG cylinder for cooking, water closet latrine facility and closed drainage wastewater outlet.

Rainfed areas - Areas having less than 40% of the land under assured irrigation.

THE MAJORITY AREAS OF RURAL POVERTY IN INDIA OVERLAP WITH RAINFED AREAS
RAINFED AREAS - CHARACTERIZATION

Areas with less than 40% of land under assured irrigation

Land is subject to the variability, distribution, non-uniformity of the rains

Characterized by:

- A mix of topographies, fragmented
- Varied agro-climatic conditions
- Marginal soils
- Remote locations with poor access to institutions

COMPARISON of RAINFED AND IRRIGATED DISTRICTS

- Percent Area Above 500m Elevation
- Percent Scheduled Tribes Rural Population
- Percent Area with Tree Cover
Groundwater Stress Areas..
She now can irrigate her 1.5 ac dry land in kharif without digging any new borewell!
Kummarivandlapalli, Gandlapenta Mandal, Anantapur Dist, AP

12 borewells out of 42 in the village

113 acres
- 83 rainfed
- 24 irrigated

21 Borewell owning farmers

23 rainfed farmers

Costs: About 9500 Rs. Per acre

>> Impacts:
- Average kharif yield increased from 2.5 qt per acre to 4.12 qt/ac.
- Annual Net income increased by 10,000 Rs/ ac
Securing Crops through GW Collectivisation

• A contiguous area chosen 50 to 100 ac (1:3 ratio of borewell owning to non-owning farmers)

• Water literacy and analysis with farmers; PGWM – mapping.

• Agreement on pooling of borewells for kharif protective irrigation & reducing paddy crop

• Commitment on NO NEW borewells for 10 years (with revenue office).

• All farmers contribute 2500 Rs. Per ac.

• A pipe line grid is made (maintenance is collective)

• Sprinklers are provided in common.

• Right of all to have protective irrigation in kharif and the borewell owners can decide on provision of irrigation during rabi to others.
Gorantlavandlapalli: Anantapur District

19 of the 34 borewells brought into the pool covering 68% of the households in the village including 50 non-borewell farmers.
Changes in Area (ac) under Well Irrigation by Well Status: Gorantlavandlapalli

<table>
<thead>
<tr>
<th></th>
<th>Area under Owned Wells</th>
<th>Under Water Sharing</th>
<th>ALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>77</td>
<td>18</td>
<td>59</td>
</tr>
<tr>
<td>Present</td>
<td>92</td>
<td>64</td>
<td>83</td>
</tr>
<tr>
<td>% Change</td>
<td>19%</td>
<td>255%</td>
<td>41%</td>
</tr>
</tbody>
</table>

Changes in % Area under Well Irrigation by Farm Size

<table>
<thead>
<tr>
<th></th>
<th>Marginal Farmers</th>
<th>Small Farmers</th>
<th>Large and Medium</th>
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<tbody>
<tr>
<td>Before</td>
<td>8</td>
<td>66</td>
<td>80</td>
</tr>
<tr>
<td>Present</td>
<td>69</td>
<td>85</td>
<td>90</td>
</tr>
<tr>
<td>% Change</td>
<td>763%</td>
<td>29%</td>
<td>13%</td>
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**RRA (Revitalising Rainfed Agriculture Program) in Anantapur District**

Supported by the Department of Agriculture, AP. (3 yrs old)

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
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<tbody>
<tr>
<td>No. of Borewells</td>
<td>128</td>
</tr>
<tr>
<td>Farmers</td>
<td>411</td>
</tr>
<tr>
<td>Borewell owning Farmers</td>
<td>156</td>
</tr>
<tr>
<td>Non-BW farmers</td>
<td>255</td>
</tr>
<tr>
<td>Total Area (ac)</td>
<td>1111.41</td>
</tr>
<tr>
<td>Dry land (ac)</td>
<td>(77%) 857.07</td>
</tr>
<tr>
<td>Irrigated (ac)</td>
<td>(23%) 293.76</td>
</tr>
<tr>
<td>Total investment from the Dept of Agriculture</td>
<td>Rs.1.03 crores</td>
</tr>
<tr>
<td>Farmers’ Contribution (Rs.)</td>
<td>518,783</td>
</tr>
<tr>
<td>Direct investment Per acre (Rs./ac)</td>
<td>9269</td>
</tr>
<tr>
<td>Through Convergence – seeds, soil organic matter etc. (rs./ac)</td>
<td>6000</td>
</tr>
<tr>
<td>Pay-back period (returns on investment)</td>
<td>4 years</td>
</tr>
</tbody>
</table>

Department of Agriculture has now expanded the program to 1000 ha (Rs.10 cr investment). And efforts are being made to expand the program to other districts in AP.

Much cheaper compared to 2.5 lakh rs/ ac investment in medium and large irrigation projects.
Participatory Drought-Risk Mapping
Initial investment from the project
Agreement on 20% contribution
Return of the rest of the costs over four years by sharing half of the additional value of productivity gains.

JAURA village, Chatterpur Block, Palamau District, Jharkhand
A combination of
- large farm-ponds for fish rearing & protective irrigation;
- Additional support from a grid lifting water from stream flows (supply of protective irrigation & filling of ponds).

- Initial investment from the project
- Agreement on 20% contribution
- **Return of the rest of the costs in four years** by sharing half of the additional value of productivity gains.
Irrigation for Rainfed Areas under PMKSY: A framework

Conservation alone to soil organic matter →
Overcoming Short term droughts and effective moisture management &
Farm Ponds for critical irrigation – short-medium drought spells &
Groundwater/ stream flows for medium and long drought spells.

Source: IWMI Part 4 Ch8: Unlocking the potential of Rainfed agriculture, 2008
REQUIRED INVESTMENTS
Around Rs.25,000 per ha

PRESENT WATER INVESTMENTS
Around Rs.2.5 lakh per ha
1. Enhancing **Soil Productivity**: regular addition of organic matter in every ha of rainfed agriculture areas
2. Expanding **Protective Irrigation** to secure rainfed crops (from ground and surface water sources: equity, productivity, efficiency and security aspects of water management) – **protection of at least 2 acres of rainfed crops for every family**
3. **Seed systems**: timely, quality, contingency, diversity
4. **Agronomic innovations**: LEISA, SRI, NPM, SSNM and others and enhancing farmers’ knowledge and management skills
5. Appropriate **farm mechanization** for enhancing labor productivity
6. Developing and strengthening **producers organisations** (resources management, credit access, securing inputs, value addition and market linkages, infrastructure)
7. Strengthening support systems for **Extensive Livestock Systems** (health care, breeding, drinking water, fodder in commons, etc.)
8. **Promote fisheries** in numerous rainfed water bodies through institutional approach
9. Integrated **value chain support systems** to realise growth potential in pulses, millets, meat and fish production systems; including infrastructure and processing facilities.
10. **Risk minimization and resilience building** and enhancing private investments