TAKING WATER TO WETLANDS: AN EXPERIMENT WITH SMALL IRRIGATION FOR RESOURCE POOR FARMERS

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Outline of Presentation

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- Experiment with Farmer-managed Small Irrigation
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Definitions

- **Wetlands:**

  “Areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is flowing or static, fresh, brackish or salty, including areas of water the depth of which at low tide does not exceed six meters”

  (Ramser Convention, 1971).

- **Types:**
  
  (i) Inland Valleys
  
  (ii) River floodplains
  
  (iii) Mangrove swamps.
Wetlands in Nigeria

- 7.2% of Nigeria’s total land area is major wetlands (Ojanuga, Lekwa and Okusami, 2003);


- Water management is the foremost technology the wetlands farmers need to improve their productivity, expand incomes from farming activities.

- Water management technologies that can be extended to wetland farmers on agro-ecological basis are yet to evolve (Ojanuga, 2006).
Wetlands in Nigeria

- Efforts in extending water management technologies to wetlands farmers in Nigeria:
  
  (i) River basin and Rural Development (RBRDA) (1973);
  
  (ii) National Fadama Development Project phase I (1992-1995):- farmers were taught to irrigate their crops in the dry season using water from tubewells installed with pumps).

- Outside of the two projects, there has not been any form of water management in wetlands/fadama farming anywhere in Nigeria (Ojanuga, 2006).

- Wetlands/fadama farmers resort to manual watering using plastic containers, earthen wares or any available container.

- Manual watering is full of tedium and would hardly increase on-farm productivity in the face of climate variability and long term change.
During the short dry season, the wetland soil could become so dry leading wilting of crops due to extreme low moisture level in the soil.

In such circumstances, farmers need irrigation to rescue the crops and remain in business.

Farmers resort to hand watering using plastic containers, earthen wares or any container at their disposal.

The tedium of carrying water manually during the dry season saps the energy of the poor farmers and further reduces their below-average output.

Hand watering of crops by wetland farmer
A Typical wetlands soil in the dry season
Experiment with Farmer-managed Small Irrigation


- One project was located in each of the six states.

- Aims:
  (i) To encourage resource poor farmers exploit the dry five months of idle time to grow vegetables on the banks of ponds, rivers and small lakes;
  (ii) To improve yields and income.
Requirements for Siting Project:

- Availability of perennial water source;
- Evidence of farming activities near the water body in the dry season;
- Availability of local materials for irrigation facilities-pipes, tanks, hoses, etc.
Irrigation Facilities Supplied

- Motorized pump
- Reservoir tanks (water storage tanks)
- Watering hoses
- Pressure pipes
- Tank stands
- Power generating set.
Operational Inputs/equipment Supplied

- Training;
- Seeds;
- Fertilizers;
- Agro-chemicals;
- Wheel barrows & machetes, etc.
Water management practice

- Water was pumped from the river to the tanks as the need arose,
- Reticulation: Water was piped to locations in the farm. Water channeled from taps through hoses for watering of crops
- Watering was done twice in a day: morning & evening by farmers.
The Impact Study

- Two of the six projects were selected for impact evaluation:
  1. Akai Effiwat Small Irrigation project, Cross River state

- Objective: To assess impacts small irrigation on Crop outputs, income, productivity & farmers’ welfare.
Research Methodology

- **Data Collection methods:**
  1. Administration of structured questionnaire
  2. Focus Group Discussion

- **Data Analysis**
  1. Descriptive Statistics:
  2. Regression Analysis

\[ Q = f(X_1, X_2, X_3, X_4, X_5, X_6) \]
\[ \ln Q = b_0 + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + b_6 \ln X_6 + \mu_i; \]

- \( \ln \) = natural log, \( b_0 \) = intercept, \( b_1 \) - \( b_6 \) are the coefficients of the respective production input and \( \mu = \) stochastic error term to be estimated.
Impacts on Crop Outputs & Income
FGD discussants reported of increase outputs
(i) Leading to more farmers joining the groups: Number of farmers increased from 25 to 50;
(ii) Cultivated land area increased from 3 to 5 hectares;
(iii) 450% rise in income

According to Emmanuel Johnny, Chairman, PMC, Ata Obio Akpa:

Farming is good. We harvest a lot from the farm. People now know this place as vegetables centre. People come from the cities and neighbouring communities to buy from us here in this farm. With the training I received, I am also cultivating vegetables in my compound and my number one customers are the university students who reside in our community. I added fish farm to the farm, but had to stop because of too much pilfering. Proceeds from the farm are enough for my family needs. I don’t regret doing farm business and I will keep expanding it.

