Economic Impact of Forest Management Institutions of Collective Action on Groundwater Recharge in Karnataka, India

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Selected Poster prepared for presentation at the International Association of Agricultural Economists (IAAE) Triennial Conference, Foz do Iguaçu, Brazil, 18-24 August, 2012.

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Introduction

- Groundwater has become the major water resource for agriculture, livestock and other purposes in the country.
- Groundwater depletion and deforestation are creating many socio-economic and environmental problems.
- Development of innovative forest management institutions is a sine quo non for the development of forest and groundwater resources.
- Government of Karnataka introduced the decentralized system to involve people in forest management.
- Joint Forest Planning and Management (JFPM) is an institutional innovation focusing on decentralization in planning process.
- In addition to usufruct benefits of the forest, JFPM enabled groundwater recharge at local level through collective action institutions of Karnataka Forest Department.

Research Objectives

- To analyze the economic impact of JFPM on groundwater recharge.
- To analyze the incremental net returns of the farmers due to JFPM over non-JFPM area.
- To analyze the equity in income distribution among different categories of the farmers in JFPM area.

Study Area

Karnataka State (India) (Districts Map)

Sampling Framework

Population of farmers possessing irrigation wells:
- JFPM + Watershed village (23 farmers).
- JFPM village (42 farmers).
- Watershed village (24 farmers).
- Control village (15 farmers).

Analytical Tools

- Tabular Analysis
- Descriptive Statics
- ANOVA

Results and Discussion

Table 1: Estimated contribution due to JFPM development program, 2007-08

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Particulars</th>
<th>JFPM + watershed</th>
<th>Only watershed</th>
<th>Only JFPM</th>
<th>Control area</th>
</tr>
</thead>
</table>
| 1      | Contribution of JFPM program:  
A. net returns in only JFPM minus net returns in control area | = 2044 - 6702 = 13242 | = 13068 - 13045 = 23 |
| 2      | Contribution of JFPM + Watershed:  
Net returns in (JFPM + watershed) minus Net returns in control area | = 13068 - 6702 = 6366 |
| 3      | Contribution of Watershed:  
A. net returns in watershed minus Net returns in control area | = 13045 - 6702 = 6343 |
|        | B. Net returns in JFPM + watershed minus net returns in only JFPM | = 13068 - 2044 = 9767 |

Table 2: Incremental net returns, per acre 2007-08

<table>
<thead>
<tr>
<th>Type of farm</th>
<th>JFPM over Non-JFPM area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small and marginal farmers</td>
<td>= Rs. 16355.09 - Rs. 10605.25 = Rs. 5749.84</td>
</tr>
<tr>
<td>Medium farmers</td>
<td>= 2118 - 8944</td>
</tr>
<tr>
<td>Large farmers</td>
<td>= -548 - 2243</td>
</tr>
</tbody>
</table>

Note: Incremental net return in JFPM over Non-JFPM = net return per acre from all sources in JFPM minus that in non-JFPM area.

Table 3: Gini coefficient for income distribution for different classes of farmers in all the four study areas, 2007-08

<table>
<thead>
<tr>
<th>Type of farm</th>
<th>JFPM + watershed</th>
<th>Only watershed</th>
<th>Only JFPM</th>
<th>Control area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small and marginal farmers</td>
<td>0.72</td>
<td>0.65</td>
<td>0.64</td>
<td>0.66</td>
</tr>
<tr>
<td>Medium farmers</td>
<td>0.66</td>
<td>0.67</td>
<td>0.63</td>
<td>0.66</td>
</tr>
<tr>
<td>Large farmers</td>
<td>0.73</td>
<td>0.88</td>
<td>0.73</td>
<td>0.77</td>
</tr>
<tr>
<td>Overall</td>
<td>0.72</td>
<td>0.69</td>
<td>0.63</td>
<td>0.76</td>
</tr>
</tbody>
</table>

Table 4: ANOVA for net returns per acre from all the sources across different categories of sample farmers in Chitradurga and Davanagere districts, 2007-08

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Particulars</th>
<th>Mean</th>
<th>F Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>a. only JFPM</td>
<td>88764</td>
<td>40.608**</td>
</tr>
<tr>
<td></td>
<td>b. JFPM + watershed</td>
<td>32149</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. only JFPM</td>
<td>88764</td>
<td>46.904**</td>
</tr>
<tr>
<td></td>
<td>b. only watershed area</td>
<td>30059</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. only JFPM</td>
<td>88764</td>
<td>52.766**</td>
</tr>
<tr>
<td></td>
<td>b. Control area</td>
<td>11798</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. JFPM + watershed</td>
<td>32149</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. only watershed area</td>
<td>30059</td>
<td></td>
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<td>11798</td>
<td></td>
</tr>
</tbody>
</table>

Note: ** and *** indicate significance at 1.5 and 10% respectively.

Conclusion

- Net returns realized by the farmers in JFPM areas is higher compare to non-JFPM area.
- The collective action of the farmers in the JFPM and watershed programs is largely responsible for statistically and economically significant net returns as well as in their equitable distribution of benefits.
- The collective action paves the way for improved, equitable and efficient access to groundwater and natural resources for small and marginal farmers in Karnataka through JFPM and watershed developmental programs.
- The JFPM program still needs the effective governance system with greater transparency and credible commitment to enforce the institutions.
- The ongoing JFPM activities in other parts of Karnataka villages need to be promoted with commitment and support by the government.

Acknowledgement

The authors would like to thank JFPM project, Karnataka Forest Department, Aranya Bhavana, Bangalore for providing funding to carry out research and also to the various staff members of the forest department at local level in study area for cooperating and providing necessary information during data collection.

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