Healthy crops and bumper harvest at Ata Obio Akpa
<table>
<thead>
<tr>
<th>Variables</th>
<th>Project participants/Irrigators</th>
<th>Non-Project participants/Non-irrigators</th>
<th>All farmers(pooled data)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-4.646 (-1.869)</td>
<td>3.369 (1.308)</td>
<td>-1.125 (-0.541)</td>
</tr>
<tr>
<td>Planting materials</td>
<td>0.473 (4.859)**</td>
<td>-0.89 (-1.095)</td>
<td>0.50 (0.736)</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>0.665 (3.027)**</td>
<td>1.006 (6.135)**</td>
<td>0.093 (0.309)</td>
</tr>
<tr>
<td>Labour</td>
<td>0.866 (2.116)*</td>
<td>-0.536 (-1.697)</td>
<td>0.559 (4.057)**</td>
</tr>
<tr>
<td>Irrigation water</td>
<td>0.336 (1.928)*</td>
<td>-0.080 (-0.579)</td>
<td>0.745 (4.649)**</td>
</tr>
<tr>
<td>Land</td>
<td>-0.419 (-1.849)*</td>
<td>0.62 (0.229)</td>
<td>0.008 (0.036)</td>
</tr>
<tr>
<td>Agrochemical</td>
<td>0.089 (0.912)</td>
<td>-0.48 (-0.410)</td>
<td>0.001 (0.100)</td>
</tr>
<tr>
<td>Dummy</td>
<td></td>
<td></td>
<td>-0.051 (-0.261)</td>
</tr>
<tr>
<td></td>
<td>Adjusted R² = .655</td>
<td>Adjusted R² = .667</td>
<td>Adjusted R² = .566</td>
</tr>
<tr>
<td></td>
<td>Standard Error =.21398</td>
<td>Standard Error =0.25674</td>
<td>Standard Error =0.31217</td>
</tr>
<tr>
<td></td>
<td>F-ratio =13.001</td>
<td>F-ratio = 14.010</td>
<td>F-ratio = 15.548</td>
</tr>
</tbody>
</table>

*** = sig. @ 1% level  
** = Sig. @ 5% level  
* = Sig. @ 10% level
Impacts on Crop productivity: Productivity Parameters

<table>
<thead>
<tr>
<th>Farm Input</th>
<th>Marginal Product (MPP)</th>
<th>Physical Product (MVP: MPP x Py) (N)</th>
<th>MVP-MFC</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) Project Participants (Irrigators)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planting materials</td>
<td>0.473</td>
<td>331.1</td>
<td>31.1</td>
<td>Productive</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>0.665</td>
<td>465.5</td>
<td>431.5</td>
<td>Productive</td>
</tr>
<tr>
<td>Labour</td>
<td>0.866</td>
<td>606.2</td>
<td>-143.8</td>
<td>Not productive</td>
</tr>
<tr>
<td>Irrigation</td>
<td>0.336</td>
<td>235.2</td>
<td>231.2</td>
<td>Productive</td>
</tr>
<tr>
<td>Land</td>
<td>-0.419</td>
<td>-293.3</td>
<td>-5293.3</td>
<td>Not Productive</td>
</tr>
<tr>
<td>(A) Non-Project participants (Non-Irrigators)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertilizer</td>
<td>1.006</td>
<td>704.2</td>
<td>670.2</td>
<td>Productive</td>
</tr>
<tr>
<td>(A) All Farmers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irrigation</td>
<td>0.559</td>
<td>391.3</td>
<td>387.3</td>
<td>Productive</td>
</tr>
<tr>
<td>Labour</td>
<td>0.745</td>
<td>521.5</td>
<td>-228.5</td>
<td>Not Productive</td>
</tr>
</tbody>
</table>

Marginal Factor Cost: (i) Labour = ₦750; (ii) Irrigation Water = ₦4 (₦100/25litres); (iii) Fertilizer = ₦34/kg (₦850/25kgbag); (iv) Land = ₦5000/plot; Planting materials = ₦300

Unit Output Price (Py): ₦700/kg (in grain equivalent)
Impacts on farmers’ welfare: Household monthly food expenditure

- Per caput monthly expenditure of project participant was₦5165.40 (equivalent of $1.1 dollar per day).

- Per caput food expenditure of non project participant was ₦154.30/day ($0.96/day).

- Going by the assumption that an individual who spends less than a dollar a day lives below the poverty line, it can be inferred that on account of food consumption, irrigation has enhanced the welfare of farmers.

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Average Expenditure(N)</th>
<th>Expenditure per caput (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigators/Project Participants</td>
<td>27,520</td>
<td>5,165.40</td>
</tr>
<tr>
<td>Non-Irrigators/Non-project</td>
<td>22,494</td>
<td>4,629.10</td>
</tr>
</tbody>
</table>

$1.00 = ₦160$
Lesson Learned & Conclusions

- Outputs from wetland agriculture can be enhanced through irrigation.

- Improved outputs, income and welfare of farmers arising from irrigation justify the need to take water to wetland.

- Effective water management in wetlands agriculture can provide a win-win solution to the provision opportunities to secure crop production.
Lesson Learned & Conclusions

- Farmers could not sustain irrigation facilities on their own.
  - (i) Tank stands had broken down with no replacement at Akai Effiwat;
  - (ii) Farmers could not replace malfunctioning generating set after 2 attempts.

- Technology should be adapted to specific wetland environment.

- Farmers require continuous mentoring and training on group management, and maintenance of the facilities.

- Farmers need support to the point where they are economically stable and can run the small irrigation scheme on their own.
References


- The Ramser Convention (1971) Convention on Wetlands of International Importance, Ramser Convention Bureau, Gland, Switzerland